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Research Papers & Articles

Smart Agricultural Robot

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Abstract : This paper represents a technological enhancement in the field of agriculture. Agriculture is an essential part of the country's economy as it gives an outstanding contribution to the country's development. Here we are proposing a wireless agricultural robot that will perform basic operations done in farming activities to reduce the labour size, time, and energy required to perform the different tasks. The concept of an intelligent agricultural robot represents a Wi-Fi-controlled robot that will perform digging mechanisms, seed sowing mechanisms, and water irrigation after sensing the temperature and moisture of the soil.

Keywords : Agricultural robot; Sensors; Smart farming; WiFi Module

1. INTRODUCTION

Agriculture is considered the basis of life for the human species as it is the primary source of food grains and other raw materials. A few years back, farmers used bullocks to perform different agricultural tasks; after some technological advancement, farmers started using tractors for seed sowing operations. Unfortunately, the traditional farming methods are still used by many farmers, which results in low yielding of crops and fruits. Some tasks need to be performed by farmers manually. To reduce workforce and efforts, we are designing an intelligent agricultural robot controlled by farmers using wireless technology, and it will perform basic farming operations. We will work on different parameters like temperature and soil moisture content according to crop requirements. We aim at building a general-purpose robot that will help in performing different operations related to farming. This paper also aims at using a cost-effective technology that will be affordable and easily accessible to the Farmers. This paper also aims at using a cost-effective technology that will be affordable and easily accessible to the farmers. [6]

2. LITERATURE REVIEW

Many systems were developed in past years to provide the best solutions in agriculture, which results in a greater yield of different crops. Nowadays, technology is becoming a great contributor in this field as with its advancement, systems are developed using microcontrollers to perform different tasks like surveillance, fruit picking, and other operations.

A precision agriculture robot for seeding function was being researched in which a robot was developed which helps in sowing seed to specific depth according to crop requirement.

A Smart Farming System Using Sensors for Agricultural Task Automation was developed, which works with different sensors to predict soil moisture and nutrient contents and works as a water irrigator.
Smart farming using IoT system being researched which works with obstacle sensors and other sensors and perform cutting and spraying functions.

A GPS-based autonomous agricultural robot was developed, which uses GPS and magnetometer, performs plowing, leveling, and gives message indication to start the irrigation process.

Table 1: Comparison with other systems

Parameters	Precision robot	Smart Farming using Sensors	Smart Agriculture robot using IOT
Microcontroller	ARM7	Arduino	AVR
Technology used	GSM based	IOT based	Zigbee based
Working	Precise seed sowing operation	Sensing moisture and perform irrigation	Sense temperature, moisture, distance and perform basic operations
Cost	Expensive	Low cost but limited operations	Cost effective
Operations	Perform seed sowing only	Performs irrigation only	Perform irrigation seed sowing and digging

3. METHODOLOGY

In past years many systems were developed which was limited to performing one or two tasks like seeding, water irrigation, and weeding. Those systems were based on wireless technologies like GPS, making the system expensive for farmers. This paper strives to develop a system using inexpensive and light-weighted components, making it low-end and compact. The aim is to provide a cost-effective system for farmers and reduce labor, human resources, noise, and it helps reduce pollution created by tractors these days.

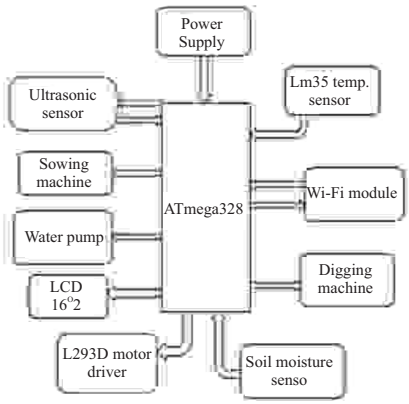

Fig.1: Block Diagram

Fig. Shows the block diagram for the smart agricultural robot, which senses the temperature and soil moisture of the field and performs other agricultural tasks like digging, seed sowing, and water irrigation using a mobile application with the help of a Wi-Fi module.[1]

4. WORKING

In agriculture, parameters like temperature and soil moisture are essential for crop production as these parameters will detect whether a particular crop can be grown in that area or not. The LM35 temperature sensor is used to measure the temperature of the field, and the soil moisture sensor senses the water content of the soil. An ultrasonic sensor is used to detect an obstacle and the fencing of field 50cm beforehand. All these conditions are displayed on 16×2 LCD. When the field conditions are perfect for a particular crop, the user can send a command to the robot using a mobile application connected with the robot through a Wi-Fi module. This module will receive commands from the mobile application and send them to the AVR microcontroller. Then, it will send these commands to other components to perform the desired task.

Table 2: Operations performed

Operations	Task performed
Forward#	Moves robot in forward direction
Backward#	Moves robot in backward direction
Right#	Moves robot in right direction
Left#	Moves robot in left direction
Sow#	Rotates the seed bottle to drop seeds
Up#	Moves digger upward
Down#	Moves digger downward
Pump on#	On water pump
Pump off#	Off water pump
Send status#	Send temperature, moisture content, distance to app
Stop#	Stops movement of robot

This table talks about the operations performed on pressing different keys on a mobile application.

The ATmega328 IC receives input through the Wi-Fi module, and output is obtained at the mechanical parts of a robot. For the forward and backward movement of the robot forward or backward, Dc motors are connected with wheels to move the robot easily on standard and rugged fields. For the digging mechanism, a clipper is connected with the help of a dc motor which will dig soil when a command to perform a digging operation is received using a Wi-Fi module. A bottle with holes is connected to the system using a DC motor to easily drop seeds in soil by rotating the bottle using a dc motor to perform a seed sowing operation. When the user sends a command for seeding operation from a mobile application, the microcontroller will receive the command and send it to the DC motor, which is connected to the seed bottle and make it drop seeds in the soil. To make the soil wet or perform water irrigation, a submersible DC water pump is connected in the system, which will receive command through Wi-Fi to plunge water in the soil, which will help keep the moisture content of the soil as required. An ultrasonic sensor is added to the system, which detects field fencing before 50cm of reaching the fencing. When the sensor detects the fencing, it will get stop and send a message to the user that an obstacle is detected on the user's mobile app.[1]

Fig.1: Agriculture Robot

5. RESULTS AND DISCUSSION

Developing a multipurpose system aims to reduce the time and energy consumed in performing agricultural tasks. This system also aims at making a cost-effective aid that can replace existing systems and help in efficient crop production. This robot will perform basic operations of agriculture efficiently. It will be beneficial for farmers to get a solution to their problems at hand. This system will perform basic agricultural tasks in very little time and help in reducing labour and human resources.

6. ADVANTAGES

I. Reduces the number of laborers required for agricultural activity.
ii. Due to its quick action, time will be saved.
iii. Agribot can able to work in any environmental condition.
iv. The robots can work without sleep, so they can work 24/7/365.
v. Protection against harmful effects of chemicals[1]

7. FUTURE SCOPE

The researchers now focus on different farming operational parameters to design autonomous agricultural vehicles as the conventional farm machineries are crop and topological dependent. For further advancements, we can use solar panels to provide power supply to the system, making the system less dependent on electricity because there are many power cuts in rural areas. We can also add different operations in the robot-like spraying pesticides, cutting weeds, etc. The agricultural robots are designed using different localization techniques: vision, GPS, laser, and sensor-based navigation control systems. In this paper, a comparative study including an overview of the Robotics approach for precision Agriculture in India and worldwide development is explored.

8. CONCLUSION

In the present scenario, all the agricultural machines are working on the manual operation or by a petrol engine or tractor is expensive. Farmers cannot work for a long time manually to avoid this problem. We need to have a power source system to operate the digging machine. A smart agricultural robot is developed to perform basic agriculture tasks, i.e., sensing temperature, sensing moisture content of the soil, digging, seed sowing, and water irrigation. This robot is developed using low-end and accessible components, which makes it cost-effective. An LM35 temperature sensor is used to sense temperature, and for observing the moisture content in the soil, a moisture sensor is used, which helps provide a greater yield of different crops. The technology used in this system is easy to understand, which makes it user-friendly. In this system, a Wi-Fi module is used for serial communication between the AVR microcontroller and mobile application, easily accessible. The design of the robot is less complex and manageable, which proves to be a quick fix to farmer's problems. This robot helps reduce manpower, labor, cost, noise, and it helps in decreasing pollution created by tractors these days. This robot can be a good choice over tractors used now as it is an environmentally friendly system.

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Automated Databases in Industry 4.0

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Abstract: The Automation system has gained tremendous popularity over the past few decades and increases comfort and quality of life. The job of managing an extensive program continues to have a bad reputation. There have been many efforts in recent years to simplify system management. Database automation is a process that automatically updates itself to a database of administrative tasks. The automation of the information and its scale reduces the error of delivery, improves accuracy, and strengthens the implementation rate. There are many IT companies categories have automated functions to reduce their IT functions further. In this paper, a brief survey of the automated information presented and its tools.

Keywords: Database automation, DBA, Automation tools

1. INTRODUCTION

An essential aspect of an entire organization is a database, database resources as well as DBAs. The work of the DBA has always been complex and full of responsibilities. The role of DBA in the organization is more than just dealing with sources of information, and they should be sure of other activities such as data protection, costs, migration, renewal, etc. It does not matter what kind of DBA job it is to do; there will likely be some work that needs to be done over and over again. The level of performance of such general functions may vary, but if these responsibilities are repeated repeatedly, that part becomes boring. Therefore, most of the time can be spent on doing those repetitive tasks. In addition, as the organization grows, the company should maintain several additional data and expand its platforms that continue to increase stress data managers. DBAs must function properly and be accustomed to the unintelligible route that could take an organization forward. However, instead of facing the challenges that may arise, they may spend most of their time doing everyday activities. If this tedious process is made by hand, then it can affect the consistency and accuracy of the output will make internally led to product loss.

Fig 1 DBA Tasks

Automation defines it as a wide range of technologies that limit human intervention in procedures. Individual intervention can be reduced by terms of the decision, sub-system relationships, and installing pre-configured equipment, which is automation itself. Default contains various Control systems for equipment operation with tens of thousands of installation standards and exit control signals. The mathematical foundation of control loop theory began in the 19th grew and developed rapidly by 21. How does the control system work? First, compare the estimated value of the process with the set value and process the lead error that will change other inputs so that the process remains in a safe state. There are two controls types; the open-loop control is independent of the output process. The other is closed process-based controls, also known as response controls; it tends to maintain the fixed relationship of the dynamic system in another by comparison functions and use differences as a means of control.

2. WHAT TO AUTOMATE?

Fig 2 Automation Tasks

Data automation means combining processes and tools to perform data management tasks as simple, safe, and less time-consuming. DBAs will spend less time re-testing updated code and more time for amendment, rating, provisioning, and other functions. Before database automation, engineers need to submit their data documents to the DBA for review certification to ensure compliance with technical, business, and regulatory standards. DB automation can help predict changes to the impact app will be in the database. The DBA can use those predictive reports to identify issues faster than taking days to find them with this information. One of the original automated information was Amazon Web Services' service in the form of Amazon RDS in 2009, followed by Microsoft Azure. Many Automation Tools there in the market for information services.

i. Aqua Data Studio: Changing the management process can be daunting without the right tools. Aqua Data Studio offers an integrated data management interface that efficiently manages multiple platforms' support needs. AquaData Studio provides DBAs with a writing enhancement environment that includes a collection of open interface app. One can take advantage of the application's full functionality when creating, testing, and correct script errors to enable database operations. It gives the team a way to manage their various information from a single connector for Aqua Data Studio Database IDE.

Use a single data tool to manage multiple tasks for multiple data sources

Easily develop, create and share SQL statements

View, sort, and edit query results in grid-like Excel for copy-paste

Create visuals and dashboards to analyze data by drag and drop

Compare files, query results, data, schemas, files, and folders

Recovery of developer information on business relationship images

ii. Selenium : It is an open-source software framework for web applications. Many languages like java, C#, Ruby, Python are supported. Choosing the correct language depends on the application, availability of automation frameworks, usability, etc. It is not a single tool but an entire suite of software taking care of an organization's needs. It has four components: Selenium Integrated Development Environment (IDE), Selenium Remote Control (RC), WebDriver, Selenium Grid. Firstly, Selenium was created by an Engineer at Thought Works, Jason Huggins, in 2004. He was once working on a web application that required frequent testing, and all that repeated tasks make the output inefficient. So, he created a JavaScript program that might automatically control the browser's actions. After seeing the potential in this idea, he then started automating other web applications and made JavaScript Runner, which was later renamed as Selenium Core'. It had same-origin policy issues so, another engineer at Thought Works created a new system.

This system became known as Selenium Remote Control or Selenium1. However, due to security limitations on JavaScript, it was impossible to use it to its full potential. Due to this limitation, Web Driver was created and later merged with Selenium RC, resulting in Selenium 2. In 2016, Selenium 3 was released, which expanded the list of supported browsers. The first beta release of Selenium 4 was announced on February 2021. It not only supports all main OS and browsers, but it is also used in companies such as Netflix, Fitbit, Google, and many more. The entire Selenium suite provides a variety of solutions for various testing problems and requirements.
Some places to start looking for automation attempts are:

1. Server maintenance
2. Database maintenance
3. Database production
4. Quality assurance of Database

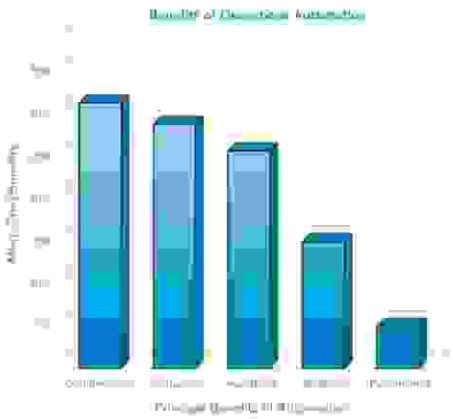

Fig 3 Benefits of Automation

3. JIRA: It is developed by an Australian company Atlassian. This tool is used for bug tracking, issue tracking related to software and mobile apps, and project management. However, the base functionality of JIRA will be available to all. JIRA is based on agile methodology. It is designed to help both beginners and professionals, and the current version of JIRA is 6. There are five valuable aspects provided by JIRA: Projects, Issues, Workflow, Search, and Dashboards. Project is used to manage the defects effectively, and Issue is used to track and manage the defects. Workflow is a set of transitions that an issue goes through its lifecycle. Search helps find the older versions or projects created with ease. When someone logs in, one can see the dashboard and can even create own multiple personal dashboards. Extra gadgets can also be added to dashboards to keep track of all the assignments and issues. JIRA is a handy product for tracking the progress of our documentation and helping to meet the deadlines of a documentation release. Once the deadline is specified, this tool will send the notifications to complete the documentation in time. It also provides the timesheets that display the amount of time spent on documentation.

4. CHALLENGES

Automation introduced into the manufacturing process and all other processes are widely accepted worldwide because of its great benefits. However, automated machines are not suitable for production in almost every context or environment. Automation advantages and disadvantages are therefore a hot topic in these global discussion days. However, here we will acknowledge the problems caused due to Automation. The following problems are faced due to automation:

i) Heavy Capital Investment

Automated applications include the maximum amount of money needed to invest in automation, i.e., millions of dollars to design and install the higher level of maintenance required than using a manual machine and a lower level of flexibility in terms of possible products compared to a manual system.

ii) Worker Displacement

Robots and other technologies deploy workers in all fields, whether related to manufacturing, teaching, banking, medicine, food and beverage, security and safety sectors, IT, etc. An employee whose job is taken over by a machine has a period of emotional stress. In addition to leaving work, an employee may leave his or her place in the area. It can be so stressful for a person to move to find another job. Also, there is a considerable possibility that automation technology will completely take over their jobs in the future.

iii) Loss of Jobs

The main effect of automation of jobs is unemployment. Implementing the non-motorized metro in Delhi has reduced the number of large companies such as Cognizant Infosys and Tech Mahindra, which clearly shows the country's impact. In addition, the impact will vary depending on the country's sectors and analytical groups. Men, youth, and reduced groups will be the ones who suffer the most. In addition to losing an existing job, automation also creates challenges for people transitioning to new jobs, especially when the skills required for new jobs are different from those for old jobs. An example of the truck industry is 27 percent CDL (commercial driver's licenses) drivers who believe that their work could be in jeopardy over the next five years due to self-driving vehicles. It is estimated that 1.7 million drivers may lose their jobs because of it. Moreover, this is about just one industry, and the risk of unemployment is enormous.

5. RACING AGAINST TIME WITH AUTOMATION

Today, automation is employed in most fields due to its great benefits. Automation provides significant advantages in all the fields, and one among those areas is that the pharmaceutical industry. Many pharmaceutical packaging systems adopt automation to handle collation systems, labeling, capping, and bottle orientation. The pharmaceutical industry manufactures millions of tablets every day, which must be carefully looked over and perfectly packed

before being shipped to the distributors. Automation in pharmacy also helps keep the records of fallen bottles, low-level supplies, watch the operation on a supervisory level, check for low-hopper level, etc. Scientists often inhibit the physical testing and checking of individual's genomes without automation and robotics. However, with automation, high screening throughput allows scientists to work out excessive knowledge with little or no manual interaction. It keeps the value low and raises the speed at which the system can analyze gene sequences.

6. CONCLUSION

DBAs face challenges daily, and as the organizations are becoming more dynamic, the responsibilities on their shoulders are increasing. In order to provide quick and efficient solutions, companies need to shift towards automating their database. No one wants to do the same tasks repeatedly and wants to avoid them at all costs. Gravitating towards automating the database will increase productivity, stability, and consistency of the output. It will save up much time to be free to be involved in other activities, adding extra value to the out-turn. When the DBA team focuses more on problem-solving, then the human errors will be reduced, but it will also yield a higher level of job satisfaction, which will be beneficial for both DBAs and the entire company.

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Li-Fi Technology : A Review

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Abstract :One may get baffled at the lethargic velocities when more than one gadget is associated with the organization on the off chance that while utilizing a remote web in a restaurant or going after transmission capacity at a gathering. To address the issue, a German Physicist-Harald Haas, has presented another innovation known as - "information through brightening," which implies the transmission of information through LED lights which shift in forces quicker than the natural eye can follow. As per him, this innovation depends on the power and capability of the light discharging diode. This paper considers the development and working of Li-Fi based framework and contrasts its exhibition and the current remote organization innovations.

Keywords: Li-Fi, Wi-Fi, VLC (Visible light correspondence), LED (Light transmitting diode), RF (Radio Frequency).

1. INTRODUCTION

Li-Fi is a remote correspondence innovation that uses light to communicate information and position between gadgets. We as a whole are reliant on the web straightforwardly or by implication for the satisfaction of our day by day necessities. We utilize the web for an arrangement of purposes, manages among them being sharing of information. We share bunches of information in the present situation, so a great information sharing limit is required. Furthermore, to carry out this, he utilized fibre optics to send information through LED lights. Light balance is not such a new idea, yet Haas is hoping to push things ahead and empower availability through bare LED bulbs. In Li-Fi innovation, we can associate the web with the assistance of a LED shaft in a limited reach. With this innovation, we would have the option to communicate information in any event, utilizing our vehicle headlights. There are different organization geographies, yet new ones are arising as the organization range is expanding. Li-Fi climate Li-Fi is another innovation that utilizes noticeable light for correspondence as opposed to radio waves utilized in different traditional correspondence advances; it alludes to 5G Visible Light Communication frameworks.

In Li-Fi innovation, LED goes about as a medium to rapid correspondence, likewise as Wi-Fi. It can assist with rationing much power by sending information through lights and other such lighting equipment. As the noticeable light cannot be infiltrating through the dividers, it is (Li-Fi) considered a secure method for information transmission. Assuming the LED current is shifted at a high velocity, we can differ the yield at high paces. It is the rule of the Li-Fi. The working of the Li-Fi is highly straightforward if the Driven is ON, the sign communicated is an electronic one, while on the off chance that it is OFF, the sign sent is an advanced 0. By changing the rate at which the LEDs streak, we can encode specific information and communicate it.

Fig. 1. Li-Fi

2. WORKING TECHNOLOGY OF LI-FI

This splendid thought was displayed by Harald Haas, coming from the University of Edinburgh, Great Britain, in his TED Worldwide chat on VLC. The individual clarified, "Extremely straightforward that assuming the LED is on, an advanced '1' is communicated if the LED is off then a computerized '0' is sent. The LEDs can be turned here and there rapidly, which gives incredible open doors for sending information". Along these lines, a couple of LEDs, moreover to a regulator that code data into those LEDs are fundamental. We need to differ the pace at which the LED's glint dependent on the information to be encoded.

Further upgrades might be made in this interaction, including the assortment of LEDs for equal information transmission or utilizing combinations of red, green, and blue LEDs to address the light's recurrence with every recurrence encodes the information of different channels. Such progressions guarantee any hypothetical speed of 10 Gbps – which implies that one can download a whole top notch film in only 30 seconds. However, blazingly quick information rates and draining transmission capacities are typically not the only reasons that offer this innovation a higher hand. Since Li-Fi utilizes only light, it is generally utilized securely in airplanes and medical clinics, which are defenseless to impedance from radio rises. It can even work submerged where Wi-Fi ignores totally, subsequently opening up unlimited freedoms for armed force tasks. Envision just expecting to float under a streetlight to get public web access or download a film from light on a work environment.

Shrewd gadgets are dramatically filling in numbers each year, and the prerequisite for ultra-quick information is additionally unavoidable to help an enormous number of gadgets and applications. Our current remote advancements utilizing radio waves have numerous restrictions because of recurrence, data transfer capacity, and it is profoundly powerless against security. What is Li-Fi innovation, working guidelines, and what are the applications?

Light Fidelity is a high velocity information transmission innovation previously presented by Professor Harald Haas in 2011 during a TED talk. Li-Fi utilizes apparent light as a transmission mode for information correspondence between gadgets.

Apparent light is an ultra-quick electromagnetic wave with limitless transmission capacity to use. Fast exchanging of light cannot be recognized by natural eyes, yet profoundly delicate photodiodes can proficiently distinguish the adjustment of light associate with the indicators. In an advanced transmission framework, information will be changed into double pieces as zeros and comparable to 'on' and 'off' states.

It looked at radio waves utilized in customary remote frameworks. The apparent light has multiple times higher transfer speed. Unlimited transfer speed makes it quite possibly the most productive answer for information concentrated applications. Li-Fi innovation is quick, full duplex and bidirectional correspondence framework fit for information rate up to 224 gigabits each second.

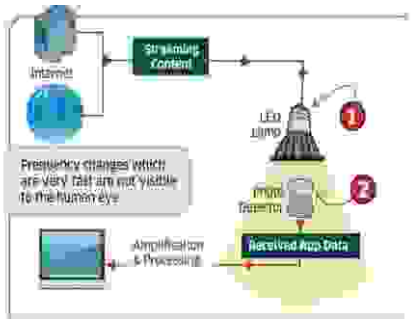

Fig. 2. Working Technology of Li-Fi

The pace of exchanging LED is quicker than the rate that our eye can distinguish, making the light source appear to be on persistently. A flashing light might be inconceivably irritating. However, it has wound up to have its potential gain, which empowers us to utilize light for moment information transmission. Light-discharging diodes found all through traffic and road lighting, vehicle brake lights, controller units alongside endless different applications) can be turned here and there more prominent than the eye can recognize, making the light source is by all accounts on consistently. However, it is really 'blazing.' This vague on-off activity enables a sort of information transmission utilizing unique parallel codes. Data can be encoded inside light by fluctuating the pace; when the LED is fired up, then a consistent '1' is shown, and when the LED is killed, an intelligent '0' is demonstrated. The LEDs glint on and off to give a diverse guitar arrangement of 1s and 0s.

Using fast pulses of delicate to send data remotely is named Visible Light Communication (VLC). Even its capability to handle customary Wi-Fi has propelled the generally utilized portrayal LiFi. An Obvious light correspondence (VLC)- "A likely answer for the worldwide remote range deficiency" Li-Fi (Light Fidelity) is typically a short and modest optical version of Wi-Fi. Its innovation will rely upon Visible Light Communication (VLC). VLC is usually an information correspondence medium that utilizes noticeable light concerning 400 THz (780 nm) notwithstanding 800 THz (375 nm) as optical transporter for data transmission and enlightenment. It uses quick beats of light for correspondence, and the transmission of information is performed remotely. The significant segments of this correspondence framework are

1) A top brilliance white LED, Which goes about similar to a correspondence source and Information transmission utilizing LED The LED brightening can be utilized as correspondence inception by adjusting the LED light while utilizing the information signal more explicitly. 2) A silicon photodiode that demonstrates an incredible response to the undeniable frequency area assumes the part of getting component. Driven can be turned here and there to produce computerized guitar series of 1s and 0s. Data is generally encoded in the light to get another information stream by fluctuating the flashing rate from the LED. As the glinting rate can be so brisk, the LED yield seems steady towards the natural eye. Information rate can even be expanded by equal data transmission utilizing LED clusters any place each LED sends some other data stream. There are inspirations to slant toward LED as the light source in VLC. However, numerous other light devices like bright light, brilliant light, and much more are accessible.

3. COMPARISON BETWEEN LI-FI & WI-FI

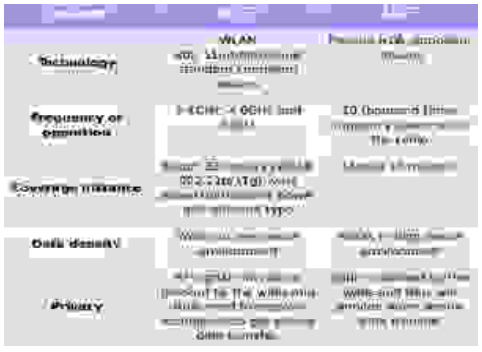

Table 1. Li-fi and Wi-Fi

4. APPLICATIONS OF LI-FI

Health Technologies: Wi-Fi emits radio waves which are very harmful to the patients, and the radio waves interpreting the actual medical instruments. Thus one can use the internet in running rooms with Li-Fi technology. For no longer time now, medical technology would lag behind those other entire wireless worlds. Operating rooms did not facilitate Wi-Fi over radiation concerns, and there was also a complete lack of dedicated selection.

Airlines: In Airlines, passengers concur to pay the additional quantity of cash for the craft's dial-up service. Li-Fi might introduce a "high-speed" transmission service that might be interruption free and differs from alternative wireless signals on the board.

Li-Fi uses light rather than radio frequency signals. Underwater in sea Wi-Fi does not work where Li-Fi will work.

There are around 19 billion bulbs worldwide, and they should be supplanted with LED ones that transmit data. We reckon VLC is at a factor of ten, cheaper than Wi-Fi.

Security is another benefit since light does not penetrate through walls.

Street Light: Cars have semiconductor diode primarily based headlights, semiconductor diode primarily based backlights, and automobile will communicate with one another and stop accidents within the method that they exchange data. The traffic signal will communicate to the automobile than on.

Li-Fi may solve issues such as the shortage of radio frequency bandwidth.

5. ADVANTAGES OF LI-FI

Capacity: As we know, light is a voluntarily accessible form of energy, so most of the portion of the EM spectrum can be covered by it. The spectrum of visible light is 10000 times more than the spectrum of radio waves.

Efficiency: Li-Fi data bits can be transmitted parallelly, which brings about expanding efficiency.

Availability: Light is available in every part of the world, making each work on the internet in airplanes.

Data rate: It is possible to get more than 10Gbps, theoretically permit a top quality motion picture to be downloaded in 30sec. It leads to fast and easy communication.

Cost: Due to the use of LEDs in Li-Fi, its cost is well-organized.

Bandwidth: The principal point of interest of Li-Fi is that its data transfer capacity is 10,000 more than Wi-Fi.

6. RECENT ADVANCEMENT

Li-Fi for smart cities: The simplicity of the li-fi technology using LED lamps to transmit data, including high speed data connections that could be served from street lights, could boost the emergence of intelligent locations.

In the future, topology matters the most: Researchers published worldwide indicate that a future network will be faster, but capacity complications could remain. It further reveals which topology – the cosmetics of transmitters providing the network signal will be increasingly crucial for conference demand in densely populated places.

Reliable communication and improved networking in a Li-Fi network: Li-Fi is a high-speed, bi-directional, and fully networked broadband wireless technology aimed at offloading the present Wi-Fi technology.

Light brings users super-fast wireless internet: Lighting in shop windows, cars, and classrooms can often access the wireless web. Li-Fi could prove to get seven times faster than Wi-Fi and enable to download of a complete HD movie in several seconds.

7. VISION FOR THE TECHNOLOGY

As the world evolves into the era of the internet of things & 5G/6G, the requirement for wireless networks that can meet the never-ending need for data communication is of paramount importance. We believe that much value can be created by assisting in the continued innovation and research in & around the world of LiFi. It can be aimed to evolve LiFi through impactful resources and build futuristic applications in various domains.

8. CONCLUSION

The probabilities are various, and in this way for the investigation should be possible. Suppose his innovation may be placed into common sense use. In that case, each bulb can supply something like a Wi-Fi area of interest to help send remote information, and we will go before toward the arrangement, greener, more secure, and better future. As of now, the idea of Li-Fi is pulling in heaps of interest, not least since it might offer a certified and productive choice to radio-based Wi-Fi. As a developing number of people and their numerous gadgets access the remote web, the wireless transmissions have become progressively obstructed, making it progressively harder to get a legit, high velocity signal. It may address issues like the lack of radii.

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Deep Learning: Overview, Types and Applications

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Abstract: In recent years, the use of Machine Learning has increased the demand of Machine Learning. The Profound learning is a larger amount of problem that is divided into smaller amount. It is known as Neural Network. It is mainly used in Business like driving, defense force, Etc. Deep Learning attain impressive result. Artificial Intelligence is a combination of Machine Learning and Deep Learning. Deep Learning are of three types. ANN, is a group of multiple neurons at each layer. A looping constraint on the hidden layer of ANN turns to RNN. The CNN models are being used across different applications and domains, and they're especially prevalent in image and video processing projects.

Keywords: Deep Learning, Profound Learning, Artificial Neural Network, Convolution Neural Network, Recurrent Neural Network

1. INTRODUCTION

Profound learning is an AI procedure that encourages PCs to do what falls into place without a hitch for people for instance Deep learning is a vital innovation behind driverless vehicles, which helps in identification of stop sign, or to recognize a person on foot. This technology can be used in voice control in smart gadgets like telephones, laptops, tablets and Tv's without using any hand speakers. Profound learning is getting huge consideration in recent time. This technology is able to achieve some results which were unrealistic and not possible previously, which are time consuming and complex for human execution. Different models are being prepared by utilizing marked information and neural organization structures containing several different layers. Figure 1 shows the network of deep learning [1]. Most profound learning strategies utilize neural organization designs, which is the reason profound learning models are frequently alluded to as profound neural organization. The expression "profound" generally alludes to the quantity of covered up layers in the neural network. Traditional neural organizations just contain 2-3 secret layers, while profound organizations can have upwards of 150. Profound learning models are prepared by utilizing huge arrangements of named information and neural organization structures that gain includes straightforwardly from the information without the requirement for manual component extraction.

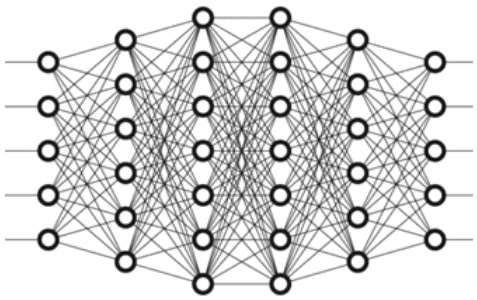

Figure 1: Deep Learning Network

2. TYPES OF DEEP LEARNING

A. Artificial Neural Networks (ANN)

ANN is a data preparing world view that is propelled by the method of Biological Nervous System. It is designed for explicit Application like Information Classification and Recognition [2]. Figure 2 shows the input, hidden and output layers of artificial neural network.

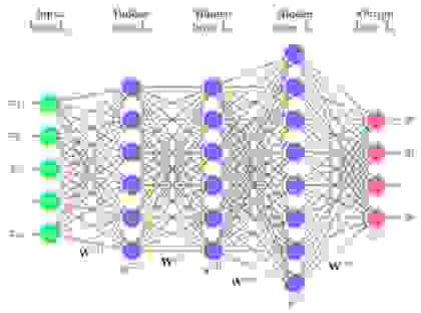

Figure 2: Input, Hidden and Output Layers of ANN

Characteristics of Artificial Neural Networks:

- Neutrally executed Mathematical Models.
- Colossal no. of interconnected Processing components called Neurons for handling.
- Info signals show up at preparing components through association and associated weighted.

Advantages of Artificial Neural Networks:

- Capacity to learn and Model non-straight and complex relationship.
- Simple Generalization.
- No Restriction on input variable.

B. Convolution Neural Networks (CNN)

They are widely used in Images Recognition, Images Classification etc. It is a Binary Form in visual data. Figure 3 shows the convolution neural networks [3]. They are of three types of layers:

1. Convolution Layer It is a Core Building Block. It is the important Portion. It Perform a dot product between two metrics.

2. Pooling Layer It replaces the output of the network. It is reduced the Spatial size. It is process on every slice to represent individually.

3. Fully Connected Layer It help the map represent between the input and output.

Figure 3: Convolution Neural Networks

Characteristics of Convolution Neural Networks:

- 3D volumes of Neurons.
- The layers of a CNN are organized in 3 layers i.e : Width, Stature and Profundity.
- Where Every Neuron inside a Convolutional layer is associated with just a little area of the layer before it, called an open field.

Advantages of Convolution Neural Networks:

- It find the features without human intervention and it is very accurate as well.

C. Recurrent Neural Networks (RNN)

In RNN previous outputs are taken as input in current step. It is useful when it is required to predict next word of sentence [4]. Sequence remembers some Information about sequence. Hidden Layer remembers information about Sequence. It has a memory that remembers all the information about what has been calculated. It reduces Complexity of Parameters. Figure 4 shows the RNN.

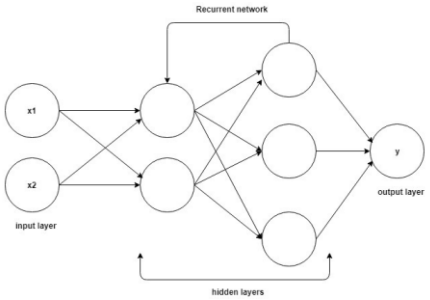

Figure 4: Recurrent Neural Networks

Characteristics of Recurrent Neural Networks:

- An RNN remembers each and every Information through time.
- It is beneficial in time series prediction.
- It is named as Long Short-Term Memory.
- It is useful in Convolutional layers.

Advantages of Recurrent Neural Networks:

- It is very useful in Time Series Prediction.
- It is used to External Pixel Neighborhood.

3. APPLICATIONS

A. Deep Learning at Work

Profound learning applications are utilized in businesses from robotized heading to clinical gadgets. Robotized Driving: Automotive scientists are utilizing profound figuring out how to naturally recognize articles, for example, stop signs and traffic signals [5].

What's more, profound learning is utilized to identify people on foot, which helps decline mishaps. Aviation and Defence: Deep learning is utilized to recognize objects from satellites that find regions of premium, and distinguish protected or dangerous zones for troops [6].

B. Deep Learning Attain Impressive Results
In a word, accuracy. It achieves accurate at highest. This is widely used to help consumers meet users electronics expectations. It is very crucial for safety in applications like driverless cars [7]. Deep Learning have improved a lot due to advancement in research and technology in this field. In some cases deep learning outperforms human like classifying objects in Images. Deep learning was first theorized in the 1980s, there are some main reasons it has recently become so useful:

1) Deep learning requires large amounts of labeled data for classification. For example, driverless car development requires millions of images and thousands of hours of video to work properly.

2) It requires considerable amount of computing power like High-performance GPUs which have a parallel architecture that is efficient for deep learning. When it is combined with clusters or cloud computing, this helps development teams to reduce training time for a deep learning network from weeks to hours or less [8].

4. DEEP LEARNING, MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE

Deep Learning: The Subset of Machine Learning composed of Algorithms that permit Software to train itself to perform tasks. Deep learning is a subset of Artificial Intelligence that imitates or function like the workings of the human brain by processing data and creating patterns for use in decision making [9]. Deep learning is a subset machine learning in artificial intelligence that contain networks that are capable of learning unsupervised from of data that is unstructured or unlabeled It is also referred as deep neural learning or deep neural network.

Machine Learning: A subset of Artificial Intelligence that includes abstruse Statistical techniques that enable machines to improve at tasks with experience. Machine Learning is the part of AI which is based on the idea that system can learn from data, pattern itself with minimal human intervention [10]. It is one of the advance technologies that one would have over come across. As the name suggests the machine or computer perform or work in such a way that makes it more like humans . Figure 5 shows machine learning and deep learning.

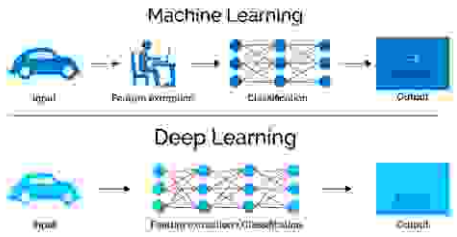

Figure 5: Machine Learning vs Deep Learning

Artificial Intelligence: Any Technique that enabler Computers to mimic Human Intelligence, using logic, if then rules, Decision Trees and Machine Learning [11]. Artificial intelligence (AI) refers to the decision making of machine just like human intelligence. These machines are programmed to think like humans and mimic their actions. The term can be used to any machine that shows features associated with a human mind such as learning from past experience and problem-solving.

5. CONCLUSION

A new technology called "Deep Learning" arose and applied complex Neural Network architectures that is capable of solving a problem more accurately than ever before. The results of this function of artificial intelligence are undeniably incredible and accurate. With the help of Deep Learning computers can now recognize objects in images and videos and can transcribe speech to text better as well as accurately and precisely than humans can.

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Wearable Technology

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Abstract: Wearable technology offers many opportunities which trigger the thoughts and imaginations of people of all fields. In this age of technology, the dependence on computers and other interfaces required them to be omnipresent. This requirement paved the way for the event of wearable technology. Wearable devices have evolved from purely mechanical devices to intelligent mechatronic systems thanks to the continuous advance of technology integrating sensors, actuators, novel materials, computation, and above all, sensory feedback. Wearable technology consists of all types of devices, materials, and components that will not be considered a part of ordinary clothing but instead are high-tech additions or modifications to clothing. It ranges from clothing details designed for a selected purpose to computers carried and used while wearing them.

In this paper, wearable computing applications are reviewed, from the first aircraft maintenance and military designs to current production models, including designs for private entertainment, communication, and health monitoring. This paper also highlights the scope and market of wearable technology in India and how it can bring revolutionary changes to our country. Finally, the hurdles presented by these applications are identified and discussed.

Keywords: Artificial Intelligence, Internet of Things, Wearable Technology

1. INTRODUCTION

How could technology be wearable, or how could a wearable be technological? Wearable technologies or wearable devices are electronic devices or gadgets that can be comfortably worn as accessories or clothing or can even be tattooed on the skin, thus embedded in the user's body, making them hands-free. This human-computer interaction enables users to access information online or to communicate with others conveniently in no time. Hence they are always in control of the user, ready to use at any time anywhere. Discussion about Wearable technology introduces us to a new term, "Internet of Things", yet not so different term, since Wearable devices are considered as the heart of "Internet of Things "and therefore, the adoption of wearable devices has placed them at the vanguard of the Internet of Things.

How do these wearable devices differ from handheld devices, like mobile phones or laptop computers, except being worn? In this generation of "smart "devices, wearable devices or wearables hold the first place, among which the famous examples are Google Glass and fitness trackers. Wearable devices perform numerous similar tasks as handheld devices. However, wearable technology provides sensory, scanning, and monitoring features and other functionalities like collecting and analyzing real-time personal data related to health, workout, or safety and notifying us.

Wearable devices have embedded sensors and scanners to gather the required data. The devices then process the data with the embedded miniature microprocessors to analyze it, gain valuable information from it, and pass it over to the user in electrical signals. Thus, there is an automated and constant transfer of signals between users and wearable computers. Like handheld devices, wearables are powered by wireless communication and an internet connection for high-speed data transfer. In addition, the growth of mobile networks enabled wearable technology, which eases mobility and connectivity for users.

Wearables are also known as fashion electronics since they have a modest shape and have become a fashion for those users who want to go pace with technology. Secondly, intelligent devices do not make them less competent in this savvy generation and help them live better, modern, and healthy lifestyles.

2. FEATURES

i. Convenient

Since the customer drives the market, if any new technological product comes into the market, it must be easy to use/user friendly for its customers to become successful. Here, wearable devices are convenient for scientific purposes and non-technical users, making them more popular and demanding because they are easy to use besides perfectly serving their purposes.

ii. Consistency

Unlike the handheld devices like laptops, mobile phones, which have to be turned on before using them, the wearables are continuously active to collect and send data and monitor purposes. Hence, the signals flow between humans and computers consistently.

iii. Fast Processing

Wearable computers provide faster data processing which enables users to get results in no time.

iv. Unique data gathering for every individual

Wearable devices offer a gathering of personalized data based on the user's activities, environment, or health and provide results. So it enables individuals to self -monitor themselves, their activities, health, etc., and thus help them live a better lifestyle.

v. Hands Free Monitoring

Besides being easy to use and providing numerous functionalities, wearable computers are hands free and thus, are unrestrictive enabl

i. Always on

It is leading to low power consumption, instant wake & background working sensing.

ii. Mobile app ecosystem

The wearable computing revolution twines in with the present reigning mobile revolution, having the proper applications. The wearable device app ecosystem comprises applications that deliver an augmented reality experience.

3. APPLICATIONS

Wearable technology has applications residing in medical, Military, Gaming, Fitness, Entertainment, Education, Scientific Research, and many more in today's world. So basically, it seems like wearable technology has spread its aura in almost all fields.

Years ago, before coming to the market for consumers, wearable technology had applications in the military and was used for scientific purposes only. However, with the technological development and passage of time, wearable devices began placing their position in different fields, among which the most important and successful one was healthcare.

i. Augmented memory

The Remembrance Agents (RAs) are wearable devices that continuously remind the wearer of potentially relevant information based on the wearer's current physical and virtual context. RAs are always active and dealing, rather than being 'worker up' when needed.

ii. Navigation

Today, GPS has been incorporated into various devices and systems to discover or track fitness purposes. As a result, some of the most straightforward outdoor companies are now looking to supply a good GPS application that benefits many worldwide. GPS devices have many significant advantages, including that many can be very small, handheld, and portable, making it easier to follow the progress or find the position with a few taps on the wrist.

iii. Infotainment

The significant products within infotainment include smartwatches, augmented reality (AR) and computer game (VR) headsets, multimedia players with computing facilities, and smart goggles. The use of AR and VR in entertainment and video gaming would help the wearable technology market grow since the demand for wearables for gaming and entertainment is increasing and have become much popular among customers, especially gamers. Furthermore, by having sensing capabilities, wearables can track users' motions and gestures, providing gamers with a perfect interactive gaming experience.ng users to perform multitasking.

Fig. 1 wearable tech in infotainment

iv. Fitness, wellness

One of the core reasons for wearables in healthcare is to transmit information for medical support from a licensed professional. However, there is also a marketplace for quantified self in healthcare, which refers to incorporating technology into data acquisition on aspects of an individual's lifestyle. It enables a roll in the hay (DIY) tool for consumers to self-monitor and self-report essential wellness items like vital signs. The alternative is to permit medical data to transmit to a trusted entity.

Fig. 2 Wearable tech in health & fitness

Wearable devices for medical, wellness, and fitness purposes are many and varied, consisting of varied form factors counting on the aim and placement of the physical body. Wearable devices are often worn and integrated into apparel to subside intrusive. Sensors (biomechanical, motion, etc.) could also be placed at specific parts of the body to speak with an overall Body Area Network system.

Machine-to-Machine (M2M) communication enables wearable healthcare devices to speak autonomously with monitoring systems for both real-time deciding and data gathering for future analysis. In addition, secure M2M enabled data transport and IoT system connectivity facilitate the mixing of healthcare info with data analytics solutions.

v. Sports

Wearable sports technologies are getting used to watching training, in-game performance, and recovery after an injury. Developments during this rapidly expanding technological niche are letting team administrators, coaches, trainers, and players excel in their sport while reducing injury and sports related illness at an equivalent time.

Fig. 3 Wearable tech in Sports

This technology was among the primary to permit coaches real-time monitoring of every player's biometrics for signs of exhaustion or injury while on the sector.

Professional athletes see the advantages of those technologies for enhancing athletic performance and reaching their personal best. In addition, these new technologies also are revolutionizing sports by reducing the potential of sports related injuries like damaged tendons, exhaustion, and concussion.

vi. Military

Knowingly or unknowingly, 'wearable technologies' have already become a neighborhood of military life. For example, walkie-Talkie units and night-sight goggles employed by the militaries for long might be considered 'wearable technologies. Also, particularly with the arrival of mini-portable computers and mobile telephony, the soldiers' connectivity and the soldiers have improved significantly. Today, the soldier might be equipped with wristwatches, armed bands, modified headgears, goggles, or fingerings with tiny sensors designed for specific purposes.

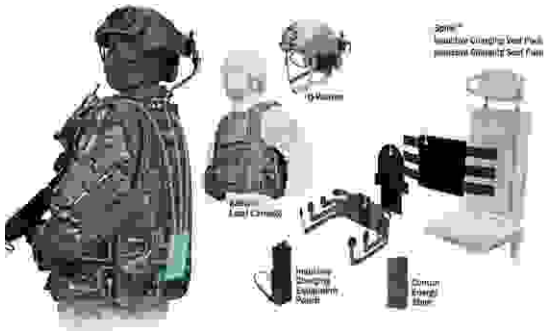

Fig. 4 Wearable tech in military & equipments

Soldiers get timely information which assists them in the furtherance of their campaign. Both operational and strategic levels such technologies could make a broader impact and offer solutions to the varied battlefield and other related necessities.

vii. Industrial

It is difficult to imagine an industry without technology, from the primary automated assembly line to the creation of Artificial Intelligence; we have seen technology and industry evolve.

Wearable technology is touted together as one of the best applications, fundamentally changing industrial relationships with data and knowledge and the way they access it.

Fig. 5 Wearable tech in industries

The quick and accurate availability of complex information to the workers within the field, office workplace, or during a non-office workplace has been critical to several organizations since the establishment of computerized records in the 1950s. Many workers used one or both hands while completing their tasks and maintained eye contact while considering the protection aspect.

One of the key drivers boosting wearable technologies in the industry, particularly within the present climate, is organizations' ability to reinforce productivity and efficiency without harming safety.

Wearable devices can help improve safety while enhancing the productivity and connectivity of workers within the field by delivering data, documents, and applications in real-time.

Rapid technology development has meant a various and growing range of wearable devices for organizations to know and explore. Wearable devices are making their way into our work environments at a growing pace, from smart glasses embedded with optical data capture and voice recognition technologies to smart safety vests deployed at construction sites to trace and alert field workers when entering pre-defined hazard zones,

viii Diet management

It would combine an in-body sensor that would measure key nutritional parameters about the user with a cloud-based service that would analyze those parameters to supply feedback to the user about what they should be eating.

If it were possible for an in-body sensor to send a semi-real time report into the cloud about the user's diet – because it could measure those key parameters directly – then the user could prefer to make this data available to a 3rd party service provider for analysis.

ix. Communication Management

This application comes with speech recognition technology. Wearables can recognize user speech and convert them into text with the least amount of errors to write messages and emails, thus acting as an assistant, managing our communications. It is something that makes wearables handier and comfortable for users since voice comes naturally to humans and is used by them daily. This voice based interface is more accessible, more straightforward, and faster to access. It is much beneficial to even physically and visually impaired people.

4. RELEVANT TECHNOLOGIES

Wearable technology is an adaptation or combination of various technologies that make it up, among which some of are:

i. Big Data

Wearable devices are data driven systems. When using wearables, Individuals expect results according to their likes and needs. It is where the Recommendation System comes into play for increasing the reliability of wearables. For the same, every user becomes a data generator. Data is being continuously generated, collected, and analyzed to understand user behavior and choices to predict future needs and choices. Thus, with constant monitoring, these devices collect much data through user input and sensors. Also, the popularity and users of wearable devices are increasing with time, so analysis and exploration of such massive data call for Big Data solutions to analyze this amount of data. The fig.6 shows how big data is involved in wearable tech & functions along it.

Fig. 6 Big Data wearable technology cycle

ii. Cloud Computing

Cloud Computing is fuel or a driving force for wearable technology. Without Cloud Computing, wearable technology would not be possible. With advancements in Cloud Computing, Wearable technology is expected to progress and grow more. So what exactly Cloud Computing does? Cloud computing means computing on the Internet, and connecting to the cloud means connecting to the Internet. Cloud computing technology allows us to store our personal information securely on the cloud, and we can access it conveniently through any device across the Internet. It has become easier with advancements in wireless technology since wearable devices generate a lot of personal data. The device stores this data on the cloud and provides convenience to its users. The fig. 7 displays the various cloud computing characteristics which could be beneficial to wearable tech.

Fig. 7 Cloud Characteristics

iii. Artificial Intelligence

Artificial Intelligence has made wearables a more competent and reliable option as the term "Artificial Intelligence" implies the ability of a machine to act and behave like a human. So similarly, when artificial intelligence is incorporated into the wearables, the wearables behave like actual human assistants. However, their assistance is not limited. They could assist us in various ways and that too without the time restrictions.

With AI technology embedded, the wearables become smart enough to understand their users, needs, preferences, behavior, and mood based on the experience gathered from collecting data. As a result, the devices can predict choices for individuals with a good percentage of accuracy, notifying them of their important events. Not only this, the speech recognition feature allows users to interact with wearables like that with a human and so getting voice responses.

Fig. 8 Impact of AI in Wearable technology

For visually impaired users, recognizing the paths, buildings across the city with pattern recognition just like sighted humans recognize could assist them with moving directions with voices cues, alerting them if there is any risk around them by analyzing their environmental conditions.

So with getting human-like guidance and assistance relating to our preferences, events, fitness, health, safety, traveling, and a lot more, AI embedded Wearables have increased the user experience to the next level and helped them attain their goals more efficiently.

iv. Internet of Things

IoT-enabled wearables devices can be worn as external accessories, embedded in clothing, implanted in the body, or maybe tattooed on the skin. These devices can be connected to the Internet to interchange the information used for intelligent decision making. These wearable devices are becoming an increasingly crucial part of IoT technology, and their development is growing from being simple accessories to more specialized, compact, and practical. Wearable devices can interact with various other devices, such as smartphones, for communication, processing information & decision making. The use of smart wearables can bring efficiency and optimization to applications, enhance the quality of life & safety and increase productivity. Fig. 8 represents the processing of IoT tech & devices integrated with wearable technology.

For visually impaired users, recognizing the paths, buildings across the city with pattern recognition just like sighted humans recognize could assist them with moving directions with voices cues, alerting them if there is any risk around them by analyzing their environmental conditions.
So with getting human-like guidance and assistance relating to our preferences, events, fitness, health, safety, traveling, and a lot more, AI embedded Wearables have increased the user experience to the next level and helped them attain their goals more efficiently.

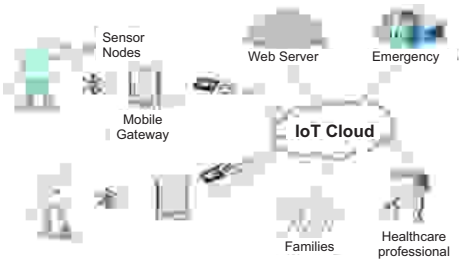

Fig. 9 IOT processing integrated with wearable technology.

Wearable devices help IoT to achieve their purposes fully. In various ways, wearable IoT devices are of great use, like monitoring a patient's health remotely by their doctor or monitoring an athlete's performance by their coach or controlling home appliances by wearables automatically based on user's preferences and needs like wearables controlling AC temperature by monitoring user's health or adjusting room lights based on user's mood, etc.

5. ADVANTAGES

i. Consistent

There is always a continuing interaction between the pc and the user; hence there is no need to turn it ON or OFF, improving consistency of data flow between the interconnected devices.

ii. Health & Fitness

One of the foremost known advantages of wearable devices is therein they assist in residing a lively lifestyle. For example, A person using the Play FIT smartwatch had helped him lose a few extra inches around the belly for the last few months. It has a sedentary alert which keeps him active all day. Packed with a powerful activity tracker, it constantly motivates him to work out more every day.

iii. Responsive

Due to small in size and compact thus providing a specific kind of service increases data processing, enabling users to get results in no time and increases user productivity.

iv. Internet of Things (IoT)

Wearable technology no helps in controlling IOT devices like TV, radio, speakers, lights, and even heating during home can now be controlled with wearable technology, which connects these devices through the web. It is not that great to form our life easier.

v. Enhance Efficiency at Work

One of the best advantages of wearable technology is that it can increase efficiency at work. The hands-free nature can make employees more efficient as they can have information readily available on their devices without asking their computer.

vi. Multi-Tasking

Wearable computers provide computational support even when the user's hands, voice, eyes, or attention is actively engaged with the other physical activities. Other than its very efficient in recognizing a person in a high alert area, it can be manipulated to complete daily tasks of the wearer tracking his/her daily habits.

vii. Increased worker awareness

Supply chain workers will experience a change with wearable devices wherever they are. From the loading docks, warehouse floor, production line, or any demanding setting, wearables will heighten the extent of any employees' environmental awareness. Wearable devices assembled with soft and pliable rubber straps are designed for employee satisfaction – discomfort will not become a distraction. By being highly engaged with their surroundings, questions of safety, accidents, and replacement costs are often avoided.

6. DISADVANTAGES

i. Expensive

Wearables could appear cool to most, but the bulk of studies show that customers still find wearable technology too expensive. For example, Apple Watch starts from $349, pair of wireless earbuds $249, and a connected shirt $300. Indeed the value of buying wearable technology seems to be more of a luxury instead of a necessity currently.

ii. Battery

It sure gets annoying when somebody is heading out

for jog, office, commute, and then come to notice that they forgot to charge smartwatch, smart band, or earbuds. Battery life is also a critical issue when it involves wearables hitting the mass markets. Most wearable batteries do not last a sufficient amount of time and should still be charged on an almost near-daily basis. It is also one of the foremost problematic aspects for wearable developers because battery life does not develop at the identical rate as other technologies. Remembering to charge the smartphone daily can be a hassle because one has to remember to charge everything else!

iii. Security

If left unattended, wearable technology can cause several security issues as it can be hacked easily. Wearable devices are connected to their company's server to enable easy data flow, information & communication between people out in the field and their counterparts in the office. However, if not taken care of and monitored, then the external source can use this information to either steal the company's data or personal information.

iv. Health Risks

Like smartphones, tablets, and other devices, wearables also emit radio waves that affect the human body's tissues. However, since wearables are much closer to the user's body and for much time, they pose pretty serious health risks for the individuals wearing them as massive exposure to these rays could lead to cancer. So ironically, wearables could be used for monitoring health while significantly degrading it.

v. Distractive

Wearable devices have numerous features to offer to their users, like chatting, accessing social media, playing games, and doing more fun and entertainment. Secondly, their small size and wearability are handy and easily accessible anytime, anywhere. So all these provide enough reasons for students and employees to distracting from their works or goals.

vi. Not stand-alone

Wearable technology is generally linked to separate standing smart devices due to their smaller processor in size and compactness. For example, think of the fitness tracker, which must be synced and connected with a corresponding app on a Smartphone, tablet. However, again, this may lead to further expense for a business owner if they have to provide it to their employees.

vii. Discomfort : Wearable devices sometimes tend to irritate the user at the time of hot and humid weather conditions because wearable components emit heat and radiation despite the cooling technology inbuilt that only some premium devices include. It also results in health hazards such as headaches and vexation.

3. THE APPROACH FROM WEARABLES FOR SUSTAINABILITY TO ENHANCE THE QUALITY OF HUMAN LIFE

Recently, users, researchers, and developers have realized that future wearable technology should evolve from its current state from only collecting simple physical activities, biometric data, and processing them. Furthermore, several researchers and developers' anticipation that wearable devices would improve the quality & standard of life but influence all aspects of life have been realized today. Therefore, the current wearable domain has attempted to improve the quality of life from sustainability viewpoints and adopt human-centered wearable devices, applications, and services for public social interest, safety, and guidance beyond the concept of measuring physical body or environmental states. At the same time, tracking and monitoring outcome data about various events which are changing over time, as mentioned previously. The following model can explain this approach of viewing the growth of wearable tech, which is based on the social ecological model.

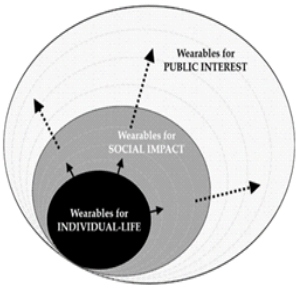

Fig. 10 The social ecological model

4. WEARABLE TECH IN INDIA

· The increasing and rising demands of wearable technology have become quite a necessity for all of us. Most people in our surroundings wear some fitness tracker, health watch, heartbeat or blood pressure calculator, etc. In a country like India, which has a vast range of social, economic, cultural, regional, geographical, climatic, and political diversities, and above all having second ranking in the world in terms

of population count, wearable tech has a massive scope. It has a large umbrella of applications, devices under its fold. It has a considerable market calling and can make a mass appeal to attract many customers and businesses due to its wide range of applications.

· The rate at which users adopt a new technology product is directly proportional to the relative advantage they feel that the product with its set of attributes offers to them. In India's current scenario, the technology sector has immensely boomed up in the past two decades, thanks to the vast range of customers & their needs bring new possibilities and advancement to the growth in all possible forms of tech currently available in India. As talking about wearable technology, India was the only country in the top 20 to see triple-digit growth in wearables in 2020 as per the report and continues to be the third-largest wearables market globally, thus signifying the positive trends in India for wearable technology.

· As nowadays, Safety in India has been a rising concern. Several wearables are available in the market that could be used to communicate and provide location information of the user. It is beneficial for women's safety who, when in danger, can inform her near ones and hence call help and send their location with just a click of the button. Moreover, parents who leave their children in daycare, play-school or crèche can constantly monitor their activity and ensure their wellbeing & health.

· Indian industries may experience a boom in production by using wearables, which will help in more accessible and better manufacturing processes besides providing safety and comfort, thus improving labor quality and production efficiency. Industrial applications of Wearable Technology include heads-up displays, smart glasses and smart protective gears in production lines, hand-worn terminals in logistics and warehousing, and smart clothing to track user location and detect industrial gases.

· Wearables have been one of the rapidly growing markets in India. According to a research firm International Data Corporation (IDC) report, the Indian wearable market posted a 144.3 percent year-on-year growth in 2020. As a result, shipments in 2020 exited at 36.4 million units. Further, India was the only country in the top 20 to see triple-digit growth in wearables in 2020 and continues to be the third-largest wearables market globally.

· The increasing acceptance majorly drove this growth and the need for wearable earbuds and upgrades to smartwatches from fitness bands, recording their highest annual shipments in 2020. Watches and fitness bands recorded the biggest quarter in India in Q4 2020 as vendors shipped 15.2 million units, resulting in a growth of 198.2 percent year-on-year. Additionally, this was also the first quarter when shipments of smartwatches crossed the one million mark, with shipments reaching 1.3 million units in the quarter. New launches drove the growth from brands like Noise, Realm, Apple, FastTrack, Fitbit, and Amazfit.

5. FUTURE AND MARKET SCOPE

· Wearables are the future of technology, and their popularity will continue to grow, thus having a great scope in the Tech Market. Wearables have a lot to offer to their users and are behind way more to offer. Companies are willing to find other contemporary ways to incorporate wearables in our daily lives by making them more desirable and usable for individuals. Companies are increasingly getting insights into people's needs, experiences, and choices since customers are the market drivers—advancements in technologies like Artificial Intelligence, Big Data, Cloud Computing, and IoT fuel wearable technology.

· Sensors are being improved to improve the inputs to wearable devices. In addition, machine Learning Algorithms are being improvised for more accurate and reliable predictions to fit user's preferences perfectly. We are familiar with wearables tracking our fitness and health that they alert us if there is any inconsistency in our health related data or notify our doctor. However, efforts are being made so that besides monitoring, wearables could provide actionable results to solve those medical problems. For example, there is a device named "Artificial Pancreas" developed for diabetic patients to monitor their blood sugar level and supply insulin when required.

· Electronic Miniaturizing is becoming another major factor for expanding the scope of wearables in the future. They would produce light, small, comfortable, and modest wearables. Currently, plenty of customers perceive wearables as heavy objects not able to wear for much time. Some do not find them going with their outfits, and some want them to be unrecognizable for security purposes. So they are

being made more light and comfortable for increasing their usability. Companies are looking for wearables like rings, bracelets, or necklaces to put them closer to fashion and make them indistinguishable. They could be hidden as a patch or strap or even placed as thin film inside jewelry. Thus, changing their appearances, with not compromising their features, will change their market.

· Another feature that the future wearables will comprise of is Energy Harvesting. Presently because of shorter battery lives, especially of those with greater processing power and internet connectivity. Users have to face the hassle of charging these devices frequently, which is lowering the efficiency of wearables and convenience for customers. So Energy Harvesting would be a perfect solution that will convert users' movements, body heat, or solar energy into power. For, e.g.: - Smart shoes that could be charged while walking or running. This feature would prove to be a game changer for the future market of wearables.

· Furthermore, medical industries are looking forward to taking wearables to the next level by placing them beneath the skin to track medical activities like blood analysis, effects of drugs, and other such vital biological activities. Of course, it would take a long time to come, but it can change severe medical conditions and, thus, could hit the market differently.

· The future of wearables is heading to the authentication application. For instance, wearables are smart enough to automatically unlock our smart doors when arriving home or any such security place where authentication is required. Further future wearables applications include monitoring our moods and emotional levels and providing ways to cheer us up and tackle emotions like depression, stress, frustration, anxiety, and loneliness. For such, wearables need to be intelligent enough like humans to understand human emotions.

· Wearable devices have a vast and endless scope since there is always something new about the technology. So wearable technology will continue to grow more while making the lives of its users more organized, secure, and healthy. Ultimately with all this, there would be a need for new rules, policies, and guidelines to cope with social, ethical, and safety issues regarding wearable computations.

6. CONCLUSION

This paper provides a comprehensive review of wearable technology fields regarding scope, growth, application, features, advantages & disadvantages, tech in India, sustainability that specialize in improving living standards. Concluding the tech, it majorly performs track. It collects human data for user monitoring, context-aware technology that processes and analyzes collected data and provides valuable information & stats to users. The evolution into wearable technology is extended through a mixture of users' physical bodies and the surrounding environment and middleware technology with efficient wearable applications. As research into perception and user modeling through devices carried on the body progresses, new intelligent interfaces will result, which will reduce work and complexity and result in new capabilities. Additionally, this paper discussed the wants and future directions of current sustainable wearable technology

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Starlink : A Constellation for Network

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Abstract: Space X's satellite constellation called Starlink is one of the largest in history and already started the pre-registration of its services. This satellite constellation promises a high speed internet facility with low cost and high availability. In this paper, we have analyzed and summarized the recent advancement in the Starlink project.

Keywords: Starlink, Internet, Satellite, Space and SpaceX

1. WHAT IS STARLINK?

Starlink is a network of satellites that provide internet. It is being built by SpaceX, which is Elon Musk's aerospace company. The satellite network operates at 550km higher than the Earth's surface in low Earth orbit. In contrast to typical web satellites, that area unit positioned abundant higher, at over 35,000km.

Fig.1. Starlink's Logo

The first Space X Starlink project was launched on May 24, 2019, which featured 60 satellites. The company has approved the launch of 12,000 Starlink satellites and has requested the U.S. In addition, the Federal Communications Commission (FCC) has approved the launch of another 30,000 satellites.
Starlink collects small internet satellites closer to the Earth's surface (at an altitude of 550 km) than extensive navigation and communications satellites that operate satellites in a medium earth orbit or geosynchronous orbit of 2,000 km to 35,000 km. Do, which operate beyond 35,000 km. Starlink and other similar satellites are better in latency and interference due to their proximity to the Earth's surface, resulting in better Internet services [1].

2. WHAT'S NEW?

The answer lies in the math. In addition to Starlink, other providers use geostationary satellites to make the internet. Geostationary satellites have an operating range of 35,000 kilometers. When a user sends a signal, waves from the user's board travel to the geostationary satellite. From there, the response returns to the end of the user recipient. Therefore, the total online return trip is 35,000 km + 35,000 km = 70,000 km.

Fig.2. Starlink Constellation In Space

Electric waves travel at the speed of light (about 3, 00,000 km per second). Therefore, the navigation time for satellite internet is 70,000 km / 3, 00,000 km-per-sec = 233 ms. This time is called latency.

The higher the latency, the slower the internet. Although the latency theory is 233 ms, in real life, due to various system delays, this latency is more than 300 ms. Depending on where you live (for example - Guam), this delay can be as high as 1500 ms.

On the other hand, cable internet has latency between 20 ms to 40 ms.. This comparison shows that typical

satellite internet is at least ten times slower than cable internet. There is nothing the geostationary satellite can do to speed up the internet [2].

3. WHAT IS ITS CURRENT STATUS?

Starlink is now bringing the first beta service locally and internationally and will continue to grow closer to the global broadcast of the human population by 2021.

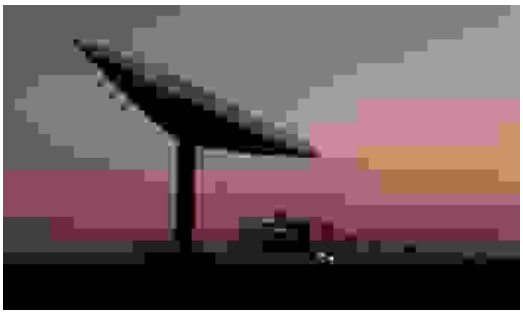

Fig.3. Starlink Setup

Users can expect to see data restrictions during the beta phase vary from 50Mb / s to 150Mb / s and latency from 20ms to 40ms in multiple locations over the next few months as we upgrade the Starlink system. There will be short periods of total disconnection.
With the introduction of satellites, global channels and improve communication software, data speed, delays, and overtime will improve significantly [3].

4. HOW MUCH DOES IT COST?

Starlink internet is more expensive than most traditional internet providers, and the high cost is not only monthly but also when it starts. Therefore, it is advisable for those considering enrolling in a space-based service to consider how much they will contribute financially before placing an order.

SpaceX's StarLink internet system is still in a beta state, and while that beta has been severely restricted in the past, that has changed now. Starlink recently opened the option for anyone in the U.S., Canada, and the U.K. to register their interest in the service and place an order previously. However, unlike previous custom orders, placing one via Starlink does not automatically guarantee access to the Internet service once it is available locally.

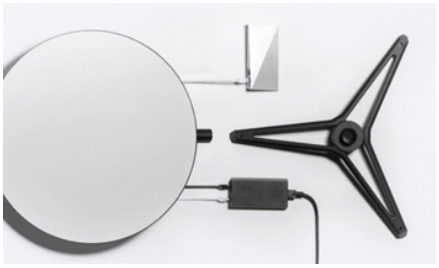

Fig.4. Starlink Accessories

Starlink internet costs $ 99 per month, and SpaceX requires a $ 99 deposit when you place an order for the service. In general, this is higher than online packages from many traditional providers. While some companies charge as much as $ 100 a month and more just for the internet, those services are usually gigabit internet. Starlink plans to offer download speeds of up to 10Gbps in the future, but for now, it does not. As a result, the cost of $ 99 per month is probably more expensive than most U.S. citizens what they need to pay for providers in their area with the same online system.

In addition to the $ 99 per month online cost, Starlink comes with some very high start-up costs. The Starlink kit costs $ 499, and this includes a real Starlink antenna, a Wi-Fi hotspot, power supply, cables, and an ascending tripod. However, that amount does not include shipping or taxes. Depending on the user's location, they should expect to pay up to $ 600 before delivering their Starlink kit. Technically, they can end up paying up to $ 500 when the Starlink Kit is ready for shipping due to the $ 99 deposit paid when it comes to placing the actual order.

All in all, Starlink internet is not the cheapest option around, and Elon Musk has previously suggested that lowering costs could be a problem in the future. Therefore, consumers will want to measure the benefits and limitations of what Starlink offers before placing an order, including the possibility that monthly costs may increase over time. In addition, interested buyers may also want to ensure that they can meet additional requirements that may affect information, such as Starlink's clear view of the sky to ensure the best internet signal[4].

5. WHY STARLINK?

i. Faster Internet

Starlink internet is faster than traditional satellite internet. Starlink is so fast that comparing its speed

with a standard satellite is unreasonable.

ii. Cheap

Cheaper than cable and internet cable in rural and urban areas. Starlink's online price is competitive. In many places, suburban users pay the same amount as their city partners but find the internet slower. For example, in cities, sometimes people pay $ 50- $ 60 for 100/10 internet (100 Mbps down, 10 Mbps up). However, in rural areas, users pay more than $ 100 but only get 10/1 internet (10 Mbps down, 1 Mbps up). At the moment, Starlink charges only $ 99 for unlimited speed.

iii. Starlink is Available Everywhere

Starlink internet is available everywhere, irrespective of geographical location. Starlink covers the whole world, from Antarctica to the ocean. Thousands of terrestrial satellites are orbiting us. So its signal reaches all parts of the world. So whether you live in a remote area, in the middle of the ocean, or the sky, Starlink internet is available.

In contrast, cable internet (for example, Spectrum) is not available everywhere. Except for major cities, their service is limited. The speed of the rural internet is very disappointing and expensive. It also works with mobile internet. Mobile Internet is not very good at using media - like YouTube, Netflix, Hulu.

iv. Easy to Install

The Starlink bowl is easy to install. After order confirmation, SpaceX will send the Starlink package containing the feed, Wi-Fi router, plug-ins (per the specifications), and the required cables. Container installation does not require special knowledge or skills. First, it requires a place from where a clear view of the sky is visible. Next, put in a cold bracket and tighten the Starlink dish, pointing to the sky. After activating it, the meal will re-create itself to have a proper signal. Installation cannot be easier than this.

v. Fast Disaster Recovery

Whenever a disaster strikes a region, it takes days, if not weeks, to restore the internet service. Storms, hurricanes, wildfires, or floods can severely damage an Internet cable. After a severe storm, repairing the ropes is not only expensive but also time-consuming.

However, Starlink internet does not have an internet connection problem due to the global disaster. Starlink internet is available as soon as the sky is clear. It has thousands of primary channels around the world. Even if one base station falls due to bad weather, other low-level channels will provide internet access to Starlink satellites.

vi. Reliable

Starlink provides a reliable internet connection. Typical satellite internet providers only work with geostationary satellites. Due to the high altitude of geosynchronous orbit, their network is unreliable and spotted.

vii. Superior Portability

Starlink internet has better carriers than cable internet. However, although mobile is portable, the service is not available everywhere. Traditional satellite internet is also mobile like Starlink, but it offers low internet speed with high latency and poor service [2].

6. STARLINK IN INDIA

Satellite internet has many opportunities in India. It can bypass local barriers and enable access to internet services in the most remote areas where providing services with a ground cell tower is difficult. According to the World Economic Forum (WEF), as of August 2020, 50% of Indians do not have access to the internet. By comparison, only 14% of U.S. people are offline. However, India has also become one of the fastest-growing markets in terms of new adoption, with an increase in the number of internet users growing by 23% between 2019 and 2020, according to WEF.

SpaceX, led by billionaire Elon Musk, aims to launch its satellite service, Starlink, in India in 2022. The aerospace company's website has listed many places in India where these services will be available first. The Starlink services preview option is available for Indian users on the website for a refund of $ 99 (approximately ₹ 7,265)

SpaceX is not the only satellite operator looking at the Indian market. Under the auspices of Hughes Network Systems, Hughes India recently teamed up with the Indian Space Research Organization (ISRO) to provide internet services to 5,000 remote villages in Eastern Ladakh, Arunachal Pradesh Mizoram, Tripura, and Manipur. The company will use the Indian space agency communication satellites, GSAT-19 and GSAT-11.

Bharti Airtel also plans to launch a fast satellite service by 2022 using OneWeb's LEO constellation satellite. In addition, the telco is in talks with ISRO to build cost-

effective access terminals [5].

7. MORE ABOUT STARLINK

The year is 2020, and about 40% of the world does not yet have full internet access. That is almost 12 times the number of people across the United States of America who are offline. For their large number, the reason is that they do not have access to the necessary infrastructure to access the internet. However, that is about to change with Elon Musks' SpaceX company and their Starlink project.

Starlink is a unique project that aims to put about 2,000 small satellites in their line by the end of 2021 to provide a global network for internet access. The ultimate goal is to find the cheapest internet in all parts of the world. As Starlink provides access and the remaining 40% worldwide comes online, the basic structure of the internet will change [6].

Fig.6. SpaceX Satellite Launching

As the world gains access to the internet, we will see a wave of cultural change in existing digital societies and new digital environments. In addition, an online economic engine will provide new forms of success for billions of people and fundamentally transform the traditional world power.

8. CONCLUSION

Some of the planned mega-constellations will impact the spectators because their proposed satellites are both small and rotate at the top. However, the effects of astronomy may be far more significant. OneWeb Satellites (https://onewebsatellites.com), based in the U.K., is another program currently being launched. In 2020 March 1, OneWeb satellites were deployed; their fixed orbit of operation is approximately 1170 kilometers with 88 degrees. No photometric surveillance of OneWeb satellites has not been reported. OneWeb program can be compared to layer B in my Starlink model, although the higher inclination will lead to different behavior. China has a few low-lying self-organized stars, including Xinhe (1000 proposed satellites), Hongyun (864 proposed satellites) and Hongyan (320 proposed satellites). Each of these functions has launched at least one test satellite so far.

The number of satellites produced in less than 400 miles [600 km] is changing rapidly and is now under control via the Starlink program. Starlink is the first mega-constellation to see an extensive post, but it is impossible to be alone.

Astronomers and casual observers of the night sky have to look forward to the future when the Earth is down. The human orbit encompasses tens of thousands of relatively large satellites (few angles of the arcsecond angular) of the order of 0.01 per degree in zenith that serves as a source of sunlight reflecting ground-based (and other) cases and even space-based views). Thus, effects will be significant for certain types of viewing (e.g.twlight views and long-term recognition through a wide range of perspectives), specific observers (those at the highest level latitude), and at certain times of the year (local summer)

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Data Analytics : A Study of Need & Common Tool

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Abstract: Data Analytics has been widely discussed nowadays as a powerful medium for retrieving great information from data. The growth of technology and its usage by mass has benefitted the data analytics domain to access great patterns to understand better customers' needs, which serves as a significant input to the businesses. Through this paper, we aim to understand the need and type of Data Analytics. Also, we try to brief about the standard tools available and used for the analysis in the current market.

Keywords: R, Excel, Tableau, Python, IBM Watson, MATLAB, SQL.

1. INTRODUCTION

Visualizing our habitat without data storage nowadays has become impossible. Living in the era of fast-growing technology and using online mediums for almost everything has generated gigantic data. Anything ranging from customer names and addresses to products available to purchases made has become essential for day-to-day continuity and has contributed enough to know the customer.

The size, variation, and quick change of such data propose big data analytics as an excellent tool for handling mass data. Due to current innovations in technologies and the internet, the expansion in storage capabilities and data collection methods for enormous data has become readily available.

Every second, more and more data is being created and needs to be stored and analyzed to extract value. Data or information is in raw format. The expansion in the size of the data has led to a rise in the need for carrying out inspection, data cleaning, alteration, and data modeling to gain perceptions from the data to derive inferences for an improved decision-making process [1]. Data Analytics has a crucial role in improving the business as it is used to gather hidden vision, generate reports, perform market analysis, and improve business necessities. Data is fetched from various sources and is cleaned and categorized to analyze various behavioral patterns.

2. TYPES OF DATA ANALYTICS

The types of data analytics are start with the simplest one go further to the more superior types. As the more complex an analysis is, the more value, it brings. Data Analytics can be divided into four key categories.

i. Descriptive Analytics

Descriptive analytics is the most commonly used analytics in business forms because it provides the measures within the business to the analyst. The purpose of this analytics type is to review the findings and to understand.

ii. Diagnostic Analytics

Diagnostic Analytics gives a depth view of a problem characterized by techniques such as drill-down, data discovery, data mining, and correlations. It investigates the cause and what is the effect of situations. It primarily uses probabilities and the allocation of outcomes for the analysis.

iii. Predictive Analytics

Predictive analytics is the most used model across several fields. It uses data and mathematical concepts to show the relationship between data, to predict future outcomes. It is all about forecasting. Whether events are happening in the future, estimating a point on which some events might happen. These things are done by predictive analytics.

iv. Prescriptive Analytics

Prescriptive Analytics uses advanced technologies, like machine learning. It uses a mathematical model to make a set of complex problems from the available data. The best example of analytics is predicting the examination schedule such that no students are having clashing Time-Table.

Fig 1: Types of Data Analytics

3. NEED OF DATA ANALYTICS

The need for data analysis is growing day by day. Data analysis is one of the most significant factors for a company's growth, especially businesses with the following business to customer model (B2C). Data can help the companies better understand and observe their customers, decrease their expenses and improve their content. There are plenty of advantages of data, but one cannot access these benefits without using proper data analytics tools, so one needs to be very précised and sure what tools one will choose to analyze the raw data of the form. Some of the significant advantages of data analytics include: -

i. Better Customer Service

Since the raw data obtained by data analysis reveals information about the customer's preferences, interests, concerns, and more, thus one can tailor and alter the customer services according to their need. Then, customers can be provided with more personalized service, building a good relationship with them.

ii. More Effective and Targeted Marketing

As we have mentioned earlier, Data analysis leads better understand the customers. When one understands their customers better, they can market their services in a more targeted manner. One can even get the information of what type of people are interested in the services, performance of the campaigns, etc., with the help of some of the tools. Thus can run more effective targeted campaigns, improving targeting results in more conversions and less useless ads.

iii. Improved Decision Making

Insights of the data of companies gathered by data analysis can be used to improve the companies' decision-making, which will further lead to better outcomes. Data analytics gives a 360-degree view of the customers, which will eliminate the guesswork factor. Now one can plan what kind of content is required to deliver specific and which products should be developed to achieve more significant results.

4. TOOLS FOR DATA ANALYTICS

Data analytics tools are the software and applications that data analysts use to make better intelligent decisions to decrease costs and increase profits.

i. R Programming

In R Programming, there is a comprehensive environment that facilitates the performance of statistical operations also because of the generation of knowledge analysis in graphical or text format. The commands that a console takes in as input are evaluated and consequently executed. R's data cleaning, data reduction, and data analysis report output with R markdown make this tool a helpful analytical assistant covering general and academic data analysis. R has an in-depth and active community where new technologies and concepts are presented or communicated regularly [2]. The best algorithms for machine learning can be performed with R.

ii. Excel

Spreadsheets are one of the foremost traditional sorts of data analysis. Excel is one of the foremost popular in business. Excel does not need a category on its own since this powerful tool has been within the hands of analysts for an actual while. It is a reasonably versatile data analyst tool to manipulate rows and columns to make the analysis. A wide range of functionalities accompany Excel, from arranging to manipulating, calculating, and evaluating quantitative data to putting together complex equations and using pivot tables, conditional formatting, adding multiple rows, and creating charts and graphs. Excel has positively earned its place in chronic data management.

iii. Tableau

Tableau may be a dominant and fastest-growing data visualization tool utilized in the Business Intelligence

trade. Tableau provides an analytics platform that permits everyone to possess accurate and precedes actionable insights-from the incremental to the transformative. It helps in simplifying data in a very easily understandable and quite attractive format. People from no technical background can access and use this great software which makes tableau even more special. Data analysis is extremely fast with the Tableau tool, and therefore the visualizations created are within the sort of dashboards and worksheets.
Tableau believes in some analytical tools, which are as follows:-

- Analytics must be visual: Immediate Understanding
- Analytics must be powerful: Unhindered Analysis
- Analytics must be accessible: Embedded Analytics

iv. Python
Python is one of the excellent tools for data analysts that have coding acquaintance as well. Python's syntax is relatively comfortable to learn, making this tool widespread among users that look for an open-source resolution or humble coding processes. Python is used for cleaning, data crawling, modeling, and creating analysis algorithms based on business scenarios when it comes to data analysis. User-friendliness is one of the best features that means programmers need not remember the design of the system. Python is considered an advanced language that is not subject to the computer's local processor. It makes Python a highly portable language.

v. IBM Watson
IBM Watson is a supercomputer developed by IBM in 2007. It is based on cognitive computing, stores massive unstructured data. It uses a scoring algorithm so that Watson can rank answers when the ranking of answers is more excellent. Watson put that answer with evidence. It is mainly used in the health care area. With Watson, engineers keep millions of elevators moving, predicting when they will break down and proactively fix those [3]. With Watson, banks are deploying virtual agents trained on thousands of customer inquiries, helping them provide expert service to millions of customers 60% faster.

vi. Mat-Lab
MAT-LAB is a short form of Matrix Laboratory. It is software that permits executing functions like Matrix manipulation, mapping of function and data implementation of the algorithm, and creating user interfacing with programs written in another language like C, C++, JAVA, and Python. It also allows image processing. It is used in applications like embedded systems, Data Analytics, Robotics, Wireless Communication, Computational Finance, Image Processing, And Computer Vision, and many more. It is also used in automotive, Biotech, Electronics, Electrical engineering, financial service, Semiconductors, Aerospace, and Defense.

vii. SQL
SQL is a programming language used to supervise data held in relational databases, particularly effective in handling structured data as a database tool for analysts. It is prevalent within the data science community and one of the analyst tools utilized in various business and data scenarios [4]. SQL may be a highly critical component of succeeding in business, and by learning it, analysts offer a competitive advantage to their skill set. There are different relational (SQL-based) database management systems such as MySQL, MS SQL, and Oracle. For instance, learning these data analysts' tools would prove highly beneficial to any serious analyst. It will allow completing tasks such as creating and viewing databases.

5. DATA ANALYTICS & BUSINESS INTELLIGENCE

i. What Are Business Intelligence and Data Analytics?
Business Intelligence is a set of methodologies, processes, architectures, and technologies that leverage the output of information management processes for analysis, reporting, performance management, and information delivery.
Data Analytics is the method of inspecting data sets to conclude the knowledge they contain, increasingly with specialized systems and software.
ii. Similarities between Business Intelligence and Data Analytics.

Business intelligence and data analytics follow similar processes of collecting data, analyzing it, and providing insights. The data collection is crucial as providing the most precise results will mean ensuring that the knowledge gathered is complete [5]. Both of those terms also engage in reporting. Business Intelligence and Data Analytics also can identify areas

where businesses are failing or, at the smallest amount, not operating at peak efficiency.

iii. Business Intelligence vs. Data Analytics.
While both Business Intelligence and Data Analytics involve using data to get insights that will benefit the organization, there is one significant difference to the touch upon. Business Intelligence deals with the current, while Data Analytics is more focused on the longer term.

A focus of business intelligence is to require data and use it for better decision-making. By utilizing aggregation, visualization, and careful analysis, companies can use business intelligence to realize better efficiency within the organization. Business Intelligence tools are often employed for that very purpose. Data analytics engages in data processing, essentially analyzing a group of data to select out patterns and predict future trends, informing organizations on what they ought to do.

6. APPLICATION: AREA OF DATA ANALYTICS

In today's growing world, the amount of data available increases with businesses and companies being assembled information across their respective industries.

Data analytics gives them an advantage in identifying which areas they need to refine in their services and products. It shows how important is data analytics across organizations. Some of the applications of data analytics are:

i. Security
All over the world, most cities have started working on predictive analysis in predicting areas that witness a surge in crime with the use of geographical and historical data. It is not possible to make arrests for every committed crime. However, due to data availability, it is possible to have police officers in that particular area, leading to a drop in the crime rate.

ii. Transportation
A few years back, when the London Olympics was held. There was a challenge to handle over 18 million journeys made by fans in the city, and thankfully it is sorted out. It was achieved with the help of data analytics. The train operators and teams use data analytics to make sure this significant journey went smoothly. They fetch the data from events that took place and forecast the number of people going to travel, which helps to sort the problems. The government uses data analytics to control traffic, plan the route, and predict traffic conditions.

iii. Energy & Utilities
By using data analytics, intelligent meter readers collect data every 15 minutes compared to old meters, which read once a day. This data is used to analyze better utility consumption, which helps customers improve feedback and better control of utilities use. It also gives an advantage in utility companies for better workforce and management, which is very useful for recognize errors and correcting them very fast before any failure is experienced.

iv. Education
In today's growing world, data analytics are now used in education. It is used to measure teachers' performance and their effectiveness to make sure there is a gratifying experience for both teachers and students. Teachers' performance can be measured against several students, subjects matter, students' behavior, and several other variables.

v. Communications, Media, and Entertainment
Organizations in this industry analyze customer's data so that they create a detailed profile of customers so that they can use to:
- Create content for different targeted spectators.
- Endorse content on demand.

Amazon Prime, which provides a great customer experience by offering video, music also utilizes data analysis.

7. CONCLUSION

In this research, we have examined the innovative topic of data analytics, which has recently gained lots of interest due to its substantial unbelievable benefits. Data analytics can be applied to grow business, change and improve decision making by using advanced analytic techniques to data and gather useful hidden insights and valuable knowledge. In addition to all this, some of the data analytics tools, in particular, were explained. It was found that data analytics can provide multiple options and features in various applications and areas, such as customer understanding, fraud detection. We believe that data analytics is of great importance in this era of data abundance and can provide insights and benefits to decision-makers of organizations.

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Agile Supply Chain Strategy for Competitive Advantage

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Abstract: 21st century has prompted an expansion in worldwide rivalry and client requests, with more elevated levels of disturbance and unpredictability in the commercial center. Organizations, financial matters, and worlds of politics are progressively exposed to surprising stuns and discontinuities. Because of these vulnerabilities, associations today are confronted with various difficulties in the inventory network, which incorporate, among others, the capacity to get together with changes sought after inconstancy, administration upgrades, bringing down inbound expenses, enhancing time conveyance, and more limited client lead times. To endure, organizations need to react to steadily expanding levels of instability sought after and center their endeavors after accomplishing more remarkable nimbleness. Agility can quickly react to changes in market and client requests as the conveyor of an upper hand. Consequently, organizations need to re-plan their store network to handle readiness issues to remain ahead in a profoundly severe worldwide market.

Keywords: Artificial Intelligence, Intelligent Navigation System, Space Exploration

1. INTRODUCTION

i. Motivation

The main objective of this paper is to explore the concept of agile supply chain and determine the link between agile supply chain and competitive advantage.

ii. Problem Definition

The world is in a period of inventory network rivalry, where association no longer demonstrates segregation as an unrestricted substance. However, esteem conveyance frameworks are more receptive to quickly evolving markets, more predictable, and dependable as a production network. The center capacities of an organization lie in its capacity to plan and deal with its inventory network to acquire the most significant benefit in the market where serious powers are evolving. New administrative practices and novel plans of action arise and blur continually as chiefs endeavor to assist their organizations with succeeding less-kind, less delicate, and less unsurprising world. The best word to portray the worldwide market today is unpredictability. Associations need to create methodologies to react to steadily expanding levels of unpredictability popular. The unavoidable issue is: How are production network chiefs adapting to the changing industry climate? What methodology can be carried out to accomplish the upper hand in their store network? Nimbleness can quickly react to changes in the market and client requests as the carrier of the upper hand. Regardless of the conspicuous advantages of readiness, associations are confronted with difficulties in executing the actions essential to building their spryness. The Paper investigates the light-footed inventory network and upper hand and presents a system on the linkage between deft store network and the upper hand. The excess segments of the paper present store network the board, inventory network procedures, an upper hand in the store network, and system for adjusting inventory network and serious methodologies and end.

iii. The objective of the Paper

The main objective of this paper is to explore the concept of agile supply chain and determine the link between agile supply chain and competitive advantage. The 21st century has led to an increase in global competition and customer demands, with higher levels of turbulence and volatility in the marketplace.

2. SUPPLY CHAIN MANAGEMENT

Production network the executives can be characterized as "the plan, and the board of consistent, esteem added measure across hierarchical limits to meet the genuine requirements of the end client. SCM is the administration and control, everything being equal, reserves and related data in the coordination interaction from securing crude materials to the conveyance of completed items to the end client.

Albeit the meanings of SCM vary across creators, it exists altogether authoritative sorts. It can be ordered into three classes: an administration theory, execution of an administration reasoning, and a bunch of executive's measures. Effective SCM requires a change from overseeing singular capacities to coordinating exercises into SCM measures. The SCM measures distinguished by individuals from The Global Supply Chain Forum are client connection the board; client assistance the executives; request the executives; request satisfaction; fabricating stream the executives; provider relationship the board; item advancement and client specialization; and brings the executives back.

3. SUPPLY CHAIN STRATEGIES

A store network methodology is characterized, comparative with its rivals', the arrangement of client needs to fulfill through its items and administrations. The methodology includes choices identifying with the choice of providers, the area of offices, and the decision of conveyance channels. These choices are completely determined by empowering the promoting targets of the association to be accomplished. A run of the mill production network technique should be pointed toward accomplishing a smooth stream at least expense. Production network techniques should be customized to coordinate with the commercial center's required 'request winning rules. Adjusting the association's activities to commercial center necessities has not generally been reached out to the more extensive production network. An association's sourcing system, tasks methodology, and course to-showcase should be suitable for the exact item/economic situation.

The effective nonexclusive techniques in inventory networks are lean and agility. Leanness implies building up a worth stream to dispense with all burn through, including time. To empower a level timetable through Agility implies utilizing market information and a virtual organization to abuse productive freedoms in an unpredictable commercial center.

I. Lean vs. Agile Supply Chain Strategies

The idea of agile stock chains was acquainted with a move and apply the triumphant procedure of agility to that of supply chains. It is a recently acknowledged unit of business. Agility with regards to inventory network the executive's centers around "responsiveness." Existing writing on agility presents it as an overall idea, regularly connected to assembling, as it were. A production network gives a more appropriate setting for evaluating agile capacities. It is far-fetched that any single association will want to create curios with accurately designed customization and enhanced fulfill a specific eminent market interest. Agility recommends participation to improve intensity inside associations. A few creators guarantee that it is hard to appraise agility straightforwardly in the store network. The inventory network is often presented as a zone where the agility idea can be applied to decrease this critical lack.

The vital components of an agile methodology are very much like the components of the agile inventory network. Agility is about client responsiveness, individuals and data, participation inside and among firms, and fitting an organization for change. A production network should have various distinctive attributes: market affectability, virtually, measure coordination, and systems administration to be genuinely agile. With equal advancements in agility and inventory network territories, the board prompted an agile production network presentation. While agility is acknowledged broadly as a triumphant methodology for development, even a reason for endurance in certain business conditions, making agile stockpile chains has become a coherent advance for organizations. Agility in a store network is the capacity of the production network all in all and its individuals to quickly adjust the organization and its activities to dynamic and violent necessities of the clients. The fundamental spotlight is on running organizations in network structures with a sufficient degree of agility to react to changes just as proactively expect changes and look for new arising openings.

With the expansion in rivalry and organizations charming the client, an agile production network has arisen as the new mantra. The individuals who can fulfill client needs are fruitful. With buyer inclinations changing quickly, it became essential to acquire new items at a speed that would put a supersonic to disgrace. However, doesn't this speed go against worldwide stockpile chains that blossom with "best

cost" sourcing? Somewhat indeed, never again is the client able to stand by a quarter of a year to wear her design (garments) made and sent out from a country a great many miles away. Style contemplations presently rule the day: if the item, for instance, a dress, is to be worn, its time is currently, before every other person is wearing it. 'Lean' works best in a high volume, low assortment and unsurprising conditions, though 'Agility' is required in a less unsurprising climate where the interest for assortment is high. Shouldn't something be said about industrial facilities that have been explicitly worked to accomplish economies of scale? Is it accurate to say that they are helping their motivation? Every association (fabricating) that needs to boost economies of scale will strive when that client comes thumping to put requests and needs speedy reaction for its items.

So when should an association seek agility? Everyday items that meet all requirements for this thought are gadgets and design things. These items are sold for their "particular" advance and not actually for the capacity they perform. They have short everyday routine cycles and more limited rack experiences. Interest for these items is hard to conjecture, and stockout rates can be astronomic. In some circumstances, there may exist the requirement for both lean and agile store network arrangement since certain items will have to anticipate capable interest.

In contrast, for other people, the interest will be undeniably more unstable. Recognizing the kinds of store network procedures may fit various conditions to situate the item in an association's portfolio as indicated by their market interest qualities. Supply attributes include: the lead season of renewal and unmistakably unique inventory network procedure will be utilized when lead times are more limited than when they are longer. With more limited lead times, there is a hurry to make everything in the present worldwide commercial center, from bread rolls to Barbie dolls. Commoditization is reducing as time passes.

DISTINGUISHING ATTRIBUTES	LEAN SUPPLY	AGILE SUPPLY
Typical products	Commodities	Fashion Goods
Marketplace Demand	Predictable	Volatile
Product Variety	Low	High
Product Life cycle	Long	Short
Customer Drivers	Cost	Availability
	Low	High
	Physical Costs	Marketability
Stockout Penalties	Long term Contractual	Immediate and Volatile
Purchasing Policy	Profit Margin	Assign Capacity
Information Enrichment	Dominant Costs	Obligatory
Forecasting Mechanism	Algorithms	Consultative

Markets are redesigning from mass business sectors into exceptionally divided specialty markets. So is lean dead? Scarcely, it exists for "utilitarian" items, those utilized for our necessities (like food). These items have unsurprising interest and subsequently are simpler to gauge. The stockout rates are immaterial. The anticipated interest of a lean store network makes the errands simpler for organizations as they can zero in on one prime objective: Cost decrease. Complex frameworks and cycles guarantee that innovation assumes the necessary part in gathering this objective. Stock is limited, and productivity all through the store network is boosted to get the ideal outcomes. All upstream and downstream capacities team up to ensure that the anticipated interest numbers are met at the base expense conceivable. These demand conditions might be characterized by the predictability of demand, as shown in figure 1.

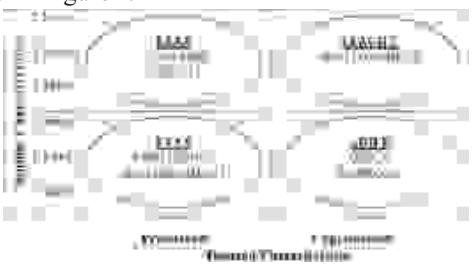

Figure 1: Demand and Supply Characteristics

The interest attributes as far as 'consistency' decide the changeability of interest. Choosing an essential methodology (lean or agile) in a store network can be perplexing. Wise inventory chains all through the world utilize a mix of lean and agile for their advantage. Table 1 shows some of the attributes that distinguish lean and agile supply.

When it is realized that store network system, it is imperative to decide the market Winners and market Qualifiers for its items. Hill (1993) indicated an extensive contrast between the two gatherings of items ('request qualifiers' and 'request victors') against which producing methodologies ought to be resolved. Each business needs to comprehend the benchmark for going into the serious field (the request qualifiers). Request Qualifiers are those (base) rules that an organization should meet to be considered as a potential provider, while request victors are those models that succeed the orders. The meaning of request qualifiers and request victors sensibly prompts the detail of the suitable assembling system. On this premise, the idea of 'market qualifiers' and 'market champs' was created. Table 2 depicts a framework for market winners and market qualifiers.

Fashion Goods (Agile Characteristics)	• Quality • Price • Lead Time	• Service Level
Commodities (Lean Characteristics)	• Quality • Lead Time • Service Level	• Price

Table 2: Market Winners and market Qualifiers

The market victor for style items is accessibility, though the market champ for wares is cost. Quality and lead-time are market qualifiers in the two cases: cost and accessibility are market qualifiers for style items and products separately. The accentuation on the figure is that the sup-handle chain should dominate at the market champ measurements and be exceptionally serious at the market qualifier measurements that is the base norm for section into the commercial center. These two item types react to unmistakably unique commercial center pressing factors and subsequently require an alternate production network to address their particular qualities. Understanding the specific qualities of the item type, commercial center necessities, and the board difficulties will assist in planning the right store network methodology that will guarantee ideal execution and gain the upper hand. It can be accomplished by creating methodologies that will diminish the framework's impact instigated vulnerability, accordingly decreasing the Bullwhip impact and, simultaneously, effectively adapting to the specific commercial center vulnerability pressures.

There are various ways that an association can incorporate lean and agile store networks, taking a ganderat the various qualities. In light of the ascribes of lean and agile production networks, it is clear that various regular attributes exist, and the entire idea can exist together. There are three manners by which Leanness and agility can, in some cases, be joined. Through the essential, the Pareto bend approach, the decoupling point, and the 'base and flood' requests. Subsequently, rather than a "unadulterated" agile and unadulterated lean production network, there will regularly be circumstances where a mix of the two might be fitting, for example a crossover procedure, that is, a blended arrangement of items and markets, there will be a few items, where a request is steady and unsurprising, and a few items where the opposite is valid. It is significant that the qualities of interest are perceived in the plan of supply chains. Likewise, it isn't really that a production network ought to be either lean or agile. All things being equal, an inventory network may be lean for part of the time and agile for the rest.

4. COMPETITIVE ADVANTAGE

The general targets of SCM is to make an incentive for clients, competitive advantage and improved productivity for inventory network firms, the elements of significant worth that might be imperative to clients, and the components whereby competitive advantage and improved benefit can be accomplished. Competitive advantage exists when a firm has an item or administration that its objective market clients see as better than its rivals. An advantage an association has over contenders is acquired by offering buyers more prominent worth, either by methods for lower costs or by giving more substantial advantages and administration that legitimizes more exorbitant costs. Inside an association, client esteem is made through joint effort and participation to improve proficiency (lower cost) or market adequacy (added benefits) in manners that are generally important to key clients. Worth is not inalienable in items or administrations, yet rather is seen or experienced by the client.

An association's competitive advantage is based upon a broad arranged and executed store network the maintainable board procedure. This is because it is extensively considered as a way of thinking of the board. Inventory network the board is never completely achieved by any organization or gathering of organizations, nor can the components of progress delighted in by one stock organization be moved to another with the assumption for indistinguishable degrees of execution. Consequently, competitive advantage has a place with those stockpile chains that can enact simultaneous business cycles and center capabilities that blend infra-structures, share dangers and expenses, influence the brevity of the present item lifecycle, lessen time to market and acquire and expect new vistas for a competitive initiative.

i. Competitive Strategies

An association's general situation inside the industry is given by its competitive advantage decision (cost leadership versus differentiation) and its decision of competitive degree. Competitive extension recognizes firms focusing on expansive industry portions and firms zeroing in on a tight section. Nonexclusive techniques are valuable since they describe key situations at the most straightforward and broadest level. Accomplishing a competitive advantage requires a firm to decide about the sort and extent of its

competitive advantage. However, every nonexclusive procedure has various dangerous characteristics; however, being "everything to all individuals" is a specific formula for un-remarkableness - get-chime "stuck in the center." In this way, an association can make competitive advantage through:

· Cost Leadership: Cost advantage happens when an association conveys similar administrations as its rivals at a lower cost.

· Differentiation: Differentiation advantage happens when an association conveys more prominent administrations at a similar cost to its rivals. They are aggregately known as positional advantages since they signify the uncompromising stance is in its industry as a pioneer in either predominant administrations or cost.

Cost Leadership	Differentiation
Efficiency Standardization Mass production Process improvement Reduced service Stability Cost accounting skill	Effectiveness Customization Shorter production runs Product development Enhanced service Flexibility Strong marketing

There is a linkage between the agile supply chain and competitive strategies. An agile supply chain responds rapidly to changes in the business environment; align with the firm's competitive strategy to improve competitive performance, hence gain competitive advantage. The bottom line is cost minimization, improved quality products/services, gaining competency, and increasing speed. This is illustrated in figure 2 below.

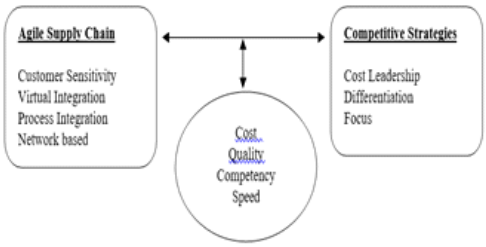

Figure 2: The Link between Agile Supply Chain and Competitive Strategies

5. FRAMEWORK FOR ALIGNING AGILE SUPPLY CHAIN TO COMPETITIVE STRATEGIES

The point of the proposed system is to plan the connection between the agile production network and competitive advantage. In this violent vulnerability in the business climate, it is essential to decide your market, the idea of items and administrations, the market victors and market qualifiers to stop mine your store network system. As shown in the Paper, the best inventory network methodology to use to satisfy client assumption when need is unsure is agile production network. In an unsure business climate, competitive advantage is accomplished when you decide the drivers of progress, be adaptable, versatile and responsive through agile production network procedure; and adjust your inventory network methodology to the general business technique to acquire competitive advantage as clarified beneath.

Drivers of Change: The principal main thrust behind agility changes. It is changed or pressing factors in a business climate that power an organization to look for better approaches for maintaining its business to keep up its competitive advantage. The accompanying components can portray the change drivers: changes in the commercial center; changes in client necessities; changes in rivalry models; changes in innovation; just as social factors change. When an undertaking is confronted with fast changes, an agility store network system ought to be utilized to react rapidly to balance the impact of the progressions to acquire a competitive advantage.

Agile Supply Chain: An agile production network requires different distinctive capacities to advance and fulfill clients. These include responsiveness, adaptability, and flexibility. To be agile, an association should have the accompanying components: market touchy, measure mix, network based and virtual. They ought to have the option to be adaptable, responsive, and adjust to changing economic situations. It can be accomplished through community-oriented relationships, measuring combination, data coordination, and client/showcasing affectability accomplishing client-refilled targets. It incorporates cost, time, competency, and speed in the store network adding to the competitive advantage of the whole association.

Competitive Strategies: An association's situation in the business wherein it works is hindered by its competitive technique. A triumphant competitive methodology is established on reliably under-standing and foreseeing changing economic situations and client needs. The agile store network should be adjusted to the competitive methodologies to improve

the general presentation of the association. The objective of an agile inventory network is to furnish customized items with notable highlights to the market rapidly to keep a competitive advantage in the present evolving climate. The inventory network may keep a meaningful supply of segments sitting tight for the last gathering or arrangement to satisfy such an objective. That is the opposite technique to the lean inventory network that is a cost-advantage system. Goldman et al. (1995) battled that the market division is a significant power for presenting and carrying out agility in an association. Through the portion of market information and abilities of accomplices, the agile store network can detail market division and introduce duce new items more rapidly. Doorman's differentiation technique alludes to the interesting picture or estimation of items and administrations.

Regarding the executives' inventory network, the agile production network is the most suitable arrangement to satisfy the particular objective of Porter's differentiation procedures. It is fitting to address the difficulties of the business climate. If you realize your inventory network procedure and your competitive system, the item and the clients will adjust the two techniques to prompt competitive execution in the association. Figure 3 underneath shows the structure for agile store network as a system for competitive advantage.

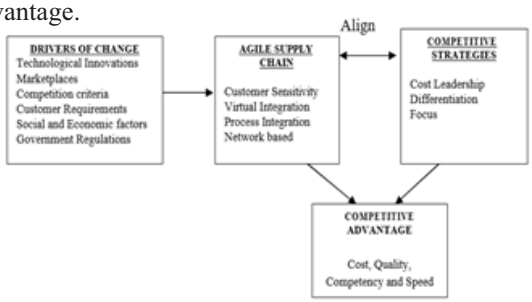

Figure 3: Aligning Agile Supply Chain to Competitive Strategies

6. CONCLUSION

The principal objective of the paper was to investigate the idea of an agile store network and decide the connection between an agile store network and competitive advantage. Given writing investigated, be-cause agile inventory network is a triumphant technique for development, and lean store network a pre-essential for making an agile production network, it is obvious that it is a methodology for competitive advantage. The agile production network is set off by "change," which is the lone steady thing in the business climate. Besides, pertinent writing has shown that business achievement must be accomplished through powerful co-appointment of the relative multitude of member's organizations across the store network to abbreviate item life cycle and decrease item cost as supply vacillates more quickly than any other time in recent memory. Getting through this test, associations must center their work after accomplishing more impressive agility to such an extent that it can react in more limited periods both as volume change and assortment change. Agility is considered a crucial factor for business achievement in complex modern scenes as it empowers rival firms to perform under an ideal opportunity to advertise pressures productively. It may be reasoned that lean is expected to assemble agility by putting lean and agile production networks together,. The pre-imperative for achievement in the commercial center is an agile store network. The way to achieve an association is to adjust the agile store network methodology to the differentiation procedure to meet the general target for competitive execution, consequently, competitive advantage. Like this, an agile production network is a technique for competitive advantage. If you're not agile, you can't do it since client assumptions are rarely static.

Therefore, to sustain and maintain supply chain agility, an organization should:

Commit to flexibility and adaptability regarding the supply chain. Convince those who will implement the necessary programs of its importance.

· Identify the factors involved in past problems with the company's supply chain. Review a business's history for its most significant problems.

· Implement simple solutions for these problems.

· Design programs for solutions that are not solved. Prioritize problems based on which are most likely. Systematically move through these problems.

· Address flexibility and adaptability while moving through the later stages of disaster-proofing production. Begin by asking for input from all levels of production, even levels below that of managers.

· Centralize responsibility for reviewing plans for change. Those with the responsibility should have a broad base of experience. Involve consulting firms if needed, but critically assess the consultants' skills to fit into your team.

· Integrate the newer theories of agile supply chains, specifically those that allow for greater coordination between customers and suppliers, where appropriate.

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Medical Imaging and Visualization Toolkit in Java

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Abstract—Clinical imaging research and clinical applications, for the most part, require mix and joining of shifted procedures beginning from picture handling and examination to reasonable perception to easy to use communication. Analysts with various foundations from different territories have utilized various equipment, programming, and conditions to acquire their outcomes. We likewise see that understudies regularly construct their devices without any preparation prompting excess work. A conventional and adaptable clinical imaging and perception toolbox would be helpful in clinical examination and scholarly organizations to downsize excess improvement work and subsequently increment research effectiveness. This Paper presents our involvement with building up a Clinical Imaging and Perception Tool stash (BIL-unit) that gathers exhaustive libraries and an assortment of intelligent instruments. The BIL-unit covers a decent scope of central capacities from picture change and change, picture division, and examination to mathematical model age and control, all the high to 3D perception and intelligent reproduction. The tool stash plan and execution accentuate the reusability and versatility. BIL-pack is executed inside the Java language all together that it works in crossover and dynamic exploration and scholarly conditions. It likewise permits the toolbox to expand its use for the occasion of Online applications. A few BIL-pack based instruments and applications are introduced, including picture converter, picture processor, life systems, model test system, vascular displaying climate, and volume watcher. BIL-pack might be a reasonable stage for specialists and understudies to create perception and reproduction models, and it additionally can be utilized for the occasion of clinical applications.

Keywords : Bill-Kit, Java Progressed Imaging, Java Media System, Medical Imaging

1. INTRODUCTION

i. Inspiration

The inspiration for scripting this Paper is principally an interest in the endeavor, a complicated undertaking in an invigorating territory of exploration (JAVA). The opportunity to discover a couple of new regions of processing not canvassed in addresses.

ii. Issue Definition

The capacities of radiology hardware are expanding significantly, and three-dimensional (by and large n-dimensional) clinical pictures are getting significant and significant in clinical findings and treatment. This model drives the exploration interest in clinical picture investigation and demonstrating. It also lifts requests for reasonable clinical imaging innovative work stages and conditions that will quickly transform research thoughts into models and clinical applications.

Clinical pictures are frequently deciphered as n-dimensional digitized signal arrangements. Some of the vital sign handling calculations are often utilized in preprocessing and progressed examination. Before chronicled reasons and business rivalry likewise as of scientists' very own traditions and inclinations, pictures are made, conveyed, and moved in various configurations. The scope of clinical picture designs has consistently been an irritating issue, we would say. During the investigation of sweeps, different displaying calculations could likewise be applied. At long last, the consequences of study and display had the opportunity to be approved or checked by scientists and clinicians, which needs these outcomes to be introduced in an easy to understand and quantitative way. To understand this reason, demonstrating and perception procedures are utilized much of the time to call attention to the examination, investigation, and

displaying prompts the satisfactory top way indispensable correspondence spans among specialists and clinicians.

2. THE OBJECTIVE OF THE PAPER

- It intends to supply an establishment framework for organizations directing clinical imaging investigates
- Clinical picture research joined with programing language java offers nonexclusive picture handling calculations beginning from straightforward edge contrast upgrades.
- The improvement of an extensive tool compartment to coordinate bundles from the two territories to supply a more exhaustive toolbox for clinical imaging scientists

Objectives

a. Cover existing advancements for clinical imaging
b. Brief the proposed innovation in java
c. Working of BIL-pack with clarifications
d. Future and coming approaches

A few clinical imaging tools stash accessible either The objective of this work is to manage these issues to broaden research productivity. The pressure of tool stash configuration is focusing on the accompanying:

1. Conveyability: The libraries and apparatuses ought to be stage free, all together that the toolbox is frequently used in a heterogeneous registering climate with limited redevelopment work

2. Reusability: arranging the tool compartment object classes ought to follow the article situated guideline, all together, what classes are well self-epitomized, with high attachment and most miniature coupling. In the meantime, what classes will be tried and recorded altogether so that the clients will be prepared to utilize them without thinking much about the execution subtleties.

3. Adaptability: It will be the pool of summed up object classes with the reusability highlights. Hence, specialists and understudies can choose significant article classes to rapidly gather a device or a model to their most significant advantage.

4. Extensibility: The new modules created by analysts and understudies will effortlessly be consolidated into the toolkit.3. View and navigate their rundown of associations and individuals made by others inside the assistance.

3. RELATED WORK AND OUR METHODOLOGY

Existing Tool stash inside the possession or the business market. One including the business bundles, the accepted best quality level in clinical picture investigation, is Break down from Mayo. It is an incorporated set-up of reciprocal devices for completely intuitive presentation, control, and estimation of multidimensional biomedical pictures. The framework is created using C++ with Tcl/Tk; VTK3 might be a property right programming bundle created for 3D illustrations and representation. It has created C++ and depends on Tcl/Tk or Java as its cross-stage graphical UI (GUI) support. VTK gives just fundamental picture handling usefulness.

Additionally, to the designers, they need to dominate a subsequent language, either Tcl/Tk or Java. Another bundled under late dynamic improvement is that the Understanding Division and Enrollment Tool compartment (ITK). ITK has the chance to execute the usually utilized clinical picture division and enrollment calculations. Also, it is created in C++, and along these lines, to beat the cross-stage GUI issues, the apparatus designers even need to dominate a subsequent language like Tcl/Tk, Java, and so forth. The previously mentioned frameworks require a subsequent language or content to beat the cross-stage inconvenience. In addition, they are not as advantageous as Java when it includes creating Electronic applications. There are additionally clinical imaging bundles created by utilizing Java. Counting one is ImageJ—a clinical imaging programming created by Rasband6 at NIH. ImageJ gives a significant number of fundamental picture activities. Be that as it may, the vast majority of the picture preparing tasks are 2D, some of the time with capacities to handle picture stacks.

Furthermore, we found that its 3D demonstrating and perception capacities are inadequate to uphold our examination exercises. Another Java-based clinical imaging bundle, NeatVision, created by the Vision Frameworks Gathering of Dublin College, gives a unique visual picture preparing stream interface, with solid picture handling usefulness. Be that as it may, practically like ImageJ, they are brought together more on imaging instead of mathematical displaying and control.

4. JAVA AND THE SYSTEM

Working during a dynamic and quick pacing biomedical exploration climate, we have procured insight to influence heterogeneous equipment and programming stages and building research models inside the least cutoff times. Java is intended to fulfill the difficulties of use advancement inside the setting of heterogeneous, network-wide circulated conditions. Fundamental among these difficulties is a secure conveyance of uses that devour the base of framework assets, can run on any equipment and programming stage and might be broadened progressively. Other than the high level plan theory of Java language, it has likewise carried the norm and profitability to engineers. What is more, Java gives some discretionary bundles helpful in improving picture handling and perception capacities. Specifically, the Java Progressed Imaging (JAI) segments of Java Media System (JMF) and the Java3D segment. The upsides of those segments will be tended to inside the Tool stash Design and Modules. The Java3D segment gives the representation engineers many more elevated level APIs contrasted with most designs bundles that numerous designers utilize, like OpenGL. This component will fundamentally decrease the significant weight of the tool stash designers and, henceforth, the further application engineers utilizing our tool stash. Organization based related clinical imaging exploration and applications are progressively famous. Java, as a language climate, intended for heterogeneous stages and appropriated figuring, is an ideal language in creating network-based end-client applications. The new evolved innovation of Java Web Start has conveyed a helpful sending answer for send Java applications. These high level highlights, the consistent similarity of Java discretionary parts, and the run wherever guarantee permit us to construct a clinical imaging and representation tool stash adjusted to dynamic and heterogeneous equipment and programming foundation of our examination climate. One of the inquiries discussed in Java execution. Indeed, the exhibition of Java is not close to the same as some streamlined dialects, like C++. Nonetheless, the speed of Java has been fundamentally improved inside the new years and is almost similar to C++.

Thinking about programming productivity and quality, Java is detectably better contrasted with C++. A point by point assessment of the Java versus C++ relationship perceived Java to be verifiably better in programming quality and proficiency. Besides, an apparatus compartment created by utilizing unadulterated Java requires the designers to dominate just a single language; those engineers utilize different bundles
like C++, with another dialect or contents to beat the cross-stage issue.

5. THE TOOL COMPARTMENT ENGINEERING AND MODULES

The Java Clinical Imaging and Representation Toolbox called BIL-unit created in our Biomedical Imaging Lab (BIL) had been based on top of the Java Programming Advancement Pack (SDK), JAI, and Java3D bundles. The toolbox can be isolated into four significant modules: establishment module, clinical picture input/yield (I/O) module, an image processing module, and displaying and perception module (Figure 2). These modules structure most of the reusable libraries. On top of these libraries, devices and applications can be constructed. By utilizing these devices as formats, and utilizing the reusable classes, further developed explicit applications or models can be worked for specialists and clinical clients.

i. Establishment Classes Library

An exhaustive arrangement of establishment classes must be worked to shape the base of any tool compartment. Java SDK has made a broad scope of establishment classes that can meet clinical imaging and representation prerequisites much of the time. BIL-unit is uncommonly intended for clinical imaging examination and applications. A portion of them as often as possible utilized establishment classes should have been stretched out from the standard Java SDK, for example, information structures utilized for introducing clinical data and some GUI gadgets now and again utilized in clinical imaging.

ii. Clinical Picture I/O Module

As far as we can tell, we have experienced various picture designs from numerous sources. Other than the overall photo arrangements like JPG, GIF, and Altercation, the picture designs utilized by various PC stages additionally change, for example, RGB design for SGI and PNM design for XWindows. Clinical pictures will, in general, convey patients and conclusion data just as spellbinding data of securing techniques together. These configurations pretty much rely upon picture procurement frameworks. We experienced issues in managing picture designs from various merchants in the good 'ol days; for instance,

picture designs from GE scanners were not the same as Siemens. Indeed, even various models from a similar merchant had varieties.

This instrument gives an adaptable and helpful interface for engineers to deal with detailed clinical picture designs. It additionally gives a system to the options of explicit arrangement modules. The modules are standard Java classes stacked into the Programming interface at run time, adding usefulness. These modules can likewise be installed in Java document records. Another benefit of the presented design is an incredible Programming interface accessible for taking care of metadata. The metadata is changed over into an XML record. Following is the chart for java clinical imaging innovation BIL-Unit Design

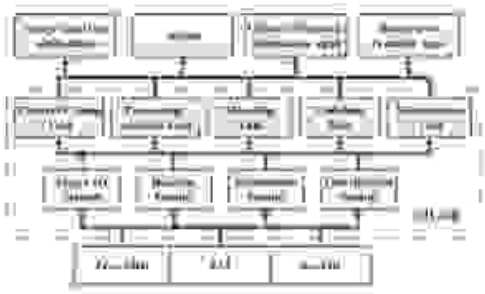

Fig. 1. The Java Medical Imaging and Visualization Toolkit (BIL-kit) architecture

By broadening the Java Picture I/O structure, the BIL-unit offers backing to most clinical picture organizations, and all the more critically, it is exceptionally extensible. It may be effectively stretched out by updating or adding code (coder/decoder) as modules to deal with new clinical picture designs later on or keep pace with the guidelines redesign. This execution essentially saves the scientists and designers from doing excess and drawn-out work and carries incredible comfort to the clients.

iii. Clinical Picture Handling and Examination Module

Regular clinical picture examination requires different nonexclusive picture handling calculations; hence, the more significant part should be carried out in the tool stash. Notwithstanding, there are some particular prerequisites to be dealt with. For example, picture change calculations are habitually needed to be performed in 2D and 3D. In the interim, a few boundaries, for example, pixel size, picture obtaining methodology, and so on, must be taken as boundaries in picture change. These necessities are likewise viewed as in the plan of the picture preparing segment in our tool stash. JAI is a bunch of complete Programming interfaces provided as an expansion bundle of the standard version of the Java stage. JAI gives imaging usefulness past that of the Java Establishment Classes. Although it is viable with those classes in most cases.24, JAI is proposed to help picture preparing utilizing the Java programming language as large as could genuinely be considered typical. At the same time, JAI presents a direct programming model that can be promptly utilized in applications without a significant mechanical programming overhead or the necessity that the developer must be master altogether the periods of the Programming interface's plan. JAI typifies picture information organizations, and the far off technique summons inside a reusable picture information object, permitting a picture record, an organization picture object, or a constant information stream to be prepared indistinguishably. Consequently, JAI addresses a basic programming model while hiding the intricacy of the inside instruments. JAI offers a few benefits for application designers contrasted with other imaging arrangements, e.g., dispersed imaging Programming interface, which implies it is appropriate for client server imaging through Java. The stage is organizing engineering and distant execution innovations. It is additionally interoperable, which proposes that it is incorporated with the rest of the JMF APIs, empowering media-rich applications to be sent on the Java stage. Nonetheless, the JAI bundle gives 2D picture activities that do not use complete data in 3D clinical pictures. A supportive and viable clinical imaging toolbox should carry out 3D imaging calculations to benefit the freshest radiology innovation. Picture preparing in 3D is generally considered a characteristic augmentation of 2D picture handling, yet that is regularly not right. Execution of 3D picture preparing should consider the situation of voxels cautiously; here and there, the calculations had the chance to be overhauled to understand the improved result.26 As JAI was intended for broadly applicable picture handling, it does not uphold clinical pictures. Nonetheless, as a clinical imaging toolbox, it should be prepared to catch and keep obtaining data, so it is regularly used in specific programmed picture handling activities. The underlying picture preparing calculations executed in our toolbox is the

accompanying: Y picture number-crunching capacities, including expansion, deduction, duplication and scaling, division, and mixing; Y picture polynomial math change, including picture AND, OR, XOR, Rearrange, and bit move activities; Y picture mathematical change, in particular, turn or change mathematical size and position of picture volumes by resampling 3D picture voxels with various addition capacities; Y spatial area changes, including single-and different reach thresholding, locale developing (steady and versatile), histogram stretch and histogram evening out, mean and middle separating, and distance change; Y recurrence space changes, including Fourier change, convolution sifting, which joins a bunch of improving tasks, as Gaussian and Laplacian separating, honing and smoothing, likewise as Sobel and zero-intersection edge recognition tasks. Y nonlinear spatial changes, as numerical morphology including expansion, disintegration, opening, and closing. The occasion of picture preparation stays in measure. More picture preparing functionalities are added. Some further developed calculations are on our improvement guide, including wavelet change, shading picture handling, and information based division. The tasks carried out are both in 2D and 3D and are improved by our most noteworthy endeavors.

iv. Displaying and Representation Module

The demonstrating and representation segment of our tool compartment is made on top of the Java3D part. Java3D might be a 3D scene diagram that upheld the illustrations Programming interface for the Java language. It is a discretionary bundle of the Java standard release. Java3D Programming interface gives schedules to the production of 3D calculations during a scene diagram structure that is autonomous of the remote equipment execution for continuous programming. The Programming interface gives scene diagram gathering and other enhancement methods. It is vigorously improved toward the needs of continuous 3D delivery. Java3D executes the scene diagram ideas, which is one level above rudimentary embellishments bundles, like OpenGL. The scene diagram is utilized broadly in representation advancement platforms.25. An increasing number of software engineers like to utilize the predominant scene chart programming stages, as Java3D and Open Innovator, to decrease improvement endeavors and expenses. Java3D used in our advancement additionally utilizes the scene chart. The current perception dialects and bundles offer valuable help to establish representation conditions for biomedical reenactment and schooling. The famous dialects and bundles utilized are Java3D, VRML, and Open Designer. These advancement conditions have their benefits and burdens. We picked Java3D because of the establishment of our representation module because of its few benefits: utilizing the scene diagram idea, consistent incorporation with Java SDK, and cross stage highlights. Although there are a few debates about the more drawn out term of Java3D, Sun Microsystems declared its arrangement as late to deliver the Java3D ASCII text document through a type of public source permit inside the close to future.A master bunch under the Java People group Cycle will be framed to characterize and execute new highlights for the revamp of the Java3D programming interface. The open-source technique might be a decent sign that it will permit clients to contribute bug fixes and utilities, which can expand the inventory and speed up its speed of advancement. Java3D highlights an upscale arrangement of APIs, which gives incredible and deftly intelligent capacities to build instructive and recreation frameworks. It is reasonable for building 3D models and PC games conditions exquisitely. Be that as it may, to accomplish the best aftereffects of Java3D delivering and intelligent impacts, proficient perception is needed to utilize the Java3D progressed highlights. To analysts and understudies performing on clinical imaging and without adequate perception information and information, certain disentanglement and deliberation to the Java3D classes would make their work a lot simpler. Some complete and theoretical articles had the opportunity to be planned and created to introduce multimodal life structures models. In Java3D, the representation situation is framed as a virtual universe; protests that sway the enhanced visualization of the virtual universe, similar to math, lights, area, direction, appearance, and so forth, are shaped by hubs and circular segments. A hub might be an information component, and a bend might be a connection between hubs. The scene diagram is an organization of the hubs and bends inside such a tree structure. Hubs are classified into gatherings and leaves, where gatherings contain change and control data, and leaves contain the visual items' mathematical data and optical property. Gatherings are further subclassified into change bunch, branch bunch, shared gathering, requested gathering, and switch bunch. Leaves are further subclassified into shapes that contain mathematical data, lights that address light, and heaps of others addressing the rudimentary data of perception scenes. The subtleties of Java3D are past the extent of this Paper and are excessively definite for

clinical picture specialists who are not representation experts. Hence, rearrangements and exhaustive wrapping to Java3D are helpful and important to supply devices with agreeable and advantageous connections for clinical foundation clients. The scene diagram idea is acquired in our tool compartment, although it has been upgraded to adjust to the anatomical model introduction prerequisites. We consider it the life systems scene chart. assortment of extensive various leveled object classes is intended for building the motivation of virtual life systems models for biomedical recreation and schooling. These are improvements of the Java3D scene diagram objects, which give more attention to conventional clinical item models. various modern activities and qualities are covered up to the clients to have a more friendly interface, so clients can consider clinical examination rather than to influence representation methods. Besides the by and large mathematical components and surface models, the mathematical shape hub inside the scene chart has been reached out to store and decipher more perplexing models, e.g., cylindrical models and volumetric lattice models. These models will be constructive inside the perception, clinical picture based investigation, and reproduction applications. An illustration of a living systems model used in perception and recreation and its portrayal of the life structures scene chart. The gathering hub expands to the Java3D scene diagram change bunch hub for certain highlights of change gathering and connections to a life structures model consolidated, which permits the perceivability of submodels to be controlled without any problem. the structure hubs are components of life systems models made out of the math hub in Java3D for certain capacities and characteristics stretched out for introducing more unpredictable life structures modular information. Mix with Anatomical Information When creating applications or models, anatomical information normally alludes. It will even be required in some cases, e.g., when building life structures, map books from different wellsprings of information. Our tool stash contains the worldwide authority guide of anatomical wording—Terminologia Anatomica—delivered by the Federative Panel of Anatomical Phrasing. Its progression structure is made inside the XML design, and a simple implicit data set stores the anatomical names. This element upholds specialists and designers to mark their models with life systems phrasing. Life systems Scene Diagram Information Construction The life structures scene chart model is utilized to introduce clinical life systems models being prepared or extricated from clinical pictures. They will be delivered and controlled by the tool compartment altogether. One way or another, there's no clear organization for putting away this information model because of the intricacy of life systems model introduction and the necessity of providing food life structures data. The more significant thing is that the arrangement characterized ought to be additional adaptable and extensible to deal with requests from specialists with various exploration interests and along these lines such applications. We choose XML because it is intended to clarify information in a basic, adaptable, and extensible way. We have planned an XML diagram reliable with the life structures scene chart model depicted above, which incorporates the anatomical wording close by the XML definitions referenced above inside the Picture I/O module. This mapping permits us to store the life structures models and picture information in XML records that are perceived by the toolbox, all together that they are interchangeable inside the instruments

5. BIL-KIT BASED DEVICES AND APPLICATIONS

We have built up a few apparatuses and applications based on the tool stash, including DICOM extractor, picture converter, picture processor, general life structures model test system, vascular displaying climate, division validator, and volume watcher. The current screen previews a portion of our apparatuses and applications based on the tool compartment. The picture converter is supporting a broad scope of picture arrangements to be decoded and encoded. It likewise gives a few helpful tasks to attempt to straightforward transformation, e.g., changing the pixel portrayal or direction of pictures. Delineates the picture processor, which will be utilized for picture investigation; numerous regular picture changes are regularly acted in 2D and 3D intelligently by utilizing this instrument. The model test system where the 3D life structures scene chart model is frequently envisioned and controlled. The client can intelligently control the chain of essential connections of the model items, their spatial positions, and delivering impacts. Avascular centerline model altering climate where the vascular model is frequently made and controlled. Figure 8 shows an angiographic picture life systems marking device with the Terminologia Anatomica-based file coordinated. A 3D cerebrovascular chartbook is utilized to mark angiography pictures. A volumetric view joined with a surface-delivered model; the

toolbox gives appropriate usefulness to half breed volume and surface delivering. These apparatuses have been grown effectively quickly by utilizing BIL-unit, which shows its ability and potential.

i. Using the Tool stash

Like other clinical imaging and displaying tool stash, BIL-unit upholds two degrees of UIs: the designer level and the end-client level.

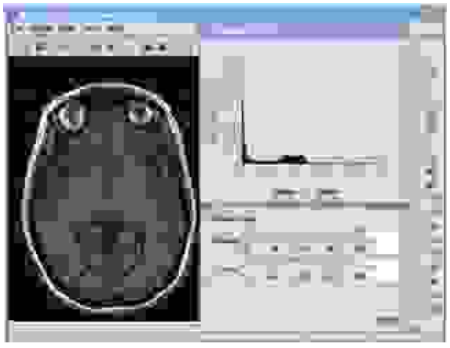

Fig. 2. A medical image conversion tool built based on BIL-kit.

For experts with computer programming foundation, they can utilize the APIs of the reusable Java class libraries, with their favored Java improvement conditions,

Fig.3. A medical image processor, built based on BIL-kit.

To model new calculations and create progressed devices and applications. For the clients with clinical foundation and no programming abilities, they can utilize the instruments based on top of the BIL-unit libraries to

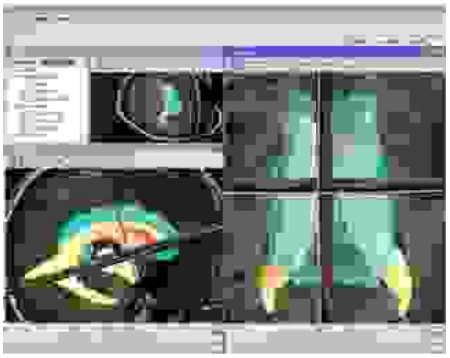

Fig. 4. An anatomical modeling tool built based on BIL-kit for manipulating anatomical models.

6. COMPENDIUM AND FUTURE WORK

This paper shares our experience and highlights our work in building a clinical imaging and representation toolbox, which is a valuable turn of events and prototyping stage in our lab. It helps scientists and understudies lead their examination work significantly more effectively by using reusable libraries to decrease their repetitive and monotonous improvement endeavors. Contrasting BIL-unit with the comparative bundles referenced in Related Work and Our Methodology, their extents of usefulness are marginally unique; along these lines, it is difficult to make a quantitative examination. Our tool compartment configuration has considered the imaging and perception prerequisite all along. It guarantees that the two zones are consolidated flawlessly, which is a benefit for creating clinical imaging and demonstrating instruments. This reliable plan advanced the reusability and adaptability contrasted with different bundles. The transportability is accomplished by utilizing the Java language.

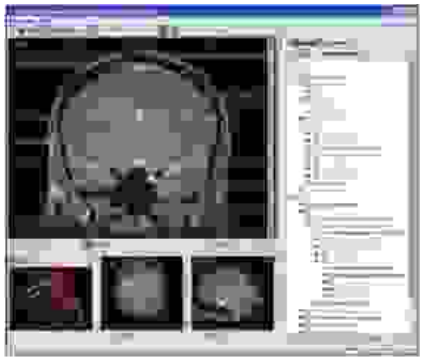

Fig.6. An angiographic image labeling tool with the Terminologia Anatomica index integrated.

It is vastly improved contrasted with the bundles that necessary a numerous language blend; correspondingly, the extensibility is much better. Taking into account around 2-year improvement history (and a drawn out encounter in apparatus advancement), BIL-unit is as yet juvenile. The rich usefulness and a few valuable apparatuses created in a brief period represent the advantages contributed by the reusability and adaptability of the BIL unit.

The primary goal of specialists and understudies is to lead research on their #1 area; like this, mentioning them to discover a few distinct dialects is not practical. Contrasting with those bundles requiring different dialects to require care of either calculation codes or GUIs on various stages, using one language (Java) for both GUI and calculations on all stages might be a more effective methodology. The benefit of versatility is self-evident: our devices are prepared to chip away at different stages, similar to MS Windows, Linux, Sun operating system, Macintosh operating system, et al., with no alteration and even without recompiling. The toolbox is utilized in our organization from picture designs transformation to picture division and investigation, and further to show introduction and representation. Assortment of instruments for picture preparing and 3D displaying are developed quickly utilizing a similar gathering of classes, which exhibited the toolbox's reusability and versatility. Scientists and understudies utilize the reusable item classes to speed up their innovative work. More applications to incorporate the most up-to-date clinical imaging and demonstrating research results are a work in progress. It exhibits its potential as a valuable framework in clinical imaging examination and its extensibility. The thing focused component of the Java language likewise has an immediate impact in advancing its reusability. More work will be carried out to carry out cutting edge picture handling calculations, similar to wavelet change and shading picture preparing, complex picture investigation and acknowledgment capacities, etc., as well as cutting edge calculations that are firmly connected with clinical space information, e.g., division of anatomical constructions.

Additionally, demonstrating practices and properties of anatomical designs is a potential territory to investigate because the toolbox is extensible to help the data models for actual twisting displays. Combining multimodal virtual models with information based and semantic philosophy will be a fascinating plan to deliver certifiable and valuable virtual models for clinical schooling and reproduction. There is still much room to improve the usefulness to make BIL-pack a completely valuable clinical imaging and perception tool compartment worthy of the examination and clinical networks.

7. CONCLUSIONS

In this Paper, in medical imaging and visualization toolkit in Java, we have proposed a unique solution for collaborative management of shared data. A BIL-Kit was formulated alongside a multiparty policy specification scheme, corresponding policy evaluation mechanism, and rigorous programming. Additionally, we have introduced an approach for representing and reasoning about our proposed model. A proof-of-concept implementation of our solution ongoing called BIL-Kit has also been discussed, followed by the usability study and system evaluation of our method.
As part, we are getting to examine more comprehensively. Also, we might search for more criteria to estimate the features of our proposed BIL-Kit. Therefore, we might study inference-based techniques for automatically configure. Besides, we decided to thoroughly integrate the notion of trust and reputation into BIL-Kit and examine a comprehensive solution to deal with GUIs and 3D quality for providing top notch medical service in researches and diagnostics.

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Artificial Intelligence in Space Exploration

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Abstract— Space exploration has long piqued the attention of scientists and governments around the world because it holds the key to humanity's origins as well as a plethora of other incredible cosmic mysteries, such as the possibility of alien life. The observable universe depicts the regions of space that will be visible by telescopes. Scientists and explorers assume, however, that the universe might be more significant than previously believed.

Until now, humans have only studied about 4% of the visible universe, which is made up of planets, stars, galaxies, and other celestial phenomena visible to astronomers and scientists. The remaining 96 percent has yet to be found.

Artificial intelligence's use in space exploration is exploding at a breakneck clip, with a demand worth $2 billion and that. There are more stars in space than grains of sand on Earth, and each can support life or have a habitable planet. Even if all humans assembled under one roof to study each of those stars, it would be inadequate.

Keywords: Artificial Intelligence, Intelligent Navigation System, Space Exploration

1. INTRODUCTION

Space exploration is no longer an outlier, with AI's benefits pervading every market. AI's application in space exploration could be the most advanced of the other sectors. With the continuous flow of information, one can not place their trust in human intellect alone since they are vulnerable to various distractions. On the other end, AI delivers results with minimum errors, so it makes sense to put more faith in it.

Artificial intelligence (AI) is the emulation of human intelligence of computers designed to interpret things like humans. Every process that demonstrates characteristics linked to a person's mind, such as learning and problem-solving, may be pragmatic.

Machine learning is a specialized branch within the AI domain that focuses on training machines to develop intelligence that will enable them to do complex tasks by using intelligence. Machine learning algorithms use a plethora of data to facilitate a mechanism to get conversant in diverse scenarios. It enables machines to find out from their training experience and use them in real-life scenarios.

· If we were to incorporate the ideas of the two massive terms:

· Considering the recent developments within the field of Machine Learning and Artificial Intelligence, AI and Space Exploration envision how easy it might be for scientists and explorers to realize their goal and how it might affect our lives.

· Predictable, Unpredictable, and Real-Time operations are the three types of operations that AI applications support (Jónsson et al., 2007).

· Even predictable operatives are often highly complex, allowing AI to play an important role in automating complexity management or assisting human decision-making.

· Since the maneuvering environment is unpredictable, an AI system must identify a wide variety of circumstances.

· Real-time constraints can restrict the amount of reasoning that the AI system may perform.

2. LITERATURE REVIEW

Artificial Intelligence is Transforming the Face of Space Exploration. [1]

· Government agencies and private entities alike are working to eliminate roadblocks to furthering our understanding of space. Even though space is an almost infinite expanse of an empty vacuum, there is still the risk of the real threat, whether in the form of cosmic radiation, earth-shattering meteors, or massive interstellar events.

· To have any hope of learning more about outer space and one day safely traversing this fascinating frontier, we must first gain a better understanding of the climate and its risks. Humans will never be able to explore any part of space. Therefore, policymakers have set up numerous projects that use artificial intelligence and machine learning to look for potentially dangerous threats and events.

· AI has also been used to map unmarked galaxies, cosmic rays, stars, black holes and Research astronomical phenomena that would otherwise go unnoticed if not for machine learning algorithms. One fascinating application of artificial intelligence in astronomy is the ability to identify and distinguish rocky worlds close to those in our solar system.

· The discovery of these exoplanets is based on observing how light acts when it travels through their atmosphere.

· It helps scientists ascertain the planet's overall consistency in terms of elements that could sustain life, such as oxygen and methane.

· Then there is deep learning to model galaxy formation and identify images of galaxies captured by the Hubble Space Telescope. One of the benefits of AI is that it never gets tired of grading and can do it reliably.

NASA is constantly advancing AI applications to manage space travel efficiently. In 2018, NASA awarded a $330,000 research grant to a team to improve artificial intelligence (AI) to direct spacecraft through debris.

Furthermore, NASA developed AEGIS (Autonomous Exploration for Gathering Increased Science), an AI upgrade that helped the Rover's laser-firing capabilities be automated. An intelligent AI system is an excellent match for tracking spacecraft while minimizing downtime and possible risks, thanks to the increased data collection rate.

In 2018, a partnership between NASA's Frontier Development Lab (FDL) and Intel guided astronauts in space. NASA has assigned a few researchers to create an AI system that will model the moon's surface and compare it to the local environment as part of this program.

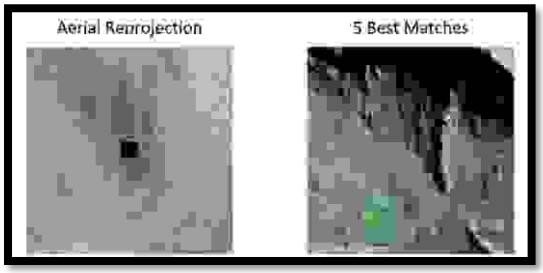


Fig. 1.Aerial projection (SOURCE: Google)

Black Hole

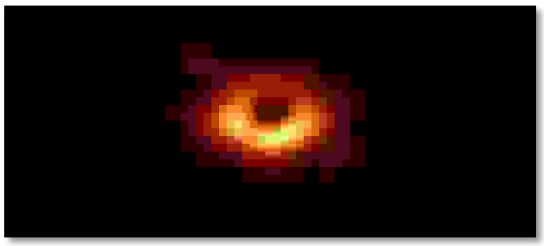


Fig.2. Black Hole (Source: National Geographic)

We received our first black-hole image using the CHIRP (Continuous High-Resolution Image Reconstruction using Patch Priors) Algorithm. CHIRP may be a Bayesian algorithm to perform deconvolution on images created in astronomy. The event of CHIRP involved an outsized team of researchers from MIT's computing and AI. The CHIRP mechanism used the image data from the Event Horizon Telescopes which has been substantial. Moreover, this is where image processing had concluded. Scientists have used Numpy, pandas, and other Python libraries to scale down information, data correlation, calibrations, and mutuality. Machine Learning is utilized in image analysis.

We have the first-ever image of a region, the Scientists and Researchers are working towards getting more accurate images of a belt. To pursue that, they have come up with more complex algorithms to use more Machine Learning and AI.

Keep in mind that many objects are still unknown to us within the region; executing Machine Learning and Deep Learning algorithms will help us classify the sort of entity where these researches within the future may identify more and more new objects and help in space exploration.

3. AI BASED ASSISTANTS AND ROBOTS

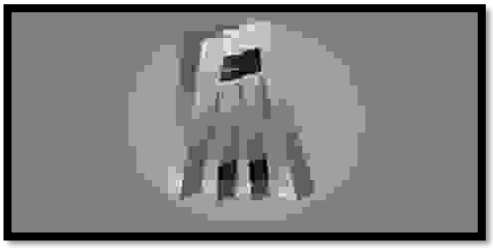


Fig. 3.CASE from "Interstellar"

Scientists are developing AI-based assistants to assist astronauts in their mission to Moon, Mars, and beyond. The assistants are designed to predict the requisites and comprehend astronauts' emotions and psychological states, and take necessary actions in an emergency.

The solution to the present is Sentiment Analysis. Sentiment Analysis (also referred to as opinion mining or emotion AI) may be a sub-field of NLP (Natural Language Processing) that tries to spot and extract opinions across journals, blogs, reviews, social media, forums, news, etc.

Robots, however, can are available handier when it involves physical assistants like helping in piloting spacecraft, docking spacecraft, and handling extreme conditions that are not safe for humans. Most of it may reverberate hypothetical, but it furnishes much help to astronauts.

Intelligent Navigation System [2]

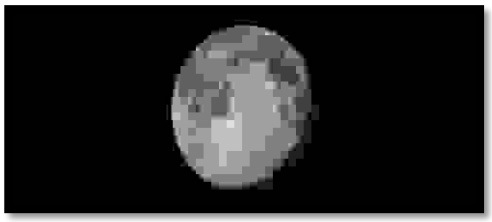
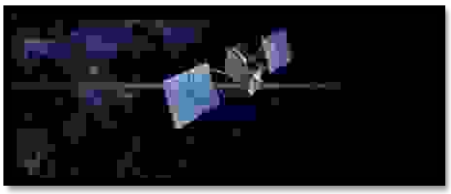


Fig.4.Moon's 3D model (SOURCE: NASA) [11]

In 2018, NASA with Intel developed an AI system that helped Astronauts find their way onto the planets. This new navigation system would help to navigate the surface of the planets through the shortest possible routes. Scientists applied this program to the moon, and the way this technique worked was that it simulated the moon's surface then compared an equivalent with the local environment. The AI is trained with millions of images using a neural network to make a virtual map. The identical algorithm was then pragmatically used for the Mars exploration program.



Source: NASA

Rollin Justin [6]

Rollin Justin is a robot with artificial intelligence applications. Researchers intend to send Justin to Mars with a few humans to help them research the Martian atmosphere.

Justin resembles a humanoid capable of distinguishing between smooth and coarse plastic surfaces. It is also a perfect companion to toss a ball around on Mars and play catch. Also, adapting the robot to Mars' gravity would be more straightforward than for a human since lower gravity will distort human bone development and create other physical problems.

Research Gate (SOURCE: GOOGLE)

India in Space Exploration with AI [2]

The Indian Space Research Organization developed Pragyan, a solar-powered robotic vehicle that would explore the lunar surface.

The Pragyan was configured into the Chandrayaan-2 Rover.

Pragyan was equipped with a LIBS (Laser-Induced Breakdown Spectroscopy) from the Laboratory for Electro Optic Systems in Bengaluru, to identify elements near the landing spot, an APIXS (Alpha Particle Induced X-ray Spectroscope) from the Physical Research Laboratory in Ahmedabad to inspect the structure of the elements found by LIBS.

Artificial intelligence helped the Chandrayaan-2 Rover in a myriad of contexts. For example, the AI-powered Pragyan was able to communicate with the lander. It contained motion equipment intended to assist the Rover in traveling to and landing on the moon's surface. Furthermore, the artificial intelligence algorithm will facilitate the Rover in detecting signs of water and other minerals on the lunar surface.

Astronauts' Lives are Being Transformed by Artificial Intelligence [7]

It is not easy to become an astronaut on the International Space Station. There are far too many tasks to complete, sparse gravity, dwindling supplies, and the ever-present possibility of being stranded in space.

Artificial intelligence relieves some of the pressure on astronauts' feet and offers a brief respite. Even more notable is the use of the CIMON robot to make astronauts' lives easier. The Falcon 9 was used to carry CIMON to the International Space Station. The flying robot uses voice commands and touch screens to interact with astronauts.

The super-helpful Astrobee, a science fiction movie invention, is the best example. This cube-shaped flying machine supports astronauts with repetitive tasks. It uses artificial intelligence and machine learning to minimize the time astronauts spend on relatively monotonous tasks, including detecting faults in space station machinery. These nimble robots also fitted with Bosch's SoundSee technology.

It will capture the sounds of equipment onboard the space station in real-time and send them back to Earth for analysis. SoundSee, on the other hand, employs AI-based sound analysis to assess the efficiency of sensitive machines by detecting minor disturbances in their noise patterns. It would be a lifesaver for astronauts, allowing them to troubleshoot issues before they arise.

4. FUTURE POSSIBILITIES

· In space exploration, artificial intelligence would be crucial. It has been instrumental in discovering countless exoplanets, stars, galaxies, and, most recently, two new planets in our solar system. Artificial intelligence has also discovered new hypotheses, viz. Mars once had water on its surface.

· When reporting systems are unable to reply in deep space missions, AI may play a critical role. To build a dialogue with scientists, AI can use deep learning to apply facial recognition and speech recognition. AI will take on risky and redundant tasks that astronauts are not equipped to manage. The use of CIMON on the International Space Station and Bosch's SoundSee are two excellent examples of space exploration.

· SoundSee captures equipment sounds with its array of microphones and sensors, then uses Bosch's advanced AI to detect possible fixes. SoundSee's possible applications in Industry 4.0, autonomous vehicles, and new building technologies may be investigated on Earth.

· Self-driving spacecraft, similar to self-driving cars on Earth, is another use for AI in space. Instead of smashing into objects in space, spacecraft operators would have to train machine learning algorithms to stop them. AI can collect data, troubleshoot problems, and direct astronauts or vital space equipment in several ways.

A Space Race Led by Artificial Intelligence [5]

With artificial intelligence interfering, the new space race is somewhat different from the rivalry between two Cold War rivals, the Soviet Union and the United States, to achieve the first spaceflight capability in the twentieth century.

It is no wonder that some of the world's most influential businessmen want to be a part of the space industry, which is expected to be worth $1 trillion by 2040, according to estimates. Big names like Elon Musk, Jeff Bezos, and Richard Branson have shown interest in AI research for space exploration, fueled by their intense rivalries. All three businesses have been operating at the same time and in the same manner.

Musk created SpaceX in 2002 to assist the reduction of space transportation costs, with the ultimate aim of colonizing Mars. Bezos, alternately, has invested over $500 million in Blue Origin, an aerospace manufacturing firm, to build a lunar lander for NASA's return to the moon by 2024.

Finally, Branson founded Virgin Galactic, a commercial spaceflight company that designs commercial spacecraft and offers suborbital

spaceflights and launches to space tourists and science missions.

These multibillion-dollar businesses have come a long way with the use of artificial intelligence in space exploration over the last 20 years. They have also taken bold strides toward their ambitions in recent years.

5. CONCLUSION

To effectively empower spacecraft operators in orbit, they must first gain trust in AI through validation and conventional verification. A word of warning, however: it is essential to keep human operators updated at all times. We have a long way to go before fully autonomous systems are developed and made available to scientists.

It is long before Artificial intelligence applications are available to increase the capabilities of space systems. For the time being, AI will continue to comb through vast volumes of data.

We still cannot comprehend the potential of Artificial Intelligence in space exploration, or even in general, in the not-too-distant future. However, artificial intelligence in space will make traveling across the vast empty nothing the next evolutionary step in our search to better understand the universe.

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Parasitic Computing

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Abstract: Reliable communication on the Internet is guaranteed by a standard set of protocols, used by all computers. In 'parasitic computing', one machine forces target computers to solve a piece of a complex computational problem merely by engaging them in standard communication. Consequently, the target computers are unaware that they have performed computation for the benefit of a commanding node. In this paper, we have discussed present use of parasitic computing with its working style.

Keywords : Parasitic computing, cluster computing, internet, TCP/IP, checksum

1. WHAT IS PARASITIC COMPUTING?

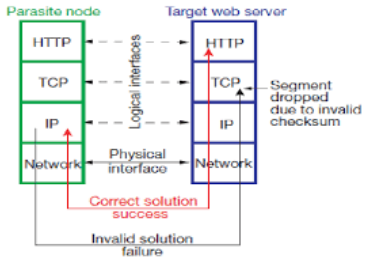
Parasitic computing is a concept by which one can use the resources of machines connected to the Internet. This technology exploits open Internet protocols to use the resources of remote machines. It means that the machine that requires the services of others does not need to be authorized by the latter. However, any machine connected to the Internet has to carry out minimum processing of any packet they receive without any authorization.

This concept is exploited by parasitic computing in order to make use of the computing powers of remote machines and web servers all around the globe. So, one cannot stop their machines from being utilized in this manner.

2. THE PRESENT USE OF PARASITIC COMPUTING

Parasitic computing can be a very effective technique for solving NP-complete problems such as Circuit SAT, 3 SAT, etc. These problems are currently considered some of the world's most complex and time-consuming problems. These problems generally have a set of solutions that are a subset of possible solutions. In essence, a parasitic computer is a realization of an abstract machine for a distributed computer built upon standard Internet communication protocols.

We use a parasitic computer to solve the NP-complete satisfiability problem by engaging various web servers physically located in North America, Europe, and Asia, each unknowingly participating in the experiment.

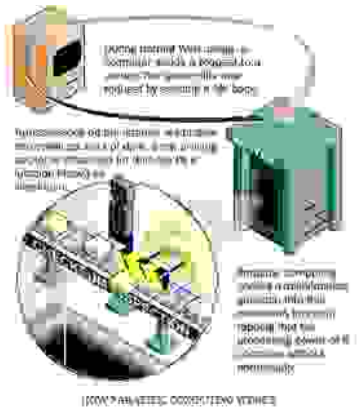


3. PRINCIPLE OF PARASITIC COMPUTING

parasitic computing decomposes a complex problem into computations that can be evaluated independently and solved by computers connected to the Internet; unlike the SETI project, it does so without knowing the participating servers. Unlike `cracking' (breaking into a computer)or computer viruses, parasitic computing does not compromise the security of the targeted servers. It accesses only those parts of the servers that have been made explicitly available for Internet communication.

4. WORKING OF PARASITIC COMPUTING

Although any possible solution to such problems can be verified quickly, there is no known efficient way to identify a solution in the first place. The most notable characteristic of such a problem is that there is no fast solution because the time required to solve such a problem is exponentially proportional to the size of the problem. So, as the problem grows, the time required to find all solutions to the problem grows exponentially. The time required to solve a moderately large NP-Complete problem can easily reach billions if not trillions of years using any modern computing technology we have available today. For this reason, even just determining whether there is a fast solution to such problems or not is one of the principal unsolved problems of computer science.



The parasitic computer starts the process by transmitting specially generated messages to the number of targeted web servers consisting of arithmetic and logic unit (ALU) and a network interface (NIF). Then, the packet carrying one of the possible solutions to the problem is inserted into the IP level bypassing the parasitic node's TCP.

The parasitic computer generates a message so that if the solution is not valid, it will fail the TCP checksum on the destination machine, and the packet will be dropped. However, when the solution is correct, it will be propagated to the HTTP layer via TCP. Since it is a web server's behavior to respond to any requests coming to an HTTP layer regardless of whether it understands the request or not, the webserver will respond back to the parasitic computer that it has received an HTTP request. Thus, the parasitic computer sends out a message for each possible solution it only receives responses from the server when the possible solution is one of the actual solutions to the problem.

5. FEATURES OF PARASITIC COMPUTING

There are some unique features of parasitic computing which make it different from other technique as follows:

i. computing theoretically offers the chance to use the vast computational power of the whole Internet.
ii. Several significant computational problems can be solved by engaging various web servers in different parts of the world, each of which unknowingly participated in the experiment.

iii. ethically challenging alternative for cluster computing, as it uses resources without the consent of the computer's owner.

iv. parasitic computing does not compromise the security of the targeted servers and accesses only those parts of the servers that have been made explicitly available for Internet communication.

6. DRAWBACK OF PARASITIC COMPUTING

Adverse effects of parasitic computing may be considered as malicious use of other resources by resources. However, there is no security breach of the computer as standard packets are only used in communication. Therefore, it does not offend any law, but it still leads to the unauthorized use of others resources. Various ethical issues raised by parasitic computing are:

i. It is difficult to bound parasitic computing. It exploits basic internet protocols of communication. In order to communicate over the Internet, these are the basic requirements as well as the necessity for communication. Revoking them would lead to loss of communication.

ii. Communication over the Internet is based on, to some extent, on trust. Packets are sent and received by machines on trust. Initial processing of the packet is done without any authentication. Parasitic computing exploits this trust relationship.

iii. As the target machine is busy performing computation given by parasitic computers, it can cause a delay in services or denial of service. Intensive computations may delay the communication process of the target machine. Flooding of packets by parasitic

computers may slow network connectivity.

7. CONCLUSION

Parasitic computing exploits communication protocols for computations tasks, thereby proving the scope that network protocols can be utilized to instruct other computers on the network to perform computational tasks without their knowledge and consent. The implementation discussed proves the concept in its basic form. However, it presents a scope that different computational problems can be solved using parasitic computing. Issues that exist with parasitic computing include denial of service, network congestion, and above all, using others' resources without their consent. Indeed, the TCP checksum provides a series of additions and a comparison at the cost of hundreds of machine cycles to send and receive messages, making it computationally inefficient. The computation-to-communication ratio must increase until the computation exported by the parasitic node is larger than the number of cycles required by the node to solve the problem itself instead of sending it to the target to make the model viable.

Theoretically, it cannot be considered a security breach, thereby making its existence long live.

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A Study on Internet as a Marketing Tool

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Abstract: In today's modern world, the Internet has become a major necessitate in our lives. Internet as a marketing tool is more likely to be used more than other media like news, television, etc. The Internet has changed marketing tremendously in this era and has significantly impacted buyers' online product prices and promotions. It is a process of creating and maintaining the need and the desire of a customer and having a good customer relationship. Internet marketing can also be termed as E-marketing or online marketing, or E-commerce.

Keywords: Affiliate Marketing, Content Marketing, Social Media Marketing, Video Marketing

1. INTRODUCTION

In current years, the Internet has become an essential part of marketing. Internet marketing provides a smooth and flexible platform for small local retailers and businesses to interact with consumers directly. They can now advertise their products and services on a large scale and to a broader market. More companies have chosen E-marketing to advertise their products and services. Marketing through the Internet has resulted in the third communication revolution that provided a direct path for companies to reach their target customer, leading to customer satisfaction. It has created much awareness amongst all the customers. It was widely benefited both seller and buyer to meet their needs and wants. More and more people have started to buy products online because it has created a wholesome environment for both parties. Marketing heads use various methods to promote their product and getting more traffic on their website or a specific webpage. Many companies use Internet marketing as a medium to advertise their products like HP, use the Internet as an alternative media, and advertise on all other media platforms. It all depends on the size of the companies and their investments. It is all a basic understanding to promote products through the Internet, which has been very successful in this modern times.

2. OBJECTIVE

One of the core objectives of Internet Marketing is to increase returns. For every organization, the main objective of marketing is to get max profits and increase income and internet marketing is like any other marketing is not an exemption.

The objective of internet marketing is as follows-;

i. Familiarity

The comprehensibility of the organization that deals through internet marketing give a wide range of selection to all its customers, who can surf through their products. It does not matter if the transaction is successful or not. It helps the organization create awareness of its brands and services. With the help of the Internet, it attracts more traffic to their websites and web pages to create awareness amongst their customer to promote their products and services.

ii. Create Temptation/Enticement

Without a temptation for a product, the buyers are just familiar with the product .there is no desire to buy one's product. So the main objective here is to make an excellent public relationship so that the customer is intrigued to buy the product after awareness.

iii. Encourage Business Deal

The organization's primary purpose is to initiate more transactions for more profits and returns in a profit organization. The two objectives are sufficient for internet marketing, but the organization wants to deal with the customer on another level to increase their profits. They can exclude intermediaries from the websites where the customer buy should be more

flexible and user-friendly to do more transactions without difficulties.

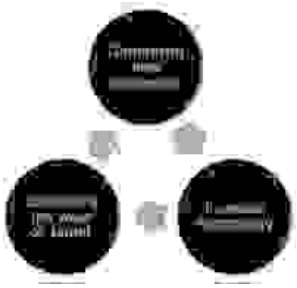

Fig.1. Objective of Internet Marketing

3. TECHNIQUES TO USE THE INTERNET AS A MARKETING TOOL

i. Pay Per Click (PPC)

It is an Internet advertising model used to express traffic to websites, in which sellers pay when the ad is clicked. PPC is the best method used in internet marketing. Through this medium, people get to see an advertisement. Target customers click on the advertisement link, pay, and ensure that they are the target customer rather than any other customer who does not require the product.

Many tools such as Google AdWords permit relevant keywords to ensure that people can choose the terms that people search. A rule of thumb is that longer keyword phrases allow better targeting and, therefore, cheaper clicks.

ii. SEO

Search engine optimization (SEO) is a technique to maximize the quantity and quality of the website. It gives a stable environment to the product through non-paid searches. It takes a little bit more in SEO to grow business to get at a higher level. To achieve a certain level, one should create content relevant to keywords and phrases that customers use. Again, one can check Google Adwords to see that people use specific keywords to find sites and click on the links suitable for meeting their needs.

SEO is not a very promising job at the present moment. However, it will come up when many big investors use digital marketing to find websites and invest in the organization.

iii. Video Marketing

Video is one of the top budding areas of online marketing. Not only is it preferred with people who like watching instead of reading, but it is also best used to sell the product by a video because people these days have a better sight of video marketing. It enhances the product advertisement to a certain level which cannot be done through any other means.

One of the best examples of video marketing is YouTube. It is the second most popular search engine after Google, and YouTube allows its users to host their video for free. After this, Facebook also started with this system where the user directly uploads his/her videos so that their followers can watch them directly.

The potential of video marketing is quite impressive. Small businesses can also be used because they do not require many expenses and are very effective and efficient.

iv. Social media Marketing

People nowadays are very socially active. The massive advantage of social marketing is accessible for all people and even for a business account on Instagram and Facebook. A regular customer can easily access a business account with one click and purchase products using social media.

Most social media platforms also allow some level of paid advertising to reach even more potential customers, often for a far lower cost than through other forms of online advertising such as PPC.

v. Content Marketing

Also, there is a question section for all the people who visit the sites. Websites which have genuine content are more likely to be trusted by the people on the Internet. The more people see rich content, the more people visit those sites, and the traffic on the site is attracted. Many businesses have a blog page where they give daily updates about their own business. It also creates awareness among users about their product.

vi. Affiliate Marketing

In Affiliate marketing, the executive is rewarded whenever the customer and affiliates their marketing efforts. This type of reward-based strategy is very effective and efficient.

One can sell their products online through this medium by paying basic pay. Some people who are not good at sales choose this marketing strategy and get sales in minimal time, the people who are good at selling are hired for this type of job, and they uplift the product in the market, which creates a desire in the customer to

buy the product. Examples of these institutes are click banks, etc.

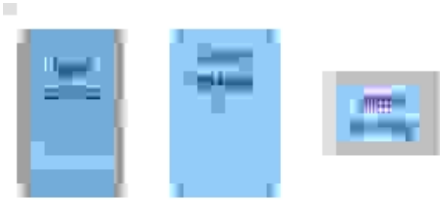

Fig.2. Internet Advertising

4. MARKETING ON THE INTERNET

There are four P's in marketing which are also included Internet Marketing.

1. Product
2. Price
3. Place
4. Promotion

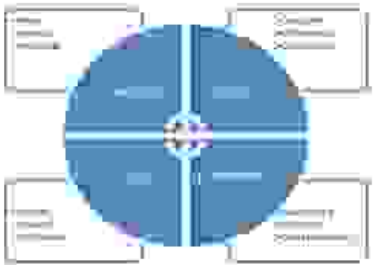

Fig.3. Four P's of Marketing

Product: It generally means the companies goods and services that the company provides to their customer, which fulfills the customer needs and wants. Every company knows about their product and how to promote it. What kind of product defines what type of company it is. Apple was the first company to launch a touch screen phone.

Price: It is the cost of the product that the company sets for the customer to pay. The company decides the cost, keeping in mind the supply cost, manufacturing, discounts, and keeping up with the competitors and putting it on the Internet to decide whichever product they want to choose and buy that exact product.
The cost may be categorized as follows:

Opportunity Cost
It all depends on the business what kind of cost is best suited for the customer. Spending a certain amount of money on one advertisement to get to a larger market is the best option for the company.
Online Pricing Comparison
When customers buy products online, they compare prices from different sites to get the value they want and fulfill their requirements. Some prices are customed according to consumer needs.

Place: keeping in mind the product description, the company sets a place accordingly and when to sell the product, ease in delivering the product to the market. The aim is to get the product to the consumer as fast as possible and to the right place. Different stores are located to the benefit of the consumer. For example, many Amazon warehouses are located just at the right place to reach the customer as soon as possible.

Promotion: Promotion is one of the essential P in Internet Marketing because it is one of the cheapest ways to promote the product through internet marketing. Organizations on websites tend to promote in many different ways like video marketing pay per clips, etc., called Digital Marketing. It also includes public relations, advertisement, etc.

5. INTERNET MARKETING SURVEY

Data collection for Internet Marketing Survey may be done following three different methods:

i. Direct observation

The content of a WEB site page can be directly observed by the researchers or a sample of users. This method may be used to collect objective data such as the number of advertisements on-page or the existence of frames or the number of links inside that page or to gather data such as users' satisfaction about their content or design of web application.

ii. A Questionnaire

Four kinds of formats could be used for internet questionnaire surveys:

- Web sites questionnaires
- Email questionnaires;
- Downloadable text formatted form posted at design.

Except for technical issues, there are no fundamental differences between these forms of questionnaires and the traditional questionnaires, i.e., by mail or phone.

iii. An Experiment

An experiment can be managed by forming an experimental Web page and knowing users' requirement behaviors towards some manipulated changes in the site. The content is manipulated to identify its effect on consumer behaviors.

There are Eight, unlike research designs, can result from the blend of the above three dimensions.

i. The first and easiest design is to draw a sample of Web pages after the analyst has noticed the pages' content. This design can learn cyberspace as a marketing tool, especially the fulfillment of a page in terms of image or advertisement.

ii. A second design is to draw a sample of Web pages by a two-stage sampling procedure. The first stage contains drawing a sample of Web sites and the second round of drawing a sample of pages between the pick-out sites. This design lets the researchers control the representativity of the selected in terms of the kind of site. Thus design, non-commercial sites might, for example, be easily excluded from the sample. Watching may also be used to study the usage of the Internet as a marketing tool.

iii. A sample of Webpages may also be drained to command the Internet's utilization as a marketing tool by watching still at a level higher than the Web page. Mottner et al. (2001) use a similar design to develop a typology of Internet exporters. Compared with the earlier design, this permits the researcher to study the structure of a site.

iv. In the old two designs, the researchers were the spectator. However, to study some subjective features of the Web pages, the observation could be done by a representative of customers. In this case, two samples need to be drawn: first, customers and the second sample of Web sites or pages. This blueprint may also be used to learning the use of the Internet as a marketing tool. For example, Griffith and Krampf (1998) have used such a design to examine the impact of the retail marketing mix on consumer attitudes.

v. A Web page sample can also be drawn to obtain firms' addresses (mail, email, phone, or fax) and the executive's name. Then a test could be sent to these firms or managers. This design is fascinating for two main reasons: first, before sending a test, some characteristics of the firms to be sampled could be examined to be sure that these firms belong constructively to the population to be studied; second, the Web page can offer to the researcher's details is not listed all over, for example, an email address. Fontenot and Vlosky (1998) used this design for their exploratory study of Internet buyer-seller connection.

vi. Comley (1996) has used a similar design to look into the use of the Internet as a data collection technique. Instead of sketch sample pages, a sample of Internet users could be drawn to send them a test by email or to send them to an Internet address where a questionnaire is located. Nevertheless, this blueprint could also be used in the various unlike questionnaire views related or not to the Internet.

vii. A sample of Web pages and a sample of the Internet enjoyer could too be drawn. The Internet users are to query to visit selected Web pages and fill in a test concerning individual experience with the selected Web pages. Unlike the design where only the users are sampled, this design permits the researchers to Determine which Internet users visit sites.

viii. An experimental design could also be used for Internet marketing examination. An experimental Web page may be designed, and Internet users could be drawn along with asked to visit the page.

6. CHALLENGES IN MARKETING SURVEY

The challenges that exists in Internet Marketing survey are as follows:

i. Challenges related to the Format of Questionnaire

Three kinds of formats for the questionnaire could be used:

1) Web site questionnaires;
2) Email questionnaires; and
3) work forms sent by email as an attached file. Each one of these formats has some problems.

ii. Challenges related to use of Research Engines to get a Frame

The most crucial issue of a sample on the Internet is to get a "representative" mount of the Internet universe from which we can draw a probabilistic trial. One solution to this difficulty is to use search engines as a sampling mount. However, search engines are not perfect mount, and their standard has to be assessed. Their quality as a sampling mount depends on three criteria:

1) The size of their index;
2) The freshness of the index; and
3) The ranking procedure and relevancy.

The "representativity" – i.e., the quality – of the mount is the most critical problem for the logic of a view. Some trials have to be done to estimate this quality.

These tests consist of the control of the part of the different Levant in the mount. A non-exhaustive list of the Levant could be:

· The proportion of dead sites in the mount – i.e., non-existing addresses;
· The proportion of shutting down lots – i.e., non-responding addresses;
· The proportion of lots having changed their address but maintaining a link between the old and the new addresses;
· The proportion of sites (pages) appearing more than once in the mount – duplication.

The evaluation of these moves has to be completed by analyzing the importance of the bias that they create.

iii. Challenges related to the sampling units

The Internet is a network collected of sites, pages, links between different pages inside the same site, and links between different pages; the sampling units could also be a page, a site, or a group of sites. The mount generally available – search engines – give the address of one or more pages of sites. If the sample unit is the site, a problem of surplus appears, and if the sampling unit is the

Page, the problem is that not every page of a particular site is in the frame. The sample unit could also be a group of sites belonging to the same firm –i.e., international mount – but having different addresses and related by several links. When the sample unit is the site, it is essential to clean the frame of all duplications before drawing a sample. When the sample unit is the page, a two-stage sample is better. The first period is to draw a sample of sites, and the second is to draw a sample of pages among the sites sampled.

7. CONCLUSION

This paper was written to study Internet as a Marketing tools. The objective of this paper was to know how all businesses use the Internet as a marketing place to sell their products. As we all are aware that with the advancement of technology .it is a very successful option for digital marketers. It is a growing field and has many scopes., in a minimal time, all the businesses have grown and have covered a wide range of customers .internet marketing has given a bigger platform, especially to all the small businesses who entered internet marketing. It gave them a chance to get to their target audience. This paper discusses about the various dimensions of Internet as a Marketing tool like Internet Marketing techniques , survey and the various challenges which exist during Internet Marketing survey. Nevertheless, these problems, it is reasonable to wrap up that e-marketing is, on the whole, a helpful development for businesses and that despite certain dangers, its impact upon businesses has mainly been positive.

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Neuralink- Brain's Magical Future : Time to Augment Intelligence

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Abstract: Over the years, Artificial Intelligence (AI) and Machine Learning (ML) have evolved to the extent that the biological evolution of humans could not compete and would be ousted. In many jobs worldwide, humans are being superseded by robots as they are more efficient and can be upgraded as per the requirement. So the only solution for humans is upgradation which can be achieved by mixing both the intelligence and improving the skill set of humans using the concept of Neural Lace using the technology of Brain-Computer Interface.

Neuralink, a neurotechnology company, works with the same ideology of bringing both intelligence together and making humans relevant again. They also focus on treating brain disorders and restore the body's dysfunctionalities to help in the evolution of humans.

Keywords- Artificial Intelligence, Brain-Computer Interface, Neurons, Neural Lace, Neuralink

1. INTRODUCTION

In 1843 Emil du Bois-Reymond illustrated the similarities of nerve signals with electrical signals, which Hermann von Helmholtz measured in 1849. In 1924, Hans Berger invented electroencephalography (EEG), a monitoring method used to record the brain's electrical activity. Recently, the studies related to neuroprosthetics have advanced, and it helps substitute neural signals that might get damaged due to a particular injury or disease. Neuralink uses technology that performs electrical signals that are no longer possible by humans and connects them to external computing devices.

2. ABOUT NEURALINK

Elon Musk founded a neurotechnology company in 2016 named Neuralink, which was highly secretive till 2019 where Elon Musk showcased their prototype. Neuralink aims to create a link between Neurons and AI and computers. In July 2019, Elon Musk revealed their prototype and their intention & future enhancement with the vision of symbiosis between humans and AI and treated severe brain disorders.

Fig. . Neuralink Logo

(28 August 2020), Elon Musk updated their prototype and showcased a live demonstration with pigs. They overhauled the design from being surgically implanted behind the ears to a modified new way by removing a small part of the skull and replacing it with The LINK, the name of the chip which 100% concealed inside the brain. They reduced the size of the chip to the size of a large coin.

Elon Musk also talked about “Neural Lace”, a fictional concept of communication between brain and machine and vice-versa, and how it stemmed his interest in this idea.

3. BRAIN-COMPUTER INTERFACE

Brain-Computer Interface (BCI) is an interface through which the computer can read the brain's signals and help users communicate and control body channels that are not dependent on the brain's normal output channels, such as peripheral nerves and muscles. To achieve this, we require a high bandwidth data rate transfer. However, we as humans only use fingers to input the data, which significantly reduces the bandwidth, so we can improve bandwidth if data is transferred directly from our brain to the machine.

Brain-Machine Interfaces can help in restoring or repairing our cognitive and sensory-motor functions. Neuralink uses threads and electrodes to achieve a high-bandwidth channel from the brain to improve data rate and restore any body's dysfunction like a micro-controller.

4. NEURONS AND NERVOUS SYSTEM

How our brain works are pretty fascinating. The Nervous System transmits signals to and from different parts of the body. It consists of two main parts, i.e., Central Nervous System (CNS) and Peripheral Nervous System (PNS). CNS consists of the brain, spinal cord, and PNS, consisting mainly of nerves, long fibers, or axons, which connect CNS to every other part of the body. Nerve Cells or Neurons communicate with other cells using a connection called Synapses. It acts as a transport system for our sensory and motor nerve signals. Sensory Neurons act upon stimuli such as feel, touch, see, sound, or light which are then sent to CNS. Motor Neurons transfer signals from the brain and spinal cord to control muscle contraction.

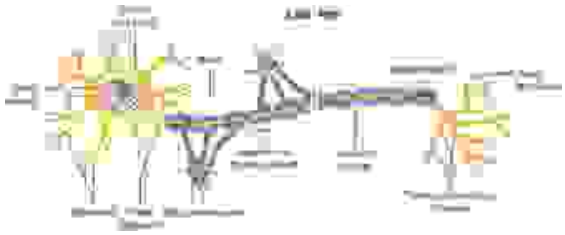

Fig.2. Neurons and Nervous System

5. USE OF NEURONS BY NEURALINK

Neuralink will insert electrodes using a neurosurgical robot with high-level precision as those electrodes are too small for humans to handle, even with tweezers avoiding veins and arteries. Neuralink aims to read and write brain activity in which writing is possible using two-photon microscopy, which is a method that stimulates the neuron firing process. The writing of electrodes will help in treating brain diseases such as paralysis and dementia.

6. NEURAL LACE

Neural Lace is a science-fictional concept that originated from series of novels, "The Culture", written by Scottish Author Ian M. Banks. Neural Lace is an upgraded form of Brain-Computer Interface (BCI), which will help humans to enhance their skills to stand side-by-side with Artificial Intelligence.

Neural Lace is an ultra-thin mesh with a bunch of electrodes used to monitor brain functions and enable direct brain computing capabilities. The mesh is inserted using a tiny needle containing the rolled-up mesh. After implanting mesh inside the brain, it spans across the brain and creates a symbiosis between human and machine.

Neuralink adopts a similar concept to unite the human brain with intelligent computers.

7. NEUROPROSTHETICS

Neuroprosthetics is neural prostheses designed to perform functions that are no longer capable by the human body due to any injury or brain disorder. These are the devices that are built to substitute the missing biological functions. The concerns regarding the implants in the brain are justifiable, but the possibilities with these prosthetics are endless. An individual can recover its sensory, motor, or cognitive modality.

Over the years, Neuroprosthetics have helped in recovering the visual, auditory, and many more problems. Neuralink aims to deliver neural prostheses combined with Brain-Computer Interface, which gives users complete control over prosthetics restoring the neural signals lost due to any disease. Neuralink visions on restoring full-body motion neural shunt.

8. ERA OF TRANSHUMANISM

Transhumanism is a technology that helps in enhancing humanity's capability through a combination of science and human biology. The idea of transhumanism was firstly seen in 1923 by British geneticist J.B.S Haldane in his essay “Daedalus: Science and the Future”.

Transhumanism aims at the improvement of humans and gains greater control of altered states of consciousness. It helped many people regain the sensory motions using prosthetics connected to their nerve cells and controlled by neurons of the brain.

9. ARCHITECTURE

In 2019, Elon Musk showcased the prototype of the Neuralink Chip, which are ultrafine threads that can be woven into the brain. The N1, 4mm-square chip implanted into the skull has wires thinner than a human hair placed to necessary parts of the brain. The chip rest over the user's ear like a hearing aid containing Bluetooth radio and battery. It connects to iPhones through an app. No physical product was displayed.

Later on 28 August 2020, Elon Musk showcased the update to the chip named "The Link", which is now reduced to the size of a large coin and entirely inside the brain by replacing a small piece of the skull, all done by the Neurosurgical Robot fully automated process with great precision. It is inductively charged with Bluetooth, battery, and reversibility is the key if someone no longer wants to continue with the link. They also demonstrated the chip on pigs and showcased the neural spikes in the implant. It is measured at 23 mm by 8 mm and has 1024 electrode threads.

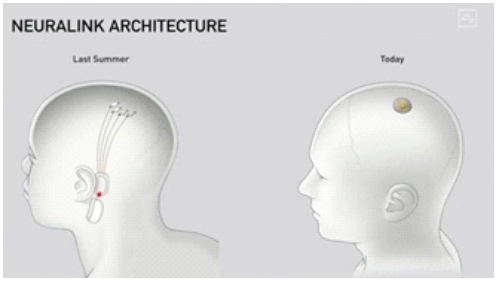

Fig. Neuralink Architecture /Source: Neuralink

i. Threads

"Threads" are the ultra-thin electrodes the information to the transmitter. The wires (4-6 μm) are thinner than a human hair (17 μm) and 20 μm. The human brain changes shape over time which may cause damage to these threads, but these threads are flexible to help them shift accordingly. Tiny little flexible threads each have multiple little electrodes at the very end. When one gets those electrodes next to a neuron, one can record what that neuron is doing.

However, there lies a disadvantage, i.e., these threads are too small for humans to handle even with tweezers and can break if not stitched carefully. So, Neuralink has created a neurosurgical robot that can automatically use AI to perform the surgery in less than an hour and even without the need for general anesthesia.

Fig. . Neural Threads / Source: Neuralink

Fig. . Neural Inductively charger /Source: Neuralink

2. ROBOTS

The Surgical Robot is designed with the sole purpose of inserting the electrodes in the least invasive manner and with incredible precision. It is co-created by San Francisco-based firm Woke Studio in which Neuralink engineers and scientists developed technology.

The robot consists of three main parts-

a) The Head holds the head of the patient as well as the guide for the surgical needle. It has embedded cameras and sensors for mapping the patient's brain. It includes a single-use disposable bag that lines the interior of the helmet for sterile operation.

b) The Body includes the mechanism responsible for the movement of the robot to set up for the procedure.

c) The Base contains the computing hardware of the robot and also keeps the machine from tipping over.

d) During Insertion, four cameras are focused on the needle.

e) Stereoscopic Cameras

Figure : Neurosurgical Robot /Source: Neuralink

Neuralink opted for robotic insertion for fast and precise insertion of threads. The electrodes are inserted while avoiding arteries and veins to avoid bleeding and the formation of Glial Scar3. The Robot has four cameras focusing on the needle during insertion and stereoscopy.

10. IMPLEMENTATION AND VISIONARY

Neuralink had showcased a demonstration of the group of pigs that are being used to test the device. The chip was sending real-time neural signals from the animal's brain whenever they touched something with their snout. They were all described as "healthy and happy", one of the pigs was given an implant two months ago, while another pig has dual Neuralink implants, showcasing that it is possible to have multiple chips in your head at the same time.

A third pig has no implant demonstrating that the animals are "indistinguishable" from each other.

Neuralink using flexible threads for long-life and improved data speeds. They simplified the device from a hearing-aid-like product to a chip that sits flush with the skull making it look normal. Lastly, a pig that previously had a chip inserted into its brain has been removed to show that the procedure is reversible without any side effects.

Neuralink also stated that “The Link” will be available for clinical trials for people with paraplegia or tetraplegia by the end of 2021.

The vision of the Neuralink is to achieve full AI Symbiosis, which will help in reading and writing brain activity. Elon Musk, in an interview, also expressed his vision of a Non-Verbal way to communicate and having a universal language. Also, humans need to merge with AI to save humanity's future. Otherwise, AI can dethrone us.

11. SYMBIOSIS IS NECESSITY OR NOT

We as humans always got fascinated by innovation without realizing its long-term effect. There are many examples that when humans had tried to interfere with natural process repercussions are to be faced.

Humans have always adapted to the change in the environment, such as the adoption of laptops or smartphones. Maybe AI seemingly feels futuristic might get adapted by future generations and can outlast the AI.

Insertion of a foreign element in our body is far more modification which our body might not handle. It is worth paying a considerable sum of money and getting drilled in our skull, which might bring problems over the benefits in the long term. Interfering with the natural process is not what has proven to be a good idea, and using technology other than medical purposes is unnecessary.

12. COMPETITORS USING BCI

i. EMOTIV

Emotiv is also a technology company using Brain-Computer Interface to help in improving healthcare. They have developed a wireless headset that records 14-level EEG (electroencephalography), which helps examine stress, focus, and more. Emotiv made access to raw data of the headset a paid option which was not appreciated.

ii. KERNEL

The kernel is a private neurotechnology company found by Bryan Johnson. The kernel is working over a technology to measure and stimulate activity from a group of neurons. As of 2019, the company is researching neurological diseases and disorders.

13. FUTURE OF NEURALINK

Brain-Computer Interface has lots of potentials to innovate and can start a new biological era, but the consumer needs to adopt the technology. Neuralink needs to keep the hardware as well software as seamless and smooth as possible otherwise. It will not be suitable for the company's reputation. For mass coverage, the technology should be affordable, assure their products, and improve security to preserve customer privacy. Neuralink can be a great innovation of all time but need not be vigilant and make necessary changes as per the early adopters.

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Virtual Reality

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ABSTRACT: During this era, most folks are aware of Virtual Reality whether or not they recognize it's good; however, somehow and somewhere they expertise VR, it might be in education, games, training, fashion, or sports. VR is a technology that permits a user to act with computer-simulated surroundings. Those surroundings may be a simulation of the vital world or associate imagined world. It is the key to experiencing, feeling, and touching the past, gift, and future. However, only a few folks recognize what VR is, its fundamental principles, and its open issues. During this paper, a historical summary of VR is given. Basic nomenclature and categories of VR systems are listed, followed by applications in science, work, and diversion areas.

Keywords: BOOM, CAVE, Sensorama, Virtual Reality

1. INTRODUCTION

Virtual Reality (VR) is not an entirely new concept; it has existed in numerous forms since the late Nineteen Sixties. It permits ascertaining the encompassing world in alternative dimensions and expertise things that do not seem accessible in the world or perhaps not created. It is created and manipulated by ourselves as we evolved -we will enhance it by a fourth dimension: the dimension of our imagination.

The latest manifestation of VR is desktop VR, most notably in education, wherever computer-based virtual learning environments (VLE) are prepacked as desktop VR. These computer-based virtual learning environments (VLEs) have opened new teaching, learning, following medication, physical sciences, and engineering. VLEs offer students the chance to realize and learn about their goals. Virtual learning environments offer three-dimensional (3D) insights into the structures and functions of any system desired. Students will thereby learn the principles of such a system in an exceedingly quick, effective. It is better known than VR to create the fictitious as realistic as, and even a lot more realistic than, the real.

Virtual Reality technology has been a promising technology applicable in numerous application domains like coaching simulators, medical and health care, rehabilitation, education, engineering, scientific image, and show biz. Additionally, VR will result in states of the art and technologies like Second Life. This fascination with a new reality often starts with computer games and lasts forever. It allows one to see the surrounding world in other dimensions and experience things that are not accessible in real life or even not yet created.

Moreover, the world of three-dimensional graphics has neither borders nor constraints and can be created and manipulated by ourselves as we wish – we can enhance it by a fourth dimension: the dimension of our imagination.

2. EVOLUTION OF VIRTUAL REALITY

Ivan Sutherland presented the very first idea of it in 1965: "make that (virtual) world in the window look real, sound real, feel real, and respond realistically to the viewer's actions." It has been a long time since then; much research has been done. Let us have a short glimpse at the last three decades of research in Virtual Reality and its highlights:

i. Sensorama

The Sensorama Machine was concocted in 1957 and licensed in 1962 under patent # 3,050,870. Morton Heilig made a multi-tangible test system. A prerecorded film in shading and sound system was enlarged by binaural sound, aroma, wind, and vibration encounters.

It was the primary way to deal with make an augmented simulation framework, and it had every one of the highlights of such a climate, yet it was not intuitive.

Fig.1.
https://www.pinterest.co.uk/pin/352969689529371489

ii. The Ultimate Display
In 1965, Ivan Sutherland proposed a definitive augmented reality arrangement: a counterfeit world development idea that included intelligent illustrations, power input, sound, smell, and taste.

iii. The Sword of Damocles
The primary augmented simulation framework acknowledged in equipment, not in idea. Ivan Sutherland builds a gadget considered the main Head Mounted Display (HMD), with a fitting head following. It upheld a sound system see that was refreshed effectively as per the client's head position and direction

iv. GROPE
The primary model of a power input framework was acknowledged at the University of North Carolina (UNC) in 1971.

v. VIDEO PLACE
Artificial Reality made in 1975 by Myron Krueger – "a theoretical climate, with no presence". VIDEO PLACE was made where the PC had power over the connection between the member's picture and the articles in the actual scene. It could arrange the development of a realistic item with the activities of the member. In this framework, the outlines of the clients got by the cameras were projected on a huge screen. The members could interface one with the other gratitude to the picture handling methods that decided their situations in the 2D screen's space.

vi. VCASS
Thomas Furness at the US Air Force's Armstrong Medical Research Laboratories created in 1982 the Visually Coupled Airborne Systems Simulator – a high level pilot test program. The military pilot wore an HMD that increased the out-the-window see by the designs focusing on ideal flight way data.

vii. VIVED
Virtual Visual Environment Display – built at the NASA Ames in 1984 with off-the-rack innovation a stereoscopic monochrome HMD.

viii. VPL
The VPL organization fabricates the mainstream DataGlove (1985) and the Eyephone HMD (1988) – the first monetarily accessible VR gadgets.

ix. BOOM
Popularized in 1989 by the Fake Space Labs. Blast is a little box containing two CRT screens that can be seen through the eye openings. The client can get the container, keep it by the eyes and travel through the virtual world, as the mechanical arm estimates the position and direction of the case.

x. UNC Walkthrough project
In the second half of the 1980s at the University of North Carolina, an engineering walkthrough application was created. A few VR gadgets were built to improve the nature of this framework, like HMDs, optical trackers, and the Pixel-Plane illustrations motor.

xi. Virtual Wind Tunnel – Created in the mid 1990s at the NASA Ames application that permitted the perception and examination of stream fields with the assistance of BOOM and DataGlove.

xii. CAVE – Introduced in 1992. Cavern (CAVE Automatic Virtual Environment) is a computer generated experience and logical representation framework. Rather than utilizing an HMD, it projects stereoscopic pictures on the dividers of the room (client should wear LCD screen glasses). This methodology guarantees the overall quality and goal of saw pictures and a more extensive field of view in contrast with HMD based frameworks.

Fig.2.
https://prodisplay.com/products/cave-projection-screens

3. WHAT IS VR OR VR NOT:

At the beginning of the 1990s, virtual reality development became much stormier, and the term Virtual Reality itself became extremely popular. We can hear about Virtual Reality nearly in all sorts of media, people use this term very often, and they misuse it in many cases. The reason is that this new, promising, and fascinating technology captures the greater interest of people than, e.g., computer graphics. The consequence of this state is that nowadays, the border between 3D computer graphics and Virtual Reality becomes fuzzy. It cooperates with recreated protests in that climate as though they were genuine. A few people can see each other and interface in a shared Synthetic climate like a war zone. Augmented Reality is a term used to portray a PC created virtual Environment that a client might have traveled through and controlled progressively. A virtual climate might be shown on a head-mounted showcase, a PC screen, or an enormous projection screen. Head and hand global positioning frameworks empower clients to notice, move around, and control the virtual climate. The primary contrast between VR frameworks and traditional media (like radio, TV) lies in the three-dimensionality of Virtual Reality structure. Drenching, presence, and intuitiveness are unconventional highlights of Virtual Reality that draw it from other illustrative innovations. Computer generated Reality does not copy genuine Reality, nor does it have an illustrative capacity. Person's have failed to recognize discernment, mind flight, and hallucinations. VR has developed into another stage and turns into a particular field in-universe of processing. The utility of VR has effectively been investigated in-vehicle plan, robot configuration, medication, science, science, training, and design and construction.

4. WORKING OF VR:

The thought behind VR is to convey a feeling of being, thereby giving the eye what it would have gotten on the off chance that it was there and, more imperative to have the picture change quickly as the perspective is changed. The spatial truth is driven by different obvious signs, similar to relative size, brilliance, and rakish development. One of the most grounded is the point of view, which is incredibly unique in its binocular structure in that the privilege and left eyes see various pictures. Intertwining these pictures into one 3D insight is the premise of stereovision. The view of profundity given by each eye seeing a marginally extraordinary picture, eye parallax, is best for objects close to you. Items farther away cast a similar picture on each eye. The typical clothing standard for VR is a head protector with goggle-like presentations, one for each eye. Each show conveys a marginally alternate point of view picture of what you would check whether you were there. As you move your head, the picture quickly refreshes, so you believe you are rolling out these improvements by moving your head (versus the PC following your movement, which it is). You believe you are the reason, not the impact.

5. USES OF VIRTUAL REALITY

It is not easy to characterize every one of the employments of VR because presently, it is sufficient to create in numerous fields. Here, a few employments of VR are clarified. EDS Jack is an illustration of an economically accessible augmented experience programming bundle. It is primarily utilized for perceivability and ergonomics study. These are two of the regions that utilizing Virtual Reality truly benefits. For instance, when planning an enormous mechanical gadget like a tractor or even a vehicle, perceivability and ergonomics are vital to the administrators. Would you purchase a vehicle that was awkward to drive or had helpless perceivability, presumably not? Numerous organizations go through a lot of lucrative their items interface better with the administrators. The expense of building models is extravagant, upwards of a couple of million dollars for one machine utilizing the tractor model. By utilizing computer generated Reality, the organization could rapidly look at the feasibility and ergonomics of their machine and make changes to it while never burning through cash on building equipment. Another region that Virtual Reality is vigorously utilized in is driving or flying recreations. These allow the clients to acquire aptitude working a vehicle without this present reality results of committing an error. MPI Vega Prime is an illustration of a product bundle that upholds any driving reproduction. The client constructs the virtual climate inside the product bundle. Its most significant benefit is its practical physical science motor which upholds crash location. Pilot test programs are the most well-known kind of machine recreation. The US Army's test systems to prepare tank binds with virtual tank wars would be different models. NASA additionally prepares its space travelers on the most proficient method to land the space transport with an augmented experience test system.

6. ADVANTAGES OF VIRTUAL REALITY

i. Quality visualizations: There is no doubt what VR can achieve when providing an impressive visualization. A VR headset is what you need for improved levels of experience.

ii. A solution to the language barrier: Using different emerging technology to overcome the communication gap between places or countries and do just fine using a VR headset.

iii. Increases levels of interest: By using VR technology, many sectors are using VR as a tool to learn and improve their skill in many ways, e.g., flight simulation technology to teach how to fly. Students are also attracting to VR. It helps to under quickly.

iv. Facilitates retention of information: As we all know, we can memorize things we see. For this reason, VR presents different scenarios and acts accordingly. It is the main reason why VR is being used is Different education centers for training.

7. DISADVANTAGES OF VIRTUAL REALITY

I. Could be addictive: VR is used to represent imaginary things. It is pretty popular in youth and many adults. VR makes it more attractive. VR is being used in both learning and playing games, VR has become addictive to some students or teenagers and gamers who cannot just let it go, and that makes them to the technology, and this is one of the most common reasons why people want to sell their VR headsets.

ii. Provides no room for interaction: when we use VR for learning in the classroom, VR does not allow interaction since we are not open to asking questions or giving suggestions. It is always a one person job when it comes to learning with the help of using a VR headset.

iii. It is expensive: The use of VR is quite expensive due to its advanced feature. Therefore, it can be used by only those who can afford it. It makes it unfair, especially in learning, since not all students can afford it.

iv. High Level of Skill: It requires a high level of skill and programming language to develop and implement the VR device. It also requires outstanding technology that may be hardware and software to implement these.

8. CONCLUSION

Virtual Reality is now involved everywhere, whether in-home and industry everywhere VR technology is used.VR device has been improved since its origin. You cannot imagine your life without the use of VR Technology. In this paper, we define the definition of Virtual Reality and its history. We also define some significant development which gives and will give the birth of this new technology. Many VR technologies were developed for manufacturing, education, simulation, entertainment, Games, etc. VR technology is now recognized worldwide in many sectors, everywhere VR technology is used to make things easier. If this technology is used in the right way, it will human race achieve many more things.

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Internet of Things

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Abstract: The Internet of Things (IoT) is an emerging paradigm that describes a network between the physical objects "things" and sensors to connect and exchange data with other devices through the Internet. IoT's evolutions are Smart cities, smart homes, pollution control, waste management systems, smart transportation, and industries automation. Internet of Things (IoT) is a boundless approach for future technology enhancement. Many research studies and investigations have already been done to bring advancement in the technology through IoT. There are still many challenges and issues that must be considered, such as security and privacy of data or quality and reliability of services. This review article provides a detailed study about IoT from both technological and social frames of reference. The article discusses various challenges and critical issues of IoT and its potential application domains.

Keywords: Internet of Things; IoT applications; Smart Home; Smart Cities; RFID; GPS

1. INTRODUCTION

The Internet has been around for a while, but it has been mostly the product of people, so all of the data and images, recordings, games, books, commerce, and all of that were created by people, people, and people. The Internet has been the most important and transformative technology ever invented. Internet is like a digital fabric woven into the lives of all of us in one way or another. The Internet of people is changing the world with new internet emerging, and it has poised to change the world again. The new Internet is not just about connecting people, it is about connecting things, and so it is named the Internet of Things. With the introduction of the Internet of Things, the devices (things) can share their experiences with other things. When things or devices are added with the ability to sense, communicate, touch and control, the opportunity is other things. The examples of these things can be like generated for things to interact and collaborate with smartphones sensing our daily activities, smart-watches tracking our footstep or the smart home applications. Internet of Things was born when there were more things on the Internet than people around 2008, and today there are over 20 billion devices on the Internet.

The technologies inherent in the Internet of Things are helping to build processes and systems that can deliver better health care through remote diagnostics and monitoring and bring a safer environment with early warning systems for tsunami or earthquakes. Technologies already have a proven track record of providing a new comfort level for us and certainly convenience in automating everyday tasks. However, wisdom comes from sensing the world around us, collecting all that raw data, and finding how it comes together with patterns and trends, and that turns into knowledge, and what we derive from knowledge is wisdom.

The Internet of Things is the perfect way to collect data and turn them into wisdom and move the human race forward. Besides all the fascinating outcomes of the Internet of Things, there are many challenges, pitfalls, and blind spots. The challenges occur because it is human nature to resist change. In history, electricity, automobiles, airplane travel, or the telephone, took years from the point of the invention to the point of widespread adoption. So, one of the challenges for IoT maybe this notion or belief. However, another component is the technical side, and it is that the Internet of Things is way too complex. Privacy and security are significant challenges in the Internet of Things by overcoming the challenges IoT faces by

bringing up more stern approaches and protocols. Moreover, IoT researchers and developers are actively involved in uplifting the disabled and senior age group's lifestyle. As these devices and equipment are very cost-effective in terms of development cost and readily available within an average price range, most people are availing them [1].

The remaining part of the article is organized as follows: the "Literature review" section will provide state of the art on essential studies that addressed various challenges and issues in IoT. The "IoT architecture" section discusses the architecture of IoT in detail. The "Potential Application Domains of IoT" section provides the details of emerging domains of IoT. In the "Major Challenges of IoT" section, IoT's key issues and challenges are discussed. The "IoT as Frontline in Covid-19" section discusses the need for IoT technologies in pandemic times. Finally, the article is concluded in the "Conclusions" section.

2. LITERATURE REVIEW

Internet of Things promises to bring immense value into our lives with its several application domains such as environmental, industrial, public/private, medical, transportation, and many more. It enables devices to interact, collaborate and learn from each other's experiences just like humans do.

In the last few years, several Internet of Things projects has been taken into consideration.

The smart city is one of those significant IoT projects that incorporates smart homes as well. Smart homes consist of IoT-enabled home applications, air-conditioning/ heating systems, thermostats, television, audio/ video streaming devices, and security systems that communicate with each other to provide the best comfort, security, and reduced energy consumption. All this communication takes place through IoT based central control unit Internet. Besides various emerging IoT based technologies, an essential issue of IoT is the requirement of attention and much research towards security and privacy. Internet is the backbone for the communication among devices that takes place in an IoT system. Therefore, security issues in IP based IoT systems are an important concern.

Moreover, a significant concern around the world is climate change due to global warming. The introduction of an Integrated Information System (IIS) that integrates IoT, geo-informatics, cloud computing, Global Positioning System (GPS), Geographical Information System (GIS), and e-science is in order to provide an adequate environmental monitoring and control system. The IIS provides improved data collection, analysis, and decision making for climate control. Industrial IoT can also have a significant impact on reducing the carbon footprint of processes. It does so by minimizing natural resources, including raw materials, electricity, fossil fuels, and water. Alongside this, the technology can reduce production waste and play a vital role in tracking material flow in the emerging circular economy. IoT is the digital skin of our planet [3].

Quality of Service (QoS) has been considered the foremost challenge and a complex task in evaluating and selecting IoT devices and services. It is an essential criterion to attract and gain users' trust towards IoT devices and services.

Given all the benefits being provided by IoT devices and services, different governments worldwide have shown interest in the IoT concept by providing more funding in the field that is meant to facilitate further research.

3. IOT ARCHITECTURE

Internet of Things is a huge buzzword, and each person has their definition for it. Internet of Things aims to create a world where all devices and appliances are connected to a network and, in turn, actually collaborate to complete complex tasks which require a high degree of intelligence. It intends to help everyone ease up their tasks or day-to-day challenges, and this can be done using various devices using a connection as a medium. Moreover, in this case, the medium becomes the Internet. In the IoT ecosystem, there is no single architectural design that is agreed universally because each organization or user, for that matter, has different requirements. When we look down at it, we can break it down to a simple three-level architecture wherein we have mainly three layers, namely perception layer, network layer, and application layer.

Fig. 1 Three Layer Architecture of Internet of Things

Following is the detailed information about the three layers of basic IoT architecture:

I. Application layer: The application layer is responsible for delivering application specific services to the user. It defines applications in which the Internet of Things can be deployed.

ii. Network layer: The network layer is responsible for connecting smart things, network devices, and servers. It is also used for transmitting and processing sensor data.

iii. Perception layer: Under the perception, layer sensors sense and gather information about the environment. It senses physical parameters or identifies other objects in the environment.

The three-layer architecture defines the basic idea of the Internet of Things, which is insufficient for the detailed information gathering on IoT as there are various other essential aspects of IoT also present. That is why we have many more layered architectures proposed for the Internet of Things. Another one is the five-layer architecture, which additionally includes the processing, business, and transport layers [6].

Fig. 2 Five Layer Architecture of Internet of Things

Following is the detailed information about the five layers of basic IoT architecture:

i. Business layer: This layer manages the whole IoT system, including applications, business and profit models, and users' privacy.

ii. Application layer: The application is mainly responsible for delivering application specific services to the user.

iii. Processing layer: This layer stores, analyses, and processes a massive amount of data. It employs databases, cloud computing, and extensive data processing modules.

iv. Transport layer: The transport layer transfers the sensor data between different layers through networks such as wireless, 3G, LAN, Bluetooth, RFID, and NFC.

v. Perception layer: In this layer, sensors sense and gather information about the environment [6].

In some system architectures, the data processing is done in a significant centralized fashion on the cloud. Cloud centric architecture keeps the cloud at the center, applications above it, and the network or smart things below it.

4. POTENTIAL APPLICATION DOMAINS OF IOT

The association of IoT and usage of IoT data qualify various improvements and innovations in consumers' lives in business, healthcare, mobility, cities, and society. Researchers and developers are involved in developing highly efficient IoT devices to monitor several issues.

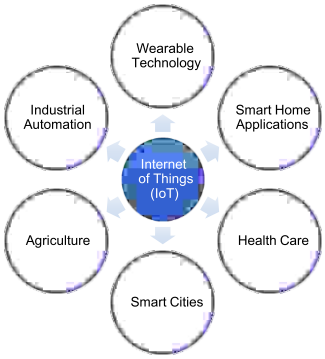

Fig.3 Some of the potential application domains of IoT

i. Wearables

IoT plays a crucial role in developing the smartness of wearable devices and can monitor several aspects of the human body. Nowadays, wearable technology is being widely used among the population. Devices like Fit Bits, heart rate monitors, and smart-watches have become very common. One of the most known wearables these days is the Guardian glucose monitoring device. This device is developed to aid people suffering from diabetes. It can easily detect glucose levels in the body using a glucose sensor

placed under the skin and pass on the information via Radio Frequency to a monitoring device [3].

ii. Smart Home Applications

The utilization of IoT on home appliances to make a smart home is a huge step in changing the view of life. The smart home can be called a group of intelligent devices such as smart lights, doors, windows, and many other things considered a smart home. Building smart homes with IoT helps us to manage our lives straightforwardly. When sensors are attached, the appliances designed by the intent of the smart home concept can be used without touching. The devices can be easily controlled with the help of applications on our smartphones or another device and the voice recognition option.

iii. Health Care

Most of the countries are still having inefficient, slow, and error prone health care systems. It can easily be changed by the introduction of automated devices and enhanced technology. IoT application offers many benefits in the health care sector, such as tracking of patients, pharmacy inventory control, temperature monitoring, testing, etc. Internet of Things explores new dimensions of patient care through real-time health monitoring and accurate access to patients' health data.

iv. Smart Cit:

The Internet of Things (IoT) applications are preparing Smart City initiatives throughout the world. These applications provide the ability to monitor, manage, and control devices remotely and bring new insights and actionable information from massive real-time data streams. IoT is remodeling the traditional structure of society into high tech structure with the concept of smart cities. Smart cities include intelligent transportation systems, smart buildings, traffic congestion, waste management, smart lighting, smart parking, and urban maps. Applications of IoT to achieve smart cities would require using radio frequency identification and sensors. Some of the already developed applications in this area are the Aware Home and Smart Santander functionalities. More advancement in this area of IoT will offer significant breakthroughs in terms of saving money and energy.

v. Smart Agriculture and Water Management

The IoT can strengthen the agriculture sector by examining soil moisture and, in the case of vineyards, monitoring the trunk diameter. IoT would control and preserve the number of vitamins found in agricultural products and regulate climatic conditions to make the most of the production of vegetables and fruits and their quality. When it comes to cattle, IoT can assist in identifying animals that graze in open locations, detecting gases from animal excrements in farms, and controlling growth conditions in them. Moreover, through IoT applications in agriculture, a lot of wastage and spoilage can be avoided through proper monitoring techniques and management of the entire agriculture field. It also results in better electricity and water control [3].

vi. Industrial Automation

The Internet of Things (IoT) plays an essential role in industrial automation as it is commencing to explore and implement IoT concepts and technology. IoT helps to create system architectures that are effective, affordable, and responsive. The primary aim is to accelerate the development and delivery of services. Several tedious tasks can be done through IoT, such as rerouting traffic to keep data moving, accounting for the effects of network topologies to sustain optimized service quality or duplicating and storing data as necessary to prevent catastrophic losses.

5. MAJOR CHALLENGES OF IOT

Internet is not only one network. It has many considerations which cause problems and challenges. The Internet of Things digitizes physical assets, sensors devices, machines, gateways, and the network. It connects people and things in real-time. A typical IoT network can proliferate, resulting in an exponential increase in the variety, velocity, and overall volume of data. This data opens opportunities for significant data creation and revenue generation. However, the real challenge for the Internet of Things environments is how to analyze the large volume of information from all sources and take action in real-time [5].

The complexity of IoT combined with the high expectations created by the Internet, mobiles, and 24/7 IT environment has made the need for new analytics approaches and technologies more urgent. Following are some challenges that are being faced in the area of the Internet of Things.

i. Security and Privacy Issues

With the increase in the number of connected users or devices, security and privacy issues are raised. Trouble integrating devices into the environments without people using them consciously is a significant challenge for privacy. The main problem is data breaches. Many new kinds of ransomware we have not

imagined yet. However, tomorrow, there is a vast potential for many nasty scenarios. Such scenarios may be like malware that locks people out of their homes or autonomous drones or vehicles deliberately crashing into things. So for addressing these kinds of issues, much better technical approaches, UX design, and developers' support are needed.

ii. Interoperability/Standard Issues

Interoperability is the ability of computer systems or software to communicate the data with other devices and use information. Different devices are made with different approaches and protocols, so when these devices interact, they need some handshaking approach. The handshaking is where these protocols have been devised, which can be some middleware that can help the different devices to be able to interact with each other. Developers may design the devices in any number of disruptive ways online without regard for their impacts. The cooperation and coordination of a large number of distributed devices are required.

iii. Law and Regulatory Issues

Another issue for the Internet of Things developers is the number of laws and regulatory rights to be followed on the Internet of behavior and life. The need for laws arises when someone has breached a legal parameter. If the rules and regulations are not followed, then some unpredictable results might be faced. There has to be proper accountability by IT users in data protection, privacy and safety issues.

iv. Scalability and reliability

There is a significant concern about the IoT systems that go from small to large commercial scale deployments encompassing hundreds of heterogeneous devices in buildings and industrial settings. In such systems, it is increasingly becoming difficult to design reliable and scalable Internet of Things applications. The leading cause is that we do not have the right network abstractions. Some of the fundamental challenges being addressed are identification and naming in international systems, especially when devices may come and go. There is a need to implement access control policies that are very common in the physical world, such as giving proper access to IoT devices to clients in the same room and giving the giving read only access to everybody else.

v. Quality of Service

Quality of service can be called a measure of IoT devices' optimization, efficiency, utilization, and performance standards. The quality factors important for IoT devices are cost, energy consumption, reliability, availability, and response time. To ensure the quality of service, these factors to be working correctly, effective quality models must be deployed [6].

6. IOT AS FRONTLINE IN COVID-19

Covid-19 has become both a global health crisis and an economic threat. Covid-19 has shown devastating effects on different sectors. Today, if one talking point is making the noise apart from the coronavirus, it is social distancing. While lockdowns can ensure that people are not transmitting the infection to others, several organizations are concerned about ensuring safe distance on site after the restrictions are eased. While many companies may continue to adopt the work from home policy, others will have to let their shutters open and ultimately live with the virus. In theory, minimizing the contact to prevent the covid-19 spread sounds easy. In practice, however, it is not natural to automatically maintain a safe distance from others.

The emerging technology trends can help stay safe and maintain a considerable distance continuing with work, build a smart office, have smart technology, the chances of an employee increases when they are crammed in office spaces for a long time with other workers. Hence, the management needs to incorporate technology that ensures that common points are barely touched and that the space is sparsely shared. Following are some technologies under the Internet of Things that can help in pandemic [6].

i. Integrate RFID tags to minimize physical touch

RFID is an integral part of IoT. The RFID tags can mark attendance and grant access to office spaces, thus eliminating the need for a biometric fingerprint attendance system. These tags can also be used for gate procedures and also ensure efficient asset management.

ii. Use GPS tracker to keep a tab on the staff

The GPS trackers can be used to ensure that there is an optimum distance between the staff. Simple GPS tracking applications could be downloaded onto phones, and authorities can ensure that workers are not traveling outside the designated areas. GPS tracker can track the location, ensuring that nobody is near the containment zone.

iii. Wearables can monitor vital health signs

The wearables such as wristbands can be used to monitor the vital health signs of people, including temperature, heart rate, and blood oxygen levels. As a result, in case any person or worker is unwell, the authority can ensure that the other members are at a safe distance.

iv. Contactless payments to be the new trend

To minimize contact, one area that is likely to see a spurt is contactless payment. It will be necessary for businesses to offer customers a safe, reliable, and contactless payment experience.

The pandemic has brought to light the need for greater automation and the need for visibility to ensure the safety of people. Due to the pandemic, significant projects of IoT have been postponed, such as innovative city projects. However, healthcare is the one sector that will see greater adoption in the longer term.

7. CONCLUSIONS

Until recently, access to the Internet was limited via devices like desktops, smartphones, or tablets. With the Internet of Things, practically all appliances can be connected to the Internet and monitored remotely. IoT is shaping the way we live our lives. It is helping us to get better insight into the working of things around us.

Today IoT is being used extensively to lessen the burden on humans. Internet of Things makes the future look more promising than ever before. According to experts, there will be over 80 billion devices by 2025, which will be used to ease the tasks. IoT is a vision to connect all the devices with the power of the Internet, always learning and constantly growing.

Integrating IoT with other technologies like cloud computing, machine learning, and artificial intelligence is paving the way for many new exciting and innovations.

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Big Data- Challenges and Issues

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Abstract: The new trend to partake in the 21st century would be making data driven and informed decisions. The buzz around Big Data is growing. It includes information created by machines and people, explores, pre-processes, analyzes, and communicates results by making data-informed decisions, and Walmart, US shipments making millions. Big data is at the infancy stage where all domains need to be reviewed, acquired, and taken to a complete adult growth life cycle and one of the values we need to adopt in recent times. However, it comes with its gridlock of issues and grand challenges, mainly security, privacy, scalability, integration, inaccuracy. We then move to its solutions and future direction. In this paper, we will debunk the myths around Big Data.

Keywords: Big Data; Veracity; Valence; ETL Process; Data Profiling; Data Integration; Data Mining

1. INTRODUCTION

Big Data is something huge and way too complex to be done by traditional systems. Big Data refers to large datasets with confidential information that needs to be dealt with to make sense and value the data from fast-moving and wide-ranging datasets. Big Data is used to analyze the information, realize hidden-difficult patterns, relationships, associations, and make insightful decisions in the surrounding text of decision-making. Due to the enormous data generation, multiple technologies and software have been created to handle additional storage capacity and real-time analysis. John R. Mashey introduced the term in the early 1900s. Egyptians' data analysis was done in 200BC to statistically determine how many armies to deploy in the library of Alexandria or Romans. Big Data is divided into 3 phases, where 1st phase wholesomely covers database management without understanding the core concept of Big Data. In the early 2000's the data was generated, and big companies like Yahoo, Google, and Facebook started analyzing customer behavior, clicks, search logs, etc. The understanding became more apparent with the help of social media, and insights were gained from unstructured data. The third phase is a burst of data generating every second and becoming unstructured. Hence, many technologies are being used to extract the value, like the pin in a haystack.

The data should be gathered in a new way that enables it to be utilized for different purposes many times; this can be seen today in the many devices connected to the internet and the massive amount of data accesses even by individuals. By 2020, the predicted value of data is posited to double every 24 months.

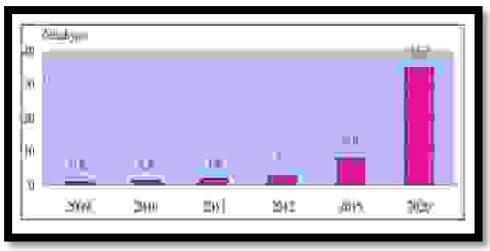

Fig 1: Global data volume predicted by IDC (Wang et al., 2016) [1]

2. CHARACTERISTICS OF BIG DATA

Big Data is the tree with many characteristics where roots represent the size, flowers representing the different kinds of data, the way it grows representing the speed of data fabricated. The following v's are:

Volume: is the first dimension coupled with the downright volume of Big Data. Data can be associated with large datasets too small inventory checkups in local stores. Every minute 204 million emails are sent, 200,000 photos are uploaded, and 1.8 million likes are generated on Facebook. On YouTube, 1.3 million

videos are viewed, and 72 hours of videos are uploaded. The data is massive and must be handled earnestly. The data mass-produced will be in yottabytes, and data is on an astronomical scale and said data is compared to Milky way Galaxy.

Variety: is the second v of data and refers to heterogeneity of data. In pre-dominantly, we refer to tables as the significant source of data or spreadsheets. However, now we have a biodiversity of data like geographical maps, text, audio, gifs, tweets, Instagram posts, etc. (Refer table 1). It is needed for real-time analysis, and various disparate methods have been used to analyze and make decisions regarding them. The data is an amalgam of various variations like emails. The variety is one of the critical factors for analysis and processing the reports.

Table 1: Understanding the data

Old Data	Big Data
TABLES	TABLES
SPREADSHEETS	DATABASES
STOCK RECORDS	IMAGES, 3D MODEL AUDIO
FINANCES	TEXT, LOCATIONS
PERSONNEL FILES	TWEETS, SATELLITE

Velocity : is the third v of data and refers to the data's incoming speed and needs to be stored and analyzed. Imagine going to a new destination, needing information for places to visit, weather, how to pack, and what must be done. So, the information must be pertinent to visit favorite café but would be seeking their schedule of 2 years back or recently updated. Thus, it makes sense to monitor the data and act on that. Batch processing was typical years earlier, where data was fed into machines and processed for days. Hence, these days organizations that pursue the latest data are successful in the market.

Fig 2: Attributes of Big Data [5]

Veracity: is the fourth v of big data and refers to questioning the credibility of data acquired and finding noise, anomalies, and biases. The data quality must be top notch to evaluate the decisions. Otherwise, it is no good. The data quality is measured upon factors like reliability, accuracy, credibility, etc. Nowadays, most data is unstructured and have no time for its quality check due to mass produce. There are fake reviews on sites like Amazon, Myntra where a product is unacceptable yet given five stars or great reviews. Google Flu Trends was used to analyze outbreaks of influenza in 25 countries but were failed because they ignored the quality of data and did not account for uncertainties. It is akin to an art artifact having the providence of everything it has gone through. Thus, the quality of data must be
checked.

Valence : is the fifth dimension of big data, where it upholds the concept of chemistry. It means the connection in data. The higher the valency, the higher the connection and leads to organizational behavior [Fig 3]. Data can be connected directly and indirectly like two friends play the same sport, and two students study at different schools but in the same class respectively. The highlight is that the interconnectivity increases with due time and finds possible connections in the datasets. When we go on a trip and meet some people, we plan another trip due to the same likes. The data becomes denser when dynamic behavior is present. The complex analytical methods must be adopted, and particular evens must be noted.

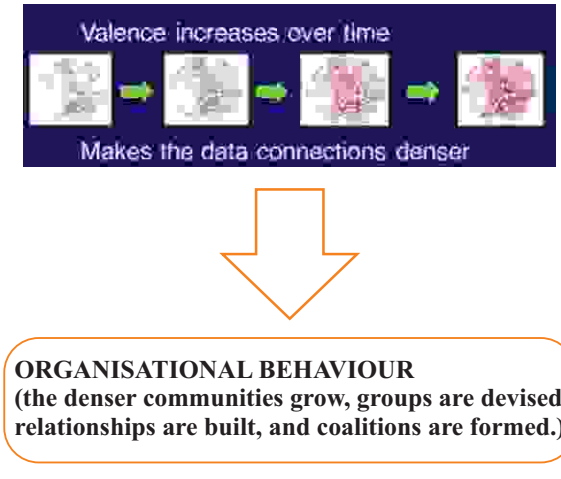

Fig 3 : Valence increases over time

Value: is the sixth and most valuable dimension of Big Data. The idea behind all this is to bring value to the problem at hand. The exploring, acquiring, processing, and analyzing is just done to get this from the data. The gainful insights lead to guaranteed success for various companies like Walmart, Google, Amazon, etc. Big Data is all about making the right decisions with correct data. The value lies in the eyes of stakeholders and the beholder and is not concentrated on volume dimension or others. The value of data for big companies must be calculated through cost-risk analysis and benefits reaped, and ROI must be taken in context. The enterprises can extract value from maintaining transparency, analyzing market patterns, customer behavior, trends, etc.

These are the v's of big data and what it encompasses.

3. CHALLENGES AND ISSUES IN BIG DATA

Big Data mentioned earlier is a bit episode of happy moments in the series, but it also contains a sad side. The flip side to big data massive prospect comes with challenges. According to a report from Dun and Bradstreet, enterprises just face half of the problems in big data with accurate data, data quality, and analysis. The unspoken challenges are related to privacy concerns, security, integration of different types of data. (Fig 4) The current culture is not well equipped and needs to be made more dynamic.

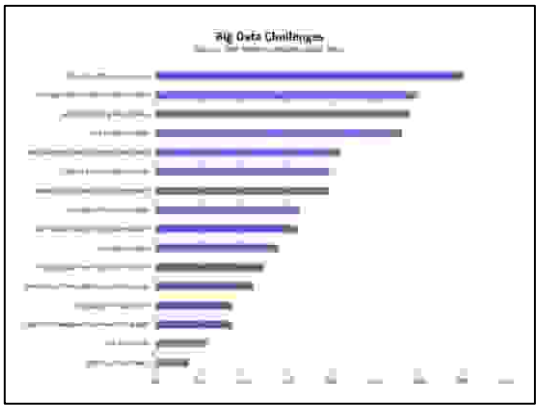

Fig 4: Big Data Challenges [14]

The challenges are intertwined and difficult to consider in isolation. However, according to King and Powell (2008), they can be split into three categories: (a) getting the picture right (i.e., summarizing the data), (b) interpreting or making sense of the data through inferences, and (c) defining and detecting anomalies. (Fernando, Catlin, 2013);

i. Scalability

The extent of data mass produced these days brings one of the future challenges of Big data. Most of the data is unstructured, transpired from documents to tweets, other sources. Stringent requirements are required for storing and managing the data. The Relational Database Management System (RDBMS) makes up for traditional databases, but today's data needs extensive databases or solutions to achieve their role of being reliable, available, and quality enriched. Quick access, proper analysis, and storage ampleness must go hand in hand to evade this challenge.

To cope up with these modern problems, we require modern solutions. Techniques and massive storage devices are required to be adopted. Compression is one of the oldest techniques and helps in reducing the amount of storage and bandwidth required for data sets. It also removes irrelevant or redundant data, making analysis and processing more accessible and faster. The second technique would be Tiering allows

The motion of data between different storage tiers allows an organization to ensure that adequate data resides on adequate storage technology. Data tiering vary in data size. The third technique would be Deduplication, which refers to redundant and unwanted data and helps achieve reliable data quality. The current storage devices Direct Attached Storage (DAS) and network storage, while network storage can be further classified into Network Attached Storage (NAS) and Storage Area Network (SAN) (MH., 2014). DAS is per se for personal use and small sized and can decrease the efficiency with increased storage. The NAS is equipment based on a hub of servers and more large-scale. The scalability can affect efficiency and access time and is used for backups as well. These techniques can help in acknowledging and providing solutions to future storage challenges.

ii. Privacy and Security

In a world where privacy is now considered a fundamental right for every person on Earth, we ignore the terms and conditions before enjoying the content of any web page and website. The companies are trying to protect their data and business tactics to avoid a whiff of their business plans. It is one of the budding challenges in Big Data and the number one challenge which needs to be overcome. The degree of sensitivity of data depends on accessing names, addresses, to bank account numbers. Security Breaches are now common and used for illegal purposes. The

intermediary nodes and the massive number of channels increase the chance of hackers taking benefit of susceptibility. As a consequence, the organization must follow pre-eminent security practices from a security and privacy perspective.

The current security practices need to be upscaled and enriched with more secure locks. Encryption, real time monitoring, identity, and access control are some modern-day practices that apply even to social media platform's messaging features. Encryption plays a vital role in getting encrypted into incomprehensible code, which is hard for hackers to hack and get decrypted and sent to the receiver—the authentication access given to the selected set of people and login password or double step verification. Cloud Computing is one of the efficient solutions for storage and privacy purposes.
Cloud computing for private purposes is more respected but costs more and more companies due to this reason, go for public services that can easily lead to the leak of data with sensitive information. A good company will always protect its data and enforce good security practices. (Table 2).

Table 2: Techniques to adopt for privacy

PRIVACY AND SECURITY SOLUTIONS TO BE ADOPTED
READING TERMS AND CONDITIONS
ENCRYPTION AND DECRYPTION
LOGIN ID AND PASSWORD
REAL TIME MONITORING
PRIVATE CLOUDS

i. Integration of Data

In the daunting era of big data, where data is generated by machines, by people, by databases, its integration is becoming one of the expanding challenges. The data is very heterogeneous and, in typical ways, needs substantial human intervention and attention. The data required by companies, research works, and surveys need to work on different forms of data to arrive at a decision that makes it necessary to integrate them. The disparate sources and their integration go hand in hand for analytical processing. The traditional integration is done through ETL. (Fig:5) The Extract from a database transforms the extracted database into the target database, and Load means writing into the target database. It has been used with batch processing and has failed to keep up with the modern data speed.

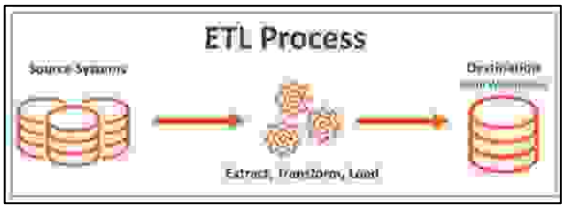

Fig 5: ETL PROCESS [21]

The elements of Hadoop software can help to integrate data in modern ways and superior to old ones. The traditional ETL process is also evolving for current data, and each software has its way of ETL. The new techniques for extensive data integration are Schema Mapping, Data Fusion, Record Linkage. Schema Mapping can be considered two phases where the global schema is created, and mappings are created between global and local schema and hold identical information attributes. The second is Record Linkage which refers to identifying records in the same logical entity across multiple data sources. It only links structured data in traditional ways, but recently the norm is to work on unstructured data and draw insights. Data Fusion refers to the combination of unstructured data from large datasets to a structured operational database. It is a new way of integration and highly motivated by veracity. It makes us confident that results will be meaningful.

i. Data Quality

High- quality data is preconditioned for extensive data analysis and guaranteeing the value of data. The data currently is lacking comprehensible quality standards. The data quality needs to be minded in large datasets and is the essence of big data analysis. The challenge is one of the main ones which needs to be dealt with in the early stages, and the main goal must be to find the noise from data and remove it. Incompetent data quality can lead to incompetent analysis. The problems with big companies can lead to legal and judicial complications if not minded and can provide inaccurate data if its looks for research purposes. The data must be conformed to the user's implied needs. Some organizations store data as a whole without implementing much to it, which creates data pollution. Furthermore, inappropriate data can lead to the risk of decision making on erroneous information. The data quality is the multipart concept and wholesomely represents the real-world construct and perfect intend to use.

To cope up with this everlasting challenge, we must zero on in data quality management techniques. This

situation can lead to data silos which refer to data held by one particular group and is completely inaccessible and can lead to wrongful analysis within an enterprise. The techniques include Data Profiling, Data Governance, Data Matching, Data Quality Reporting, and many more are called Key Performance Indicators. (KPI's) Data Governance lays out data policies and standards that set the bar and data elements that need to be addressed. Data Profiling refers to data cleansing professionals who are appointed must have a deep understanding of data. Businesses often support it on many structural levels. Data Matching refers to real world alignment for data quality and is more than exact databases copying values and preventing human errors. Machine learning here plays a vital role in deduplicating a database where it tells two or more records than the same person. Data quality reporting depends on data profiling inputs and used as KPIs and used for measuring data uniqueness. The big data quality dimensions and metrics are Accuracy, Completeness, Timeliness, Orderliness, Uniqueness, and many more. (Fig 6) The metrics are essential for achieving the primary purpose and achieving reliability at 100%. Digitized Data must be avoided where unnecessary and cross-departmental views must be holistically accepted by top level management. Thus, data quality can be achieved.

Fig 6: Data Quality Dimensions [14]

i. Lack of Understanding of Big Data

Companies suffer from this challenge most of the time. The population is divided with being obsessed with significant data era and another half being unenlightened. Big data is a necessity these days and must be made aware of it. Data professionals may have a clear picture of what is going on, but employees may not know what the data is, processing, and sources. For instance, if employees do not recognize the significance of data storage, they might not retain the backup of sensitive data. As a result, when this data is required, it cannot be retrieved easily. The various online survey (Fig 7) shows how little IT professionals and suppliers understand this and hit the markets. The employees are not ready for the dynamic environment, and laidback practices are still going on. The importance is not understandable to employees at lower and middle corporate levels. The solutions must be fast paced to enhance fast learning and a keen interest in that topic.

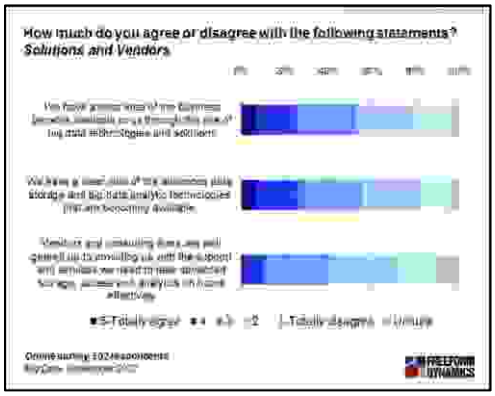

Fig 7: Online Surveys [18]

The companies and many influential organizations can help in evading this challenge. The surveys cannot be generalized for the whole population but make us aware of significant data challenges.

The corporations can arrange workshops and seminars for employees to make them aware. Basic training must be given to all employees to make them understand about it. Advanced training must be given to interested and employees involved in Big Data projects. It must be treated as a habit to be inculcated at every corporate level. The influential organizations can make dedicated social media about the topic, build a community, and increase the interest of others. We also hope our research paper can help others to eradicate this challenge. These are simple essential solutions to this big challenge. (Table 3)

Table 3: Techniques to make aware of big data

AWARENESS FOR BIG DATA
SEMINARS
WORKSHOPS
DEDICATED SOCIAL MEDIA
BUILDING COMMUNITIES
BASIC AND ADVANCED TRAINING

Hence, these are some of the challenges related to big data and prove its flip side. Any topic in this world cannot have only one side, and thus a proper perspective and understanding are critical existential to understand the crisis.

4. DISCUSSION AND FUTURE DIRECTION

The most buzzed topic Big Data is heavily visible to all and discussed thoroughly in this paper. We started with the big data definitions, its characteristics, its applications, and leading towards the flip side that is open challenges and issues faced and with modern solutions and how to tackle them and thus concluded by a discussion. The future stages of Big Data will be very advanced and bring new problems to the light. The data generating speed will quadruple in upcoming years. The data analysis will have no utility if data is not standardized. Big Data is an excellent domain in future years with high growth prospects, job empowerment, and more data enabled decision making. The other hot topics like Cloud computing, Data Mining, Artificial Intelligence are intertangled with it and have a lot to process together. Fast processing would be another future issue for its broad mass data. The data would have to be accessed fast, stored adequately, and retain backups, data quality practices are standardized, different types of data can be integrated in seconds. In the future, more powerful computers and servers will be built while maintaining money, privacy, reliability, and others. The future research papers would be exploiting the new areas currently unknown in the Big Data era and helping humanity. The Big Data domain brandishes successfully and makes significant leaps in the form of positive impact.

5. CONCLUSION

The use of big data is healthy in many ways and for upcoming generations. The research paper covers all the topics and presents a wholesome view of them. The big data applications in the Indian arena have been underwhelmed and need to use this domain fully. Big data is the Data era where it needs to be analyzed and provide successful business insights. This research paper enlightened the issues and challenges of big data and solutions regarding it and the future scope related to this domain. The characteristics of Big Data highlight the concept around it and tells us that good data analysis is of use only when the actual value is found. It is one of the hot topics for research and scientific work. The people must be aware of it and hope this research paper helps them educate about this topic.

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A Comprehensive Study on Mobile Security Threats & Solutions

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Abstract: Mobile has become an essential part of our daily routine. Whether it is our home or office, our phones always accompany us. From taking selfies to making transactions, mobile phones have made our life and work a lot easier. However, on the contrary, these result in a great variety of data stored on the devices, which could be a high security risk in unauthorized access. If it gets infected, the whole credibility of the phone vanishes because it has all the user's data inside it. While the mobile industry knows a lot about mobile threats, how much do mobile consumers know? The need of the hour demands proper guidance on how phones can be cracked or hacked. One needs to know that downloading unauthorized applications from malicious links can lead to data theft, giving access to the user's previous history, location, and breaching of one's personal information. Awareness of the user and adequate steps towards data protection and usage of biometric and lock systems must be considered. This paper deals with the various threats and vulnerabilities and the challenges that affect mobile devices and discusses the various solutions to ensure their security.

Keywords: Crypto-jacking, Spyware, Hacking, Rootkit, Botnet.

1. INTRODUCTION

Mobile security as a concept deals with protecting devices from almost all possible attacks, threats, malware, or the wireless environment that the device is connected to. It is estimated that here and 5.89 million mobile world users have exponentially grown from the last few years and will reach nearly 12 to 13 million within the coming 4 to 5 years of span. Due to this brewing technology, the security concept should be taken into consideration. Furthermore, as almost all industries and organizations depend on cell phones for their work and to increase their productivity, it is vital to secure their confidential data. Mobiles are no longer modern for today's workforce; it is a way of life. Moreover, getting used to this new normal bring odds. Following are the extensive threats regarding mobile security:

- Loss of mobile devices in a crowded area

- Application hacking and breaching: This happens when we download unauthorized applications from malicious links that steal the data, also known as phishing. Breaching gives access to previous history, location, and organizational data. Other factors of concern are Trojans, viruses, etc.

- Smartphone theft is an enlightening problem for the users of iPhone or Android having high market demand. However, the risk of corporate data, such as account credentials and access to email, falling into the hands of a tech thief is a threat.

- Data leak: Data leaks are one of the most enlightening threats to business, according to research. Organizations and industries have a chance of almost 33% suffering data leaks within the next few years.

i. Need for mobile security

One of the crucial risks mobile devices face is internet risks. As the internet risks are at the top and growing tremendously, internet-enabled mobile devices became the priority targets for cybercrimes these days. One should keep in mind not to connect their devices with that their confidential data. Mobile security safeguards devices from various cybersecurity risks

when you flip through online though you're mobile, such as social networking, shopping, or checking emails. It also secures your physical devices from any miss happenings (such as losing your device).

There are several types of mobile security solutions, such as proactive Anti-Theft protection, Antivirus, anti-Phishing, and options for both types (Android and iOS). So, therefore, there is a brewing demand for knowing the needs of mobile security and threats related to it and conventions we can take to Wi-Fi which does not have WPA/WPA2 security. Mobile security is also essential as your data can be stolen easily by cybercrime techniques (like phishing). Sometimes malware spams your browser with unsolicited ads; hence, one should not click such infected URLs and links. An excellent mobile cybersecurity program should include software that automatically deletes data on your remote devices at a click of a button at the time of physical losses. Most crucially, one should also need to know about the unpatched software to change the setting accordingly to prevent unwanted unpatched software from getting downloaded automatically on the devices.

2. MOBILE SECURITY THREATS AND VULNERABILITIES

i. Mobile Security Threats

Fig.1.Mobile Security Threats

Threats are categorized into four categories.

- Application Based: The applications we download from the google play store sometimes are malicious and can also be downloaded from unauthorized sources. In addition, these applications may include malicious malware, which is designed to exploit systems software and hardware.
- Web-Based: These threats are when we access unauthorized websites that may include malicious spyware URL links that may infect the system and crash the system and breach the data by getting confidential data through phishing. These threats are tedious and dangerous and are often sometimes not noticed. However, since mobile phones are often connected to the Internet and are used to access the web-based services, web-based threats pose issues for mobile phones.
- Network-Based: Mobile device users often connect their devices to free Wi-Fi and Bluetooth. Each of these interfaces has its vulnerabilities. The susceptible DSTA HORIZONS | 2016 33 to wireless eavesdropping attempts using readily available Wifite or Aircrack-ng Suite tools. Therefore, users should connect to authorize networks.
- Physical threats: These threats include loss of mobile devices in crowdie areas, making it easy for hackers to steal data and information without tracing the device's IP address, which is sometimes risky for them. In this case, one should require a robust pattern recognition system not to be hacked easily.

Some Current Mobile Security Threats of Recent Years:

- Data Leak: Data leaks are one of the most enlightening threats to business, according to research. Organizations and industries have a chance of almost 33% suffering a breach within the next few years. Most extensively, the biggest threat comes from users. Themselves, who are often not careful in what information they allow they allow apps to share. It is the most common reason for a data leak. However, that is something that can be easily guarded against with the right mobile security solution.
- Phishing and Scam Attacks : Another type of threat that can be overcome with appropriate practices is what is known as social engineering – scam emails. Sometimes you receive an email from a known person. However, it contains a link that you click that can contain malicious malware that can destroy or crash the device and easily steal confidential data like bank account details or any other particulars. Remain cautious against such scams is once again the best way to manage these types of attacks.
- Wi-Fi Interference: A mobile device can only ever be as secure as the network using encrypted data. Again, this can be guarded against with more vigilant behavior. Open networks are not secured enough. Therefore, it is a folly to send and receive sensitive data while on these networks. There is a known term called network spoofing, where you actually log on to fake networks and intentionally put your details, impersonating that you are joining.

- Crypto-jacking: This term is somewhat related to

your cryptocurrency. Some of the cryptocurrency miners often mine to get the entity's cryptocurrencies. Miners do this by dropping malicious malware in the form of a link in email or from any other source into the users PC, then code gets loaded in the device and turns the device into a mining botnet

- Spyware: Spyware installed by someone known to you can be a great cause of threat to your mobile device. You think that there is nothing to worry about, but your job is handled by someone else who spies on your device.
- SMishing: Just like email phishing, SMiShing uses a mobile number sent by messages to the recipient's mobile to entice the user into making a call, automatically leading to a security breach on their device.

ii. Mobile Security Vulnerabilities

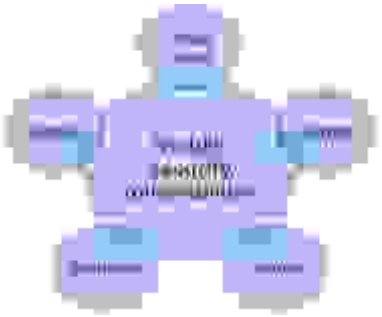

Fig 1.2 Mobile Security Vulnerabilities

- **Trojan horse :** The Trojan horse, a program downloaded and installed on a computer that appears harmless, but is, in fact, malicious, spread via Bluetooth or multimedia messages, and can affect phones running the operating system. A Trojan is designed to disrupt, steal or inflict some or other harmful action on your devices.
- **Botnet :** Botnet is a set of compromised devices that can be controlled and coordinated remotely. This attack strategy is used to utilize the power of connected devices to complete various activities starting from sending spam mail to committing Dos attacks.

- **Worm :** Worm is a self-replicating malicious application designed to spread independently to uninfected systems. A more recent example of a worm type malware for mobile devices is Ikee. B, which is used to steal financially sensitive data from jailbroken iPhones.

- **Malware :** Malware is designed to bring on profits for cybercriminals. Malware steals the information, make their device send SMS messages, or forcibly installs adware that forces you to view malicious web pages or download malicious apps.
- **Rootkit :** Rootkit is an application that breaches the data by gaining itself as a higher privilege than other apps. When a rootkit is installed, device data can be accessed without any obstacles so far. During the last few months, several incidents related to rootkit-like "Ghost Push" malware infected six lakhs androids in a single day.

iii. Mobile Security Attacks

Attacks are categorized into three categories:

1. Application Binary -Level Attacks

Compared to the web apps, the mobile apps cab be exposed to binary level attacks, as the application is to be made public. The attacker can download the app and can exploit the source code.

Some of the attacks are:

- **Reverse Engineering**

Hackers can use some tools to reverse-engineer the application's source code, revealing a company's core business logic, which others can use to steal ideas.

- **Extract sensitive information**

Some tools can be used to extract string constants from the binary, which can reveal sensitive information, such as Admin login credentials.

- Insert malicious code and redistribute the app

Hackers can hack into the binary file of the app, then insert the malicious code and then redistribute the app through the means of some unofficial channels and gets them installed on the user's device.It enables them to phish a user's details or redirect them to their websites unknowingly.

2. Mobile Device Level Attacks

This type of attack happens when a vulnerable device is exploited to gain access to a network. It can be performed on any connected device.

- **Malicious apps that steal data**

Hackers can distribute their malicious apps in the name of games, etc. It will be used to observe the user's activities, which will help them steal many details such as all of the user's keyboard inputs, etc.

- Installing apps on rooted/Jailbroken devices

Hackers can modify the operating system on users' phones and then run their apps, which helps them

observe all the app's internal activity that an average user would not be able to see. With this, they know more about how the product is working and can abuse them.

- **Modifying app data**

Hackers can modify the data files, which can make the app behave differently. For example, a hacker might be appeared to be logged in without having any credentials.

- **Observing logs**

Developers might sometimes forget to remove the app logs before releasing them to production, which they had put to debug the application. So, anyone can observe the logs and get an idea of the working of the app.

- **Observing unencrypted network traffic**

If the app's communication with the server is not encrypted correctly, it can be read in plain language by the observer.

3. Server-Level Attacks

Using the above two levels, hackers have gained knowledge about how the app is communicating with the web service by which they can exploit the web service.

- **Man-in the middle attack**

The hacker uses the authentication sent by the app and portrays it as a legitimate user. The unsuspecting server might serve confidential information to the hacker.

- **DDos attacks**

The hacker could use automated tools to push heavy traffic to the endpoints, causing the server to go down. Thus, making the service unusable for the users.

3. MOBILE SECURITY STANDARDS

Some of the standards and guidelines to quickly identify mobile vulnerabilities to protect the devices from a breach are OWASP, CVSS, CWE, and NIAP. These standards are built to make choices for testing and developing mobile software and its application.

Some of the guidelines and standards are:

- OWASP (Open Web Application Security Project)

OWASP came up with the concept of mobile application security by testing its vulnerabilities in the year 2018. First, OWASP put forward some of the standard guides, namely MSTG (Mobile Security Testing Guide), and second is MASVS (Mobile AppSec Verification Standard). Then, with the help of penetration testing and the OWASP Guidelines and Standards, testers found.

Top 10 Vulnerabilities in mobile applications by penetrating the infrastructure of the software and search where the vulnerability lies.

- **CVSS (Common Vulnerability Scoring System)**

CVSS defines austerity in an application and emphasizes what to fix and how to fix it. It is a tool to seize the vulnerability and construct a numerical score reflecting its austerity and features of the particular vulnerability. This numerical score is then put into a qualitative representation like low, medium, high or critical to help users in accessing and emphasizing their vulnerability management and restoration process.

- **CWE (Common Weakness Enumeration)**

CWE is a set of well-known vulnerabilities. It is a community project to help developers and testers identify the weaknesses by facilitating them with fundamental methodologies. It bounds several layers, which are further classified into many categories, which aims at creating automated tools that can be used to identify, fix, and prevent those weaknesses by searching keywords quickly. Some examples are defective cryptography, poor code quality, insecure authentication, and authorization.

4. MOBILE SECURITY CHALLENGES

Mobile Security nowadays has become an essential aspect of protecting user's sensitive data and information. Malicious attacks which were once found on our desktops have now shifted to various mobile phones and applications. Mobile phone makers are aware of these threats and are investing in protecting data.

Various mobile security challenges faced are as follows: -

- **Challenges associated with Physical security:**

Challenges faced by mobile security are improper architecture and services provided by the device programmers. Also, it faces when lost financial theft and identity theft. Also, some of the crypto-miners steal data and wishing to reconstruct data from poorly deleted files. Therefore, the very first layer that is responsible for mobile security is an operating system. Since mobiles are basically designed to accommodate many applications, they must have mechanisms to see whether these applications are safe for the phone itself, other applications on the system, and the user.

- **Mobile Malware and Malvertising:**

Sources of malicious programs are designed basically to harm the mobile environment by proliferating it

with malware being concealed in otherwise legitimate patches and applications. Ransomeware is the most renounced choice for cybercriminals as it enables perpetrators to record user activities and other sensitive information. Malicious malvertising is also brewing up in recent years to distribute malicious payloads from its power to tempt users onto special offers on websites and resources.

- **Intercepted Communication:**

Mobile is data transmission rules, and unsecured wireless networks such as Wi-Fi hot spots are primary targets for hackers, who can steal or corrupt data by their operating tools. In addition, so called "man-in-the-middle" attacks are becoming common, along with attacks like the hijacking of user sessions to gain access to online resources and services.

- **Insider Threats and Human Error:**

The lack of awareness and tendency to make errors and are a major threat to mobile security. A lack of diligence in downloading applications either from official play stores or from second party downloading sites. Jail-breaking of devices overcomes restrictions forced by the device or operating system manufacturer, leaves users vulnerable to malware, and also does not protect security patches.

- **Confidentiality and Disclosure:**

Today many users and corporate sectors use an application service provider or ASP, which provides the risk of data thefts and data leakage when service providers are not sufficiently robust in safeguarding their user's data. There is also a way out that confidential data or information gets disclosed to other parties, such as advertising networks. Users using ASP also get confirmations of the hosting provider's policies, terms, and procedures for enabling data security and preventing data thefts. In this case, VPNs also provide additional security.

- **Services and Client Confidentiality:**

Keeping the customer's data confidential and secure is the major concern for those whose business depends on consumers' care details and requirements. Personally identifiable information (PII) transmitted to such agencies or stored on user devices can be targeted by hackers. However, with the situation not being transparent regarding who should be liable for security breaches or unintended disclosure, users are mainly left to guard their data privacy.

5. MOBILE SECURITY SOLUTIONS

As with all the above threats, the most vulnerable ones are humans that threaten the devices. However, unfortunately, humans are less aware of how they threaten their own devices. In addition, more than half of mobile users have no idea that security programs exist for mobile devices, which is another big problem.

- Use a strong password or biometric: It provides essential protection from financial theft and identity theft.
- Turn on The Find My Device feature: This feature allows you to remotely lock your phone, sign out of your device, and clear its content.
- Encrypt your device: A programmer should also keep in mind the cryptographic channels to ensure end-to-end encryption while designing the security code of devices. Most of the phones have automatic encryption features you can enable. The users should always make the encryption mode enabled to secure data. An encrypted device is far more secure than an unencrypted one because every time you power your phone on, you will need either a numeric pin or password to decrypt the device. When encrypted, the only way to get into the phone is by using the encryption key.
- Mobiles browsing and application downloads: As we sometimes browse some malicious URLs and download pirated asps that may threaten mobiles, one should not accept the privacy terms of the several websites and applications we download. To check whether a URL is malicious or not, use http://google.com/safebrowsing/diagnostic?site=(the site you want to check). It will let you know if it has hosted malware or not.
- Never have multiple accounts running on your device because whenever you connect to several Bluetooth for data transfer for useful information, your data could be transferred.
- Application isolation is a feature that protects mobiles from browser-based exploits; for this, we need to change some of our device settings.

(1) use run in monitor/audit mode only look at the events that these policies detect
(2) we can analyze events before turning off the screen
(3) run policies under system wide settings mode.

- **Bluetooth:** Always enable your VPN from settings. Also, there is KNOB threat in Bluetooth where the connection of connected devices is altered, so never connect to an unknown Bluetooth.

- Using cell phones as e-wallets can also be a major scam as your devices and e-wallets are linked to your account. The hackers can steal your transaction data and change the entity of your account to their own, making you the fake entity, so avoid using unsecured e-

wallet applications.

- Whenever you receive, any emails scan for viruses and other vulnerabilities before opening the links and downloading.
- Most mobile phones do not have any firewall protection in them. To install a firewall to get more robust protection against threats and safeguard your online privacy.
- Before using, ensure that public or free wi-fi is protected
- Most of the free wi-fi points are not encrypted, allowing malicious people to eaves drop on the network traffic and quickly get sensitive information.

6. CONCLUSION

With the increase in mobile phones and their functionalities, the amount of data stored in them increases. Much sensitive personal information such as credit card details, account details, personal contacts, and messages are being stored on these mobile devices. Therefore, it has become essential to analyze the security awareness of the users. This paper states some of the defensive methods that the developer and the mobile user need to follow to prevent security issues on mobile devices. Many people do not pay for online threat protection, maybe because they have not heard of "malware" or are unsure whether the problems they encountered were caused by malware. One should not download any malicious apps, open suspicious emails, use non-secure wi-fi networks, and log out or delete apps that you are not using, which guarantees high security to avoid such threats.

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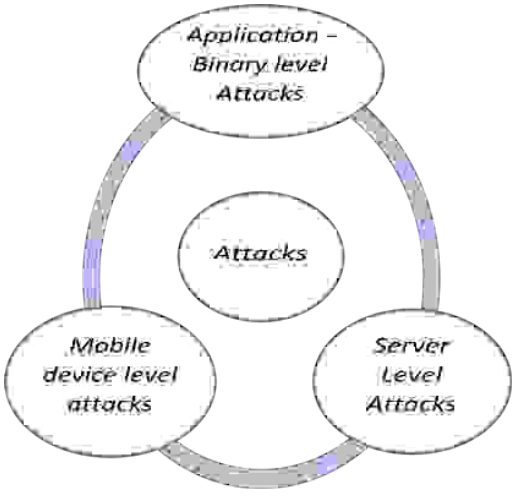

Fig 1.3 Mobile Security Attacks

Blockchain : Personal Identity Security

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Abstract: In the way of life, and identity represents a personal level of any human. In the information communication technologies field, individuality identity security protects and authenticates the identity of a selected person. Therefore to avoid any misfortunate, it is crucial to guard and secure identity as personal data. Currently, how individuals are represented within the digital ecosystem appears to be free to manage centralized control on personality.

Nowadays, blockchain technology has been making its mark a revolutionized approach to exceed expectations with its decentralized approach. Blockchain technology could also create a disordered effect within identity security management popularized with the cryptocurrency. In the domain of identity management, it is essential to possess privacy protection of private data. However, there is an absence of structured study on how the identity management aspect of blockchain technology supports personal data protection supported the necessity of conduct.

Keywords: Breachers; Cryptographically Verifiable; Decentralized identifiers; Identity fraud; pseudonymization.

1. INTRODUCTION

This paper evaluates the implementation of blockchain as a service to protect personal identity. The identity and access management market is predicted to grow from $8.09 billion in 2016 to $14.8 billion by 2021.

i. Inaccessibility

Around 1 billion people across the globe have no identity proof, and 45% of those individuals without any identity. Inconvenient identification paperwork processes, expenses, lack of access, and therefore the simple lack of data around personal identity are primary obstructions that keep over a billion individuals outside of traditional identification systems. Without holding physical identities, one cannot enroll at school, apply for jobs, get a passport, or access many government services. Having an identity is very important for gaining access to the present national economy. On the contrary, 60% of the approximately 3 billion unbanked people already own mobile phones, which come
up with the way for blockchain-based mobile identity solutions which better go away the requirements of unguarded citizens.

ii. Data Insecurity

Nowadays, we store our most precious identification information on centralized government databases supported by legacy software operate with various single points of failure. Extensive, centralized systems containing all the personally identifiable information of millions of user's accounts are incredibly likable to hackers. A recent study shows that for breachers, the most targeted data is non-public identifiable data. Despite regulatory legislation and efforts to extend cybersecurity, individual data is exposed.

iii. Fraudulent Identities

The experience of the user's digital identity landscape is unusually shattered. Users juggle numerous identities related to their usernames across non-identical websites. There is no other option to use the data generated by one platform on another platform. There is a weak link between physical and digital identities, making it much easier to create fake identities. Fake identities are like the fertile ground for the phenomena of faux association, which may help within the delegacy doing scams and frauds, which results in high numbers and lost revenue. Moreover,

afterward, this fragility eases the formation and broadcasting of sin like
fake news, posing a possible threat to democracy.
We have the tools and technologies to make new identity encrypted management due to the increasing usage of cell phones, cryptographic advancements, and developed technologies in the blockchain. The structure of cyber based identity is built upon the belief of decentralized identity– self-sovereign identity includes a new subgroup of decentralized identifiers known as SSI.

2. OBJECTIVES

- Personal identity security provides a potential solution so that no third party can share anyone's personal and sensitive data without their consent.
- Blockchain technology is designed to protect people's identities from data theft and breaches which took place digitally.
- Now the individual can freely create a self-sovereign identity (SSI) and digital encrypted identity.
- If we implement blockchain identity security management successfully, we can enhance solid security and privacy.
- The unnecessary need of making more than one username and password can also be removed.
- No personal identity has been shared without the individual's permission.

3. BLOCKCHAIN

Online Distributed Ledger Technology, commonly called ―Blockchain Technology, refers to the technology behind decentralized databases providing control over the data between entities through a peer-to-peer network, using different algorithms that ensure replication across the network's nodes.

4. SECURITY IN BLOCKCHAIN

What makes blockchain secure? The answer is that the data cannot be changed in each block where data is recorded. After the approval of the majority of the network, one can only write to the blockchain. At least fifty one percent of the people must agree when a piece of information is being changed, and all the blocks are made. The blocks preceding it until and since blocks are being produced instantly and replace until reaching the one we considered to replace would require more computing power. Also, changing a block will create a new branch of information that will be considered the source of truth, but the existing data remains in a different branch (i.e., unchanged). This process is called forking.

Online Distributed Ledger (Blockchain) is also considered a system with high Byzantine fault tolerance. A Byzantine Fault is an occurrence on decentralized systems where it may emerge, for only one user, that the system is working ideally, and for others, the system is failing.

5. PERSONAL IDENTITY

Identity is something that is created to differentiate ourselves from others. It contains all the required information about a person like a Birthdate, place of birth, Mobile number, address, etc. They all can be attained using personal identity.

Earlier this all things were handwritten, due to which it became difficult to update it and get it when required. Digital identity is created that can be updated and can provide each information required without any hassle-bustle to resolve this problem.

However, if this ―digital identity‖ is set aside on a centralized server, it becomes a target for hackers. Since 2017 alone, more than 600 million individual details – such as addresses or credit card numbers – have been hacked, leaked, or breached from one organization to another organization.

Currently, identity management systems are old (i.e., outdated) and weak.

Identities need to be portable and verifiable anywhere, any time, and digitization of identity can enable that. However, being digital is not enough for security. Identities also need to be secure & private.

Through the architecture of a blockchain, the verifying association does not need to check the validity of the actual information in the provided proof. However, they can instead use the blockchain to check the attestation and attesting association (such as the government) to validate the proof.

For example, when an identity holder presents proof of their date of birth, rather than checking the date of birth itself, the verifying party will check the government's signature who had issued and authenticate to this credential/attribute. Then choose whether he believes the government's evaluation of the accuracy of the data.

6. PROCESS

Only references and the associated authentication of a

user is verified credential/attribute are written on the ledger.

Privacy can be ensured with the help of non-correlation principles via pseudonymization. So, instead of keeping essential private information, the only things stored on the ledger (for the motive of verification) are:

i. Ledger Components

- PUBLIC DECENTRALIZE IDENTIFIERS AND ASSOCIATED DID DESCRIPTOR OBJECTS (DDOs) WITH VERIFICATION KEY AND ENDPOINTS:

Decentralized Identifiers are a new type of unique identifiers for verifying digital identities and are entirely controlled by the identity holder. Decentralized Identifiers are independent of centralized registries, authorities, or identity providers.

- **Schemas**

Schema is the formal explanation for the structure of a credential/attribute of personal identity.

- **Credentials Definitions**

The different (often physical) proofs of identity or qualification issued by some authorities include driver's licenses, passports, identification cards, and credit cards.

- **Revocation Registries**

It is one option for issuers to be able to revoke his/her claim. The revocation registry tells the rest of the world how the issuer will add the revocation information/data.

7. DECENTRALIZED IDENTIFIERS IN BLOCKCHAIN- IDENTITY MANAGEMENT SECURITY

These are the type of unique identifiers for verifying digital identities. The identity owner controls it. These are free of identity providers, registries.
Properties of Decentralized Identifiers:

i. Non- Reassignable

Identifiers such as email id or IP addresses can be reassigned. It reduces privacy and security.

- **Permanent**

Identifiers other than IP address or Email address should be permanent. It can increase privacy and security.

- **Cryptographically Verifiable**

The owner of DID can prove its ownership through the use of cryptographic keys. The key contained can be used to attest to the authenticity of the issuing authority.

- **Decentralized**

DIDs should not depend upon centralized registries. Therefore, it should be decentralized. Distributed ledger ensures trust because it allows everyone to have the exact source of truth about the data.

8. BLOCKCHAIN PERSONAL IDENTITY MANAGEMENT AND SECURITY PROCESS

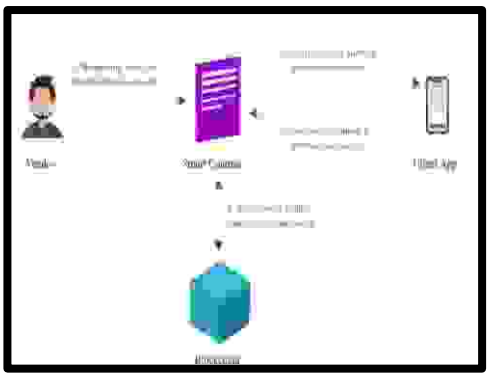

Fig.1.Blockchain working in personal identity security

Nowadays, people need the right way to manage their identity other than the paper based identity storage method.

Following steps must be followed for identity security with the help of blockchain:

Step 1: Installation of Mobile App:

An individual first have to download a mobile application from the play store or apple store.
After downloading the application on a device, the user has to create its profile on that application.

A unique number is provided by the application, which can be used to access the personal identity.

Step 2: Uploading the documents

After getting the unique number from the application,

the user has to upload the required documents. For example, while making a resume with the help of the app first user has to create a profile after that user uploads the documents.

It allows user to share the data will he/her wants to share with an organization. Without the user's consent, no data or identity can be shared with an organization.

Step 3: Smart contracts provoking trust score of the person:
Let us assume that there is a score for determining the trustworthiness of a person.
Smart contracts consisting of the business logic can make a trust score for a user from their data.

Step 4: Third-party companies requesting access:
A notification is sent to the identity owner to allow a third party to access the person's identity for authentication purposes.

Once the owner allows the third party to access his/her identity, the third party gets the right to access his identity. The owner can also trace the activity of the third party in his activity.

Blockchain only records the transaction between the identity owner and the third party. It does not store any owner's personal information.

For example, suppose the passport authority accesses the personal identity of an individual for authentication purposes. In that case, this transaction will be recorded in the blockchain and visible to all connected nodes.

8. MAJOR CHALLENGES ON BLOCKCHAIN

Indeed, many organizations and companies are ready to embrace this technology, but few challenges are responsible for the slow adoption and growth of the technology. We have listed few problems here:

i Elimination of Mediator

Most solutions depend upon the central server for data storage. The complete removal can compromise several things and the functions of identity security, such as reinforcement of personal identity recovery services, etc. The improper regulation of identity is fully user controlled, which affects the authentication of data flow.

ii Scalability and Optimization

The major problem arises with the adoption of scalability. Transaction networks can do so many transactions in seconds Without any failure, such as Bitcoin and Ethereum transactions.

iii Increasing Privacy

Identity management is built to provide support while maintaining privacy, authenticity, indisposition, etc., as there is a transparent flow of information and authentication of data. The third party needs security and well versed communication channel.

iv Lack of Standardization

There are no universal standards set apart from diverse variety networks that subsist. The problems that exist due to lack of standardization are interactivity, higher costs, and complex mechanisms. Apart from these challenges, security and privacy are different difficulties faced.

v Lack of Expertise

The demands for blockchain developers are enormous because there is a lack of talented people. The developer is a primary concern for all organizations due to the shortage of skilled professional developers to solve peer-to-peer networks' difficulties.

vi Experience of User

The primary issue that requires to be addressed is united human integration and the experience of the individual. The validation and methods of proving identity rely on specific identification using blockchain, and poor management limits the extent for un-technical persons.

9. REVOCATION

Revocation means deleting or updating information in a personal identity of an individual. For identity management, it is a very crucial process that should be done for the management and security of personal identity.

Some attributes/credentials change over time, for example, house address, phone number, number of children, marital status, etc. So here, the new information is updated, and the old information is made invalid. They were updating the new information, and making the old information invalid will increase the trustworthiness to prevent fraud.

10. PREVENT IDENTITY THEFT AND FRAUD

With the help of blockchain, every individual stores

their digital identities in the digital identity wallets on their device.

With this, one question arises that what if the device is stolen or the device breaks?
The solution to it is that digital identity can be accessed with the device which is authorized to do so. The user can revoke the access of the digital identity from the device which is stolen.
The user can access his digital identity from other devices like laptops, laptops, etc. They are using the credentials used for accessing their digital identity.
Through this, the personal identity is safe and can be accessed anywhere, anytime using valid credentials. The breachers would not be able to theft the user's personal information even if he has her passwords, biometrics, or phone because the blockchain, immutable and secure, would contain a revocation registry for the phone.

11. IMPACT OF BLOCKCHAIN IN DIGITAL IDENTITY

The technology in today's cyber world has to gain chief importance and becoming more linked with cyber-physical systems, data privacy, and individual's digital identity. The concept of digital identity comes in front of when the consumers are increasingly using the Internet to perform online transactions both for buying goods and services and banking and across multiple devices.
Some examples of an important area where digital identity is being supported to bring about social boost and economic upliftment of communities genuinely include:

- More than a billion of a person in India having aadhaar card as a personal digital identity linked to all the social schemes started by government and subsidies is being paid to the economically weaker section.
- In Nigeria, smart cards are being issued to them before 2014, which increases the country's services and security.
- In Kenya, social crimes have been reduced as they follow the importance of digital identity.

12. CONCLUSION

Therefore, the blockchain solutions are increasingly being inspected, given their primary attribute of produced trust and transparency and user control, all essential factors for digital identity management.
However, it is essential to say that blockchain in digital identity security cannot only be viewed as a panacea. It does provide the appropriate framework, but like every system, it has its advantages and disadvantages. Firstly the advancement of technology and secondly, lack of uniformity of data exchanges.

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Machine Learning: Introduction, Types and Applications

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Abstract: Now a day's data is increasing at very alarming way and we are living in a generation of technology transformation that lead us to changes in the way we take decisions. This field will require big data and machine learning specialist and inquisitors with ability to understand and make decisions based on the analysis of big data. The period of robots and machine has just established. These computers must be configured in today's generation before they can follow up the command. This paper discuss about what machine learning is and how it's works and what are its features. It also addresses the technique and, most significantly, how it will help and improve the decision-making process. The paper ends with describing the machine learning types and its future scope.

Keywords—Machine Learning, Supervised Learning, Unsupervised Learning, Reinforcement Learning

1. INTRODUCTION

Machine learning (ML) is an AI application/subset that allows a system to automatically learn and develop from experience without having to be explicitly programmed. It concentrates on the designing of system and consequently allowing them to work out and make prediction centered on some experiences which is data just in case of the machine [1]. ML could be a class of algorithms which is data-driven, i.e., unlike "normal" algorithms it's the info that "tells" what the "good answer" is.

i. Features of Machine Learning

- It uses the data to locate patterns in a dataset and modify the program accordingly.
- It focuses on improving computer systems that can learn to adapt and improve when confronted with new data.
- It allows the devices to discover latent insights without having to be specifically programmed using iterative algorithms.
- Machine learning (ML) is a form of data processing that automates the development of analytical models.

ii. Working of Machine Learning

In standard programming what we used to do was be responsible for data and program then the computer used to generate the output but now the situation has been modified, in machine Learning what we do is provide the data and provide the predicted output to the machine and what it does is, attain information from the data, find hidden insights and create a model. Then it takes the output data again and it reiterates and grows accordingly so that the model gets better every moment it's strained with the new data or the new output. Figure 1 shows the machine learning working.

Fig.1: Working of Machine Learning

i. Life Cycle of Machine Learning

Standard Machine Learning life cycle has six steps so the First step is acquiring the data which is collected from various sources, the Second step is data wrangling which is process of cleaning and converting raw data into format, Third is data analysis to select and filters the data, the Fourth step where we train

algorithm to understand the pattern and the rules which govern the particular data and Fifth step are when we test the algorithm that determines the speed & accuracy of our model and last and Sixth is when we deploy that particular algorithm for industrial uses if speed and accuracy are acceptable then the model should be deployed in a real system [2]. Figure 2 shows lifecycle of machine learning.

Fig. 2.: Lifecycle of Machine Learning

2. TYPES OF MACHINE LEARNING

i. Supervised Learning

It is a technique where you have input variable (x) and output variable (y) and an algorithm can be used to learn the mapping function from the input to the output, if we consider the case of object recognition or face detection, firstly, what we do is input the raw data in the form of labelled faces and it's not necessary that we only input faces to train the model, what we do is input a mixture of faces and faces images. As we have labelled face and labelled on faces now, we will provide them with the algorithm and algorithm creates the model it uses the training dataset to understand what exactly is in a face what exactly in a picture which is an ordered phase and after the model is done with the training and processing so to test it what we do is provide particular input of a face now what we exactly know is output so when we are providing a face, we ourselves know that's it's face [3]. Figure 3 shows the supervised learning.

Fig.3. Supervised Learning

ii. Unsupervised Learning

It is a training of a model using information that is neither classified, now this model can be used to cluster input data in classes or the basis of the statistical properties for example for a basket full of vegetables can cluster different vegetables based upon their color or size so if I have look at this particular example we have what we are doing is we are inputting the raw data which can be either apple banana or mango what we don't have here which was previously there in supervised learning are the labels so what the algorithm does it that it visually gets the features of a particular set of data it makes cluster so what will happen is that it will make a cluster of red looking fruits which are apple yellow looking fruits which are banana and based on upon the shape also it determines what exactly the fruit is and categorized it as mango, banana or apple, so this is unsupervised learning [4]. Figure 4 shows unsupervised learning.

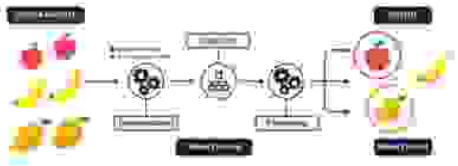

Fig.4. Unsupervised Learning

iii. Reinforcement Learning

Reinforcement learning is the learning by interconnection with space or an environment it selects the action in the support of its past experience the exploration and also by a new choice. A reinforcement learning agent learns from the residue of its action rather than from being taught explicitly, for example, the input data goes to the agent where the agent selects the algorithm which takes the best action from the environment who gets the reward and the morale is strange [5]. if you provide a picture of a green apple what it will do is, it will try to get an answer with the past experience what it has and it will reiterate the alcohol time and then finally provide an output accordingly to your requirements. Figure 5 shows the reinforcement learning.

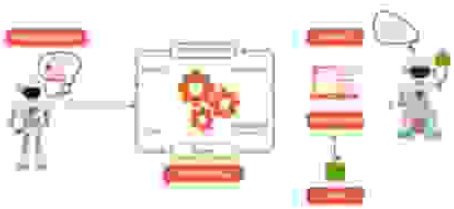

Fig.5: Reinforcement Learning

3. APPLICATIONS

i. Google Maps

Google Maps is likely the app we use whenever we go out and call for assistance in direction and traffic. It detects the best route but how? Well, it is a combination of people currently using the services, the previous data of that route collected over time and few tricks acquired from the other companies. Everyone nowadays is using maps that provide their location, their average speed, the route in which they are travelling which helps Google to collect massive data about the traffic which accelerate the upcoming traffic which helps in adjusting the route [6].

ii. Social Media

The most popular example is Facebook which is mostly used by everyone. There is a feature in Facebook of automatic tagging through face detection. So, it uses face detection to automatically find the face of the person and matches its database. Therefore, it suggests us to tag that person based on the deep face.

iii. Transportation and Commuting

Transporting and communication, now a days there are many apps from which we can book a cab, these apps are made using machine learning techniques and gives an option to personalized app that is unique to you as it automatically detects your location and provides options to either go to home or office or any other frequently visit location based on your history and patterns. it uses a machine-learning algorithm. Taking the example of uber, the implementation of ML on their app and their websites saw 26% accuracy in dropping and picking up the passenger, that's huge a point [7].

iv. Google Translate

Travelling as a tourist to a new city, there is a difficulty in understanding the new language. Converting our language into their language, google launched an app known as google translate different language. Well for that, Google's neural machine translation is neural machine learning that works on thousands of language and dictionary [8]. It uses natural language processing to achieve the most accurate translation. Other techniques, such as POS tagging name entity and chunking are used because the tone of the words is important, and it is one of the most widely used applications of machine learning (ML).

v. Tesla self-driving cars

You don't need a driver; the car will automatically drive it to your destination. Tesla's current AI is driven by Nvidia's hardware focusing mainly on unsupervised learning. Any explicit object detection, mapping, path learning or control components which are not programmed are helpful to reach the standard approach to operate a self-driving car during this car rather than the car gain the knowledge on its own to form all necessary mental object necessary to stare human drivers. Operating of tesla is not hard as tesla crowdsources data from the vehicle and drivers via internal and external sensors.

vi. Moley (Robotic Chef)

It is the first robotic kitchen. It is capable of replicating any dish cooked by any master chef in the world. Moley is a pair of fully articulate robots' hand which reproduce the function of human hands with the same constant speed, sensitivity and the movement. The cooking skills of the master chef tremendous was recorded on the system and then it replicates their exact movement through his robotic hands. The kitchen is controlled by touch screen or remotely by smartphone.

vii. KUKA (Robot)

KUKA offers a comprehensive range of industrial robots which uses ML for increase safety of human around robot collaboration, within the project KUKA is researching the cause of problems in the development of sensitive robot application using data analytic and ML methods [9]. You will always find the right choice no matter how challenging the application is like HRC capable lightweight robots or direct human report collaboration, heat and dust resistant robot for extreme ambience condition industrial robot in cleaning variant for strict hygiene condition requirements. So, there are various types of robots which are available in this kind of situations.

4. PROS OF MACHINE LEARNING

I. Trends and patterns are readily identifiable

Machine Learning can process vast quantities of data and recognize particular trends and patterns that humans might take into consideration.

ii. Automation

With ML, there is no need for human interference at every point in the way. [10]. It allows machines to make predictions and enhance algorithms on their own since it is allowing machines to learn.

iii. Continuous Enhancement

The accuracy and efficiency of ML algorithms improve as they develop expertise. This helps them to make more conscious decisions.

iv. Wide Applications

ML has the potential to have a much more personalized service for customers but still attracting the right customers.

5. CONS OF MACHINE LEARNING

i. Data Acquisition

To practice on, machine learning needs large data sets that are inclusive/unbiased and of high quality [11]. They will also have to wait for new data to be developed from time to time.

ii. Time and Resources

ML requires enough time to allow the algorithms to learn and improve enough to serve their function with a high degree of accuracy and relevance. It, therefore, necessitates a large amount of capital to work. This will necessitate additional computational power requirements for you.

iii. Interpretation of Results

Another major issue is the ability to accurately analyse the algorithms' results. You must also carefully pick the algorithms for your submission.

iv. High error-susceptibility

Machine Learning is self-sufficient, but it is vulnerable to mistakes. Assume you train an algorithm with data sets that are too minimal to be inclusive. As a result of a biased training environment, you end up with biased forecasts. As a result, consumers are exposed to irrelevant advertising.

6. CONCLUSION

Machine Learning, as we all know, is a method of teaching computers to do tasks that a human brain would do a little faster and easier than the average human. Machines can be trained to perform human functions in several areas and can aid humans in living better lives. If you have lesser data supervised learning is better, but on a large scale unsupervised is prefer. And if data is huge it should be reinforcement learning or deep learning techniques. This subject is vast, Deep Learning is a subpart of machine learning and if you consider the depth, it takes lots of information and time to gather it. Machine learning in today's generation plays a very significant role and in the upcoming generation, it will play the most vital part in human life.

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National Conference on Innovative Research in Computer Science and Information Technology: "Advanced Computing Trends & Cyber Security"

The purpose of the Conference is to bring together the academicians, researchers, scientists, engineers and practitioners from various institutions, universities, colleges and industry to discuss the relevance of various futuristic technologies emerging in Artificial Intelligence, IoT, Machine Learning, Networking, Big Data, Data Mining, Cyber Security and also areas related to innovations in Information Technology throughout the world. This Conference is aimed to expand its coverage in the areas specified where expert talks, young researcher's presentations will be placed in every session will be inspired and keep up your enthusiasm.

Conference Objectives

- To present the latest research and results of experimental work related to Computer Science and Information Technology
- To endow opportunities for delegates to exchange new ideas and application experiences.
- To address the real-world opportunities and challenges faced by today's IT professionals.
- To promote a high level of interaction among stakeholders in theoretical, experimental and applied concepts.

Conference Themes

Topics covered by the Conference include, but are not restricted to, the following:

Advanced Computing Trends

- Computer Architecture and Engineering
- Web Security, Client and Server Security
- Applications of Cryptographic Techniques
- Self-protecting and Self-Healing System
- Artificial Intelligence and Robotics
- Soft Computing

- Software Engineering
- Human Computer Interaction
- Internet of Things (IoT)
- Social Networking
- Crowd Sourcing
- Image Processing
- Theoretical Computer Science
- Tracking and Locating Mobile Users
- Energy Saving Protocols
- Analysis of security protocols
- Communication and Networks
- Authentication and authorization of Systems
- Bots and Botnets
- Big Data Analytics

Cyber Security

- Current Trends in Ethical Hacking
- Web-Resource Protection
- Cyber Forensics and Cyber Laws
- Crypto-Systems
- Security aspects in Open Source Software
- Authentication and Authorization strategies in Networked Environment
- Management of Confidentiality and Privacy
- Securing Computing Infrastructures
- Security Breaches in Big Data Analysis
- Machine Learning applications in security
- Biometric Technologies
- Steganography
- Trojans, Vulnerability and Zombie Drones
- Emerging IT Security Models and Practices
- Intrusion detection and prevention
- Cryptography
- Diagnostics and Forensics for Security
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