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IITM Journal of Information Technology

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CONTENTS

Research Papers & Articles

Metaverse: User Centric Factors

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Abstract—Since the Internet's widespread adoption in the 1990s, cyberspace has continued to evolve. We've invented social networks, video conferencing, virtual 3D worlds (e.g., VR Chat), augmented reality applications, and Non-Fungible Token Games, among other computer-mediated virtual environments (e.g., Upland). Such virtual environments have provided us with varied degrees of digital transformation, even though they are non-permanent and unconnected. To further assist the digital transition in every element of our physical life, the term 'metaverse' has been coined. The metaverse is built around the idea of an immersive Internet as a large, unified, persistent, and shared realm. While the metaverse may appear futuristic, thanks to new technologies like Extended Reality, 5G, and AI, it is actually the digital 'big bang' of our time.

Keywords— Artificial Intelligence, Augmented/Virtual Reality, Avatars, Digital Twins, Immersive Internet, Metaverse, Networking and Edge Computing, Privacy and Social Acceptability ,Virtual Economy.

I. INTRODUCTION

METAVERSE is a hypothetical synthetic environment related to the physical world, defined by the prefix "meta" (implying transcending) and the word "universe." The term "metaverse" was originally used in Neal Stephenson's speculative fiction novel Snow Crash, published in 1992 [1, 2]. Stephenson defines the metaverse in this novel as a huge virtual environment that exists in parallel to the real world.

Users engage with each other in the physical world using digital avatars. Since its inception as a computer-generated universe, the metaverse has been defined by a wide range of concepts, including life logging, collective space in virtuality, embodied internet/ spatial Internet, a mirror world, and an omniverse [4]: a venue for simulation and collaboration. The metaverse is defined in this paper as a virtual world that combines physical and digital elements, assisted by the convergence of Internet and Web technologies, as well as Extended Reality (XR). According to the Reality-Virtuality Continuum proposed by Milgram and Kishino, XR mixes digital and physical elements to varying degrees, e.g., augmented reality (AR), mixed reality (MR), and virtual reality (VR).

II. USER CENTRIC FACTORS

A. Avatar

The term Avatar comes from a Hindu notion that represents the incarnation of a Hindu god in the everyday world as humans or animals. Avatars can be found in a wide range of digital realms. For starters, it's been widely used as a profile photo in many chat rooms (e.g., ICQ), forums , blogs (e.g., Xanga), and social media sites (e.g. Facebook).

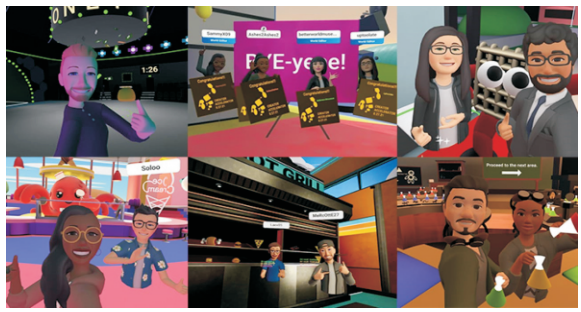

Fig. 2. Avatar

Virtual reality games like VR Chat allow users to scan their physical look and then choose virtual clothing to replicate their real-life appearances. Avatars as intimate friends, coaches, or a virtual self-have also had been used in research studies to help people regulate themselves and set goals in areas like learning and diet.

Avatars are digital representations of users in virtual spaces, as noted above, and other physical embodied agents, such as social robots, regardless of form sizes and shapes, as defined by computer science and technology. The discussion in this section is limited to digital representations. However, it is worth mentioning that social robots could act as a potential channel of communication between human users and virtual entities in the real world and the metaverse [3]. For example, robots can become aware of a user's emotions and react accordingly in a discussion, or robots can serve as telework (telepresence workplace) service providers in physical worlds.

The digital depiction of a human user is meant to operate as a mirror of their behavior and interactions with other metaverse users. During various social activities inside the metaverse, the design and appearance of avatars may influence user perceptions, such as senses of realism and presence, trust, body ownership, and group satisfaction, which are influenced by a variety of factors, including the details of the avatar's face and related micro-expressions, the completeness of the avatar's body, avatar styles, representation, colour and positions, fidelity, and the levels of detail in avatars' gestures.

B. Content Creation

This section will describe the present authoring systems that facilitate content production in XR, followed by a discussion of censorship in the metaverse and a possible vision of creator culture.

1) Authoring and User Collaboration

Authoring tools in virtual environments allow users to build new digital items in an intuitive and creative manner. Virtual keyboards and controllers are provided in VR immersive settings to enable users in completing complex activities. Furthermore, in virtual contexts such as a presentation, reusing existing patterns might speed up the authoring process. Smart wearables can also be used to produce creative things, such as smart gloves. Users can create interacting AI characters and tales in virtual settings using the techniques mentioned above. Users can draw sketches and paste overlays on physical items and people in their environment in AR or MR.

2) Censorship

Censorship is a popular method of censoring ideas and information when certain stakeholders, whether individuals or groups, as well as authorities, find such information or ideas disagreeable, dangerous, or harmful. In the real world, censorship entails restricting access to specific websites, controlling the dissemination of information electronically, limiting the information disclosed to the public, facilitating religious beliefs and creeds, and reviewing the contents to be released in order to ensure that user-generated content does not violate rules and norms in a given society, with the potential side effects of sacrificing freedom of speech or certain digital freedom (ex. Digitally, several censoring techniques (such as DNS manipulation and HTTP(S)-layer interference) are used.

1) IP-filtering techniques are used to block entire subnets; 2) access to certain sensitive domains is restricted to prevent access to specific websites; 3) specific keywords are used as markers for targeting specific sensitive traffic; and 4) specific contents and pages are designated as sensitive or restricted categories, possibly through manual categorization.

Numerous user interaction traces and fresh material will be developed as the metaverse becomes a popular site for content creation. Minecraft, for example, has long been recognized as a wonderful virtual environment in which avatars have a great deal of creative flexibility when it comes to creating new user-generated material. Minecraft also caters to a wide range of users who want to meet and share knowledge in virtual environments.

3) Creator Culture

We can only build our argument using existing work connected to creators and digital culture to sketch a user-centric culture on a huge scale inside the metaverse, hence the section on content production concludes with a conjecture of creator culture. First, because every metaverse member will create virtual entities and contribute to new metaverse assets, we expect the aforementioned authoring methods to reduce barriers to such co-creation and co-contribution. To put it another way, instead of a small group of expert designers, all avatars will most likely collaborate in the creation of digital material. Investigating the authoring journeys design space and incentive strategies for amateur and rookie creators to actively participate in the process.

Multiple avatars (and content developers) in a virtual living area can iteratively add new and distinctive features to their virtual settings. In virtual contexts, the creative culture can be enhanced further by providing prospective

measurements for the preservation of obsolete contents, such as a virtual museum to track the footprint of digital items. The next point to consider is how the preserved or current digital materials should seem in real-world settings. Everyone in physical contexts should be able to use the fusing metaverse technology, as well as sense the physical affordances of virtual entities and their contents in public urban places. In addition, the new virtual culture has the potential to influence the current culture in the actual world; for example, digital cultures can influence workplace interactions.

C. Virtual Economy

1) Economic Governance

Several instances of gamers creating and maintaining in-game economic systems have been seen throughout the last two decades. The space theme game EVE stands out from the others with a player-generated intricate cobweb of an economic system, in which players also play a role in economic governance, as seen by their monthly economic figures. This isn't to claim that metaverse creators can just copy EVE's success and hand over complete economic control to their users. For one thing, the link of crypto currencies with potential deflationary pressure is one of the primary underlying obstacles of realizing crypto currency as a formal means of exchange. Specifically, whereas in EVE, players have authority over currency generation, Bitcoin does not.

In contrast to the current world, where central banks can change money supply through monetary instruments and other financial entities can affect money supply by producing wide money, crypto currency in its current form lacks such a method. As a result of the quantity theory of money, one is justified in being concerned about deflationary pressure if money velocity is relatively stable over time, as the money supply fails to match the expanding number of transactions in a thriving virtual world.

2) Oligopolistic Market

Given the dominance of huge digital firms in our real world, it's no surprise that people like Epic Games creator Tim Sweeney advocate for a "open metaverse." However, due to the high cost of establishing a metaverse, it's unclear whether the existing paradigm will move to a less consolidated metaverse market. Sunk cost is strongly connected with an industry's barriers to entry, according to empirical datax. In the metaverse, sunk cost may refer to a company's non-recoverable costs associated with building a metaverse system. Major corporations such as Facebook and Microsoft have already entered the fray.

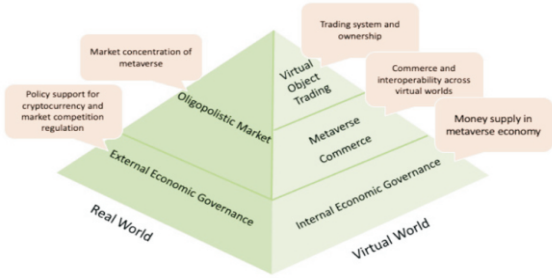

Fig.3. Oligopolistic Market

As a result, unless the cost of developing and maintaining a metaverse world capable of holding millions of users falls dramatically in the future, either as a result of institutional factors or simply because of plain-vanilla technological progress, late-arriving startups with a lack of funding will have a difficult time breaking into the market. The metaverse sector could become an oligopolistic market if market share is concentrated in the hands of a few prominent IT corporations. Despite the fact that it is de jure less extreme than having our parallel world dominated by a massive monopoly, incumbent oligopolies can nevertheless wield significant power, particularly at the third stage of metaverse development.

3) Metaverse commerce

Metaverse commerce is an emerging idea that refers to trading that takes place in the virtual world, including but not limited to user-to-user and business-to-user trade. Because trade is conducted digitally, the trading system can heavily borrow from the current e-commerce system. For example, eBay, with a net worth of 48.56 billion USD50, is a classic example of C2C e-commerce from which the metaverse community might learn.

At this time, most video games, even those produced by the same company, do not provide players with complete interoperability between games. Existing games in real world, on the other hand, do have some interoperability, albeit in limited versions. Players can transfer their data from Nintendo 3DS to Nintendo Switch in games like Monster Hunter and Pokemon Go, for example.

However, such transfers are often unilateral (e.g., from an older to a newer game) and lack an immersive experience because they occur outside of the actual gaming. Games with downloadable content (DLC) generated from the purchase of prior matches from the same developer are another type of game that could be deemed interconnected.

4) Virtual Objects Trading

Objects that are not real Establishing a trade system for virtual objects amongst diverse stakeholders in the metaverse is what trading is all about. Trade has been a vital aspect of our daily lives since humankind first began barter trading ages ago. As a result, the digital twins of the actual world should similarly represent such notable physical equivalents. Furthermore, as we progress from the stage of digital twins to digital natives, when user-created virtual contents begin to proliferate, the demand for a well-developed trading system only grows. Fortunately, the existence of multiple real-world exemplars gives light on the metaverse trade system's growth. Trading platforms for Non-Fungible Tokens (NFTs), such as OpenSea and Rarible, make it easy for NFT holders to trade with one another, much like they would with other traditional assets.

With more virtual object trades at the digital natives stage and more people adopting a digital nomad lifestyle, the virtual trading market area should be capable of defending virtual object ownership. Despite the fact that an NFT cannot be hijacked by other metaverse users, counterfeits are always possible. Individuals with nefarious intentions may attempt to make counterfeits of a user-generated masterpiece listed on the virtual trade platform in order to claim its originality. NFT-related fraud is not uncommon, as evidenced by reports of multiple cases in which buyers were duped into believing they were paying for genuine works by well-known artists, despite the fact that trading platforms lacked sufficient authentication.

D. Social Acceptability

The social acceptability of the metaverse is influenced by a range of design considerations, which are discussed in this section. User diversity, fairness, user addiction, cyber bullying, device acceptance, cross-generational design, acceptability of users' digital copies (i.e. avatars), and green computing are among the factors (i.e., design for sustainability).

1) Privacy threats

Despite the unique potentials that the metaverse ecosystem may provide, it will need to address the issue of potential privacy leaks sooner rather than later, when the problem has become so entrenched in the ecosystem that any solution to address privacy concerns would require a complete redesign. The third-party cookies-based marketing ecosystem is an example of this problem, where the early focus was on offering utilities. The entire revenue model was built on cookies, which follow users in order to deliver personalized adverts, and it was too late to consider privacy concerns. They were eventually enforced by privacy legislation such as GDPR, and that was the final nail in the coffin.

2) User Diversity

The design of mobile AR/MR user interaction in city-wide urban should address many stakeholders, as described in a visionary design of human-city interaction. Similarly, the metaverse should be welcoming to all members of the community, regardless of ethnicity, gender, age, or religion, including children, the elderly, and disabled people. Various contents may exist in the metaverse, and we must ensure that the contents are appropriate for a wide range of users. Furthermore, it is critical to consider individualized content display in front of users, as well as increase the fairness of recommendation algorithms, in order to reduce biased material and thereby influence user behavior and decision-making. The contents of virtual worlds can lead to a variety of outcomes.

3) Fairness

In the metaverse, many virtual worlds will be created, and each virtual world may have its own set of rules to govern user behaviour and activities. As a result, the time and effort required to manage and maintain such virtual worlds would be immense. We anticipate that AI-assisted autonomous agents will take on the job of governance in virtual environments, easing the burden of human labour. It's crucial to note that autonomous agents in virtual worlds rely on machine learning algorithms to respond to the dynamic yet continual changes in virtual items and avatars. It is commonly established that no model can precisely capture a real-world instance, and an unfair or biased model in the metaverse could systematically impair user experiences.

4) Other Social Factors

First, social acceptability of technologies connecting people to the metaverse, which refers to the public's or bystanders' acceptance of such devices, such as mobile AR/VR headsets [96], requires further examination. Furthermore, the user safety of mobile headsets may have an adverse effect on users and onlookers, resulting in a breakdown of user experience in virtual worlds. To our knowledge, there have only been a few research on the social acceptability of virtual worlds, but none on digital twins or the metaverse.

In addition, the differences in cross-generational social networks suggest that Gen Z adults prefer Instagram, Snapchat, and Tiktok to Facebook. Rather, Facebook keeps a higher percentage of Gen X and Y users. Until date, social media platforms have failed to meet the needs of all users.

E. Privacy And Security

Internet-connected gadgets, such as wearables, allow users' data to be monitored and collected. This data can be interpreted in a variety of ways. We are usually unaware of such omnipresent and continuous recordings in most instances, such as in smart homes, and hence our privacy may be jeopardised in ways we cannot anticipate. Personal data (e.g., physical, cultural, economic), user behaviour (e.g., habits, choices), and communications are all examples of data that can be collected by these devices (e.g., metadata related to personal communications). In many cases, users are willing to trade off the benefits of using these smart gadgets or services for the potential privacy and security risks. For example, GPS location is used to locate friends who are close by.

1) Privacy behaviours in the metaverse

Individuals can construct avatars in the metaverse using similar personal information such as gender, age, and name, or wholly fictitious characters that do not resemble the physical appearance of the real person or feature any connected information. For example, in Second Life, an open-world social metaverse game, players can build their own avatars and choose what information they want to share with other players.

However, due to the nature of the game, any participant in the metaverse can observe the users' activity (e.g., which places they go, whom they talk to). Users in the metaverse cannot be fully aware of their surroundings or who is following them due to the existing limits of VR and related technology. According to [470], participants in the metaverse, including such Second Life, behave similarly, and so their privacy and security practises are similar to those in the real world. As stated previously, when players' avatars engage with other avatars in the metaverse, they may be exposed to extortion, constant monitoring, or eavesdropping.

2) Ethical designs

As previously stated, attackers in the metaverse can give different representations and deep-fakes. First, we'll talk about how the metaverse can be regulated, as well as the metaverse's governance options.

Second Life, for example, is based in the United States, and hence adheres to US privacy and security standards.

However, the metaverse has the potential to grow to global proportions, posing various issues in terms of protecting users across such a large spectrum. Second Life, as an example, demonstrates in-world (metaverse) regulations and legislation. Regulations are enforced in this environment through the use of a code and regular player monitoring. After being reported by others, the latter can assist the metaverse developers in banning users. However, as can be seen, this resembles some form of government. This lack of governance can obstruct the metaverse's experience, but without global management, the metaverse can devolve into anarchy and chaos. This government will be in charge of making decisions such as imposing limits on a banned player.

F. Trust And Accountability

As the Internet, Web technologies, and XR evolve, the concept of the metaverse becomes theoretically possible. And the success of the project will be determined by how willing consumers are to accept it, which is determined by perceived trust and accountability in the event of unforeseen effects.

1) Trust and Information

Socrates didn't want his words to go out into the world without a father, inscribed into tablets or into books that may circulate without their originator, beyond the reach of debate, modification, and authenticity. As a result, he conversed and advised people on the streets of Athens, but he never wrote or published anything. In an age of recirculation, "news," public relations, worldwide gossip, and internet access, the issues raised by Socrates are particularly poignant. How can rumours be recognised from reports, facts from fiction, a trustworthy source from false information, and a

trustworthy source from a deceiver? These issues have previously been demonstrated to be a stumbling block to widespread acceptance of social networks and smart technology, as seen by user migration in many cases.

2) Informed Consent

A large amount of potentially sensitive information is likely to leave the owner's sphere of control in the metaverse system. We must design an informed consent mechanism that will allow avatars, i.e., the virtual embodiments of users, to invest their trust, just as we do in the physical world during face-to-face communication, because we can examine the information and undertakings others. This type of consent system should allow people to offer or refuse consent based on verifiable information. The difficulties emerge from the fact that avatars may not be able to represent the dynamics of a user's facial expression in real time, which are crucial indicators in establishing confidence in face-to-face interactions.

3) Accountability

Accountability is likely to be one of the most important factors in realizing the metaverse's full potential. Despite technological advancements that have made ubiquitous/pervasive computing a reality, many of the potential benefits will not be realized unless people become comfortable with and embrace the technology, as shown in Figure 3. When it comes to the responsibilities, incentives, and methods of redress for those developing, implementing, maintaining, and using XR systems and services, accountability is critical for trust.

In conventional social media, content moderation policies that describe how platforms and services will treat user-generated material are frequently used to hold users accountable for the content they create.

III. CONCLUSION

Finally, technology behemoths like Apple and Google have big intentions for making the metaverse a reality. Our virtual worlds (or digital twins) will seem fundamentally different in the future years as a result of the integration of emerging technologies and the gradual development and refinement of the ecosystem. Because of the availability of powerful computing devices and intelligent wearable, our digitized future will be more interactive, alive, embodied, and multidimensional. However, numerous obstacles must be overcome before the metaverse can be fully incorporated into the physical world and our daily lives.

We advocate for a comprehensive approach to building the metaverse, as we believe it will exist as a separate gigantic entity from our physical reality.

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Health Technology

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Abstract -The field of wellbeing innovation appraisal HTA (Health Technology Assessment) is still somewhat new, yet it has shown amazing development throughout the past ten years, having spread first from the United States to Europe, and presently to the whole world. The significance of health in human existence is gigantic.The technology created and the examinations in this field have caused contrasts in the field of healthcare as in all areas. The point of this study is to look at the needs in the field of health industry and to set the models for deciding the most suitable innovation.

Keywords – Cloud Computing, Electronic Medical record, Fog Computing, Health Technology

I. INTRODUCTION

Innovation pervades our lives like never before, as mechanical advances constantly arise. Each industry has been overturned and changed, including the health and medical industry. While any development might seem like advancement, there are unquestionably benefits and burdens of medical innovation. Specialists today can perform accomplishments that quite a while back would seem like science fiction. As a matter of fact, normal life expectancies today are higher than ever in mankind's set of experiences. Health innovation covers the wide scope of apparatuses now being utilized to analyze, treat or for the most part oversee wellbeing. This might incorporate medical hardware, progressed careful operations, electronic records, and medical related programming. A significant number of these advances have worked on personal satisfaction and stretched life ranges. Be that as it may, medical innovation can likewise introduce issues for the patient. Realizing the dangers can assist patients with turning out to be more educated customers for their wellbeing and generally speaking prosperity.

Innovation is just essentially as great as the individual who programs it and the medical staff who use it. A medical services supplier who depends too vigorously on innovation might invest too little energy in getting to know the patient as an individual, and an excessive amount of time cooperating with the gear. For instance, there is a peril that a specialist might miss a side effect that doesn't fall into the high contrast boundaries of an electronic medical record.

Numerous mechanical techniques are life-saving; however, each has its own gamble for the patient. For instance, surgeries, radiation treatment, or chemotherapy can offer advantages however could prompt adverse consequences. This has for quite some time been valid with any operation since even basic anti-inflammatory medicine can be utilized improperly; nonetheless, innovation ought to continuously be assessed for risk versus reward.[1] Let's take a deeper dive into whether technology is a boon or a bane for the healthcare sector.

A. Advantages of Technology in Healthcare Industry

1. Easier Access to Information

Probably the greatest advantage innovation brings to the table in the medical services area is simpler and quicker admittance to data expected for both medical services experts and patients.

Never again do medical clinics and specialists need to totally depend on the need to save actual records for patients with the presentation of Electronic Health Record (EHR). All the data can be handily put away carefully, setting aside massive expenses and space for clinics. While actual capacity is as yet important, a significant part is digitized, making it exceptionally advantageous for specialists to effortlessly get to any data.

Also, assuming that data should be conveyed to another party, it very well may be done essentially inside the space of seconds with the assistance of a decent web association. Along these lines, essential time is saved and it assists specialists with pursuing basic choices on schedule.

2. Monitoring the body remotely

Few patients can't stroll for longer terms, and consistently visiting the medical clinic is an undeniably challenging choice for them. For this very reason, clinical science with the assistance of innovation has made a remote observing device. This device saves a ton of energy, time, and cash. With this device, the patient can converse with their particular specialist about any issue they are confronting, whether the issue is hypertension or low glucose level.

3. Medical Apps

Everybody today has a cell phone and the best thing about any cell phone is its applications. What are the better clinical applications that can be downloaded on any cell phone utilizing specific stores? Today, we can screen our wellbeing without hurrying to a specialist for each minor burden through our telephones. You can check your calorie consumption, your everyday advances, your pulse, or converse with a specialist through your application. You could in fact really look at your side effects to be familiar with your ailment. [9]

4. Data Collection

Gathering information is one of the most significant and fundamental things in any medical field. The entire health industry depends on the information in light of the fact that without information there won't be any solution for an infection. Information is expected to break down any circumstance and disease and afterward track down a potential remedy for it. The information about ailments as well as of patients is essential on the grounds that every patient has a different autonomy. Every patient requires an alternate sort of medication as not every medicine is suitable for every patient.

5. 3D printing

With 3D printing, artificial bones, appendages, and organs can be printed which can be placed into the assemblages of the patient who needs them. 3D printers have likewise reformed prosthetics; they have made the body parts incredibly practical and exceptionally modest. These 3D printers are for printing body parts as well as supportive to specialists who need to have a superior comprehension of the human body. Specialists and specialists can perform activities and medical procedures on falsely printed bodies prior to working on genuine people. [12]

6. Medical research

Innovation has enormously changed how medical sciences work. In the past clinical explores and tests used to require a long time to settle however presently with innovation, these investigates and tries are done within the space of months or even weeks. It is with the assistance of innovation that clinical specialists can speed things up and make great episodes in medical history. This was demonstrated when the Ebola outbreak was going to occur and the clinical specialists in the least days came up with a vaccine for it.

7. Better Patient Care

Dealing with patients has become fundamentally easier because of innovation. Gadgets like pacemakers, wellbeing trackers, and numerous others make it exceptionally simple for clients to follow their own well-being.

On account of any issues emerging, the information checked through these gadgets can without much of a stretch is conveyed to specialists who can determine what going on to have a patient in any way shapes, or form. Besides, present-day hardware accessible in medical clinics has helped increment the future.

Significant medical procedures that were previously impossible are currently sensible with the assistance of hardware, for example, Capsule Endoscopy cameras, which can be effectively gulped by a patient. The camera can then be checked by specialists to distinguish any issues inside the body.

Technology is making the medical field better every day and by doing so, it is also improving the quality of our lives. On this day we can say that doctors, nurses and all other medical personas can treat patients in a lot better way than they used to in the past. They can take the history of a patient in seconds and they can also tell the patients about their illnesses in seconds. Technology has made medical sciences a lot accurate and also easily accessible. It has also optimized the lab results and made the process fast and precise. All in all, we can say with complete assurance that technology has improved the quality of health. [5]

However, with all the good things there are also few drawbacks of technology which can be harmful to human life too.

B. Disadvantages Of Technology in Healthcare Industry

1. Increased Patient Costs

New innovative advances can prompt higher patient expenses because of the research and marketing

connected with putting up it for sale to the public as well as the benefit for the creator and manufacturer. As innovation propels, typically so does the expense, particularly in the event that it offers patients an answer that was not already accessible to them. While this might be a gift for conditions that are recently treatable or ongoing, the new innovation will bring about extra and long-haul costs.

2. Cyber Security Risks

New modernized innovation, like Electronic Medical Records (EMR) store and oversees patient data to impart to the patient and all medical services suppliers. The clinical history can incorporate experimental outcomes, drugs, billing data and significantly more. It's a comfort yet in addition offers the potential for abuse, bringing about a deficiency of individual information and patient protection.

Cloud network drives quite a bit of these information abilities and has made the class of cloud-associated clinical gadgets. The possibility of gadgets with sensors that can speak with different gadgets and frameworks is frequently alluded to as the web of things (or IoT). However, each of this information being produced and swashing around the web can be tricky. It opens up the expected gamble for information to be gotten to by outsiders. Whether deliberately penetrated by vindictive entertainers or unintentionally uncovered, cases proliferate of patient information advancing into some unacceptable hands. Online protection risk doesn't simply relate to the openness of private information or the payments that are here and there related to information breaks. The dangers connected with altered data can have serious consequences. Patients and medical services experts that are depending on the information to settle on therapy choices rely upon the right and precise datasets. On the off chance that information is erased or changed, it can prompt a wrong diagnosis or treatment plan, or other unfavourable occasions.

3. Unfamiliarity with Technology

Not every person is technically knowledgeable. Truth be told, a few patients might be unfavourable to involving any innovation in any structure. Few patients are not prepared to figure out the super-advanced connection points and functionalities of a considerable lot of clinical gadgets. Subsequently, it becomes hard for them to work these apparatuses all alone.

Therefore, they might wind up misjudging the elements of these innovations or run into trouble sorting out how best to work them, consequently restricting the advantages. Consistent use of such innovations relies upon a patient's own capacities, something which should be thought of. [10]

4. Lack of Empathy in Patient and Doctor Interaction

Telehealth is a vital instrument that clinicians are progressively using as we travel through the COVID-19 pandemic. The utilization of such instruments has made all the difference for the medical services framework and guarantees that patients get a continuum of care during these difficult times. Additionally, remote patient monitoring can bring down medical care costs by distinguishing potential issues prior and keeping away from inconveniences not too far off. Remote checking and telehealth additionally permit tending to the clinician deficiencies that have tormented numerous nations remembering here for the United States, explicitly in far-off regions.

Be that as it may, the manner by which innovation has turned into the point of interaction among patients and suppliers can possibly cause issues. Managing dashboards on associated clinical gadgets and PCs eliminates the human touch of treatment, bringing about an absence of sympathy towards patient care.

Particularly for elderly and vulnerable patients, depending on innovation as the connection point of care can create turmoil and dissatisfaction; and can bring about disarray, treatment plans not being seen as expected, or patient resistance. [10]

5. Frustration with Poor Implementation

As we continue to discuss medical technology's pros and cons, it infers the famous saying: "technology is great - when it works."

80% of Americans have no less than one disappointing involvement in innovation every day, as indicated by a study by Asurion.

For innovation to help medical services, frameworks should be precise, simple to utilize, and at last, develop the current strategies for patient consideration. For clinicians and specialists, ensuring that the innovation that they are utilizing is not difficult to oversee and comprehend, as opposed to a burden, is critical.

Medical services experts that invest more energy battling with innovation rather than patient

consideration are probably going to ignore the utilization of innovation and future cycles.

However, in any event, for medical care experts that are supportive of utilizing and carrying out innovation, guaranteeing that the innovation helped results are more exact or better at diagnosing is significant.

As advancements, for example, artificial knowledge and Machine Learning become more common, care should be taken to guarantee medical services experts figure out the restrictions of these innovations. For instance, many AI models are prepared on authentic information and don't adjust well to changes over the long haul where functional information has large mismatches to trained data. Essentially, overreliance on AI/ML frameworks might prompt smugness among clinicians possibly bringing about the inability to cross-check or think about options in contrast to the framework's forecasts.

If technology is not improving healthcare – through speed, efficiency or accuracy – then the continued adoption of technology within healthcare is not likely to last! [11]

C. Trending Technologies in Healthcare Industry

1. Cloud Computing

Cloud computing is the general name of Internet-based IT services for computers and other devices,providing computer resources that can be used at anytime and shared between users [2].

a) Utilizing Cloud computing can create and further develop medical care area, additionally bring significant open doors.

b) The transmission of all information over the web causes worries about the wellbeing and classification of the patient information and information the board. Studies are as yet going on around here.

c) Cloud computing power can be utilized in choice help instruments in medical care.

d) Cloud computing makes it simpler to handle enormous information dissects in the medical field.

e) High transmission capacity prerequisites because of information moves required.

f) Another hot topic in the literature is Internet of Things (IoT) and cloud computing is insufficient on this technology which is a big problem. [3]

g) Cloud computing is a disadvantageous in terms of integrating with the types of services it provides such as Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS) [4].

h) Storing files in the cloud in a distributed storage systems [5].

I) Difficulties in analyzing large data due to distributed file or data structure [6].

2. Fog Computing

Fog computing is the architecture that suggests that smart devices should be analyzed first at a local point and sent to central servers, as opposed to the architecture that allows the data to be sent and processed to a central server.[7,8]

a) Fog Computing is reasonable for ongoing applications in medical care administrations with low inertness and high reaction time.

b) It is reasonable for use with IoT innovation utilized in medical services administrations what's more, applications.

c) It furnishes huge information investigation with its handling power and extra room with its neighbourhood design.

d) It offers preferred adaptable engineering over Cloud computing.

e) All the more remarkable appropriated handling on account of nearby handling power.

f) More secure and blame lenient engineering thanks to nearby tasks.

3. Edge Computing

Edge computing and Fog Computing have similitudes since they give nearer information handling and information assortment. Be that as it may, in spite of the fact that there are similitudes between these two ideas, they have vital contrasts. The primary contrast between these two new innovation patterns is where the computation and it are situated to handle power.

a) In e-medical care or telemedicine applications also, administrations, concentrated patient information is gotten through remote sensors. In such cases, edge registering can answer this need.

b) It is completely viable and appropriate for IoT innovation.

c) Cost is higher than Cloud computing.

d) Being liked in applications is appropriate with low inactivity period.

e) Having the capacity is required also, handling limit of the gadgets it contains.

II. Conclusion

The industry of health and medication isn't as similar today as it was around a decade prior. This has changed as a result of medical progression which was conceivable due to technological advancement. Medication could never have had the option to make revelations like today if not for the innovation. Consistently, we hear things about new technological leaps forwards and advancements. These progressions in technology have assumed control over the world and are driving it to extraordinary change. With the quick speed of development and technological advances, there are clearly advantages and disadvantages of technology in healthcare.

Existing executions of innovation in medical care have shown the possibility to work on the precision and speed of analysis, treat more patients, and give better sharing of information between parties that require it. With such quick developments, there are always disadvantages — like those highlighted in this research paper — to survive and pre-empt. For certain, there are as yet numerous neglected open doors inside medical care and innovation that are set to proceed with the pattern in propelling medical care. As this new industry develops, the hindrances are probably going to be offset by the benefits, introducing another norm for care.

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Digital Voting using Block Chain

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Abstract- Building a safe electronic lawful framework that offers the decency and security of current democratic plans, while giving the straightforwardness and suppleness offered by electronic frameworks has been a test for an all-encompassing time. During this work-in-progress paper, we assess a use of the blockchain as an assistance to execute dispersed electronic democratic frameworks. The paper proposes a one of a kind electronic legitimate framework upheld blockchain that tends to an assortment of the limitations in existing frameworks and assesses an assortment of the supported blockchain structures to develop a blockchain-based e-casting a ballot framework. Specifically, we assess the capability of circulated record advancements through the layout of a contextual analysis; to be specific, the procedure of a political race, thus the usage of a square chain-based application, which improves the insurance and diminishes the expense of facilitating an across the country political race.

Keywords- Block chain, Contextual Analysis E-casting, E-voting, Lawful frameworks.

I. INTRODUCTION

Electronic democratic frameworks are the subject of dynamic research for quite a long while, proposing to curtail the value of running a political decision while guaranteeing the political race honesty by satisfying the assurance, protection and consistence necessities.

Supplanting the quality pen and paper conspire with a present political race framework can possibly confine misrepresentation while making the democratic procedure discernible and evident [2]. Blockchain likely could be a conveyed, unchanging, indisputable, open record. This new innovation has three primary highlights:

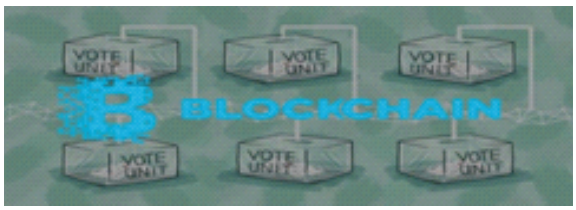

FIG. 1. DIGITAL VOTING USING BLOCK CHAIN

(I) **Immutability :** Any proposed "new square" to the record must reference the past variant of the record. This makes a changeless chain, which is the place the blockchain gets its name from and forestalls messing with the trustworthiness of the past passages.

(ii) Verifiability : The record is decentralized, repeated and conveyed over various areas.This guarantees high accessibility (by killing one point of disappointment) and gives outsider obviousness as all hubs keep up the of accord variant the record.

(iii) Distributed Consensus : A dispersed agreement convention to figure out who can annex the ensuing new exchange to the record. A lion's share of the system hubs must arrive at an accord before any new proposed square of sections turns into a lasting piece of the record. These highlights are incompletely accomplished through cutting edge cryptography, giving a security level more prominent than any recently known record-keeping framework. Blockchain innovation is in this manner considered by numerous [3], including us, to have significant potential as an apparatus for executing a present current democratic procedure. This paper assesses the utilization of blockchain as an assistance to execute an electronic democratic (e-casting a ballot) framework.
Savvy contracts are programmable agreements that naturally execute when pre-characterized conditions are met. Like regular composed agreements, brilliant agreements are utilized as a lawfully official understanding between parties. Shrewd agreements computerize exchanges and license gatherings to accomplish understandings straightforwardly and naturally, without the necessity for a mediator. Key

advantages of brilliant agreements contrasted with standard composed agreements are cost-sparing, upgraded effectiveness and hazard decrease. Keen agreements reclassify trust, as agreements are noticeable to all or any the clients of the blockchain and may, in this way, be handily confirmed. during this work, we characterize our e-casting a ballot framework dependent on brilliant agreements [5].

II. BLOCKCHAIN AS A SERVICE FOR E-VOTING

This area proposes a substitution e-casting a ballot framework bolstered the distinguished democratic necessities and blockchain as a help. We clarify the arrangement of the blockchain, characterize the shrewd agreement for e-casting a ballot that might be sent on the blockchain and show how the proposed framework fulfills the imagined casting a ballot prerequisites.

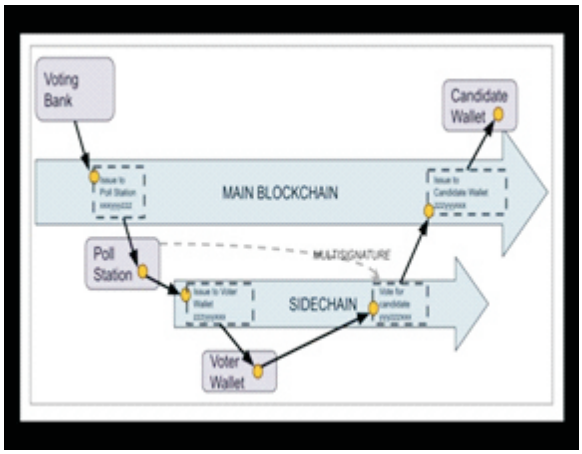

FIG. 2. BLOCK CHAIN ARRANGEMENT

To fulfill the protection and security prerequisites for e-casting a ballot, and to affirm that the political decision framework shouldn't empower constrained democratic, voters will pick a managed situation. In our work, we set up a Go-Ethereum [7] authorization Proof-of-Authority (POA) blockchain to accomplish these objectives. POA utilizes a calculation that conveys similarly quick exchanges through an accord system upheld way of life as a stake. The justification for utilizing Go-Ethereum for the blockchain framework is clarified in sub-area C. Types of hub:

(I) District hub : Represent each casting a ballot region. Each area hub contains a product specialist that self-rulingly interfaces with the "boot hub" and deals with the existence pattern of the keen agreement subsequently hub. At the point when the political decision executive (see brilliant agreement segment) makes a political decision, a polling form shrewd agreement is conveyed and sent onto its relating locale hub. At the point when the polling form shrewd agreements are made, every one of the comparing region hubs is allowed to connect with their relating contract. At the point when a private voter makes her choice from her relating keen agreement, the vote information is confirmed by the main part of the comparing region hubs and each vote they concur on is added onto the blockchain.

(ii) Bootnode : Each organization, with permissioned access to the system, has a boot hub. A boot hub could be a disclosure and coordination administration that encourages the area hubs to find each other and convey. The boot hub doesn't keep any condition of the blockchain and is run on a static IP so area hubs discover their friends quicker [6]. Subsequent to setting up a protected and individual blockchain, the following stage is to characterize and convey a shrewd agreement that speaks to the e-casting a ballot procedure on the blockchain foundation. B. Political race as an astute agreement defining a shrewd agreement incorporates three sections:

·Recognizing the jobs that are included inside the understanding (the political decision understanding for our situation)

·The understanding procedure (i.e., political race procedure)

·The exchanges (i.e., casting a ballot exchange) utilized in the savvy contract. 1)

· Election jobs: The jobs in a keen agreement incorporate the gatherings that require taking an interest in the understanding.

The political race process has resulting jobs :

(i) Election manager : To deal with the lifecycle of a political decision. Different believed foundations and partnerships might be selected during this job. The political decision chairmen make the political race, register voters, choose the lifetime of the political race and relegate permissioned hubs.

(ii) Voter : a private who is qualified to cast a ballot. Voters can validate themselves, load political race

voting forms, make their choice and confirm their vote after a political race is finished.

(iii) Election process : In our work, every political race process is spoken to, by a gathering of shrewd agreements, which are sent on the blockchain by the political decision executives a savvy contract is characterized for everything about democratic regions.

The ensuing are the most exercises inside the political decision process:

(i) Election creation Election executives make political decision voting forms utilizing a shrewd go for which the director characterizes a posting of contender for each casting a ballot area. The keen agreements are then composed onto the blockchain, where area hubs access cooperates with their relating shrewd agreement.

(ii) Voter enlistment The enrollment of voters stage is directed by the political decision managers. At the point when a political decision is made the political race overseers must characterize require a part for a legislature biometric verification administration to safely verify and approve qualified people. Utilizing such a help is basic to fulfilling the necessity of secure verification as this is frequently not ensured, of course, while utilizing a blockchain framework. In our work, for each qualified voter, a relating personality wallet would be produced. An interesting wallet is created for each voter for each political decision that the voter is qualified to take an interest in.

(iii) Tallying results The counting of the political race is finished on the fly inside the brilliant agreements. Each voting form savvy contract does its count for their comparing area in its stockpiling.

(iv) Verifying votes inside the democratic exchange, every voter gets the exchange ID of his vote. In our e-casting a ballot framework, voters can utilize this exchange ID and go to an official political race site (or authority) utilizing a blockchain traveler and (in the wake of verifying themselves utilizing their electronic distinguishing proof) find the exchange with the relating exchange ID on the blockchain. Voters can, in this manner, see their decisions on the blockchain, and check that the votes were recorded and tallied effectively. This sort of check fulfills the straightforwardness prerequisites while forestalling the recognizability of votes.

v) Voting exchange: Each voter interfaces with a polling form keen agreement for her comparing casting a ballot area. This savvy contract collaborates with the blockchain by means of the relating region hub, which adds the vote to the blockchain. Every voter gets the exchange ID for their decision in favor of check purposes. Each vote that is given, by most of the relating area hubs, is recorded as an exchange at that point attached on the blockchain.

III. EVALUATING BLOCKCHAIN IMPLEMENTATIONS

As clarified toward the beginning of this area, to fulfill the protection, security and straightforwardness necessities for e-casting a ballot and to ensure that the political race framework shouldn't empower pressured casting a ballot, in our work, we are utilizing a private (permissioned) blockchain for accommodating our blockchain foundation, where the savvy contracts are conveyed. Right now, consider three blockchain structures for executing thus conveying our political race keen agreements. Those are Exonum, Quorum, and Geth.

1) Exonum: The Exonum block chain is the solid start to finish with its full execution through with the programming language Rust. Exonumis developed for individual block chains. It has a redone Byzantine calculation that is wont to accomplish agreement inside the system. Exonum can bolster up to 5000 exchanges for every second. Shockingly, an impediment of the structure is that Rust is that the main fake language in the flow form, which confines the designers to develops accessible right now. Exonum is anticipating presenting Java-ties and staging autonomous interface portrayals inside the not so distant future to make Exonum more engineers well disposed.

2) Quorum: An Ethereum-based circulated record convention with exchange/contract protection and new accord instruments. It is a Geth fork and is refreshed in accordance with Geth discharges. Majority has changed the accord component and is pointed more towards consortium chain based agreement calculations. Utilizing this agreement permits it to help many exchanges every second.

3) Geth: Go-Ethereum or Geth is one of the three unique usage of the Ethereum convention. It runs savvy contract applications precisely as modified without the opportunity of personal time, oversight, misrepresentation or outsider obstruction [7]. This

structure bolsters advancement past the Geth convention and is that the most engineer agreeable system of these we assessed. The exchange rate relies upon whether the blockchain is executed as an open or private system. In light of these capacities, Geth was the structure we decided to put together our work with respect to, any comparative blockchain structure with the indistinguishable abilities as Geth likely could be considered for such frameworks.

IV. RELATED WORK

In this area, we present some of the conditions of the workmanship pertinent e-casting a ballot frameworks that utilization blockchain as an assistance. Public square [10] is a start to finish undeniable blockchain-based democratic arrangement intended for governments and foundations. Marketplace utilizes its Token on the blockchain for decisions, where governments and foundations buy these tokens for every individual qualified voter. A Smart Contract for Boardroom Voting with Maximum Voter Privacy, proposed the essential usage of a decentralized and self-counting web casting a ballot convention with greatest voter protection utilizing the Blockchain, called The Open Vote Network (OVN). The OVN is composed as a reasonable agreement on the overall population Ethereum block chain. Computerized Voting with the usage of Blockchain Technology proposed joining of the blockchain innovation to the current discretionary framework inside the UK during which the voters can cast a ballot at a democratic area or on an online program gathering. Netvote might be a decentralized blockchain-put together democratic system with respect to the Ethereum block chain. Netvote uses decentralized applications (dApps) for the interface of the framework. The Admin dApp permits political race heads to line political race arrangements make polling forms, set up enrollment rules and open and close democratic. The Voter dApps utilized by singular voters for enrollment, casting a ballot and might be coordinated with different gadgets, (for example, biometric per users) for voter recognizable proof. The Tally dApp is then acclimated with count and check political decision results. The fundamental particular preferences of our methodology over the past methodologies are the accompanying: (an) Our methodology depends on private blockchain usage. Open based e-casting a ballot frameworks are wasteful concerning monetary expense. This wastefulness happens because of the high gas cost and along these lines as far as possible which are set for savvy contracts inside the system. Another hazard utilizing the overall population blockchain is that prime traffic inside the system, which could influence the throughput of votes inside the framework, making it less time-effective. Besides, a 51% assault represents a risk to an open blockchain, where any individual can sign exchanges.

V. CONCLUSION

Right now, presented a blockchain-based electronic democratic framework that uses shrewd agreements to empower secure and cost-proficient political race while ensuring voters protection. We have indicated that the blockchain innovation offers a substitution plausibility to beat the requirements and selection obstructions of electronic democratic frameworks which guarantees the political race security and honesty and lays the base for straightforwardness. Utilizing an Ethereum private blockchain, it's conceivable to send several exchanges for each second onto the blockchain, using each part of the shrewd agreement to facilitate the heap on the blockchain. For nations of more noteworthy size, some extra measures would be expected to help more noteworthy throughput of exchanges every second.

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Web 3.0

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Abstract— The term world wide web (www) is around us for over past two decades. It is being utilized to make strides communication, collaboration, sharing of assets, advancing dynamic learning, and conveying of instruction in remote learning mode. Since 1990s the World Wide Web has been advanced from web 1.0 to web 2.0 to web 3.0. The primary adaptation web 1.0 begun and studied as it were medium at that point web 2.0 built up itself as a studied type in medium. Presently the most recent adaptation web 3.0 is said to be a medium which not as it were permits the client to perused compose and execute but it moreover permits the machine to carry out a few of the considering. To start with, this paper examines what is web 3.0, its design, characteristics and applications.

Keywords— Artificial Intelligence, Blockchain, Centralized Platforms, Ethereum, MetaMask, Smart Contracts.

I. INTRODUCTION

Web 3.0 is one of the latest technologies which are going to bring a huge change and fix what is wrong in the internet of today. It is the vision of the next phase of the internet's development which allows us to create a decentralized environment around the blockchain technology. It would mark the era of departure of centralized mega-platforms and corporations that dominates the present environment.

It is the latest Internet technology that leverages machine learning, artificial intelligence, and blockchain to achieve real-world human communication. The biggest advantage of using web 3.0 is that it not only allows the users to control their own data but also they will be paid for the time being spent on web.

II. ARCHITECTURE OF WEB 3.0

The architecture of a web 3.0 application is completely different from a web 2.0 application. In a web 2.0 application a lot goes in a medium architecture. Firstly there must be a place to essentially store user's data and its activities like posts, tags, etc. (in case of a blogging web application).It requires a constantly updated database. Secondly there must be a backend code that defines the business logic for e.g. what happens when a particular button is clicked. And last but not the least the front end code which defines application's UI logic. Putting it all together we interact with the frontend which talks to its backend, which talks to its database. All of this code is hosted on centralized servers and send to us through web browsers. This is the summary of a typical web 2.0 application.

But nothing remains constant, as the introduction of blockchain technology provides a new way for Web 3.0 applications. Unlike Web 2.0 applications web 3.0 applications eliminate the middle man i.e. there is no centralized database that stores the application's data and there is no centralized web server where the backend logic resides.

Instead we can use Blockchain to build applications on a decentralized state machine that is maintained by anonymous nodes on the internet. Blockchains are state machines that are instantiated with some genesis state and have very strict rules (i.e., consensus) that define how that state can transition.

And in place of using a centralized server for backend logic, we can create smart contracts (Smart Contracts define the logic behind the state changes in a blockchain) and deploy them on the decentralized state machine. It allows everyone to create a blockchain application by deploying their smart contracts on the shared state machine. Smart Contracts run on Ethereum Virtual Machine which executes the logic defined in contracts and process the state changes on the globally accessible state machine.

There are also issues when it comes to "signing"

transactions, the cryptographic process that ensures the security of blockchains. To manage this, you'll need a tool like MetaMask.

There is one more problem too, as we use blockchain to store data; it is sometime prove to be very expensive while building apps on Ethereum. In order to solve this problem we need a decentralized off-chain storage solution, like IPFS or Swarm.

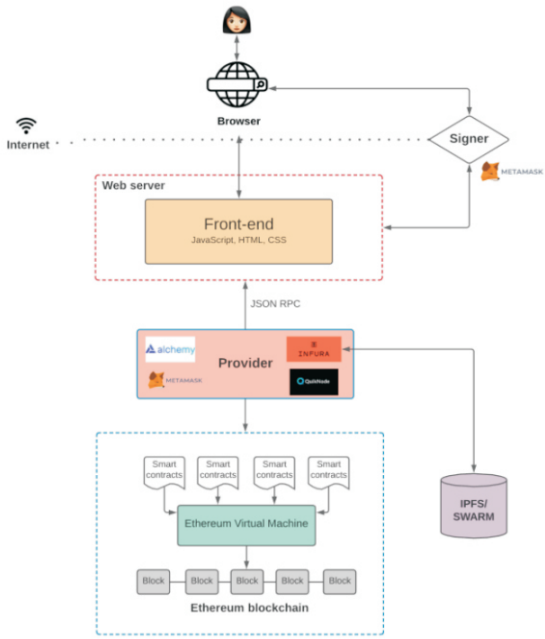

Fig.1. Web 3.0 Architecture

III. CHARACTERSTICS

A. Intelligence:

Experts accept that one of the foremost promising highlights of Web 3.0 will be Web with insights, i.e., an shrewdly web. Applications will work scholarly people with the utilization of Human Computer interaction and insights. Diverse Artificial Intelligence (AI) based devices & strategies (such as, unpleasant sets, fuzzy sets, neural systems, machine learning etc) will be incorporated with the applications to work scholarly people. This means, an application based on Web 3.0 can directly do intelligent examination, and after that ideal yield would be conceivable, even without much intercession of the client. Records in different dialects can be scholarly people interpreted into other languages in Web3.0 period. Web 3.0 ought to empower us to work through normal dialect. In this manner, clients can utilize their local language for communication with the others around the world

B. Personalization:

Another characteristic of Web 3.0 period is Personalization. Personal or person inclinations would be considered amid different exercises such as data handling, look, and formation of personalized entry on the internet. Semantic Web would be the center of innovation for Personalization in Web 3.0.

C. Interoperability:

In the setting of Web 3.0, the terms Interoperability, collaboration and reusability are essentially interrelated. Interoperability suggests reuse, which is once more a shape of collaboration. Web 3.0 will give a communicative medium for information and data trade. When an individual or a software program produces data on the Internet and this information is utilized by another, at that point the creation of unused shape of data or information takes put. Web 3.0 applications would be simple to customize & they can independently work on distinctive sorts of gadgets. An application based on Web 3.0 would be able to run on numerous types of Computers, Microwave gadgets, Hand-held gadgets, Mobiles, TVs, Automobiles and numerous others. Unavoidable Web is the term utilized to depict this wonder where web is operable to a wide run of electronic gadgets.

D. Virtualization:

Web 3.0 would be a web with tall speed web transfer speeds and Tall conclusion 3D Illustrations, which can superior be used for virtualization. The slant for future web alludes to the creation of virtual 3-Dimensional situations. A case of the foremost popular 3-D web application of Web 3.0 is Second Life.

IV. TECHNOLOGY TRENDS FOR WEB 3.0

Based upon the over definitions, it is likely that the modern generation of web applications will have a few particular center technologies to bolster them. In this area, we show a few of the major patterns in terms of innovations that might end up the building pieces of the following era of the Internet.

A. Semantic Web:

The expansion of the World Wide Web that gives an efficient & simpler way to share, discover and combine information & information from unmistakable sources is called Semantic Web. It can also be depicted as semantic web helps machine and individual easy to

understand the relationship between things.

We may say, Conventional World Wide Web = Web of Reports with Limited Interoperability, Semantic Web = Web of Coordinates, Connected significant Information. Semantic Web is all approximately information integration. The Semantic Web converts "display only" information to important data by using metadata. Ontologies, which contain the lexicon, semantic connections, and straightforward rules of induction and logic for a particular space, are gotten to by program specialists. These agents find and combine information from man.

B. The 3D Web:

This slant of long haul World Wide Web alludes to the formation of virtual 3-dimensional worlds on the Net. The usage of 3D illustrations will be broadly utilized within the advancement of Web 3.0 apparatuses or applications. Tall speed Web, faster processing speeds, higher screen resolutions, 3D gaming technology and increased reality will change the Net browsing into a 3D involvement, where you really move through the virtual passages of the Internet, as a virtual avatar of your genuine self. As of late a few Internet-based basic virtual universes, such as Radar Systems, Moment Life, IMVU, Dynamic Universes, and Ruddy Light Center, have picked up colossal consideration by the open around the world. Clients of these virtual universes are developing in a huge way regular. Clients make avatars on the Net and allow them to dwell within the virtual universes. The inhabitants or avatars of these virtual worlds can investigate, connected with other residents, socialize, take part in several exercises, make and serve distinctive sorts of administrations.

C. The Social Web:

The Social Web clarifies the interaction of individuals with one another utilizing the fundamental advances of World Wide Web. Technology progressions in Web 3.0 will take the current social computing to a modern level called Semantic Social Computing or Socio-Semantic Web which can create and utilize information in all shapes, e.g., substance, models, administrations, & computer program behaviors. Semantic Web and, in common, Artificial Insights advances will include fundamental knowledge representations to data, labels, forms, services, computer program functionalities and behaviors. The shrewdness of crowds will come not from the agreement choice of the group, but from the semantic and consistent conglomeration of the ideas, thoughts, and choices of each person within the bunch. Instead of connecting documents only, the longer term Social

The Effects of the COVID-19 Pandemic on the Educational System

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Abstract The global impact of pandemic COVID-19 can be seen in every industry. This has a negative impact on India's and the world's education sectors. It has imposed a global lockdown, which has had a negative impact on students' lives. Learners were unable to transfer schools/colleges, and all educational activities in India were halted. The COVID-19 epidemic has shown us that change is unavoidable. It has acted as a spur for educational institutions to grow and use platforms using previously unexplored technologies. To wash away the possibility of a pandemic, the education sector has been striving to survive crises with a fresh method and solving the issues.

Keywords COVID-19, Education, Impact, platforms.

I. INTRODUCTION

Online learning and classes are becoming a bigger element of the education system all around the world. Education has become more convenient and accessible to everyone thanks to the internet. In India, the education industry is constantly expanding. When it comes to higher education, India is one of the world's largest markets. Though online and remote courses have been for a long time, the adoption of the online way of taking classes at universities and colleges, as opposed to the traditional face-to-face classroom approach, has only been considered in the last few years in India [1]. When it comes to India's educational system, the face-to- face classroom method has traditionally been the most popular. The adoption of online channels of education has been hampered by familiarity and convenience of use of offline techniques, as well as a lack of demand for online teaching methods. However, in light of the current COVID-19 epidemic, educational boards have mandated the delivery of online classes at the college and university levels. Covid-19 has resulted in a significant shift in the educational system, not only in India but throughout the world. Virtual classes have taken over at universities across India and around the world, eliminating actual classrooms. In India, online education is still in its early stages [1] .

The World Health Organization declared COVID-19 a pandemic on March 11, 2020. This epidemic began in China's Wuhan city and has spread to a number of countries.

The pandemic has slowed the rise of nations where novel coronavirus cases have been reported. Countries are implementing various methods, such as lockdown, to reduce crowding. Non- attendance at work, school closures, suspension of transportation services, and so on [2].

II. IMPACT OF COVID-19 ON EDUCATION SYSTEM

State governments began closing schools and colleges across the country to combat the spread of the new corona virus. It was announced as a temporary measure to prevent the crowds in the second week of March. The government initially declared the suspension of schools for a month, but the time frame was steadily extended, and it is unclear when they will return [5] .

A. IMPACT OF COVID-19 ON SCHOOLS

The structure of learning and schooling has been changed by the closing of schools. To begin with, it had an impact on teaching and assessment methods. Only a few private schools use online teaching methods, and they are few in taking online programs. Children at those schools take classes online. Low-income private and public schools, on the other hand, have been closed

down and do not have access to an eLearning solution. It is interfering with kids' ability to learn. The change in teaching approach has caused a slew of problems for parents [6] .

B. IMPACT OF COVID-19 ON HIGHER EDUCATION

The closure of universities has had an impact on university students' learning. One immediate solution is required to ensure continuation in institutes and universities. The online teaching style is used to keep the class running smoothly. Universities use learning management software and open-source digital learning solutions to run online classes. University closures have had an impact on university students' learning. To assure the continuation of institutes and universities, one immediate answer is required. To keep the class on track, the instructor uses an online teaching technique. Universities provide online classes using learning management software and open-source digital learning solutions [4] .

The data and information used in this study were gathered from a variety of national and international sources on the COVID-19 epidemic. Information was gathered from different of reliable websites. The impact of COVID-19 on the educational system is discussed in some papers and e-contents.

During Covid-19, the Indian government took educational initiatives. On March 16, 2020, the union government proclaimed a nationwide lockdown of all educational institutions. The Central Board of Secondary Education (CBSE) has postponed all secondary and higher secondary school examinations in India on March 18, 2020. The CBSE has issued amended guidelines for test centers to conduct exams with a minimum space of one meter between students taking the exam and a class size of no more than 24 pupils.

In response to the problem of colleges and institutions closing, the Indian government, as well as state governments and corporate companies, have adopted appropriate measures. For students to continue learning, the Ministry of Human Resource Development (MHRD) h1s created many arrangements, including online portals and educational channels via Direct to Home TV and radios. Students use popular social media tools like as WhatsApp, Zoom, Google Meet, Telegram, Youtube live, Facebook live, and others for online teaching and learning during lockdown. The MHRD's ICT project (eBroucher- https://mhrd.gov.in/ict-initiatives) is a one-of-a- kind portal that brings together all digital resources for online learning. The following are the MHRD's digital projects for secondary and higher education during COVID-19: [3]

1) Diksha portal contains curriculum-aligned e-Learning content for students, teachers, and parents, such as video lessons, worksheets, textbooks, and assessments. The content was generated by more than 250 instructors who teach in several languages under the supervision of the country's national boards of education (CBSE) and the National Council of Educational Research and Training (NCERT)[8].

2) NCERT's e-Pathshala is multilingual e-Learning software for classes 1 to 12. In many languages, including Hindi, Urdu, and English, the app contains books, videos, audio, and other content intended towards students, educators, and parents. NCERT has uploaded 1886 audios, 2000 videos, 696 e-Books, and 504 Flip Books for classes 1 to 12 in several languages on this web page.

3) The National Repository of Open Educational Resources (NROER) portal offers a variety of resources in many languages for students and teachers, including books, interactive modules, and videos, as well as a variety of STEM-based games. For grades 1 through 12, content is mapped to the curriculum, and teachers' materials are aligned. It has a total of 14527 files in various languages, including 401 collections, 2779 papers, 1345 interactive, 1664 audios, 2586 photos, and 6153 videos. Welcome to the NROER website: http://nroer.qov.in/welcome.

4) Swayam is a national online education platform with 1900 courses encompassing school (grades 9 to 12) and higher education (undergraduate and postgraduate programs) in a variety of areas such as engineering, arts and social sciences, law, and management.

5) Swayam Prabha offers 32 DTH TV channels with educational programming available 24 hours a day, seven days a week. These channels may be seen everywhere in the country with a DD Free Dish Set Top Box and Antenna.[9]

6) e-PG Pathshala is for postgraduate students. During the lockdown, postgraduate students

can use this platform to access e books, online courses, and study resources. The value of this platform is that kids can use these resources without having to use the internet for the entire day. IP address: https://epgp.inflibnet.ac.in.

7) ZOOM Many people prefer it for videoconferencing because of its well-balanced features. The user interface is straightforward and easy, and it integrates with "Outlook." One-click meetings may be started from computers, mobile devices, and tablets. It is simple and quick to set up [8].

8) Google MEET Because of its accessibility, affordability, good inbuilt video conferencing tools, and rigorous security features, Google Meet is popular video conferencing software. It's easy to set up virtual conferences for up to 250 participants, and it's available on Android, iOS, and Chrome [7].

9) Google Classroom is a free online learning environment. Google Classroom is a section of "Google For Education," which is aimed at higher-education teachers and students. It's been available as an add-on service in G Suit's basic, business, and enterprise versions since 2018. The most significant advantage is that it is simple to use and accessible to anyone.

10) Microsoft Teams is a collaboration tool developed by Microsoft. Microsoft Teams offers a platform that allows users to move between chat and video conferencing in real time, as well as native Mac features. Android, iOS, and Chrome are all supported. You can plan video or audio meetings with a single individual or a group of people, as well as webinars and large meetings with up to 10,000 people.

11) GoToMeeting It is one of the most widely used online meeting programs. It has a lot of features, and even the free plan includes a meeting. GoToMeeting is a straightforward platform with a straightforward user experience.

12) Say Namaste this is an Indian app that was created by an Indian company. It was previously only available in an online version, but it is now also available for cell phones. The app is simple to use and provides a positive user experience. One meeting room is set aside for video conferencing. A code must be produced before a meeting can begin, and it can be communicated via email or chat box.

III. POSITIVE IMPACT OF COVID-19 ON EDUCATION

Though the emergence of COVID-19 has had a number of detrimental effects on schooling, Indian educational institutions have acknowledged the challenges and are doing their best to provide smooth support services to students during the pandemic. The Indian education system now has the possibility to evolve from a traditional system into a modern one. The following are some of the positive effects that can be evaluated [9] .

A. MOVE TOWARDS BLENDED LEARNING

Transition to Blended Learning: COVID-19 has hastened the deployment of digital technology for education delivery. Institutions of higher learning have shifted to a mixed learning approach. It urged all instructors and students to learn more about technology.

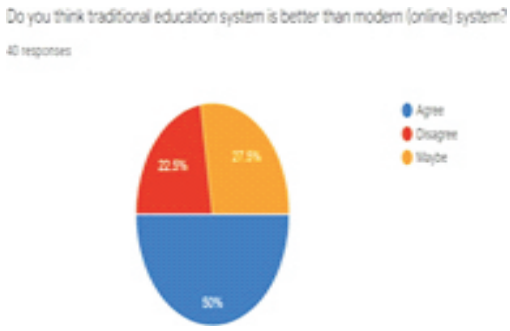
B. IMPROVEMENT IN COLLABORATIVE WORK

COVID-19 has accelerated the adoption of digital technologies in education. Higher education institutions have transitioned to a hybrid learning strategy. All professors and students were encouraged to learn more about technology.

V. DATA COLLECTION

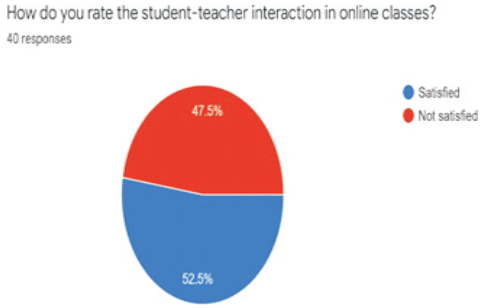
The survey was done to get an understanding of the experience and perception of student about the recently introduced online mode of education. The survey consists of 40 responses and their viewpoint.

50% students think that the online system was more comfortable because their time for travelling was saving.

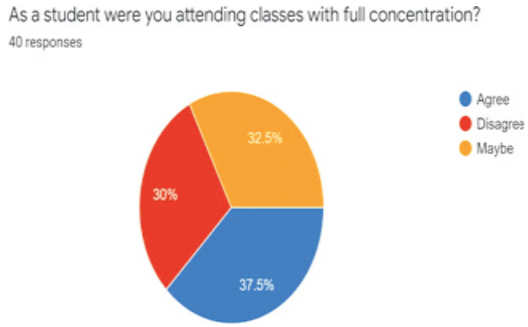


According to the survey we have conducted 27.5% students think that the traditional education system is better and 22.5% students are against the motion and 50% students thinks it is better approach to the education system.

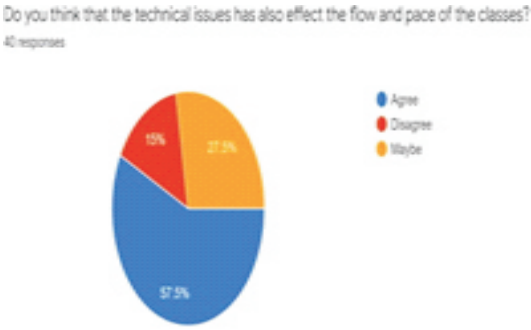
Pandemic had created more opportunities to build the skill set according to the students will. So the responses they have given with the motion are 57.5% and against the motion is 30%.



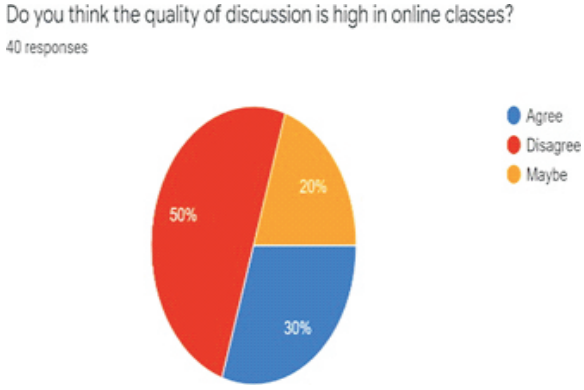
Since the classes were taken in online mode so the student teacher interaction has been declined. But teachers have done amazing job in interacting with students. 47.5% are satisfied and 52.5% aren't.



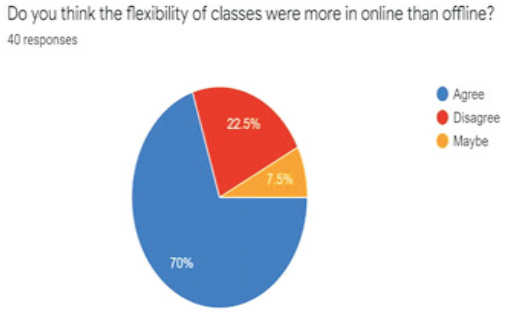
37.5% students have submitted that they were attending classes with full attention and 30% submitted their opinion with disagreement.



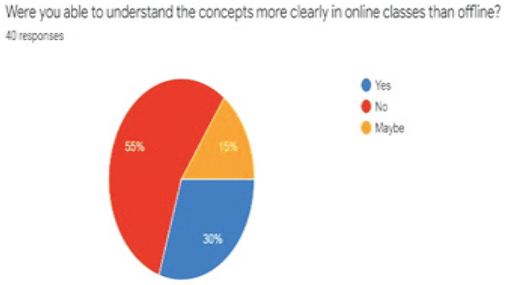
57.5% students response tells us that the technical issues like losing connection or electricity problems have created glitch in classes while 27.5% think maybe they have created problems and 15% certainly thinks that technical issue has had created problems.



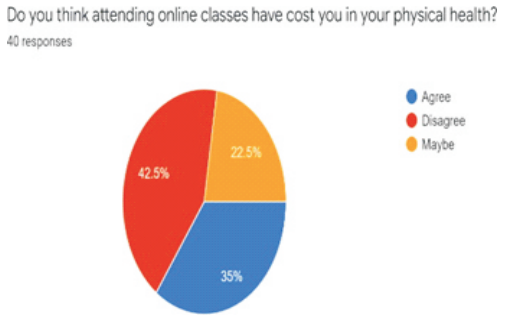
Since the online system lacks in physical interaction so the quality of discussion has been not up to the mark. 50% student's response said that they are against with the motion that they had not had a healthy discussion and 30% thinks they had a quality of discussion



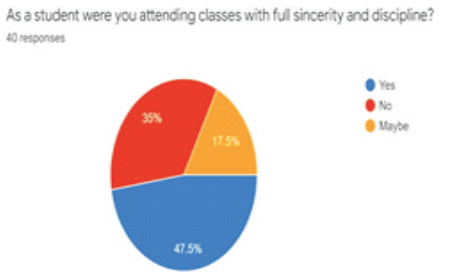
Flexibility in classes was high according to 70% students review and 22.5% were in disagreement.



55% student review says that they weren't able to understand clearly in online classes as offline and 35% students review state they were able to understand.



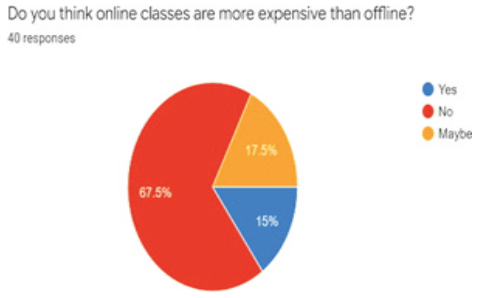
According to students review 35% thinks that the online system has caused in their eye site and many problem and 42.5% are disagreeing with that the online classes hadn't caused them in any physical health.



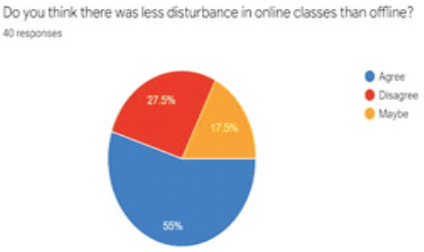
According to the survey 47.5% students have agreed with the fact that they were attending classes with full discipline and sincerity and 35% said they weren't.

45% review are agreeing with the online classes has had created an impact on their mental health and 37.5% review are disagreeing.

Online classes have been conducted in online platform. 70% people have chosen that they have used MS TEAMS, 32.5% have chosen GOOGLE MEET, and 27.5% have chosen ZOOM meeting platform.



67.5% submitted their viewpoint by stating that online system isn't expensive as compared to offline and 15% submitted the opposite.



55% is agreeing with the fact that there were fewer disturbances in online classes and 27.5% are disagreeing with the statement.

VI. CONCLUSION

Although various studies have been conducted, the impact of the COVID-19 pandemic on teaching and learning around the world concludes that, in the case of developing countries, appropriate pedagogy and platforms for different class levels of higher secondary, middle, and primary education need to be explored further.

Internet bandwidth is limited, with fewer connection points, and data packages are expensive in contrast to people's income in many developing nations, making access and affordability inadequate.

Students' learning is being disrupted by the closing of schools, colleges, and universities, as well as internal and public tests for qualifications. The traditional mode of instruction has been supplanted by online instruction. On the one hand, online teaching provides students with the opportunity to study; on the other hand, there are a number of challenges associated with the new teaching style.COVID-19 have had a significant impact on India's education industry. Although it has generated numerous obstacles, it has also resulted in numerous opportunities.

However, universities and the Indian government are working tirelessly to find a solution to this problem. The objective should be to use digital technology to put millions of young people in a better position.

There are other similar platforms to support this online teaching, and the capabilities software may supply are virtually endless, but there is no perfect video conferencing service. Zoom is ideal for any type of health communication that involves a big number of people.

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Usage of Various Messengers by Youths' Case Study of Delhi Territory

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ABSTRACT—Messengers are widely used for chatting and is the most popular services over mobile phone networks. According to a recent study, it was found that youths now a days tend to connect with their peers via messages rather than meeting in person and in order to achieve that, they use instant messenger that provides them a platform to connect in a convenient way through a user friendly interface and also loads them with various other features such as images, video and audio sharing, money transfer, live video chat, group chats etc and all for no cost. Along with above, instant messengers also help them to fulfill their academics and work needs. This paper is intended to explore impact of using Instant Messaging Applications on youths.

Keywords: Computer-mediated communication, Instant Messaging, Instant Messenger, Internet Relay Chat, Social Media.

I. INTRODUCTION

The recent convergence of communication and information technologies has created possibilities unimaginable couple of years ago. Mobile phones, email, SMS (Short Message Service) and Instant Messenger are new communication technologies that are improving with each minute. Internet Relay Chat or IRC is an application layer protocol that allows two or a group of people to carry on a conversation, in real-time, using text-based messages. Instant Messenger is a proprietary and simplified version of IRC. Instant Messengers are usually used to socialize, to maintain contact with casual acquaintance and to avoid boredom. Along with that current youth also use messengers with a motive of affection, inclusion, sociability, entertainment, relaxation, escape and fashion. People use these mediums to sustain a sense of connection in between them. A lot of portals are available on net which provide messengers free of charge and mostly are free though. Since they are free of charge, they are the preferred and give their services and used by millions of people around the world. Instant messengers also help people to communicate anywhere anytime and with anyone. However, this is a double ended sword. Cons like relying completely on messengers, no sense of personal touch, use of incorrect spellings and grammar in order to save time, spending too much time on messengers have also been noted.

Some of the most common and useful messengers and mobile messaging applications are (in an alphabetical manner): [4]

1. BBM	2. Chat On
3. Chat Plus	4. E-buddy messenger
5. FB Messenger	6. G Talk
7. Go SMS Pro	8. Hike
9. Kik	10. Line
11. Message Me	12. Nimbuzz
13. Skype	14. Tango
15. Text Plus	16. Twoo
17. Viber	18. We Chat
19. WhatsApp	20. Yahoo Messenger.

Social media is a stimulant for the advancement of everyone's rights. It is where we are reminded that all humans are equal. It is where we are able to notice and fight for a cause, globally or domestically, widespread or specialized, even when there is a distance of many miles between us. With the emergence of sophisticated devices like android phones, smart phones, tablets, Instant Messengers like WhatsApp, Instagram, Facebook messenger has potentially been dominant in terms of usage amongst youth. The service is free for now and the features which it provides is everything a person want currently. We are going to live through a devastating social media bubble which is evaluating each minute and thus there is no monopoly in the technology world that a person can boast of being the know-all.

II. BACKGROUND

Instant Messaging (IM), is currently latest and fairly new means of online communication. It uses virtually nearly synchronous text chats that enables 2 or additional people to speak with one another in current time [5]. Instant messaging initially began to become well liked in the mid 90's following its predecessors IRC's (internet relay chat) and MUD's (Multi User Dungeons) footsteps [2]. IRC is associate older program, that continues to be in use nowadays, that is "a small program that allowed users to communicate on hundreds of servers dedicated to merely concerning each topic imaginable". Similarly, MUD's is associate interactive role-playing chat program that permits individuals to communicate with each other in an interactive virtual community. IM is somehow an advancement of older communication means. However, dissimilarity between the older communication programs and instant messaging is that IM is meant to allow people to communicate online with others that they already know in person whereas older programs like IRC and MUD permits strangers to meet others they don't know in an exceedingly virtual community, [1].

III. STUDY

Participants were college students and Some People of Delhi solicited from undergraduate communication courses who were given course credit for their participation. Research and advancement in Computer-mediated communication (CMC), that happens through numerous variants of networking technology and software, has allowed us to communicate with oneanother in a more efficient and effective manner.

Instant Messaging, one among the foremost well-liked and progressively vital, kind of CMC has become staggeringly well-liked in recent years. It is redefining the means we tend to communicate during this perpetually evolving world. With many instant messaging applications out there, like WhatsApp, hike, wechat, Facebook messenger, google hangouts etc, we've got over 5 billion monthly active users because it fulfills a widespread of needs and desires like to stay in touch with friends and family especially those who live far away or whom we do not have decent time to meet, to give and receive information via text, images or videos. Along with this, new features in Instant Messengers are making it better and more useful. [3]

Participants were not pre-screened based on their technology use and 103 respondents were recorded. The age of participants ranged from 10 and above among which 53 were females, 47 were males and 3 decided not to disclose. Our maximum respondents were between 16to 20 years. Data were collected via a Google Form-based questionnaire in January and February of 2021.

IV. OBSERVATIONS

A. Measures:

Respondents were asked to complete a questionnaire designed to assess their usage of various different instant messengers for satisfying needs. Here is a glance at the questionnaire with the responses:

1. Gender

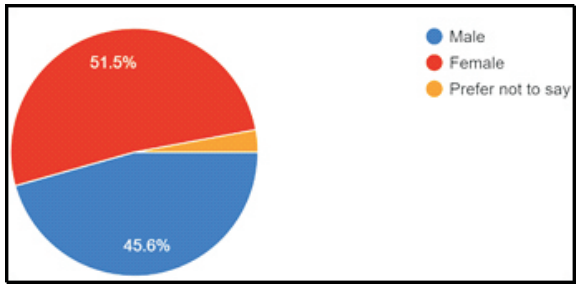

Fig. . Gender

From this we got to know that how many people have filled our questionnaire and help us to categorized the responders according to their gender. Among 103 responders', 51.5% were females, 45.6% were males and rest choose not to disclose.

2. Age

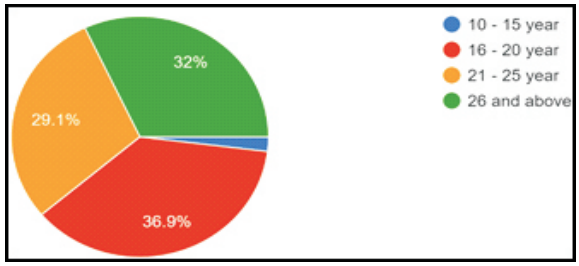

Fig. . Age

This helped us to categorized responders according to age groups. 36.9% were from age group 16-20 years following 32% which belong to age group 26 and above succeeding age group 21-25 years with 29.1% and least responders were from age group 10-15 years.

3. Messengers Used

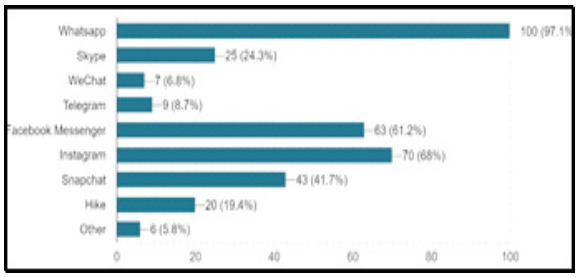

Fig.3. Messengers Used

With the response of this question we got to know about different messengers used by responders. From various options, we concluded that maximum responders used Whatsapp messenger (97.1 %) followed by Instagram (68 %) and WeChat is least used messenger (6.8 %).

a) Most Preferred Messenger

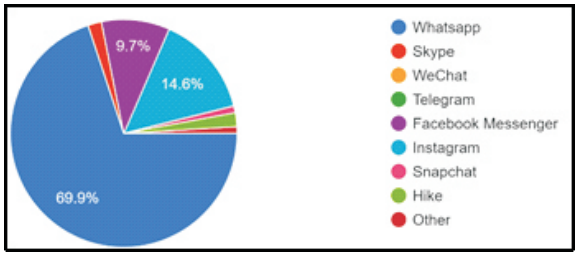

Fig.4. Most Preferred Messenger

Many people use various messengers however in order to know which messenger is most preferred this question was set. According to polls, Whatsapp turned out to be most preferred messenger (69.9 %) preceded by Instagram (14.6 %) and snapchat is least preferred messenger (1 %).

b) Purpose of using Messenger

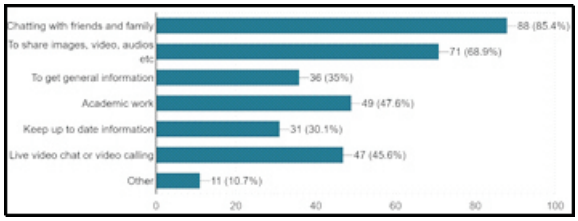

Fig.5. Purpose of using Messenger

According to the polls, the main purpose of using messenger for various responders was for Chatting with friends and family (85.4 %) followed by to share images, video, audios etc (68.9 %). Only 30.1 % of responders used messenger to keep up to date.

c) Average numbers of hours spent on messenger

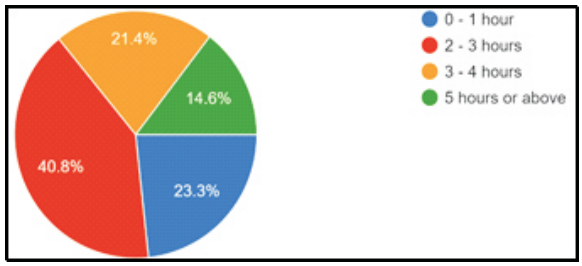

Fig.6. Average numbers of hours spent on messenger

According to 40.8 % of responders, they spend an average of 2-3 hours on messenger. Followed by 23.3 % of responders who spend 0-1 hour average on messengers preceded by 21.4 % of responders who spend 3-4 hours and 14.6 % who spend 5 hours and above on messengers.

d) Does messenger help you in day to day life in personal and academics needs?

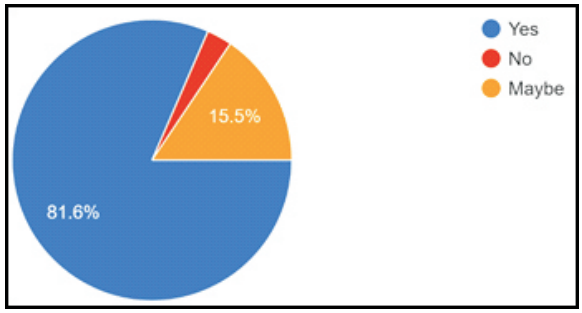

Fig.7. Does messenger help you in day to day life in personal and academics needs?

According to this poll, 81.6 % of responders agrees that messenger does help them in day to day life in fulfilling their personal and academics needs however according to 2.9 %, messenger does not help them in fulfilling their personal and academics needs. 15.5% of responders are not sure if messenger helps them or not.

e) Features of messenger mostly used

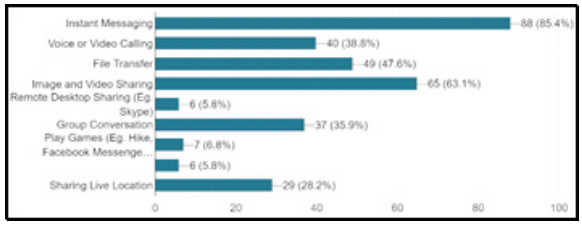

Fig.8. Features of messenger mostly used

According to 85.4 % of responders, they use messengers for simply instant messaging followed by image and video sharing feature (63.1 %). The least used features are Remote Desktop Sharing and to send and receive money (5.8 % each).

f) Reasons for using messenger

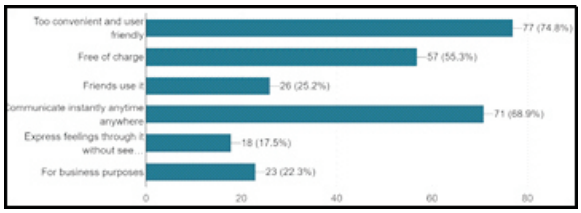

Fig.9. Reasons for using messenger

74.8 % of responders believes that messenger is too convenient to use and is user friendly. Therefore, for same reason they use messenger. However according to 68.9 % responders, the prime reason to use messenger is that one can communicate instantly anytime anywhere with another. 17.5 % responders say that they use messenger because it helps them to express their feelings through it without seeing another person.

g) Do you think messenger harms you?

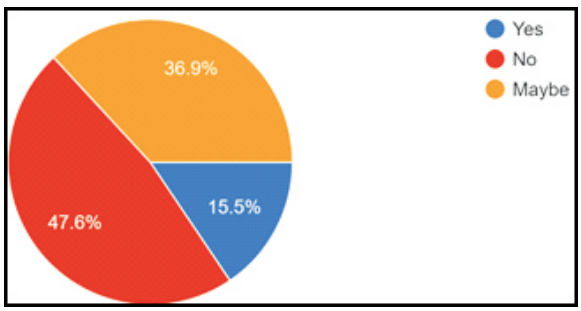

Fig.10. Do you think messenger harms you?

Almost half of the responder (47.6 %) agrees that messenger does not harm them. According to 15.5 % responders, messenger does harms us in some way or another. 36.9 % of responders are not sure if messenger harms them or not.

h) Do you think you can manage your time well when using messengers?

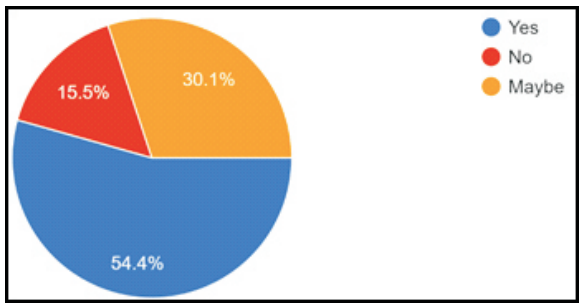

Fig.11. Do you think you can manage your time well when using messengers?

According to 54.4 % of responders, they are able to manage their time well when using messengers. However, 15.5 % of responders state that they are not able to manage their time well. 30.1 % of responders are not sure if they are able to manage their time well when using messenger or not.

i) User Satisfaction

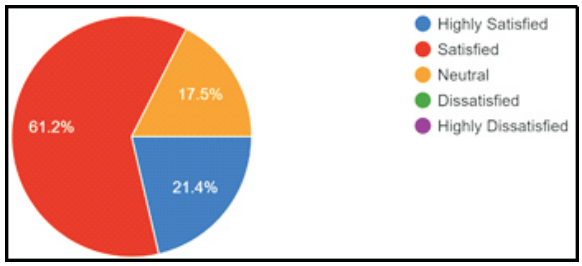

Fig.12. User Satisfaction

61.2 % of responders are satisfied with messengers followed by 17.5 % of responders who are highly satisfied with messengers. 17.5 % of responders are neither satisfied nor dissatisfied with messenger.

V. FINDINGS

This google form was circulated via various instant messengers in order to record the responses. According to the results and their evaluation, following are the findings:

Females are more active and use instant messengers more than males.
Age group of 16 – 20 year is more active than other age groups.

Among various messengers, WhatApp messenger is mostly used by people. This is followed by Instagram and Facebook messenger. Whereas, WeChat is least used messenger.

The most preferred messenger by people is WhatsApp, preceded by Instagram and the least preferred messenger is Snapchat.
According to people the main purpose of using messenger is for chatting with friends and family and stay connected, they also agree to use messengers to share images, videos, audios etc.

Maximum people spend an average of 2-3 hours on messengers and there are hardly any who spend more than 5 hours on messengers.
According to most of the people, messenger does help them in day to day life fulfilling their personal, academics and work needs. There are hardly any who disagrees with this and few are not sure.

Our findings state that the most used feature of instant messenger is instant messaging itself. This is followed by image and video sharing feature. The least used feature of instant messenger is remote desktop sharing and a feature to send and receive money.
Further, in order to know the reason why people use messenger we set a question which has following findings, most people use instant messengers because they are too convenient and user friendly to use. This is followed by the reason that people are able to communicate instantly anywhere anytime.

Almost half of the responders agree instant messenger does not harm them in some way or another. And there are hardly any that states that instant messengers do harm them. However, few cannot come to a conclusion.

Most of the people agree that they are able to manage their time well when using instant messengers. Rarely any one finds difficult to do so. And some are not able to decide.
User satisfaction is the main aim of every organization. We requested responders to answer if they are highly satisfying or satisfied or neutral or dissatisfied or highly dissatisfied with the growth and inclusion of instant messengers in our lives and the features instant messenger provides. According to the survey conducted, maximum respondents are satisfied.

VI. CONCLUSION

Most students within the Region of Delhi have access to internet which is the gateway to social networking sites like WhatsApp messenger, Facebook messenger, Instagram etc as these messengers are easy and cheaper way to interact with friends and family. Students normally use this site during lectures and study time which creates distraction for them leading to poor academic performance. With pros comes cons. This medium of communication negatively affects our grammar and spellings as a result of usage of short words like HW r u? (for 'how are you'?), Gudmornin' (for 'Good morning'),F9 (for 'fine') etc.

Students devote most of their valuable studying time in 'sapping' as they call it instead of reading that brings a serious setback in their academic performance because they cannot create a group of scale between the Instant messenger usage and their academic performance. Most students use their mobile phones to access this social media networking site more frequently within the university campus which is the main cause of academic distraction. Anything that has an advantage also has a disadvantage in life. After all the findings and deliberations at the Delhi Territory, it is crystal clear that the use of Instant messengers has being a focal problem solving medium, like making it easier and faster to communicate whilst for other youths, it has a negative impact on their academic performance and time management, less time to study and more time is allotted for unnecessary materials like chatting, gaming etc. It is therefore prudent upon the youths to wisely take the good part of instant messengers and try to improve their skills.

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A RESEARCH ON CYBER SECURITY AND IT'S TOOLS

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Abstract- Cybercrime has now become one of the most serious problems today. In network security, our main concern is "cybercrime", which is increasing sharply every day. The problems faced by cyber security in emerging technologies, and in the latest technologies, ethics, and cybersecurity trends are leading towards many changes in cybersecurity. Major reason for increasing cyber-attacks is that the attackers or hackers are not interested in the data of the organization but want to make money by selling those data to those are interested in it. Professional cyber-attackers are hired who hacks the systems with their coding and technical skills and advance technical tools. With regard to this, many authorities and companies are day by day preparing themselves against these attacks and taking measures to stop these attacks.This paper deals with the various cybersecurity tools and the challenges that are faced in cyber and solutions to resolve loopholes to escape from cybercrimes.

Keywords: cyber-crime, cyber-ethics, cybersecurity, cybersecurity tools.

I. INTRODUCTION

Today a person can transmit any sort of data, which could also be an e-mail or an audio or video just by a press of a button. In today's technical environment various new technologies,mechanics and automation are changing the face of mankind as well as their lifestyles.

We are changing our technological scenario by moving every small to big sector towards digitalization and with this advancement; we need to protect our technological environment from threats and unauthorized/unknown access.Now a day's quite 60% commercial transactions are done online, so this field requires top-quality security for transparent and best transactions. Hence cybersecurity has become the newest issue. The future of cybersecurity is not just limited to protecting the data within the information technology (IT) industries but also, in many other fields like cyberspace etc. Even the recent technologies such as cloud computing, net banking, etc also need a high level of security.

As these technologies hold important data it needs to be protected and it has become an important priority.

Making the web secure (and protecting its users) has now became an integral part of the internet. The battle against cyber-crime needs a powerful and safer approach as long as technical measures are not enough to prevent crimes, therefore agencies should be permitted to research and prosecute cyber-crime effectively. Currently many countries and administrations are putting strict laws on cyber-crimes to stop and restrict the loss of some important data. Every user should be trained effectively on cybersecurity and its tools and prevent themselves from increasing cybercrimes.

A. CYBER SECURITY

Cybersecurity refers to a technique that protects the networks, programs, and information from unknown access or one can say prevents outsiders to have an access to the system.

Cybersecurity techniques contain many layers of protection across the networks, programs, or computers important information that needs to safeguard. In a corporation, individuals, processes, and technologies must support and complement each other to make an efficient defensive system against cyber-attacks.

1. Need for Cyber Security

Cyber-attacks became more sophisticated with attackers using an ever-growing sort of tactics to take

advantage of vulnerabilities, like social engineering, malware, and ransomware. A strong cyber security stance may be a key defense against cyber-related failures, errors and malicious cyber-attacks, so it's necessary to follow the proper cybersecurity measures in situ to guard your organization.As cybersecurity threats are increasing day by day new laws are often released to secure the user from attacks. This means that increased rules and regulations may soon become a reality. Strict penalties are needed to be put on executioner respectively. There is a need to make citizens aware of rules and laws passed and to confirm that their profession and business follow the laws.

B. TOOLS FOR CYBER SECURITY

There are many tools against cybersecurity threats. With each different cybersecurity attack, specific tools are made which help to secure the cyberspace. These tools are split into few sub categories and each tool serves a specific purpose [2-3].

1. Penetration Testing Tools

Penetration testing (or pen testing) refers to simulated cyber-attack where professional white hat hackers are forced to enter into corporate IT sector for seeking out weaknesses before attackers find it.

i. Kali Linux

Kali Linux is one among the common cybersecurity tools. It is an OS containing a minimum of300 sub-different tools for security auditing. It provides a collection of tools that authorities use to search networks and information systems for problems.Major advantage of it is that whosever uses this tool does not requires in-depth knowledge of its usage. It is pretty easy to learn.

ii. Metasploit

Metasploit is one among the own kind of penetration testing tool.Experts and professionals use Metasploit to acquire different security goals. It includes identifying problems within the networks or systems, making strategies for tightening cybersecurity defence, and in managing the finished security assessment. It can test the safety of various systems and networks, including web-based or online-based applications,database and servers, among others.

2. Password Inspection and Packet Sniffers Cyber Security Tools

Password safety audits assist you to test the strength of one's passwords and your longevity against password attacks. They help in analysing passwords created by users and help them in providing strong password which is not easily hampered by attackers.

I. Wireshark

Wireshark, also called Ethereal, is a tool which is aconsole based cybersecurity tool. Wireshark is used for analysing network protocols and also for analysing network security in real-time. It helps in providing the network with a real-time approach to receive the presence of vulnerabilities. Wireshark is an important tool for checking all details related to network traffic at various levels, which ranges from all the connection levels to all the pieces of data packets.

ii. John the Ripper

John the Ripper is an important cybersecurity tool for finding and testing and measuring password strength. The tool is meant to quickly identify not strong or weak passwords which can be seen as security threats for secured and protected systems. It was initially started to be used in Unix and Linux environment. However, it works with other sort of system too, for eg- Disk operating system (DOS), Windows and Open Virtual memory (VMS) systems.

3. Technologies for Scanning Web Vulnerabilities

Web Application Vulnerability Scanners, are automatic tools that scans Web application, in-depth, to check for security issues like SQL Injection,Path Traversal,Cross-site scripting and not secured server configurations. This type of tool is usually mentioned as Dynamic Application Security Testing (DAST) Tools [1].

i. Nikto

Nikto is one among the simplest cybersecurity tool for identifying web vulnerabilities. It is an open source tools that cybersecurity expert use to find web vulnerability and then manage them. It also has a database that contains roughly or almost 6500 differing types of issues and vulnerability. This database provides threat-data which is compared with the result of an internet vulnerability scan.In order to identify new threat data easily, developers frequently update the database in real time. Also, numerous plug-in are developed and released continuously to make sure the tool is compatible with different types of systems.

ii. Nexpose

Nexpose is a convenient cybersecurity tool that provides real-time functionalities for scanning and managing vulnerabilities in on-premise infrastructure.

Also, Nexposegives security teams live and latest views of every activity occurring during a network. It makes sure that the tool contains the foremost recent threat data, Nexposecontinually restore the database such it adapts to various type of threats surrounded in a data or software.

4. ENCRYPTION CYBER SECURITY TOOLS

Encryption attempts to form the knowledge that is not readable by anyone who isn't explicitly authorized to look at that data. People or devices are often authorized to access encrypted information and data in some ways, but typically this access is granted via passwords or decryption keys. There are many strengths and methods of encryption and as technology evolves, older methods of encryption are not any longer considered secure.

i. KeePass

Network security professional uses KeePass primarily for identity management. It is very suitable for a different variety of office environments. Allows users to use passwords to access any account they use for business purposes. KeePass offers the benefits of a combination of security and convenience and can outperform other type of identity management tools. For example, the tool allows users of the system to create unique passwords to protect various accounts. When accessing an account, KeePass will automatically fill the account password as soon as the master password is entered.

ii. Tor

Tor is an effective tool used to ensure the privacy of users when they connect to the Internet, that is, by routing user requests to various proxy servers. Therefore, although there are malicious exit nodes that can be used to track Internet traffic, using Tor with caution, one can ensure that he/she is not recognized. However, compared to networks security incidents prevention, Tor provides information security better.

5. PACKET SNIFFERS

Packet sniffer — also called as a packet analyser, protocol analyser, or network analyser —monitors the network's traffic. It works by checking stream of knowledge packet that flows between the computers in a network.

i. Manage EngineNetFlow Analyzer

Manage Engine is a packet sniffer, which can be installed on Windows and Linux. A NetFlow analyser, is a tool that is deployed so that it can perform monitoring, troubleshooting,interpretation, in-depth inspections and synthesis if traffic data flow. It allowschecking the list of affected user in order that you will convey them that your network is at risk.

ii. Savvius Omnipeek

Omnipeek by Savvius is meant for larger networks with a huge amount of knowledge running through them every second. At its core, it's a performance, analytics, and forensics tool providing the basics also as in-depth analysis.

6. ANTIVRUS

Antivirus software, also called to as anti-malware, maybe a computer virus helps to prevent, detect, and take away malware.

i. Avast Antivirus

Avast Antivirus, a part of cross platform internet security application developed by Avast for, MacOS, Microsoft Windows Android, and iOS. The Avast Antivirus software includes browser security,computer security, firewall, anti-phishing, and many more services.

ii. Avira Antivirus

Avira Operations, a German multi-nation computer security software company specially known for its antivirus software Avira Free Security. It was founded in 2006; its development was started in 1986. The software helps in detecting whether there is any virus present in the system and helps in removing it.

7. FIREWALL

A Firewall may be a network security device that filters and monitors incoming and outgoing network traffic supported by organizations previously established security policy. At its most elementary, it is an actually the blockage that is between a personal network and therefore the public Internet.

i. Packet-Filtering Firewalls

The packet-filtering firewall performs an easy check of the info packets coming through the router—inspecting information like the destination and origination IP address, packet type, port number, and other surface-level information without opening up the packet to look at its contents.

ii. Stateful Inspection Firewall

These firewalls merge packet inspection technology and TCP handshake verification to make A-LEVEL of protection greater than either of the previous two

architectures provides alone.Helps in protecting the system from unknown and unauthorized access

8. PKI SERVICES

PKI Services helps in protecting the data by encrypting and decrypting it. Process is done with the use of either a public key or a private key which helps in securing the data.

i. Decentralized PKI

Decentralized identifier (DID) remove dependence on centralized registries. It is a substitute approach to centralized PKI and helps in designing and scheming improved PKI Systems.

ii. Simple Public Key Infrastructure

It refers to a system which helps in creation , distribution and storage of digitalized certificates also called as digital certificates which helps in verifying whether specific public key belong to some certain entity.

9. MANAGED DETECTION SERVICES

It (MDR) is a complicated managed Security Service that gives threat intelligence, threat hunting, security monitoring, incident analysis, and incident response.

i. Cynet

Cynet is a cyber-security company. The main work of the software is to do in depth scan and analyse whether there is any threat or any loophole present and must take immediate effective actions for the same.

ii. Rapid7

Rapid7 helps in reducing the threats which can hamper the normal working and critical section of the organization. Whether you would like to simply manage threats, monitor for suspicious behaviours, investigates and pack up attacks, or automate your operations — we've solutions and guidance for you.

II. FUTURE SCOPE

Cybersecurity has come an extended way ever since the necessity for it had been made evident. But as cybercriminals and hackers become stronger by the day, cybersecurity operations need to be improved continuously [4].

By involving Artificial Intelligence (AI) and Machine Learning (ML) with cybersecurity, we can enhance our tools and current technologies. This provides us a better and improved future scope.Artificial intelligence (AI) contains the potential to develop the cybersecurity approach from counter-active to pro-active.

III. CONCLUSION

The advancement in technologies and machines is a "boon" to us but protecting that technology is still a "bane" to us. With increasing advancement in technologies, we are growing in a positive direction, but attacks on that technology, called cyber-attacks are not a positive impact. Even large organization,industries with top professionals skills and important resources dedicated to cybersecurity has suffered extensive cybersecurity compromises. There is a need to protect and prevent from cyberattacks. Government authorities and companies are developing many new tools which are safeguarding us from these attacks. More talented and highly skilled workers in cybersecurity roles will help the state respond more strongly to the cybersecurity problem it faces. Each organization must understand the upcoming threats and therefore must prepare them for the same, and must try to adapt upcoming new tools and technologies to protect them from cybercrimes. With the dynamic changes coming in technology, there must be the expansion of higher cybersecurity tools which are our only hope to protect us from these day-to-day cyber-attacks.

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Robotics-New Era

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Abstract: This paper contains of detailed statistics about the robot's method and system. As one and all knows, how artificial intelligence is rising in the marketplace and the market is receiving totally reliant on artificial intelligence for responsibility the multifaceted tasks. Robotics is a greatest famous division in the arena of manufacturing and sciences where all engineer is taking keen attention to make a robot which could do a certain task and can give appropriate results for the given task. Every engineer is trying to mark a robot through 0% error which is quite impossible as the technology is increasing. We can think about it but still 0% doesn't unkind that it will not have any point of error but it means it will give you the correct answer for every question without any doubt. Show its uses its detailed data how it workings and how it senses working all is signified in this paper which will be enough for getting and good information about robotics and devices along with the system of robots.

Anxiety is mounting that robots and artificial intelligence will substitute many professions. To remain pertinent in this changing occupation landscape, the employee of the future is predictable to be advanced, able to spot occasions transform businesses and provide original solutions to encounter global tests. To develop such competences, work integrated learning (WIL) has appeared as an important approach. The resolution of this study is to examine the key factors driving invention among WIL scholars. Unlike prior educations that have been mainly qualitative or based on one lone snapshot, this measurable, longitudinal study actions student competences before and after contribution in a WIL assignment at a business. It then assumes confirmatory issue analysis to associate pre- and post-placement competences.

Keywords: Artificial intelligence, Employability, Innovation, Industry 4.0, Robots, Work integrated learning.

I. INTRODUCTION

Robot is a human thing which is capable of doing all the work the human can perform in a much less time than a human can take the place of a human but it can help humans for operating much of its task in daily life. Robots are also applications of artificial intelligence and sensors which combine together to form a human machine called robots. There are numerous applications of robots in the world of science and computer application. Scientists and engineers are working on robots to make it almost applicable in every field. It can be semi-automatic or fully automatic that is there are many robots which are like human that is they can talk, they can walk without the guidance of a human through programmable language input into them at the time of manufacturing it but there are also semi automated that is the needle remote for the controllability of its functioning [1]. Robotics is one and only greatest opted and interesting branches in the arena of science and education which is loved by every youth and everyone wants to learn robotics for future use. There is Number of uses in the future where people will be depending on fully automated drama full complex stars as glowing as for everyday works as well as it will decrease manpower in the world because one robot is proficient of doing work of 10 persons [2].

There is world-wide gratitude for the need for invention to transform economies. With, the advent to industry 4.0 or the fourth manufacturing rebellion characterized by cyber physical schemes, there is a focus on the advanced application of progressive robotics and AI to bring about digital revolution in productions [8]. Though, reaping the welfares of

industry 4.0 is not just a technical challenge but also a humanoid issue, requiring courtesy being placed on up skilling and also the hominid dimensions of main alteration. Accordingly, human factors are dangerous elements of manufacturing 4.0 skills wanted for the future, to not individual ensure that labors can effectively and positively use the fresh technologies but also that they continue and thrive in a rapidly varying office. Although robotics such as cooperative robots (cobots) can support workers and recover their safety and efficiency, if the skill change is not effectively achieved, many fear that automatons will take away their professions [3].

In calculation to the practitioner sphere, revolution has concerned increased attention in the learned literature. Educations have instigated to describe systematic approaches that grow creativity in incorporate technology innovation teaching and new venture and focus on innovative design.

The education of entrepreneurship should not only be the one geared on the way to generating business persons who start their own industries but also entrepreneurs, that is, those who have a business attitude and can subsidies to innovation inside companies. Consequently, the research query of this education is 'What are the important factors swaying the development of revolution in students from side-to-side WIL?' It will measure revolution and possible drivers beforehand the after the WIL settlement. Findings of the education are significant in (1) offering response on career illiterateness to students on the expansion of innovation; (2) attractive WIL program expansion by detection areas of skill insufficiency which can then be castoff to inform remedial action in succeeding WIL groundwork programs and offer additional provision to students; and (3) notifying industry appointment labours to WIL hosts over evidence-based communiqué on the competences and welfares of WIL students.

There is considerable rhetoric and anecdotes on the services needed for the works of the upcoming, but there is little experiential evidence authenticating what are the key factors or causes of innovation. The Foundation of Young Australians formed a report title as 'The new basics: Big data reveals the skills young people need for the New Work Order' where they recommended services that Australian youths essential for jobs of the upcoming, including problematic solving, serious thinking, communication and co-ordination. Though, these skills are until now to be empirically tested for their effect on origination. Therefore, the bearing of these skills on modernization will be observed in this education and discussed more in this segment.

II. TYPE OF ROBOT

There are 5 types of robots discovered till yet and are in processes. Robots can be as small as 2mm and can be as big as 200 m according to the need they are made and classified in the different types. As the Technology is going on, it will definitely reach a place where machines will replace hominids. So, five types are-

A. Pre-Programmed Robots

Pre-program robots or robots are made for a single task only. It is a program generated robot that mends for a single task as other cars are not programmed in it. For example, we can say a mechanical arm has only one task that is to weld a door on or to insert a part in an engine but it can do a single task related to a card only. The performance of this mechanical arm is quite faster and longer and is more efficient than human work.

B. Humanoid Robots

Humanoid robots are the robots similar to humans by their behavior and vocal. These robots can perform work like a human that is running, jumping, carrying objects and many others. These have a similar look as a human face that is the face with the expression. The most famous example for this humanoid robot is Hanson robot Sophia and Boston dynamics atlas both are human-like structured robots which are easily able to do human work.

C. Autonomous Robots

Autonomous robots are the robots that can be operated without human guidance. These robots are made to do the task in an open environment so it does not require any human guidance to perform its task For example-roomba vacuum cleaner which move house freely and do the necessity [6].

D. Augmenting Robots

Augmenting robots are robots which have the ability of doing work that current humans can do or we can also do the work those humans have lost doing. The great example of augmenting robots is exoskeleton which is used to boost heavy loads. Augmenting automatons either improve current humanoid competences or substitute the competences a human might have lost. Some instances of supplementing robots are robotic prosthetic members or exoskeletons cast-off to lift substantial weights.

III. USES

There are numerous uses of robotics in today's world in almost every field. Demand of robotics is growing day by day in every field so here are some few uses of robotics in the major fields.

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A. Manufacturing

Manufacturing is the main unit where robotics is scratching their hands. These robots are used in engineering units because they can work more efficiently than a human worker. There are several industries like cars industry where robots have been successfully taking place of human are working in that industry [5].

B. Home

Robots are also seen in houses where they are helping to do the household works and entertain the kids and other small works in the house. The best examples for this roomba vacuum cleaner are that cleans the house and moves in house helping others [4].

C. Travel

Due to development, there are many self-driven cars in the market which were desired many years back. It is promising because of data science and robotics.

D. Increased Productivity

Robots increase the productivity rate of an industry as humans can do 24/7 work, they have a certain time duration but robots can do work without taking breaks and leaves. Single robot can do work of 10 people and it can be used in a manufacturing unit for different productivity easily. You need to focus on the staff for their work but the headache of yours is also not job when a robot is working in your manufacturing industry.

E. Work in Hazardous Environments

Everyone can't work at a place with the environment but robots can do effort in any place without caring about this surrounding. Its production rate is extremely high. It can work. I do know extremely high temperatures on a low temperature where people are tough to do work. It gives output for the work and there is no risk with the robot as like with humans. It's also a major advantage of robots.

Combining together and forming self-driven cars for tesla, ford, Waymo, Volkswagen and BMW. These all are working to make more similar cars for the future usage so that there is no use for any human to drive it safely.

F. Healthcare

Robots have also worked excellent in the arena of healthcare as there are many departments that are governed by the robot. From physical therapy to surgeries robots are capable of doing both the things so engineers are working on it to make healthcare more convenient for the treatment of every disease in an easy way. Best example for this type of robot is Toyota's healthcare assistants, which help people to move again on their feet after any accident or anything. Everything in the market has advantages and disadvantages in the same way robots also have its benefits and drawbacks which are mentioned below [7].

IV. ADVANTAGES

A. Cost Effectiveness

They are very cost effective as they do not take breaks in between as the human body needs a break while working. So, this thing makes it cost effective and it can do the same work repeatedly once a cycle is set in it. There is no risk of RSI. It also depresses the cost of manufacturing with the increase in the amount of production. The cost that one investment in buying the robot will be easily in a very short period of time

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B. Improved Quality Assurance

There are very few people who like to do their tasks for a certain time and with full concentration but after that they lose their interest or concentration and start doing it just for money but this is not for robots. There is low risk getting bored or not concentrated because it is made for doing the work and give the higher standard of products that are tough to be found by the human race when people are comparing their jobs with their money not with their interest or field.

V. DISADVANTAGES

A. Potential Job Losses

The biggest disadvantage of robots is that good potential do is increase the skill power and get more faster which can help you to remain at your position without replacement by robot or any other device. There are many resources on robots and robotics everyone needs to read and get the knowledge about it so you don't have to bother in your future to take any decision of your life or for your future generation as future generation will be a generation which is fully automatic and Technology will reach its peak.

people are getting jobless because robots can do work of a 10 person in a single use so basically everyone

wants to save them money so they buy the robot instead of paying 10 potential people for their work. Show this made a major disadvantage to the human mankind where the unemployment it is more than unemployment and now due to the invention of robots more peoples are getting jobless day by day.

B. Initial Investment Costs

The initial investment is very high when you are going to buy a robot for your work. However the cost of the investment is reverted in a few months but still one need to pay much before buying it.

C. Hiring Skilled Staff

When you have a robot which is not totally automatic then you need to hire skilled staff for doing operation of the robots it become very tough to be paid guest take high salary and arranging their salary in your work becomes quite tough so it's better idea to have a fully automatic robot or pay humans for manpower. All olive advantages and disadvantages are the basics one and the most important one but there are many other disadvantages and advantages for the same.

VI. CONCLUSION

This was enough detail about robot devices and systems. As the world is getting converted into technology oriented with robot other top most in demand. All engineers in many companies work day and night to make robots as fast as possible. High demand and high cost give rise to an economy very fast. So, we should keep searching on robots and its other devices which can give us help in making the world full of Technology where manpower is less. We have seen that robots can do every work of humans and it's replacing human power in every field and every aspect so we need to get skilled to that level so that no one can replace you with robots. A robot is a man-made thing and it can't take the place of humans in any aspects. Just keep increasing your skills so a man-made thing can't replace you with your work. Robot manufacturing can't be close so the thing which everyone can. A key result of this education has been an authenticated tool that quantitatively measures the development of innovation and its drivers. Results from this tool can feed back into WIL package growth to improve student training and support for skill expansion. It will similarly be valuable in contribution response to students on their occupation literacy, self-awareness and authorization for their growth.

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Internet of Military Things: Overview, Architecture & Applications

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Abstract—The Internet of Military Things (IoMT) is a subset of the Internet of Things (IoT) that is used for enhanced military operations and intelligent warfare. It refers to military physical items such as connected ships, planes, tanks, drones, and soldiers that are embedded with sensors, software, and other technologies, as well as operational bases, to create a coherent network that improves situational awareness, risk assessment, and response time. These objects talk with one another to collect and transfer data via the internet in order to perform a wide range of tasks more efficiently and accurately.

Sensors, related tools, and technologies are integrated into battle suits, helmets, weapons systems, and other equipment used by troops in the Internet of Military Things (IoMT). These sensors record their iris, face, fingerprints, heart rate, movements, and facial expressions, among other biometrics.

Keywords— Edge Computing in IoMT, Internet of Military Things, Internet of Things.

I. INTRODUCTION

The Internet of Things (IoT) is characterized as global connectivity between massive numbers of objects. The term "Internet of Things" has recently been utilized in a variety of academic domains, including mobile ad-hoc networks, cloud computing, cyber-physical systems, big data analytics, and so on. IoT technology has also boosted services in a variety of industries, including medical, commercial, traffic, security, and other applications. As a result, the topic of IoT research has received a lot of interest. The number of uses of IoT technology in the military has expanded as a result of the interaction between the industrial, commercial, and military areas.

The modern war has mostly become an information-based conflict. In recent years, US forces have increasingly reliant on the central information network in all of their battle operations [5]. In comparison to typical plans, this is a relatively new concept in the field of warfare. Furthermore, one of the most significant aspects of managing battles is real-time information exchange between military sectors, especially when these forms of information are critical and timely understanding of this information will lead to the resolution of many critical circumstances. As a result, establishing communication between combat elements such as weapons, applications, soldiers, and other elements to build a single information network has become an essential study topic. The main target of the IoMT is to provide better efficiency in the battlefield [5].

Because of its unique nature, the IoMT field faces numerous hurdles. Communication between different types of weapons, as well as other things like soldiers, is the biggest issue. This form of communication should take into account vital combat conditions that may necessitate making judgments in real time. Furthermore, fault tolerance is a significant communication issue that should be taken into account while designing the IoMT system architecture. As a result, in the event that a communication strategy between groups of military things fails, a backup method of communication should be prepared to meet the communication goal. The second issue to take into consideration is scalability. The number of interaction processes occurring between large numbers of creatures on the battlefield grows with time. As a result, the IoMT system architecture should provide for billions of things joining and leaving. Traditional scalability procedures, however, will not work in this situation because the resources are likely to be constrained (i.e., bottlenecks). The IoMT presents a third problem in the form of energy consumption. There are a lot of energy-based things in the IoMT environment. As a result, if a battlefield thing consumes its whole capacity, the thing becomes useless [5]. This could cause a huge issue, especially if the item in question is extremely important.

Interoperability is the fourth challenge. Different applications that will be utilized on the battlefield can easily declare this challenge in the IoMT. The fifth issue is ensuring quality of service (QoS), which is defined as the capacity to provide a service that allows data to be transmitted in real time.

II. THE IOMT ARCHITECTURE

As of now, the Internet of Military Things (IoMT) is in developmental stage and various countries like US, India, Israel, etc. are developing their own IoMT ecosystem for their respective military and security apparatus. For example, the DARPA and Military Industrial Complex of the United States, DRDO of India along-with the Defense Start-Ups, Armed Forces are currently working to develop India's own IoMT ecosystem. As IoMT technology is still in developmental stage even for the advanced militaries, and a lot of associated technologies like 5G, AI, Quantum Technologies, etc. are being integrated with the IoMT ecosystem to enhance the military capabilities and thus making it robust, accurate, precise and lethal for adversaries [2].

The IoMT technology is also being implemented and demonstrated by militaries across the world on a small scale like the Indian Air Force in 2021 demonstrated their "swarm drones" which were using the IoMT Tech along-with other highly sophisticated associated technologies.

Various researches are being carried out to predict a scalable and reliable IoMT architecture and some researchers have proposed the IoMT architecture. We will now go through one of the proposed architectures of Internet of Military Things.

The proposed IoMT system consists of a collection of military items that must be well-organized on the battlefield. Drones, operating bases, ships, tanks, soldiers, and planes, for example, should all be connected in a unified network. The IoMT network improves situational awareness, response time, and risk assessment. Furthermore, ubiquitous computing, pervasive management, pervasive sensing, and pervasive communication should all be part of the IoMT ecosystem. Furthermore, the IoMT may result in a massive amount of data being generated by network devices such as sensors. Furthermore, the computations necessary in this form of network are large, and the results of these computations must be precise and sent in real time. As a result, the IoMT system architecture should take into account the above points [2].

As a result, the proposed architecture is made up of four layers: communication, information, application, and decision-making support (see Fig. 1). The communication layer is concerned with how items in a big network may communicate with one another. The information layer is in charge of military data gathering, management, and analysis. The application layer is made up of the program(s) that control the variously communicated military systems. Finally, the decision support layer addresses the decision support system that aids war managers in making precise, real-time judgments.

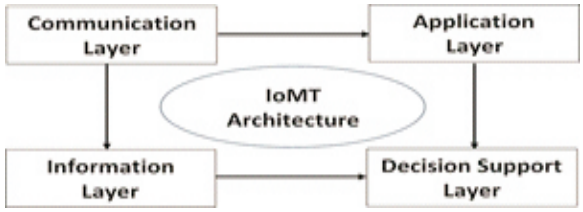

Fig. 1. Simple view of the IoMT architecture

A. The Communication Layer

The IoMT system is a unique example of the Internet of Things. As a result, the IoMT environment is similar to the IoT environment, with slight distinctions in items, communication methods, and so on. The IoMT environment can be defined as a collection of diverse networks talking with one another through the Internet, according to this concept. Active and passive items found in military missions should be included in these networks. Wireless sensor (WSN), radiofrequency identification (RFID), mobile ad hoc (MANET), satellite, and high-altitude platform (HAP) networks are the key networks that should be built in the IoMT system. Because of its importance in many military concerns, the WSN is reflected in the IoMT system. The WSN aids war operations by collecting and delivering critical data quickly. The data is then delivered to the most appropriate individual in order to make an accurate choice in real time. As a result, the WSN's primary goal is to monitor and track enemy soldiers and other enemy objects, as well as coordinate its own military activity. Sensors can be dispersed across wide areas and over long distances. The base stations that these sensors communicate with are in charge of controlling their actions. Because of its relevance in the military, the RFID network is represented in the IoMT environment. Most of the army's belongings should be tagged, which is one of the most critical issues. Soldiers, goods, small

weapons, airplanes, projectiles, missiles, and other items may all be tracked using RFID on the battlefield. In battles, for example, frequently scanning each person's medical case and efficiency is a critical concern. The inclusion of MANET in the IoMT system is particularly critical since it may be utilized to facilitate the communication of soldiers, weapons, and vehicles, among other things [5]. MANET has a variety of ad hoc military applications, such as a network that connects airplanes to ground stations or a network that connects ships. The needs of each ad hoc network are dictated by the sort of military mission. Furthermore, in military applications, ad hoc devices are provided with routing scenarios, allowing data to be transmitted automatically utilizing the optimum routing methods. The Internet of Things (IoT) is widely assumed to rely on Internet technologies to facilitate communication. Unfortunately, some battlegrounds may not have access to Internet technologies.

As a result, developing alternate communication methods is critical. The HAP network is employed in the coverage objective for this reason. Because military equipment is dispersed over broad distances, it must be covered in a dependable manner to ensure communication efficiency. In addition to the Internet, the HAP network can be utilized as a second communication approach. Because the HAP network can only be found at a certain altitude, it could be an easy target for the adversary and have a high failure rate. In the event of a HAP network failure, the communication system will be severely hampered, potentially jeopardizing the military mission. As a result, a satellite network should be built to replace the failed HAP network as well as to fulfill military needs that aren't covered by HAP networks or the Internet (see Fig. 2). A header recovery approach is used to tackle the communication problem between different networks. Between each two networks, a translator that encapsulates each packet with the header of the destination node should be introduced. The new header makes the packet comprehensible; system routers can accomplish this (see Fig. 3).

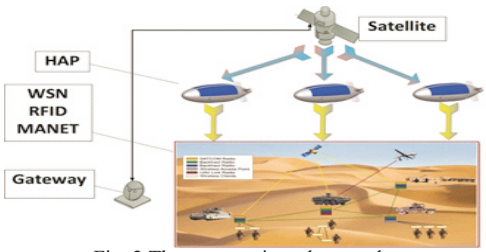

Fig. 2.The communicated networks

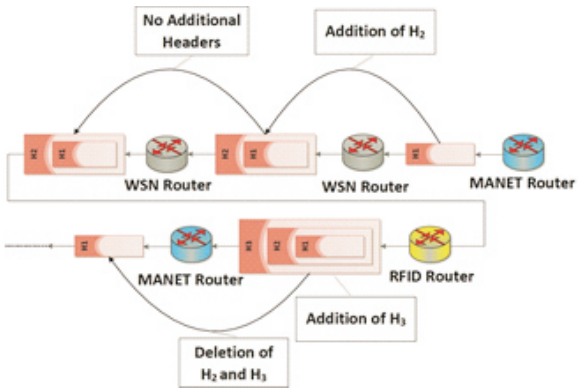

Fig. 3. The header translation process

B. The Information Layer

This layer is critical because it forms the foundation of the IoMT system architecture. Military data gathered by RFID, sensors, and other devices should be transferred, stored, and analyzed in a safe, valuable, real-time manner. The structuring and storage of gathered information once it has been processed is the initial purpose of this layer. Because of the terabytes of data that can be collected in a short period of time, analyzing IoMT system data is considered a difficult task. As a result, this data should be reduced to the extent possible without compromising quality. Furthermore, the unique requirements of IoMT, such as real-time decisions, must be considered. Data processing is divided into four parts in the IoMT system architecture: data prioritization, data filtering, data compression, and data abstraction.

C. The Application Layer

In the IoMT system architecture, the application layer contains heterogeneous applications utilized in military operations such as management, surveillance, and so on. The functions of various applications should be managed by this layer utilizing a single universal application without impacting their efficiency. The process of unification of these applications should be based on communication data (message exchange). In data communication, an application's output data can be used as input data for another program. As a result, one of the most significant goals of this layer is to determine input and output data for military applications. For example, the input of an aircraft or launcher's rocket launch application requires the satellite surveillance program's output data, and the satellite surveillance application may require data from the WSN application. Because the data that will be used as inputs and outputs should be handled first at the information layer, communication between the

information layer and the application layer is critical. As a result, before designing the general application that will be used to handle military apps, input and output data for each application should be determined individually. After that, the amount of time spent processing data should be determined (hard, real, or soft). For example, if the coordinates of a specific target change suddenly during a cease-fire, three programs should cooperate in real time to complete the operation and attack the target in its new location. The WSN, war management, and the cabin of the plane entrusted with the mission are all made up of these interconnected applications. It is also necessary to decide the priority with which special applications should be applied. In the event of many adversary attacks on a single target, defense applications, for example, will be activated first.

According to the explanation above, a dedicated database should be used for the general administration application. This database contains data about specific military applications that is always changing. This information pertains to the following subjects: The data flow directions between individual applications, hard-time military conditions, real-time military situations, soft-time military situations, and the priority for each application are all factors to consider. These priorities should be set in light of the current state of war. Depending on the nature of the general management IoMT application, the IoMT system database may be distributed or centrally designed. The complexity of database server contact should be considered in a distributed database, especially in the case of events that necessitate hard-time or real-time engagement (see Fig. 4).

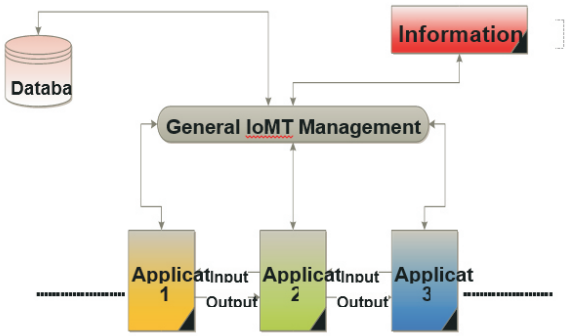

Fig. 4.The communicated networks

D. The Decision Support Layer

The decision-making process is one of the most crucial aspects of battle. A decision in a technological conflict should meet a number of criteria, including precision, real-time, clarity, security, and rapid distribution. All of these requirements should be linked to the data collected for the information layer. Despite the intimate relationship between information and military decisions, the proposed IoMT system design includes an application layer that sits between the information layer and the decision support layer. The vast amount of data collected in such a short amount of time should be examined, filtered, prioritized, and compressed. In the information layer, these processes have already been completed. The information layer, on the other hand, lacks the ability to define the direction in which data flows between applications (i.e., the normal sequence of information). Each data segment should be sent to a suitable application in order to become complimentary and balanced, according to this sequence of information. This data will be incorporated into the decision-making process. Assume that war planners have a goal that requires information to be processed in a specified sequence and in a specific manner until a specific result from a military reconnaissance trip is obtained. The infantry and air defense forces will be used to attain that purpose. As a result, the connection between the application layer and the decision support layer will have a positive impact on high-precision decision-making, which will be useful in key combat situations. Simply expressed, the five-step decision-making process defined in this study consists of five steps: event weight, solution identification, solution selection, action, and outcome evaluation (see Fig. 5). Depending on their level of experience, battle managers can extract the event weight. It's time to define solutions once the incident has been well grasped. When making a decision, there are many distinct options to consider. As a result, it's critical to figure out what options are available. After that, alternatives should be picked, and the risks associated with each should be determined. After then, it'll be time to act. The implementation strategy should be decided upon, and the resources needed to implement the chosen solution should be available. The timing of execution should be carefully defined before it can begin. Finally, the outcome of the chosen solution implementation must be assessed. It's worth noting that various decision support systems may be integrated in the IoMT after they have undergone practical tests.

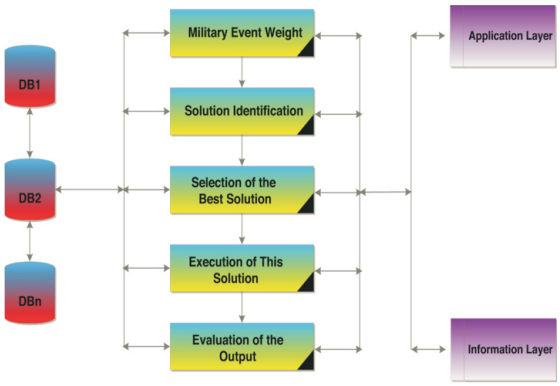

Fig. 5.Simple view of the decision support layer

In the decision support layer, there are three basic issues that can arise. The first difficulty is having too much or too little data. This means that the output from the decision support layer will be late or wrong, which might be disastrous because real-time choices are required in most battle situations. The second issue is misidentification of the problem. In most war missions, there are numerous factors to consider before making a decision. However, there are situations when there is nothing to back up these claims. The third issue is overconfidence in the outcome. Even if decision-making processes are correctly implemented, the actual outcome may not match the desired output perfectly. The application layer will address these issues by determining the precise information required for decision-making, problem definition, and output adaption. As a result, the decision support layer will use the application layer's output. As a result, the separation of these layers is a key consideration in the proposed IoMT architecture.

III. EDGE COMPUTING IN IOMT

Split-second timing is essential for good edge architecture. The large amount of data to be processed and the large number of connected sensors might quickly overload the system [1].

To boost maximum bandwidth, the researchers recommend architecture with intelligent data filters, edge device management, and network infrastructure modifications.

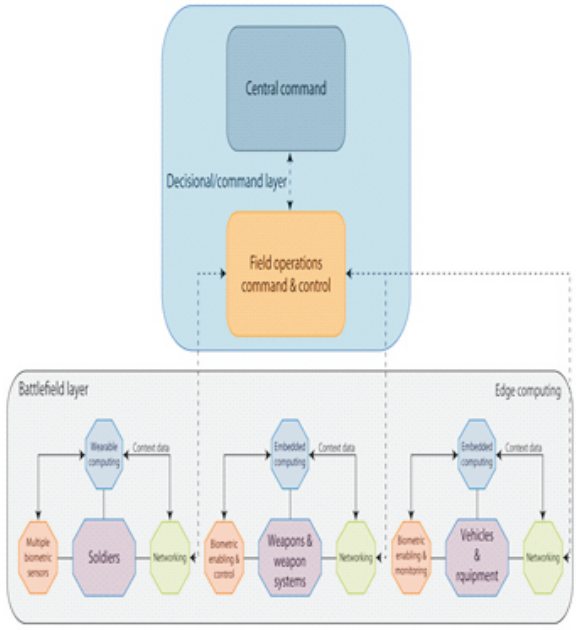

Fig. 6.Context-aware multibiometric edge-computing architecture

Figure 6 depicts context-aware multibiometric edge-computing architecture that allows for battlefield-level biometric surveillance of human resources as well as context-adaptive unlocking and control of weapons, vehicles, and other equipment [5].

The Internet of Things (IoMT) entails the full implementation of ubiquitous sensing, pervasive computing, and pervasive communication, resulting in a massive amount of data created by networked sensors and processing units. One of the many key issues facing the application of IoT solutions on the battlefield is integrating inputs from a broad and dynamic set of sensors, including static ground sensors and troops' wearable sensors.

IV. USE OF EDGE COMPUTING IN INTERNET OF MILITARY THINGS

A. Identifying the enemy

It's not always easy to spot enemy fighters in asymmetric warfare. They can pass themselves off as civilians or use a stolen credential to gain entrance to restricted military bases.

Sensors can now scan iris scans, fingerprints, and other biometric data to detect people who may be a threat. For example, fingerprints from a weapon or bomb can be uploaded to the network and used to instantaneously identify a combatant via edge computing. It can also

authenticate the target's identify so that a sniper can kill him.

"The amount of data obtained by a diverse range of Internet-connected gadgets deployed on the future battlefield could potentially make the difference in terms of strategic advantage."

A context-based paradigm has been proposed for increasing person authentication accuracy using a single identifier, such as facial, gait, fingerprint, or gestures, as well as numerous biometrics. Other well-known uses include activity recognition and user behavior analysis, both of which attempt to improve the quality of services supplied by a network of devices in the immediate vicinity.

B. Monitoring soldiers' physical and mental state

Biometrics is used for more than only identifying fighters. Sensors placed in military uniforms and helmets can transmit information about a soldier's physical status to a command center, allowing him or her to withstand otherwise devastating enemy attacks.

Pilots who are subjected to g-forces or troops who are exposed to harmful chemicals, for example, may be eligible for aid.

Context-aware biometrics may help to fully realize the IoMT potential by supplementing the available information exchanged among various types of devices with supplementary physical (heart rate, body temperature or thermal distribution, etc.) and behavioral (body dynamic patterns, speech patterns, etc.) user data, useful for inferring physiological and emotional conditions of soldiers on the field, which could be valuable for critical situation evaluation, and decisional activity.

C. Syncing soldiers with weapons systems and other devices

Soldiers can use edge computing to get access to vehicles and weapons systems, as well as monitor combat conditions using linked drones, for example.

Context information may also be useful for biometric systems enabling ubiquitous user authentication/monitoring on mobile hardware architectures to accomplish performance optimization and operational adaption (in IoMT devices that can function as a smart and mobile cyber weapon). Context data in this scenario could include information about the surrounding environment or terrain, lighting conditions, soldier physical status (e.g., collected via sensors embedded in the combat suit), and ongoing activity (in motion or at rest, such as a sniper quietly waiting for a target to appear), among other things.

V. APPLICATIONS

Military operations are growing more complex and unpredictable in the modern world. IoT can assist defense and military personnel in taking appropriate actions in increasingly stressful situations. The most important IoT applications in defense and the military are listed below [1, 3,4].

A. Gathering Battlefield Data

Armed forces can monitor the battlefield with unmanned aerial drones equipped with cameras and sensors thanks to the Internet of Things. These drones can record real-time photographs, track the landscape and enemy locations, and communicate data to the command center in real time. Officers can keep an eye on the battlefield and make timely judgments using this information.

B. Monitoring Soldier's Health

Knowing a soldier's health state is another application of IoT in defense and the military. This is accomplished by embedding sensors in the troops' uniforms to track and centrally monitor their physical and emotional well-being. Heart rate, body temperature, and thermal distribution, as well as some behavioral characteristics such as speech patterns, can all be monitored using sensors. Data on their changing medical status can be exchanged with doctors in real time, allowing them to plan ahead of time for medicinal supplements or equipment.

C. Equipment and Vehicle Fleet Management

A successful military operation requires regular maintenance of military vehicles as well as efficient delivery of ammunition and personnel. IoT technology's connected sensors and analytics can help track supplies from the source to where they're needed on the battlefield.

Sensors in military vehicles can be used to track their location, fuel efficiency, damage level, engine state, and other important parameters. Military fleets can immediately spot discrepancies and implement fixes thanks to smart tracking of defense and military vehicles. This allows them to save money on transportation and reduce human labour.

Sensors can also be used to track weapons,

ammunition, and unmanned equipment. Sensors integrated into weapons can assist soldiers in determining when to reload. During spying and monitoring on enemy territory, unmanned devices can be tracked and monitored.

D. Identifying the Enemy

Enemies can get entrance to military bases by posing as civilians or stealing badges. IoT sensors can gather iris scans, fingerprints, and other biometric data to determine a person's identification and identify potential threats.

E. Smart Bases

Military bases can benefit from the use of IoT sensors and devices to improve the efficiency, performance, and convenience of assets and services. It can assist with automated screening, resource management, and other tasks. Smart resource management, such as water and power, can assist military sites increase their capacity and productivity.

F. Remote Training

IoT can help military personnel to get prepared for the real battlefield fight. Movement sensors, acoustic sensors, and more can screen the personnel during preparation or practice and send data and insights to the coaches who prepare them.

G. Data Processing & Analysis

The data collected by IoT concerning numerous defense and military areas, such as weapons, planes, fleets, and troops, can help intelligence, surveillance, and reconnaissance systems improve their efficacy. Armed forces may be able to identify critical threats more quickly and accurately using the information gathered in these areas. Military personnel can analyze the data collected in order to spot patterns and draw conclusions.

VI. CONCLUSION

The usage of IoT in the military and defense has become a requirement as anti-military actions have increased. Integrating IoT into existing military and defense infrastructures can help them become more efficient and effective, lowering combat losses in both people and equipment. IoT can be incorporated into any type of activity, such as combat on the battlefield, spying on an enemy base, or search and rescue. Combining IoT and Machine Learning can help the military and defense gain key battlefield information in real-time, allowing them to carry out a successful operation.

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A STUDY ON BLUE BRAIN TECHNOLOGY

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Abstract—God's most valued creation is the human brain. Because of the brain, the man is intelligent. The human brain is one of the most fascinating organs in the human body. Our brain allows us to be aware of everything around us, including ourselves and our surroundings. It regulates muscle activity, gland secretions, and even the body's temperature. The blue brain is the world's first virtual brain. It's a machine that can function similarly to the human brain. Scientists are currently working on developing a virtual brain that can make judgments and store information in memory. The concept is to upload a human brain into a machine. As a result, man can think without exerting any effort. The key benefit of this technology is that we may access the knowledge and intelligence of the person even after they have deceased.

Keywords—Artificial Intelligence, Blue Brain, Data Acquisition, Data Simulation

I. INTRODUCTION

The blue brain is based on reverse engineering. Reverse engineering is used to know how brain functions work through detailed super computer based reconstructions and simulations no one can ever understand the complexity of the human brain. It is very complex than any circuitry in the world with the increasing number of people having mental disorders the accuracy to detect some mental illness has reduced one of the main goals of neuroscience is to understand the biological mechanisms responsible for the human mental activity. It is the era of artificial intelligence, robots, computer game and blue eyes technology. Artificial intelligence is a very advanced and emerging technology used in every project.

Henry Markham, a scientist at the EPFL in Lausanne, Switzerland, is the brains behind the blue brain project [3]. In 2005, he launched this effort with the goal of replicating the brain at the cellular level. His team is moving closer to success every day with a funding of roughly 1.3 billion dollars. This procedure is made possible through reverse engineering.

This will directly lead to a greater understanding of the brain and how it works, which will aid in the treatment of about 600 different forms of brain illnesses.The project's main purpose is to provide a better knowledge of how the brain works. The Blue Brain Project aims to re-construct the brain and create an artificial version of it [3]. It's nothing more than a virtual brain that, with the help of simulations, can think and act like a real brain.

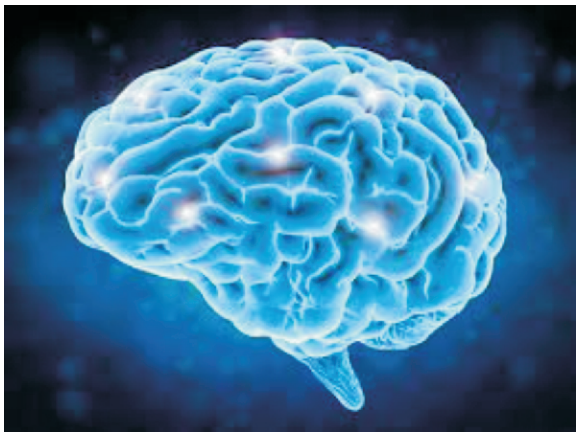

Fig.1. Blue Brain Technology

A. WHAT IS BLUE BRAIN?

Not tomorrow, but we should be expecting this in our near future. BLUE BRAIN is a virtual brain that will act as if it were a real brain. The human brain is the most complex structure on the planet i.e. an artificial brain, which is not actually a natural. However, it has the ability to behave like the brain. It has the ability to think like a human. Decisions are made by the brain based on previous experience, and behave the same way as the human brain.IBM is currently working on the Blue Brain, a virtual brain. It would be the first virtual brain in the world. It's possible to call it an artificial brain. The information saved that can be uploaded into the natural brain computer. It is possible by using a super computer, with a huge amount of storage capacity, processing power and an interface between the human brain and it is artificial one. The

Blue Brain project uses the Blue Gene super computer by IBM. Blue Brain project is the birth event of modern AI technology applied in smart phones self-driving cars and smart home or practically anything that is connected to internet [4].

B. NEED OF BLUE BRAIN

Why do we need an artificial brain when our own brain functions perfectly well? "Intelligence" is the explanation to this question. Intelligence is a natural ability. Some people are born with intelligence and have the ability to think in ways that others cannot. Development requires intelligence. It is impossible to construct. When a person dies, their intelligence is lost. A virtual brain is an attempt to replicate the human brain. Intelligence based on simulated brain waves and historical data experiences. It can also help with the issue of forgetfulness.

Some of the major factors for building an artificial/virtual brain include, brain disease treatments, better understanding of the human brain's working, and integration of neuro scientific research. It will also give you a good idea of how to make thinking devices adopting a bottom-up approach. The living brain is difficult to comprehend; the virtual brain will simplify direct observations while simultaneously attempting to provide a clearer picture. The virtual brain basically involves the process of uploading the living brain into a computer and literally living as a program.

C. FUNCTION OF BLUE BRAIN

Brain simulations that are detailed and physiologically accurate have the potential to solve some fundamental problems about the brain that can't be answered using present experimental or theoretical approaches. These are some of them:

- Defining the Basic Elements' Functions
- Understanding of Complexity
- Investigating the Function of Dendrites
- Bringing Functional Diversity to Light
- Intelligence Emergence Tracking
- Identifying vulnerability Points
- Disease Simulation and Treatment Development
- Providing a Platform for Circuit Design

Fig.2. Functions of Blue Brain Technology

D. BRAIN SIMULATION

Comparison between Brain and simulated brain is depicted in Table 1.

TABLE 1. COMPARISON BETWEEN BRAIN AND SIMULATED BRAIN

Natural brain	Simulated brain
INPUT The neurons in our nervous system are responsible for message transmission. Sensory cells in the body get the information. The electric impulses received by the neurons are produced by this sensory cell. These electric impulses are sent to the brain through neurons.	INPUT The artificial nervous system can be built in the same way. The artificial neurons were produced by replacing the neurons with a silicon chip. These neurons have also been studied to see if they can receive input from sense cells. As a result, these artificial neurons may receive electric impulses from sense cells.
INTERPRETATION Electric impulses from neurons are received by the brain and interpreted in the brain. The brain's interpretation is performed by the many states of the numerous neurons.	INTERPRETATION Registers can be used to interpret the electric impulses received by artificial neurons. The various values in this register will reflect various mental states.
OUTPUT Based on the states of the neurons the brain sends the electric impulses representing the responses which are further received by sensory cell of our body to respond neurons in the brain at that time.	OUTPUT Similarly, it can be based on the states of the register the output signal can be given to the artificial neurons in the body which will be received by the sensory cell.
MEMORY Particular neurons in our brain are permanently associated with certain situations. Our brain represents this condition when it is necessary, and we may recall events from the past. To recall things, we compel neurons to reflect particular states of the brain indefinitely, or this happens implicitly for any fascinating or significant issue.	MEMORY It is difficult to keep data in the secondary memory indefinitely. Similarly, the appropriate states of the registers can be saved permanently and retrieved and used when needed.
PROCESSING When we take decision, think about something, or make any computation, logical and arithmetic computations are done by our neural circuitry. The past-experience can store and the current inputs received to use and the states of certain neurons are changed to give the output.	PROCESSING In same -way decision making can be done by the computer by using some stored states and the received inputs and performing some arithmetic and logical calculations.

E. STEPS TO BUILD A BLUE BRAIN

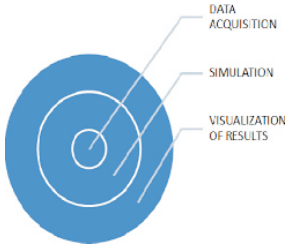

Fig.3. Steps of Blue Brain Technology

There are three important steps in the construction of the blue brain, they are [1]:

1. Data Acquisition
2. Data Simulation
3. Visualization.

1. Data Acquisition

It entails using slices of living brain to analyze the morphology and electrical behavior of each neuron at a microscopic level. These neurons are found in the cerebral cortex.

A 12 patch clamp instruments is used for the study of electrophysiological behavior of neuron, and this very instrument forms the foundation of the research and was developed as the tool for only this project. We can understand the electrical functioning of the neurons individually after collecting all of the data from the brain and inspecting it under a microscope. For a more detailed simulation, Algorithms are created from observations.

2. Data Simulation

Michael Hines created the NEURON software suite in the 1990s. This is used for neural simulations. It's written in the C, C++, and FORTAN are examples of programming languages. The software version that is now in use is 7.2, and it will still be in the works.
There are two fundamental factors to data simulation:

-Speed of simulation
-Workflow for simulation

BBP-SDK- Abbreviated as Blue Brain project: Software Development Kit, it is a set of the software classes that allows researchers to examine models and simulations and use them. The software kit is a C++ library enfolded to java and python.

3. Visualization

The main application that the Blue Brain project uses for visualization of neural simulations is RT-Neuron. It is software that has been specifically designed for neural simulations and has not been adapted to other types of simulations. The output is obtained from Hodgkin simulations and is created in 3D, making it visible to researchers and programmers as potentials activate through or within the neurons. Because the animations can be paused, stopped, started, and zoomed, the researchers can interact with the model. The results are visualized using a 32-rocessor Silicon Graphicss Inc. (SGI) SYSTEM with 300 Gb of shared memory.

F. COMPUTER HARDWARE/ SUPER COMPUTERS

The "Blue Gene" super computer built by IBM is used for the development of Blue Brain. This is where the name "Blue Brain" originates from. The series includes Blue Gene/L, Cyclops64, (formerly Blue Gene/C), Blue Gene/P and Blue Gene/Q.

The hardware & software required to build a Blue Brain are:

1. 8,096 CPUs at 700 MHz
2. 256MB to 512MB memory per processor.
3. 100 kilowatts power consumption.
4. Processor with a very high processing power.
5. 22.8 TFLOPS peak processing speed.
6. Linux and C++ software

Software used:

NEURON is the first software used by the Blue Brain Project for neural simulations for neural simulations.This was developed in the 1990s by Michael Hines at Yale University and John Moore at Duke University. This software is written in C, C++, and FORTRAN and is still being upgraded.

G. ADVANTAGES AND DISADVANTAGES

Advantages:

1. We can make use of a person's intelligence even after he has died.

2. It can contribute in the study of an animal's thoughts by interpreting the electrical impulses generated by the animal's brain

3. This project can assist a deaf person in obtaining information via nerve stimulation.

4. The brain's information can also be used to offer a treatment for mental illness

5. The Blue Brain Initiative is a project that can assist in utilizing the existing human intelligence.

6. This machine will be able to reason and make decisions on its own.

7. We're attempting to create a machine that is intelligent.

8. It can be used as a link between humans and animal minds.

Disadvantages:

1. This will make people more reliant on machines.

2. Computer viruses are a serious threat.

3. It's possible that this will lead to human cloning.

4. The human being could always just rely on the blue brain.

5. If a person's neurological system has been compromised, then

6. It has the potential to be a major issue.

7. The machine can wage war on humans in the same manner that we do. As machines are becoming more intelligent.

H. FUTURE PERSPECTIVE

Great researchers constructed and triggered the initial iteration of the blue brain. The circuit's deep characteristics and efficiency are taking time. The length of time it takes to create a realistic model is mostly determined by the scope of the research and the level of detail gathered. Fundamentally, there are no difficulties in modeling a brain, thus it is expected to be accomplished soon [2].

III CONCLUSION

The success of this project has the potential to change the world and technology we use today. There is a lot of research that takes decades; in these cases, the scientist's intelligence and efforts can be utilized long after their death. It's a difficult task to integrate duplicate brains into a system, and it could take decades to complete, but this project has the potential to change the world. Even after death, the intelligence of the human brain will be stored for the benefit of society. Without the presence of a person, we can make decisions. But it's also true that we'll be reliant on computers. It will have both beneficial and negative consequences for humanity.

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Virtual Reality content creation with Deep Learning: A Study

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Abstract - Computer game provides Virtual Reality. It implies that computer produced a natural imitation of the real-life environment. It was originated in the 1960s and evolved to produce increasing immersion, collaboration, thought, and ingenuity. Because deep learning systems are capable of representing and compiling information in a variety of contexts levels in the deepest hierarchical way, will build the most powerful items and models that can provide the best and most advanced level of knowledge. Intelligence of Virtual Reality systems and applications has greatly improved by recent developments in depth learning strategies. Virtual Reality content creation and testing are related in image and video analysis, integration and editing, it is a very in-depth learning method such as full-time communication networks as well standard conflicting networks widely used, designed especially managing panoramic and video and 3D visual effects scenes. This article examines recent research using such depth learning methods for creating and exploring Virtual Reality content. It considers the issues involved, and discusses the future directions between this active and emerging research area.

Keywords— Cyber sickness Analysis, Deep Learning, Face reenactment,Virtual reality, 360? visual and video content

I. INTRODUCTION

Virtual reality (VR) is a virtual, computer-generated imitation of the nature of real life. Immerse the viewer in the 3D computer production area where they will explore and engage. In almost 60 years of VR history, the availability and comfort of displays and other resources has increased, facilitating the spread of VR. Since 2014 when consumer-grade Head Mounted Displays (HMD) such as the Oculus Rift and the HTC Vive were discovered with commercial use, VR has entered a brand new era [1-2]. This technology has now reached the critical mass of technology, the maturity and expansion of the content needed for further expansion that will embed VR within multiple domains of economics, such as entertainment, education, and tourism. A VR environment created with world photos / videos, or computer-generated 3D models and scenes. Important features to provide a VR-focused experience to users reliability of VR content, hence the authenticity of VR interaction; we need to use computer methods to understand building a high quality VR environment, for the rich to investigate knowledge of VR content, as well as user understanding actions. Recently, AI technology has taken off development and implementation of deep neural networks. Continuous skills of in-depth learning programs improved their take on VR research, especially in VR content design and testing activities. Because deep learning systems can represent and compose information in a variety of ways in a deep hierarchical fashion with simple unambiguous structure blocks, will read the most powerful models for hundreds of prices for visual media data available today. Deep learning methods may be common among in the coming years in a few sub-areas of VR research.

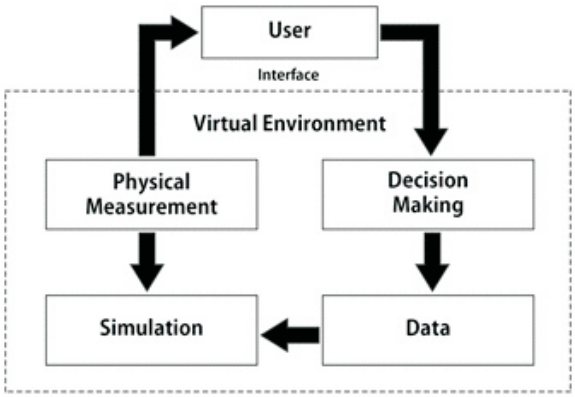

Fig.1. VR Content Creation Planning

A. VR CONTENT CREATION WITH DEEP LEARNING

The creation of high-fidelity VR content forms the foundation of immersive VR experience. Generally, two types of sources are employed for computational VR content creation: real-life images and videos, and objects and scenes created automatically or interactively using computers. Deep neural networks are utilized in 360? image and video generation, and scene composition [3]. This paper reviews representative techniques and recently proposed algorithms.

1. Panoramic image and video creation

Panoramic image and video, or 360? image/video, synthesized from real-life photos, are typically used for consumer-level VR applications [4], and can be viewed even using mobile phones. Raw images and video captured by various devices are seamlessly stitched to generate a panoramic scene for VRpresence. Normally, 360? images presented in VR are stereoscopic. Thus solutions for capturing and rendering stereo imagery have been proposed with both fixed camera arrays and casual photography. The raw images and video are then warped and stitched to make a 360? panorama for VR display [5].

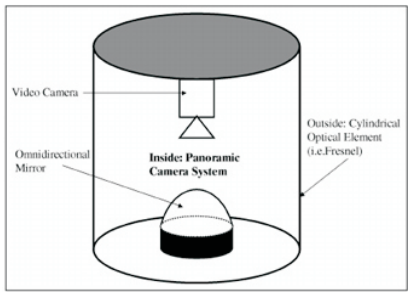

Fig .2. Concept of panoramic camera system

2. 3D reconstruction and image-based rendering

Geometry information is not in the actual photos and videos. Support for interactive navigation once testing of other VR applications, 3D geometry needs to be rebuilt from the data orexplicitly or implicitly. Also, image-based rendering (IBR) strategies are usually accustomed to integration honestlyor enhance images with novel ideas.

Three basic aspects and methods to be noted:

- General scenes using dense 3D data cloud points because of the complexity of geometric data.

- 3D facial reconstruction using either lightweight setups or CNN based deep neural networks.

- Human body reconstruction

3. 3D model manipulation

he methods listed above reconstruct the geometryfrom real life photos and videos. In those casesenvironment is intended for retrieval of user inputs,or a custom VR space should begiven, we would like some more 3D model tricksmethods. This includes shape canges as welltransformationare also widely used inpictures. In-depth learning methods have fourpast traditional methods in somespecific domains, indicating the possibility ofmachine learning to disable and change conditions.

or external scenes, methods based on in-depth learningthey tend to work specifically to change the world. The synthesizer can be a conditional production enemynetwork. The VGG network takes a local mapimportant features that look like peaks as wellvalleysas inserts, and produce the full height of place.

B. DEEPVR CONTENT ANALYSIS

In order to allow sophisticated interactions with VR applications, semantics need to be extracted by deep learning based approaches. On the other hand, to improve the comfort of VR users while exploring or making actions, the factors affecting VR adotion need to be analyzed.

1. Detection and recognition

or VR content provided by real life images and videos, object detection and recognition are essential, to extract semantics that are very valuable. Both are typical computer vision tasks, so can be handled by

deep learning methods. Nowadays, CNNs are publcly considered to be one of the most effective and powerful tools in computer vision. It is thus a natural idea to use CNNs to solve problems of object detection and recognition in panoramic images and video.

2. Cyber sickness analysis

hen a user experiences a virtual environment, cyber sickness may occur, which causes symptoms similar to motion sickness[4]. The most common symptoms include discomfort, headache, queasiness, nausea, vomiting, pallor, fatigue, drowsiness, disorientation, nd apathy. Disequilibrium between organs of the human body and the visual information acquired by the eyes may cause cyber sickness. Additionally, screen resolution, size of field of view, and latency play a role in cyber sickness, too.Crosstalk between te sensory and cognitive systems is the main factor in cyber sickness. It is difficult to quantify cyber sickness by measuring sensory and cognitive systems objectively. Analyzing electroencephalogram (EEG) data is another possible approach, using traditioal machine learning algorithms which have 95% accuracy in reading EGG data or deep learning methods like data preprocessing, DNN and CNN.

C. CONTACTLESS INTERACTION WITH DEEP LEARNING

1. Human pose estimation

uman pose estimation is a fundamental building block for methods translating natural body movements into functional actions in a VR environment. It focuses on estimating the locations of body parts and their connections.Human pose estimation may involve 2 pose estimation or 3D pose estimation where human anatomical key points or parts are represented in 2D or 3D respectively.

2. Hand gesture recognition

Hand gestures are postures or movements of the user's hands, and provide a common and natural way to interact with VR environments. Recognizing hand gestures efficiently and accurately is a critical component in contactless VR interaction.

D. DEEP VR CONTENT MANIPULATION

1. VR image and video editing

Generative adversarial networks (GANs) have been successfully applied to many image and video editing applications, e.g., image-to-image translation and inpainting.The outstanding improvements in these generative tasks have led to widespread interest in deep convolution networks for VR image/video editing.

2. Image and video enhancement with HMDs

Head-mounted displays (HMDs) block the real world from the viewer to provide an immersive experience of the virtual environment. However, when wearing such a device, the eye region of user's face is partially occluded. This partial face reduces immersion in teleconferencing, or other VR education and entertainment applications.

3. Face reenactment

Face reenactment has been widely used in the film industry to animate virtual CG avatars in recent years.Different methods both from deep learning and outside can be used for to achieve accurate video synthesis such as, Face2Face which is a representative work for face reenactment. It is a real-time system which just takes monocular video as input and can manipulate the facial expression of a target video driven by a source actor, or a style-preserving visual dubbing approach based on recurrent GANs; it modifies facial expressions of a target actor to match the speech in a foreign language while maintaining the style of the target actor.

E. APPLICATIONS

VR content creators use two main methods to create VR content: computer-generation, wherein every part of the world is synthetic, designed and integrated into an interactive experience using code; and 360-degree video, where video is taken using an Omni-directional camera and edited to create an immersive experience.

Various fields affected by and utilizing the features and allure of entertainment through Virtual reality are as follows:

1. Medical: VR headsets and controllers are used in hospitals and medical science to create and handle simulations of risky surgeries or experimental procedures in many facilities around the world.

2. Gaming: Many games and various gaming worlds are created and distributed among gamers and different platforms using the VR technology to increase the immersive experience of the gaming worlds with the help of various VR devices.

3. Animation: The popular trend of animated shows called "Anime" originating from Japan, various high quality cartoons and shows and live action CGI containing movies and shows utilize the Virtual Reality platform to provide a 3D and immersive experience to the viewers and the watchers as well.

II. CONCLUSION

The creation and testing of visual content in VR isthe topic of basic research, which works and supports diversityapplications that use an immersive visual environment. Thispaper reviewed in-depth learning activities representing VRcontent creation and testing especially the last fiveyears. We see that deep neural networks are widely usedin the creation of VR content using real-world images and videos.

They have been used in almost all stages of reconstructionprocess, which includes the texture of the raw image, and the 3D scene as wellhuman reconstruction from monocular, stereo, VR data.

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Silent Sound Technology : Overview, Types and Applications

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Abstract— When we converse on a cell phone in a crowded place nowadays, we are essentially yelling because there is so much noise and commotion around us. However, there is no longer any need to yell in order to express our message and waste our energy. A new technique known as "Silent Sound Technology" has been invented for this aim, which will eliminate noise pollution. Silent sound technology is ideal for folks who have lost their voices but yet want to communicate on their phones. It's being created at the Karlsruhe Institute of Technology, and it'll be released soon. When this technology is employed, it recognizes every movement of the lips and internally turns the electrical pulses into sound signals, which it then sends out, ignoring all other background noise. It will be quite advantageous to those who despise conversing on their phones loudly. "Silent Sound technology" aims to detect every movement of the lips and convert them into sounds, perhaps allowing those who have lost their voices to communicate and allowing people to conduct silent calls without disturbing others. Instead of making sounds, your handset would decipher your mouth movements by measuring muscle activity, and then convert this into speech that the person on the other end of the line could hear. In a nutshell, it scans our lips. Another significant advantage of this technology is that it allows you to speak with anyone in the world because the electrical pulse is universal and may be translated into any language according to the user's preferences. This technology can be utilized for languages such as English, French, and German, but not for Chinese because different tones in Chinese have distinct meanings. This new technology will be extremely useful anytime a person loses his or her voice while speaking, as well as allowing people to make silent calls without bothering others. As a result, we may now chat freely with our friends and family without fear of being overheard. The listener may clearly hear a voice on the other end. This device has a 99 percent efficiency rate and will be available in the market in 5-10 years. When it is released, it will have a significant impact and will undoubtedly be widely used.

Keywords— cell phone, electromyography, image processing, Silent sound.

I. INTRODUCTION

When an audible acoustic signal is lacking, Silent Speech technology allows speech communication to take place. It provides a digital representation of speech that can be synthesized directly, read as data, or routed into a communications network by capturing sensor data from aspects of the human speech production process — from the articulators, their neurological connections, or the brain itself [3].

While enhancing assistance for the speech- impaired has long been a goal of biomedical engineering, a second, quite distinct class of applications has recently sparked interest in Silent Sound technology: offering anonymity for cellular telephone conversations. Cell phones are commonly acknowledged to be an inconvenience in meetings or peaceful spaces, and their usage is now prohibited in many public places. The content of a cell phone conversation is frequently made public, which makes the user uneasy. At the same time, the capacity to take an urgent or critical call from any location might be a highly helpful service in many cases. If non-invasive and tiny enough to be put into a telephone handset, this technology could overcome these problems by allowing users to talk quietly without disturbing those around them. Given the current number of mobile phones in use, the market for this technology could become very significant if it received widespread acceptance.

Silent Sound technology allows you to send information without having to use your voice cords. The Karlsruhe Institute of Technology in Germany is developing Silent Sound technology. Electromyography is used in this technology. It detects

the tiniest muscular movements that occur when humans talk and converts them into electrical pulses that can be converted into speech without the need for a sound to be emitted. It is extremely beneficial to folks who are unable to communicate verbally. They can readily interact with other people by using this technology. The advantage of this technique is that the listener can clearly hear the voice. The goal of this technology is to detect lip movements and convert them into a computer-generated sound that can be sent over the phone. As a result, the person on the other end of the line hears the information. The concept of electronically or with a computer translating silent communication has been known for a long time, and was popularized in the 1968 Stanley Kubrick science-fiction film "2001-A Space Odyssey."

“Right now, we're using electrodes that are adhered to the skin. Such electrodes could be included into cell phones in the future, according to Michael Wand of the KIT. [7] The technology has a wide range of uses, including assisting persons who have lost their voices due to illness or injury. You can also use technology to become a polyglot in an instant. Because electrical pulses are global, they can be instantly translated into the user's preferred language. "Native speakers can silently pronounce a statement in their native tongue, and receivers will hear the translated sentence in their native tongue." "It appears that the native speaker was speaking in a foreign tongue," Wand observed.

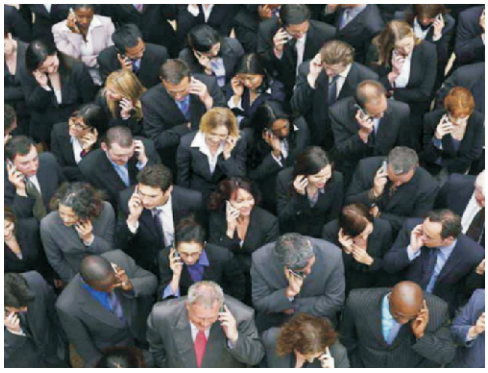

Figure 1. Common people talking at same place without disturbance

II. METHODS

A. Electromyography (EMG)

The Silent Sound Technology monitors minute muscular movements that occur while we talk using electromyography. Electromyography (EMG) is a method of assessing and recording the electrical activity of skeletal muscles. EMG is performed with the help of an electromyograph, which creates an electromyogram record. When muscle cells are electrically or neurologically engaged, an electromyograph monitors the electrical potential created by these cells. [5] Without uttering a sound, monitored signals are translated into electrical pulses that can then be converted into speech. It's a technology that tracks the minute muscular movements and pulses that it generates. The pulses are converted into electric signals by the transducers. The electrical source is the -90 mV potential of the muscular membrane. Depending on the muscle under investigation, measured EMG potentials range from less than 50 V to up to 20 to 30 mV.

As shown in Figure 2 the electromyography sensors attached to the face records the electric signals produced by the facial muscles, compare them with prerecorded signal pattern of spoken words [5].

Figure 2. Electromyography sensors

When there is a match, the sound is relayed to the person on the other end of the line, who listens to the uttered words. A needle with two fine-wired electrodes is injected into the muscle tissue through the skin. When the needle is put into normal muscles, they make particular, normal electrical noises. While inserting the electrode, a qualified expert (such as a neurologist, physiatrist, or physical therapist) examines the electrical activity. The insertional activity gives important information regarding the muscle's and its innervating nerve's condition. The electrical activity of the muscle is then measured when it is at rest. Each electrode track depicts the activity of the entire muscle in a very localized manner. Because the inner anatomy of skeletal muscles varies, the electrode must be inserted at several sites to obtain an appropriate signal. Thus, speech can be communicated without the use of sound in this manner.

B. Image Processing

The most basic type of digital image processing turns a digital data tape into a film image with the fewest corrections and calibrations possible. After that, massive mainframe computers are used to perform advanced interactive data manipulation. The picture is being analyzed using overhead prospective in this case. Image processing is any type of signal processing for which the input is an image, such as a photograph or video frame, and the output is either an image or a set of characteristics or parameters connected to the image in electrical engineering and computer science. The output of this picture processing in quiet sound technology is an audio recording. The majority of image processing approaches treat the image as a two-dimensional signal that is then processed using traditional signal processing techniques. In the instance of quiet sound technology, Figure 3 depicts how image processing works.

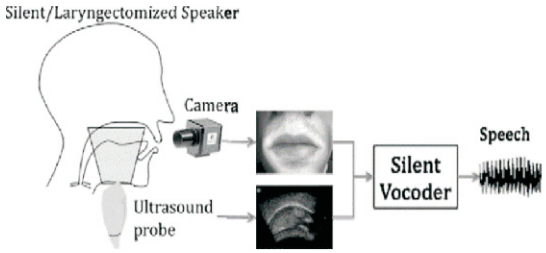

Figure 3. Image Processing

III. APPLICATIONS OF SILENT SOUND TECHNOLOGY

The technology allows for a variety of applications, including those listed below [4]:

- Because there is no channel for sound to travel in space, astronauts can make the best use of this technology.
- Assisting those who have lost their voices as a result of illness or an accident.
- Even if we are standing in a crowded area, we can make silent calls.
- Allow users to make phone calls in private without disturbing others.
- Giving your PIN code to a trustworthy acquaintance over the phone without being overheard (provided no lipreaders are present).
- In the military, silent sound techniques are used to communicate secret/confidential information to others.
- Electrical signals may be translated into any language since they are universal. Before delivering it to the other side, native speakers can translate it. As a result, it can be transformed into any language, including German, English, and French.

IV. RESTRICTIONS

- Translation is possible in the majority of languages, but in languages like Chinese, various tones have different meanings, despite the fact that facial gestures are the same. As a result, this technology is difficult to use in certain scenarios.
- Recognizing who you're talking to becomes difficult from a security standpoint.
- Even distinguishing between individuals and feelings is impossible. As a result, you'll always feel like you're conversing with a machine.
- This technology now requires nine leads to be hooked to our faces, making it impossible to use.

V. RESEARCH AND FUTURE PROSPECT

- Speech recognition technology has a bright future, from basic voice commands to memos dictated over the phone, and all of this is quite achievable in noisy public areas.
- .These electrodes will be embedded into cell phones, eliminating the need for electrodes to be hung all over your face.
- Instead of electromyography, it might incorporate capabilities like lip reading based on image identification and processing.
- Nanotechnology will be an important step towards making the device more useful.

With so many phones in use, there's a lot of opportunity for raising profits by saving 'lost calls,' which are phone conversations that go unanswered or uninitiated because the user is unable to speak - not just in business meetings, but in ordinary settings as well. These "lost calls" are estimated to be worth $20 billion a year

globally, according to study. These are potential earnings for the cellular operator that are now being overlooked. There is a significant potential for higher revenues if these 'lost calls' become answerable and can be performed without making a sound. Now, research is being conducted on technology that may be used in an office setting as well.

VI. CONCLUSION

One of the most current trends in the field of information technology is Silent Sound Technology, which enables "Talking without Actually Talking." The device, according to the engineers, is 99 percent efficient. It's difficult to make a meaningful comparison between SSI technologies. Because many of the systems are still in their early stages, it would be pointless to compare voice recognition scores or synthesis quality at this time.

The 'Silent Sound' technology aims to detect every movement of the lips and convert them into sounds, perhaps allowing those who have lost their voices to communicate and allowing people to conduct silent calls without disturbing others. Rather than creating sounds, your handset would decode your mouth motions by sensing muscle activity, then turn this into speech that the person on the other end of the line could understand. So, in a nutshell, it listens to your mouth. It will be a cutting-edge and practical technology that will be employed in our daily lives in the not-too-distant future.

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Ethical Hacking - A Panoramic View

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Abstract- The state of security on the network is exceptionally bad. Hacking is an action in which an individual misuses the shortcoming in a system for self-profit or satisfaction. As open and private organizations relocate more of their basic capacities or applications such as electronic commerce, promoting and databases get to the Web, at that point hoodlums have more opportunity and motivation to pick up delicate data through the Net application. Hence the requirement of securing the frameworks from the hacking produced by the programmers is to advance the people who will punch back the unlawful assaults on our computer frameworks. Ethical hacking is an indistinguishable action which points to discover and correct the shortcoming and vulnerabilities in a system. Ethical hacking depicts the method of hacking an arrangement in an Ethical way, subsequently with good eagerly.

Keywords: - Black Hat, Gray Hat, Ethical Hacking, Phase, Keys, White Hat.

I. INTRODUCTION

Hacking may be a common term for a variety of exercises that look to compromise computers and systems. It alludes to any unauthorized interruption in a gadget, organization, or server which encroaches on the security of their proprietors and clients and/or points to harm or something else compromise computer-based properties like records, programs, and websites. Whereas the term can allude to non-malicious exercises, it is most frequently related with pernicious attempts to exploit framework vulnerabilities for the good thing about culprit.

The individuals who lock in hacking are commonly alluded to as Hackers. To begin with started in a 1980 magazine article, this term was popularized a number of a long time afterward by the motion pictures “Tron” and “WarGames”. Over a long time, programmers have ended up a staple of prevalent culture. Be that as it may, the normal depiction of hackers as self-taught, thrill-seeking programming prodigies isn't as it were cliché but moreover incredibly overstated.

In spite of the fact that as a rule specialized in nature, hacking doesn't fundamentally require great computational aptitudes. Programmers can break into computers and frameworks utilizing social building, a set of mental strategies outlined to trap a clueless target into giving programmers access to their information. What's more, whereas hacking does require at least a few to get a handle on computer innovation, anybody can go to the dim web to buy the apparatuses they got to carry out an assault or enlist a proficient programmer to do it for them.

In expansion to fun and excitement, programmers can be persuaded by various other variables. These incorporate budgetary pick up, burglary of individual information, get to private data, the want to require down websites, as well as optimism and political activism. Whereas a few shapes of hacking are totally legitimate, most of them are not and are considered criminal offenses. Depending on the seriousness of their assault, programmers within the United States can serve anywhere from a number of weeks to 15 a long time in jail for computer altering.

A. Ethical Hacking?

Ethical hacking is the method where a professional programmer legitimately and purposely tries to break into the computers and gadgets of an association. In doing so, ethical programmers can test the organization's protections, highlighting any vulnerabilities in their frameworks and systems [1].
It's a detailed and often complex process, with many different elements to consider. An ethical hacker, sometimes known as a white-hat hacker, will look for weaknesses in a variety of different ways. They will

also perform a variety of other tasks linked to general cyber security. This can include:

- Vulnerabilities analysis
- Penetration testing
- Gathering intelligence about entry points
- Scanning infrastructures to spot weaknesses
- Accessing systems/networks and exploiting vulnerabilities
- Hiding their access and evading detection
- Compiling reports and analysis for the attempts

Penetration testing Intrusion testing and ed teaming are terms for ethical hacking. An ethical hacker conducts penetration tests in order to answer the four basic questions listed below[3]

- What information/locations/systems can an attacker gain access
- What can an attacker see on the target
- What can an attacker do with available information
- Does anyone at the target system notice the attempts?

B. Key Elements of Ethical Hacking?

Then it comes to ethical hacking, there are several key protocol elements that they need to abide by. These include:

Remaining Within the Legal Bounds–Ethical hackers need to obtain approval before performing cyber security procedures and assessments. Secondly, ethical hackers need to define the scope of their system security testing to remain within both the legal bounds and the boundaries set by the oganization.

Reporting Existing Security Vulnerabilities–A white hat hacker needs to notify the company of vulnerabilities found during their evaluation. They should also provide remediation instructions for these issues.

Respecting Data Sensitivity–When it comes to data sensitivity, ethical hackers may be asked to sign non-disclosure agreements as well as other conditions and requirements set forth by the reviewed company.

II. TYPES OF HACKING/HACKERS

Hackers can be classified into three different categories:[2]

- White Hat Hacker.
- Black Hat Hacker.
- Gray Hat Hacker.

A. White Hat Hackers

A white hat hacker is hired to break into computer networks with the aim of finding loopholes or flaws in cyber security systems that other hackers could potentially misuse.

A cyber attack is simulated so it is similar to how a malicious hacker would behave. This way all the vulnerabilities are identified and then fixed.
Here' everything white hat hackers are expected to do when hired by an organization:

- Identify threats from Open Ports

In the absence of a proper cyber security system, open ports can let hackers easily enter your system. White hat hackers scan these ports via third-party tools and recommend measures to make them safe against breaches.

- Analyze patch installations

Threat actors can easily exploit patch installations. The white hats analyze them closely to minimize the threat.

- Employ social engineering

They often put social engineering methods in place to collect certain information. This way, they identify the steps hackers could take to access your system, then protect you against them.

- Evaluate honeypots and firewall systems

White hat hackers also identify the weak points of the honeypot systems you have already set up. They try to find methods to evade firewalls, IDS, IPS, or honeypots so that they can put measures in place to prevent anyone else from doing the same.

- Protect networks

They try to recognize network-related security loopholes by performing network sniffing and hijacking your web servers.

B. Black Hat Hackers

The intention of Dark Hat Hackers is to hurt the computer frameworks and network. They break the security and intrude into the organization to hurt and annihilate information in order to make the organization unusable. They ruin the websites, take the infomation, and breach the security. They crack the

programs and passwords to gain passage within the unauthorized network or system. They do such things for their own individual interest like cash. They are moreover known as rackers' ' or Malicious Hackers Other than white hats and dark hats.

C. Gray hat hackers

As in life, there are gray zones within the hacking world that are not one or the other dark nor white. Gray hat programmers work some place between the extremes of their dark hat and white hat partners. They do not fundamentally need to cause torment or tke from their casualties, but they regularly hack into their targets' systems to hunt for vulnerabilities in a system without the owners' authorization or information. One of the chances that they discover these vulnerabilities, they will report them to the proprietor, but they regularly ask a charge to settle the issues they discover. On the off chance that the proprietor does not react or comply, some of the time these hackers will post the recently found helplessness online for the world to see. These types of hackers may not be intrinsically noxious; they're fair looking to urge something out of their revelations. As a rule, gray hat programmers will not abuse the vulnerabilities they discover. They won't take and spill the budgetary data that retailers have collected on their clients, for occasion. However, this type of hacking is still considered illegal because the hackers don't receive permission from the owners before attempting to attack their systems.

III. HACKING PHASES

There are basically five phases (Fig. 1) in hacking. Not essentially a hacker has got to follow these 5 steps in a successive way. It's a stepwise process and when followed yields a good result [2, 4].

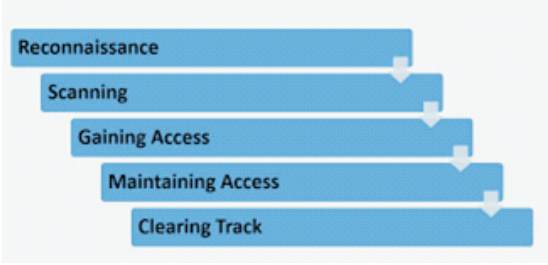

FIG. 1. HACKING PHASES

1. Reconnaissance

When it comes to penetration testing, the primary common question to find is – What is the first phase of hacking? Before performing any genuine penetration tests, hackers footprint the framework and gather as much data as they can. Surveillance could be a preparatory stage where the hacker records the organization's request, finds profitable arrangement and login data of the framework and tests the systems [3]. This data is vital to performing the assaults and includes:aming conventions

- Services on the network
- Servers handling workloads in the network
- IP Addresses

2. Scanning

In this stage, the ethical hacker starts testing the systems and machines to distinguish potential attack surfaces. This includes gathering data on all machines, clients, and administrations inside the organization utilizing computerized filtering instrumets. Penetration testing regularly embraces three sorts of checks:

- Network Mapping
- Port Scanning
- Vulnerability Scanning

3. Gaining Access

Once ethical hackers uncover vulnerabilities through the primary and second hacking phases of the method, they presently attempt to misuse them for regulatory access. The third stage includes attempting to send a noxious payload to the application through he network, an adjoining sub network, or physically using an associated computer. Hackers regularly utilize a number of hacking devices and methods to recreate attempted unauthorized access, including:

- Buffer overflows
- Phishingi
- Injection Attacks

4. Maintaining Access

The fourth phase of the ethical hacking preparation includes forms utilized to guarantee the hacker can get to the application for future use. A white-hat hacker persistently abuses the framework for assisting vulnerabilities and raises benefits to get it ow much control attackers can pick up once they get past security clearance. A few attackers may also attempt to cover up their personality by expelling any proof of an assault and introducing a backdoor for future access.

5. Clearing Tracks

To hide any evidence that can lead them to hackers, hackers perform ways that erase all the traces. Some of them are:

- Logs Clearing
- Removing folders which were created during attack
- Modifying Rules
- Removing applications used for attacking

After successfully following all the phases, they now create a report of vulnerabilities and suggest recovering ways.

IV. HOW TO BECOME AN ETHICAL HACKER?

Because there are no standardized educational qualifications for ethical hackers, each organization can establish its own. A bachelor's or master's degree in information security, computer science, or even mathematics is a great foundation for anyone intersted in pursuing a career as an ethical hacker.

Individuals who do not want to attend college should choose a military career in information security. A military background is a benefit for many firms when it comes to employing information security professionals, and some organizations are mandated to hire people with security clearances.
other technical topics, such as programming, scripting, networking, and hardware engineering, can aid students interested in pursuing a career as ethical hackers by providing a basic understanding of the underlying technologies that make up the systems the will be working on. System management and software development are two other important technological abilities.

V. CERTIFIED ETHICAL HACKERS

A variety of ethical hacking and IT security certifications are available to enable ethical hackers establish their subject matter competence. The following are examples of industry certifications[1]

1. Three programs by CompTIA
2. Certified Ethical Hacker (CEH)
3. Certified Information Security Manager (CISM).
4. Certified Information Systems Auditor(ISA).
5. Microsoft Technology Associate Security Fundamentals

VI. CONTROVERSY

Some computer security experts have criticized the term ethical hacker, claiming, "There is no such thing as an ethical hacker" - that's like saying, "There is no such thing as an ethical rapist" - it's a contradiction in terms." Part of the debate may ste from a previous, less stigmatized definition of hacker, which has become associated with computer crime. Some businesses, on the other hand, appear to be unconcerned with the association. According to the EC-Council, there has been an upsurge in the numbr of jobs that require or prefer CEH and other ethical hacking certifications.

VII. ADVANTAGES OF ETHICAL HACKING [1]

1. Unraveling the Hacker Mindset

- Hacker is always the most dangerous to network security
- Critical to understanding how hackers work and operate
- Because it is impossible to eradicate all dangers from a system totally, one must put themselves in the shoes of a hacker to carry out their duties as a hacker

2. Development and Quality Assurance

- More emphasis should be focused on security testing, which is frequently overlooked, leaving software open to assaults and threats
- Ethical hacker who has been properly educated may give significant impetus to a team by assisting them in doing security testing rapidly and successfully rather than depending on in-house procedures that need more time and energy.

3. Transition to Cloud

- Cloud technology is gaining traction in the information technology field, where virtualization and IT outsourcing are important
- Legislation has created dangers and enhanced the level of these threats, justifying the need for ethical hackers.
- Cloud computing is frequently subjected to security breaches and is the source of numerous data leaks and cyberttacks.

4. Employment

- With so much rivalry for employment, every benefit or edge that sets you apart from the competition is prized since it displays ability and may help you win the job.
- Especially noticeable in entry-level roles, employers and organizations search for specific talents to set the candidate apart rather than experience.

VIII. DISADVANTAGES [1]

- The ethical hacker uses the knowledge they gain to do malicious hacking activities.
- Allowing the company's financial and banking

details to be seen.

- The possibility that the ethical hacker will send and/or place malicious code, viruses, malware and other destructive and harmful things on a computer system,

- Massive security breaches.

IX. CONCLUSION

Hacking offers both advantages and disadvantages. Hackers come in all shapes and sizes. They can either bankrupt a firm or secure its data, resulting in increased revenue The battle against malicious or black hat hackers is a protractd one with no end in sight.While ethical hackers assist in gaining a better understanding of the situation, malevolent hackers, and the security needs of businesses illegally enters the network and causes harm to it for personal gain benefits, which could make it easier for a hostie hacker to get into your system. Their defense system Ethical hackers assist businesses. Ethical hacking is a technology that, when used correctly, can help you understand a network's vulnerabilities and how they can be exploited. This also means that haking is a significant part of the computer world. It explores both the positive and negative aspects of human nature. Ethical hacking helps to keep and save a lot of confidential information, but malevolent hacking might completely destroy everything. Eveything hinges on the hacker's intent. Because the human mind cannot be dominated, it is nearly impossible to bridge the gap between ethical and malicious hacking, but security measures can be tightened.

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3D OPTICAL DATA STORAGE

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Abstract-Optical Data Storage alludes to the storing and recovery of information in an optical way. A huge volume of information is put away with some design and recovers something similar by shining light or laser on the sent medium. The 3D optical data storage is one of the modern methods of optical data storage in which data can be recorded or potentially read with three-dimensional resolution (instead of the two-layered goal managed, for instance, by CD).

Keywords- 3-Dimensional, media, technology, optical storage.

I. INTRODUCTION

The best mechanism for information capacity has been a fundamental worry throughout the years. The vitally computerized course has been the optical data storage which has been being improved to oblige new changes in innovation and applications. Optical data storage had different constraints, for example, space and speed have requested more enhancements driving two-layered storage devices. These, nonetheless, have their restrictions which have requested greater improvement bringing about the three-dimension data storage which defeats the wide range of various restrictions because of the speed and also, convenience of a lot of information [1].

Optical memory is an innovation that utilizes a three-dimensional medium to store information and it can access such information a page at a period rather than successively, which prompts expansions in capacity thickness and access speed. Optical data storage systems are extremely near turning out to be monetarily practical. Photo-refractive crystals and photopolymers have been Photograph refractive gems and photopolymers have been utilized effectively in exploratory optical data storage systems. Such frameworks exploit the optical properties of these photosensitive materials alongside the way of behaving of laser light when recording a picture of an object is utilized [1].

Current optical data storage media saves the information as a series of intelligent imprints on an inside surface of a disc. It is feasible for disks to hold two or much a greater amount of these data layers, to increment capacity limit, yet entirely their number is seriously restricted since the tending to laser connects with each layer that it goes through coming to and from the tended to layer. The outcome of this is noise that is restricting this technology to just 10 layers.

Figure 1 is a representation of a cross-section through an optical 3D storage disc along a data track. Four information layers are seen, with the laser as of now tending to the third from the top. The laser goes through the initial two layers and is just associated with the third since here the light is at high energy.

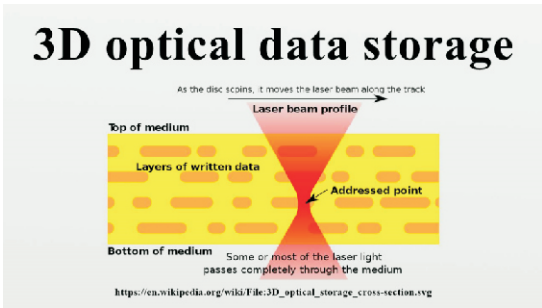

Fig.1. Cross-section of an optical 3D storage

II. FEATURE

Most commercial disks keep data on a narrow aluminum film that is housed inside a transparent plastic disk. Data is put away on such a device during the creation process as the aluminum films are stepped with a pattern. The data is subsequently used by mirroring a centered laser beam at the surface. The disk is turned about its axis, which interprets for the example comparative with the laser. The resultant reflection from the disk is tweaked with the data from the pattern, and the reflection is caught by a photodiode. Thus the photodiode produces a modulated electrical signal which communicates the data to the following stage in the process. These aluminum-based disks are the most common sort of Write Once Read Many (WORM) disk.

In 3D, data storage and reading are worked with through the basis of a laser on the capacity medium whereas, for this situation, the laser goes through different focuses as it moves in a nonlinear manner before it arrives where data recording or reading is needed. This is an improvement of the 2D optical data storage where the laser light detours each layer of data stored in the storage medium before arriving at the ideal point leading toward the recording of just 10 layers of data which is a constraint of the ongoing technology. 3D optical data storage involves techniques in which the light associates with just the addressed volumetric pixel. In this method, laser light [3]

B. Optical Recording Technology

Optical storage systems comprise a drive unit and a storage medium in a revolving disk structure. Overall the disks are pre-arranged utilizing grooves and lands (tracks) to facilitate the placing of an optical pick-up and recording head to get to the data on the disk. Affected by a laser beam exuding from the optical head, data is recorded on the media as an adjustment of the material qualities. The disk media and the pick-up head are revolved and situated through drive motors controlling the place of the head for information tracks on the disk. Extra peripheral electronics are utilized for control and data securing and encoding/decoding [2].
For instance, a prototypical 3D optical data storage system might utilize a disk that seems to be a see-through DVD. The disc contains many layers of data, each at an individual drop in the media and each comprising of a DVD-like twist track. To record data on the disc a laser is brought to a concentration at a specific depth in the media that relates to a specific data layer. Whenever the laser is turned on it generates a photochemical change in the media. As the disc spins and the read/write head moves along a span, the layer is composed similarly to a DVD-R is composed. The profundity of the center may then be changed and one more altogether unique layer of data written. The distance between layers might be 5 to 100 micrometers, permitting >100 layers of data to be put away on a single disc.

To peruse the data back (in this model), a comparable strategy is utilized besides this time as rather than causing a photochemical change in the media the laser cause fluorescence. This is accomplished for example by utilizing a lower laser power or an alternate laser wavelength. The power or wavelength of the fluorescence is different relying upon whether the media has been written by then, thus by estimating the emitted light the information is perused.

The size of individual chromophore molecules or photoactive color centers is a lot more modest than the size of the laser focus. The light consequently addresses a huge number (perhaps even 109) of particles at a time, so the medium goes about as a homogeneous mass instead of a matrix structured organized by the places of chromophores.

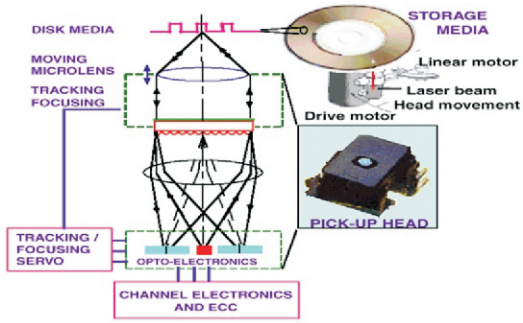

Fig.2. Optical Storage System

III. STORAGE MATERIALS

A. Read-write materials

Thick 3D images are made conceivable by cutting and cleaning enormous samples. Photo -ionized electrons are moved and caught when these materials respond to an impedance design's light and dull regions. These crystals show a direct photoelectric impact. This makes a caught charge which accordingly makes electrical fields that lead to a reasonable stage or index for diffracting light. This prompts the refraction index to become indistinguishable from the spatial varieties in light force present in the interference design. The trapped charge can be revamped by the following illumination, making it conceivable to eradicate recorded multidimensional images and relocate them with new ones.

B. Write-once materials

Irreversible photochemical responses are set off by the shinning area of the optical interference pattern while composing a long-lasting volume hologram. Be that as it may, contrastingly the atoms in a photochromic material go through a change in their absorption behavior. Such materials are cheap to make in amount. The genuine reproduction of the item is an issue in the two sorts of material shrinkage causes an issue in photopolymer materials while oversensitivity to average nearby force causes the issue in photochromic materials. Careful system configuration can limit these issues.

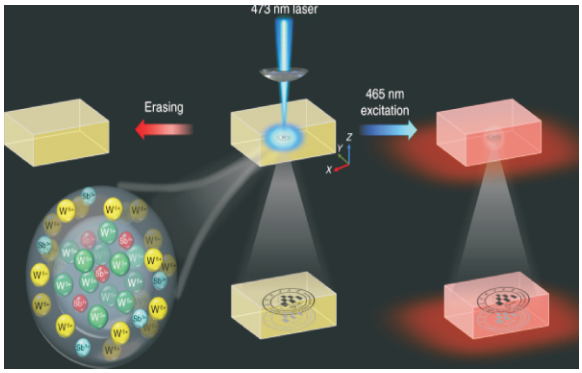

Fig.3. Schematic of the writing, reading, and erasing of optical information.

II. CONCLUSION

So from the investigation of 3D optical data storage technology, we decide that by utilizing this technology we can keep terabytes measure of data at a high pace in exceptionally less space. It can acquire an incredible revolution in the field of data recording and reading. It is accepted that the significant advances in recording media, recording strategies, and the demonstrated densities of more than 30 channel Gbits/inch combined with the new commercial accessibility of system parts eliminate a large number of the hindrances that recently prevented the practical thought of optical data storage and significantly upgrade the possibilities for Holography to turn into a future capacity innovation [5]. The area of 3D optical data storage is a serviceable field for correspondence designs. This study is look at the progressive change-out in the field of data storage and recoveries yet engineers included in the correspondence, the field can think of this and bring unrest in the field of data storage reading by using the information, accessible assets, and provision.

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Artificial Intelligence in Household

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Abstract -This paper presents the design needed and some implementations of an Artificial Intelligence which is also known as Human Interface or a housekeeper robot. It is based on the idea of making the robot understand the human needs without making the human to go through the details of robots work, for example, the way that the robot implements the work or the method that the robot uses to plan the path in order to reach the work area. The interface commands based on idioms and the expressions of the natural human language (i.e normal daily use language) and designed in a manner that the user gives the robot several commands with their execution date/time such as alarm clock as we set the timings and it help us to wake in the morning without any human interaction. As a result, the robot has a list of tasks to be done on certain dates/times. However, the robot performs the tasks assigned to it without any human intervention and then gives feedback to the human about each task progress in a dedicated list or task you have allotted earlier. As well as, the user decides to get the feedback either through the interface, through the wireless communication, or both of them. Hence, the user's presence not necessary during the robot tasks execution.

Keywords – Artificial Intelligence, Dijkstra Algorithm, Humanoid Robots, Wireless Communication

I. INTRODUCTION

In the research domain, it is now trivial to witness that humanoid robots are strolling around with biped legs, and some of them are fit for utilizing or using instruments intended for humans such as knives and sweeping Materials. In the commercial environments, robots are now not restricted to industrial environments, but they are getting into home environments such as vacuuming robots [1].

It is fundamental for robots of the new generation to meet some benchmarks like accuracy, fast and easy to understand, these robots must be animated, implying that they ought to respond to the states evolving in their surroundings. This requires a nearby coupling about recognition and movement. Second, personal robots ought to be adaptable to various users, and diverse physical environments. This typically requires reasoning and learning capabilities. Finally, robots should be accessible, meaning that they are able to explain their beliefs, motivations, and intentions at the same time; they should be easy to command and instruct which requires some kind of robot-human interaction.

Many proposed robot-human interfaces suggest different types of interaction between the robot and the human. Some examples of them are a command language interface system to operate a robot where the user uses already existing programming languages to control the robot, a human interface system operates a robot by hand gestures where the arm direction controls the robot movement. Also, a graphical human interface system operates a robot, where the interface displays an image being captured by the robot eyes actually which is a camera.

In addition, the human controls the robot based on the picture displayed and using the graphical commands that already exists in the interface. As well as a user interface based on a video game interface and offers a valid roadmap for the environment. The user controls the robot just as he is playing a game, some examples which we used in daily life are as per above explanation [2]:-

- Smart Sensor Chimney
- Google Maps
- Auto driving cars (Tesla)
- Games like Pokémon go
- Eureka Forbes robo vacuum -mop

The human controls the robot movement and tasks in a condition, where the robot and the human are present at the same time. Almost works of the robot-human interaction area assumed that the human should be present at the moment that the robot does its task or at least in the moment before the robot starts the task. That seems to conflate with the fact of freeing the human from doing the task via using the robot, and to have more time to do other things.

Besides, a vast majority of work in this domain incorporates convoluted graphical/command interfaces, wherein the user needs to learn not just the interface, but also the exhaustive robotic system hardware and software. For example, the human should specify the way of task implementation to the robot like which path the robot walks through to reach its goal, and which actions to be done in order to complete the specified task. This complicates human tasks instead of making human's life easier, and it requires a long time for learning how to make the robot do what and how it has to do.

Housekeeper robots have several features that are provided by the manufacture including: The user does not need to program the robot. This feature provided for home robots only to free the normal user from the complication of robot programming. Whereas, for industrial robots, the manufacturing companies allows engineers to program the robot according to their need and requirements, Even Some times they just need to be trained. The robot contains a database for the most common actions/responses to different situations in human's life, and it contains commands and algorithms that enable it to understand and respond to the user commands such as preparing a meal or washing dishes. However, the database helps the robot to perform its housekeeping responsibilities. The robot implicates path planning algorithms that are essential for the robot mobility within the surroundings, and the user does not have to be concerned in robot path planning. Also, the robot has image processing capabilities to detect changes that happen to its surrounding, and to monitor events that occur in the house. This requires a camera existence, which is normally positioned in the robot head. The cameras also exist in other places like robot back, robot chest, room wall, etc. The robot contains artificial intelligence (AI) program that enables it to learn and adopt the new environments that are adapted on daily basis because the robot works in a very changed environment, which related to real human life. The AI algorithm updates the robot database, this producing more humanized robot behavior.

The above features are very important for any robot to be capable of working efficiently in a human's environment. In this work, the designed robot-human interface supports all the previous features plus the capability of monitoring and controlling the robot in order to learn and understand in easy manner. They will be discussed later in this paper, although they are not part of the designed interface.

In this investigation a human interface for a housekeeper robot based on idioms of the natural human language. The robot interface has several responsibilities inside the house including monitoring a small child, feeding him, playing with him, and preparing food/drinks like breakfast, launch, cafe, juice, etc. In addition, cleaning the house and washing the platters. The user does not have to be existent while the robot accomplishes the task. Additionally, it programs the robot to do different tasks in different times, and the robot does these tasks as scheduled. As well as, maintains the wireless communication between the robot and the user. The wireless communication becomes part of human life that enables human to communicate with others through mobile phones and/or the internet. Hence, the robot and the user could communicate through a mobile phone, while the user is outside the house. This provides the user with monitoring/controlling capabilities on the tasks that are going on in the house during his absence.

II. THE ROBOT HUMAN INTERFACES

As concerning any robot to have the place in a human environment, it has some sort of artificial intelligence program that enables the robot to better understanding the surroundings, and most important is to understand people that live in that surrounding. The AI itself is not part of our work, but we give the robot in our interface the capabilities of adding new tasks, new Short Message System (SMS) information, and/or new SMSs lists of to do actions.

The proposed robot-human interface consists of several pages allowing the user to define the robot tasks. Although, the interface based on graphical design, it uses natural human language to define the tasks. For example, if we want the robot to play with the baby, we select a task named "Play with the baby" [3].

The interface designed based on the object-oriented philosophy where each page supports a certain object. The objects in this case, are the features that the housekeeper robot has. These features and the related interface pages discussed in the following sections.
In this work, the user starts adding tasks to the robot through its interfaces. The user selects a task from a task list which the robot able to execute. The user specifies the task date, time, and priority. Then, adds the task to the temporary task list. Whenever the user finishes adding all tasks, so they are added to the "to do

list", and the robot starts executing them. The robot implements a task until a higher priority task occurs. Hence, the robot postponed the current task and starts implementing the new one of higher priority.

Although the robot monitors the house all times, however, the user can add a task to the robot named monitor the house, so adding this task indicates that the user expects to go out at that time. Accordingly, the robot should be ready to start wireless communication with the user. The SMS sending procedure starts like a new task procedure for an event to occur in the house. Consequently, the robot checks if the event is emergency or not. So that, in emergency cases the robot follows the emergency predetermined procedure, then sends SMS informs the user. Otherwise, if the event is not an emergency, then the robot searches its database for SMS which the user prefers to receive from the interface, and if he chooses to receive the current event SMS, then the robot sends to him an SMS containing the occurred event with its available solutions. As well as, the robot waits 2 to 5 minutes to receive the user replay depending on the event itself. Thereafter, if the user for any reason (including mobile coverage problems, wireless communication limitations, not being fast enough to send a reply, or busy in doing another thing) doesn't reply to the SMS. Accordingly, the robot starts the default procedure for the selected event by the user through the interface.

Actually, the moving objects are monitored by the robot via several cameras. Hence, if the robot detects someone outdoors, then compares the face image of this person with the available images in the interface. Thereafter, if the robot identifies the person outside the door, then informs the user about this person. Otherwise, it informs the user about an unidentified person's existence outdoors. Finally, plans its path inside the house based on the house map using the famous Dijkstra algorithm.

III. TASK SCHEDULING

The robot performs several tasks in the house. The human himself assigns them; he specifies the needed tasks to be done along with the date and time in order to start its execution. The used approach constructs a list of "to do task list", the robot have the scheduled tasks to be done. The user adds one or more tasks at one time, even if they occur at different times during the day, or on different dates.

However, some tasks take longer time than the user estimated, and then some urgent tasks could occur in the house with no previous planning, hence the user prioritizes the tasks for the robot. Then, the robot executes the scheduled task until its ending, a higher priority task emerges in the house, or it is already in the scheduled task list.

The house owner adds tasks for the robot using "New Tasks" page. Therefore, determines the date and time for the robot to do the task, and then determines the task type, and its priority. However, tasks with lower priorities would be delayed, whenever the tasks of higher priorities are in progress as shown in Task page figure. As well as, the user monitors the under execution task and the progress of the scheduled tasks (queued, in progress, done, and/or failed) through the "Current tasks" page or a table inside the database. Therefore, the failed tasks have a reason of the failure in the "Progress" field of the "Current Tasks" page as shown in Status table [5].

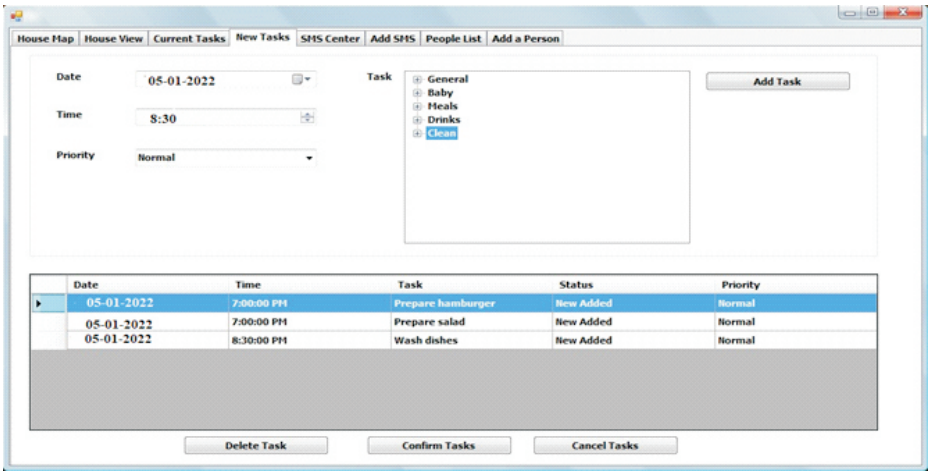
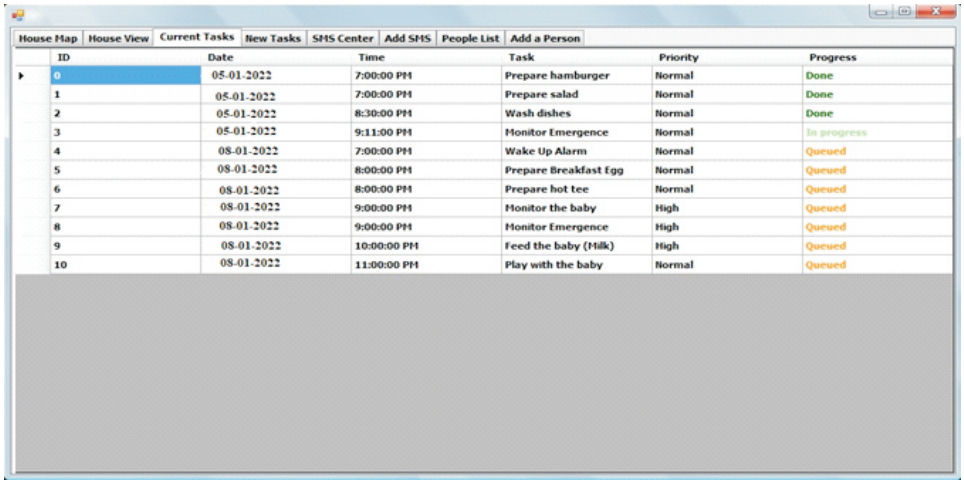


Figure 1. New Tasks Page



ID	Date	Time	Task	Priority	Progress
0	05-01-2022	7:00:00 PM	Prepare hamburger	Normal	Done
1	05-01-2022	7:00:00 PM	Prepare salad	Normal	Done
2	05-01-2022	8:30:00 PM	Wash dishes	Normal	Done
3	05-01-2022	9:11:00 PM	Monitor Emergence	Normal	In progress
4	08-01-2022	7:00:00 PM	Wake Up Alarm	Normal	Queued
5	08-01-2022	8:00:00 PM	Prepare Breakfast Egg	Normal	Queued
6	08-01-2022	8:00:00 PM	Prepare hot tee	Normal	Queued
7	08-01-2022	9:00:00 PM	Monitor the baby	High	Queued
8	08-01-2022	9:00:00 PM	Monitor Emergence	High	Queued
9	08-01-2022	10:00:00 PM	Feed the baby (Milk)	High	Queued
10	08-01-2022	11:00:00 PM	Play with the baby	Normal	Queued

Figure 2. Current Tasks Page showing the statues of each task progress

IV PATH PLANNING

In pursuance of performing a robot task, it moves in around the house. Meanwhile, the robot should avoid collision with the surrounding environment. Hence, there are several methods for robot path planning. This field is still an important field for researchers. In this work, the robot uses a path planning method that complies with two facts. The first fact is the existence of the house map. Accordingly, the robot already knew the required paths in the house. The house map is loaded through our robot user interface, and it is stored to be used by the robot, and to be modified by the user when there is any necessity. The dimensions of the map and the positions of the house furniture that appeared on the map reflect the reality of the house as shown in House Map. The second fact is the robot faces the moving obstacles during its moving For example, a moving object/ human or repositioned furniture. Here, the interface uses a Grid-Based path planning methods named Dijkstra to divide the house map into small points called nodes. Consequently, each time the robot moves, then the method generates a list of nodes that the robot used to pass during its movement. Therefore, the house robots normally have a camera positioned in their head and/or sensors in different places of their bodies. Thus, they detect sudden appeared obstacles. Furthermore, while the data sent by the camera/sensors, then the path planning method (stored in the robot) regenerates a list of nodes, which the robot passes through to reach its target place. Commonly, the manufacturer provides the path plan method in real time to avoid obstacles. Meanwhile, in this work, the path plan method based on the house map is exclusive to this work.

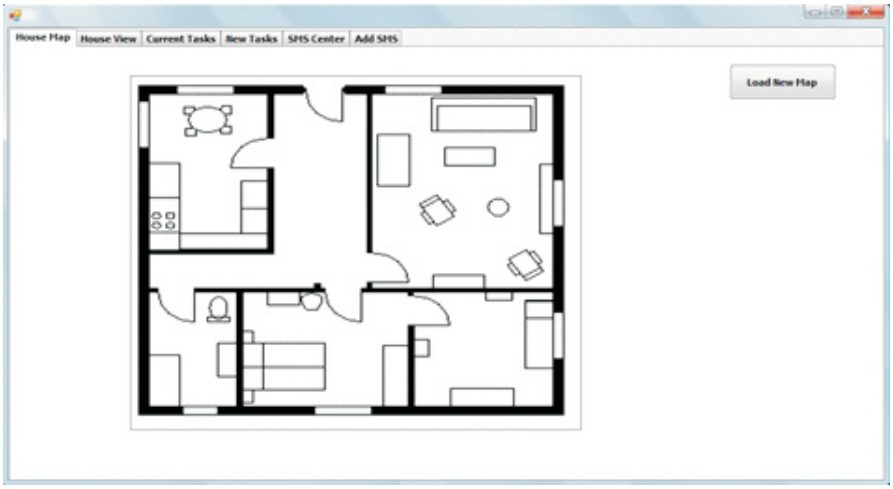


Figure 3. House Map Page

V. IMAGE PROCESSING

In this work, the robot has an image processor occupied internally in its system. As mentioned earlier. The robot recognizes moving objects that could become obstacles to the robot movement. Therefore, that means it must have an image detection processor. Moreover, these images obtained via a camera positioned in the robot head.

Besides the robot head camera, this interface supports the existence of several cameras positioned in all rooms, and in the outside door. Moreover, thanks to the existence of an image recognition processor, which supports the robot to determine moved furniture within the house immediately, and update the house map to reflect the new changes.

In addition, these cameras help the robot to monitor the house while nobody at home, so in case an emergency or unsuspected event happened, the robot takes action immediately. In addition, the user handles the images obtained from these cameras to monitor the house through the interface. In the house view page shown, the user sees four image shots for different rooms in the house. These images rotate every 30 second, so he sees a new room image each 30 second. In other words, he sees the living room, the kitchen, the baby room, and the main room in one 30 second. In another 30 second he sees the same first three rooms plus the outside door view, for example instead of the main room, and etc.

In this work, the robot has also a face detection capability, so it knows who is inside the house, and who is knocking the door. As in person added database details, the user adds new people to the robot database through our robot human interface. He puts the person's name, image, telephone number, and mobile phone number. Whenever any person existed in the people list knocks the door or rings the phone, then the robot knows visiting/calling person, and tells the user these information. Thus, the list of confirmed people to the robot displayed through our interface of the people list page in Person database list page.

Figure 4. House View Page

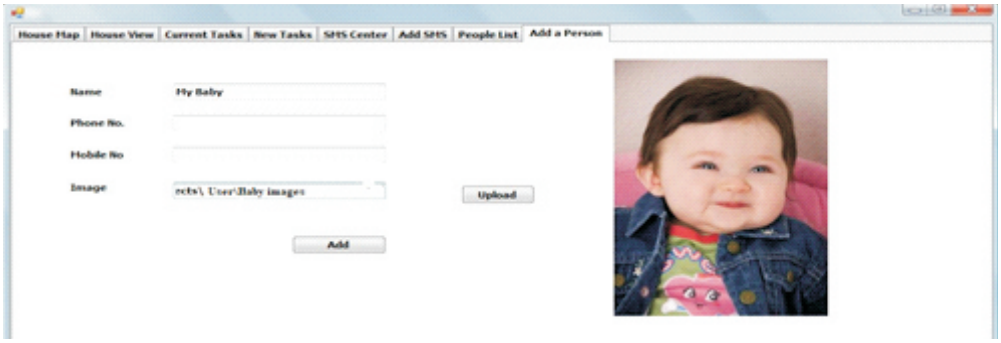


Figure 5. Add a New Person Page

VI. WIRELESS COMMUNICATION

As mentioned earlier, the robot monitors the house while the user is outdoors. The robot also has a built-in mobile, which employs the wireless communication to make the user conscious of what is going on in the house during his absence. The robot uses SMS messages to send this information to the user [4]. There are two types of SMS messages, which our robot sends: The first type is an Emergency-SMS, the robot sends them once an emergency occurs in the house like a fire. The robot has a built-in list for these kinds of emergencies, so it knows exactly what to do if one of them happened. For example, if a fire breaks out, firstly it takes the baby outside the house, then calls the emergency number, and gives them the house address, the name of the owner, and the type of the occurred emergency, which is in our case a fire.

The second type of SMS messages, which the robot sends to the user, is the Reaction-SMS, which are the messages that need user reaction. For example, if your mother visits you while you are outside, the robot sends you an SMS to ask you if the robot lets her in, or if it simply takes a message from her. The SMS body contains two parts. The first part is the information it delivers to you. As well as, the second part is a numbered reactions list, which it considers, but it needs user interaction to choose one of them. He has to replay with the reaction number to the robot, where as he does not need to write the preferred commands completely. Back to the previous example, if letting the mother get in, so the reaction has a number equal to one, then the user sends just number one to the robot, so the robot opens the door, welcome the user's mother, and additionally serves her a juice.

The robot human interface enables the user to select the Reaction-SMS he wants. Note that Emergency-SMS delivered to the user always, and the user cannot choose not to receive them, the SMS page as in SMS Database page it sets

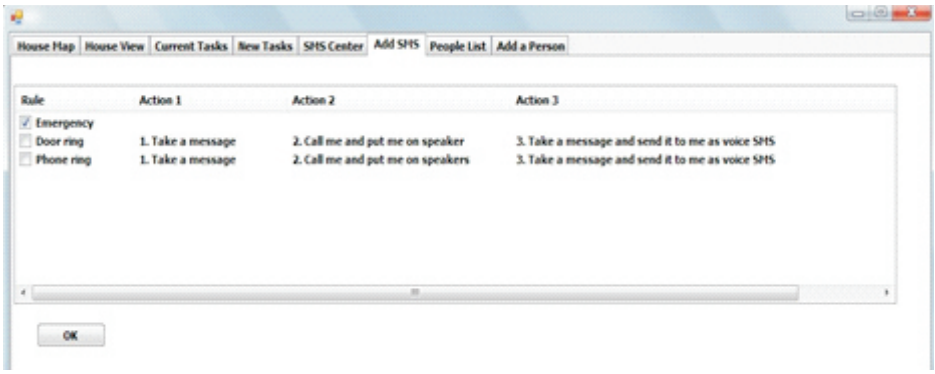


Figure 6.Add SMS Page

The robot has also a default reaction, which the user determines for it in case that the user did not answer the robot SMS. The user interface allows the user to see all SMSs being sent by the robot, and the robot reaction either they based on a user replay or on a default reaction as shown in SmsCenter page

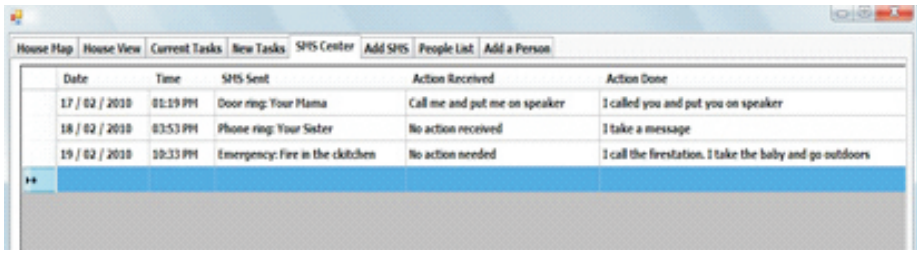


Figure 7. SMS Center page

VI. CONCLUSIONS

The discipline of robot-human interface is still needs many researchers' efforts, in order to implement easy interfaces to use by the human, and do not imply human teaching the robotics system details. This paper presents the robot- human interface for housekeeper robot. It assumes that the robot has many capabilities, which are supposed to be important for any robot to work in a human environment like a house. This interface designed in a way that enables the human to give scheduled tasks to the robot, and it implementing these tasks according to their schedule. The robot provides the resulted task implementation to the user via the interface and SMS messages. The SMS messages used in order to keep the user aware of tasks implementation in the house while the human is outdoors. The interface takes into consideration passing the feedbacks to the user, especially the interesting events for him, and he has to get their feedback. The interface design is simple and can used by any user. Also, covers almost information the robot may need from the human, like passing out the house map to it. Finally, the robot learning capabilities adapts the interface.

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Quantam Computers: Overview Applications and Future scope

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Abstract—Quantum computers is a challenging topic to read, understand and explain, this paper explains characteristics of a quantum computer in the most understandable way. Each year, transistors are getting smaller and they are getting closer to reach the size of the atom. Based on that, scientists exploited the quantum mechanics to create a new technology using particles smaller that an atom and with a faster behavior. Based on the principle of observation, superposition state and entanglement, scientists had created quantum computers. Also, it explains the problems that scientists encountered, but also the benefits and the most important applications.

Keywords—Entanglement, Gate Operations, Qubits, Quantum Computing, Quantum Circuits, Superposition.

I. INTRODUCTION

Since the year 1960, the production and improvement of computers are grown so fast, that they not only go more powerful, they get smaller at the same time. Nevertheless, humanity are reducing transistors incredible fast that now it is near the atom size, and that signify that our computers will reach soon the minimum size.

But also, humanity is demanding everyday a computer with more capacity to. But the capacity of computation, is also reaching its maximum.
In the last few years, physicist and engineers had developed quantum computers that not only enhance the capacity, but also has incredible improve the size of the futuristic PC.

Quantum theories are characterized for their complexity, but these 'disadvantages' had been exploited in order to create a small and powerful computer.

This paper throws a light on the basic concepts to understand quantum computers, that englobes the explanation of the minimum information piece, that it is the quantum bits or qubits. Also, it will be explained the principle of observation, the superposition state and also the entanglement.

After that, it will be continued with the physical implementation and the superconducting system, finally the applications, problems presented in quantum computers and a description of the quantum computers of the actual market.

II. BACKGROUND

Computer technology has been changed during the last 50 years, microprocessors become smaller and smaller and this increased the number of transistors and also the speed rate of computation.

Gordon Moore (co-founder of Intel) noticed that the number of transistors in integrated circuits doubling roughly every 18 months. This is known as Moore's Law is merely an empirical observation of a scaling regularity in transistor size and power dissipation that industry had achieved, and Gordon Moore extrapolated into the future. However, there is uncertainty in the chip industry today regarding how much longer Moore's Law can be sustained. Some of the companies are migrating to multi-core microprocessors architectures and using new semiconductor materials to sustain Moore's Law. Beyond these advances, a switch to nanotechnology may be necessary. Whatever strategy industry adopts to maintain Moore's Law it is clear that as time goes on fewer and fewer atoms will be used to implement more and more bits.

Computers are large, finite physical systems which play an important role in science today. Computers use algorithms to process information, sequentially. That is the main reason why classical computers have limitations, to do more complex calculus or simulation

will be prohibitively time-consuming, for example, factorize a large number, simulate molecular bond or search in a complicated database.

The first approach on quantum computing was carried out in 1981 by Richard Feynman, in his lecture "Simulating Physics with computers" he asked what kind of computer could simulate physics and then argued that only a quantum computer could simulate quantum physics efficiently. He focused on quantum physics rather than classical physics because nature has a quantum mechanics behavior cannot be explained using classical theory.

Around the same time, Paul Benioff demonstrated that quantum-mechanical systems could model Turing machines. In other words, he proved that quantum computation is at least as powerful as classical computation systems that could model Turing machines.

In 1985, David Deutsch, a physicist, published a paper describing the world's first universal quantum computer. He showed how such a quantum machine could reproduce any realizable physical system. What's more, it could do this by finite means and much faster than a classical computer. He was the first to set down the mathematical concepts of a quantum Turing machine, one which could model a quantum system.

III. THEORETICAL FRAMEWORK

In this point, it will be explained all the basic knowledge we should know in order to understand the present work. In the first point, it will be explained what a Qubit and the comparison with the digital bits, in the second point it will be explained the principle of observation, in the third point will be shown the superposition state and finally the entanglement state.

A. Digital bits and quantum bits

In classical information systems that we are familiar of, the most basic piece of information is the bit. The bit represents two states: a yes-no answer; or in binary numbers, a 0 or 1. But all our logic is based on bits, because physically everything is compounded with transistors, and they can only represent two states.

In quantum computation, the basic unit of information is the quantum bit, or in the short way, qubit. Qubits also represents two states that will be labeled hereinafter by 0 or 1. These states are sometimes referred as 'up' and 'down', related to the spin direction, and are denoted with the following notation:

1) $|\uparrow\rangle \equiv |0\rangle$ $|\downarrow\rangle \equiv |1\rangle$

It is also important to precise, that in the quantum theory, the notation $|\ \rangle$ represents a state, and also called ket.

But what is the difference between a classical bit and a qubit? While the classical bit can only have a state 0 or 1, the qubit is a two dimensional system and can also have both states at the same time, and chose to be one of them at the moment that is observed. From here it derives the principle of observation and the superposition state.

B. The principle of observation

According to physics, sometimes the observer plays an important role during the development of the experiment. As soon as it measured or even observed, change the result or phenomenon. There are different examples of the observer effect, not only applied in quantum, but also in other areas.

For example, in electronics when it has been implemented an analog circuit and it is necessary to measure the current or voltage, it is used as equipment to measure. But this electronic equipment contains inside an analog circuit that in certain way affects the circuit when it is measured.

Another example applies in thermodynamics, where is used a temperature instrument to measure the temperature of certain body. As soon as the thermometer impact in the environment, the proper temperature of the thermometer will affect the temperature of the system before being measured.

The same occurs in quantum, when a qubit has not being measured; its final value is not yet defined. But, as soon as the observer measured the qubit value, the qubit is set on $|0\rangle$ or $|1\rangle$.

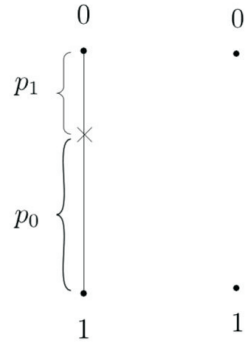

Fig 1: Qubit vs. classical bit [5]

C. The superposition state

The superposition state is the linear combination of $|0\rangle$ and $|1\rangle$, where the values can be represented mathematically as follow:

$$|\psi\rangle = \alpha \times |0\rangle + \beta \times |1\rangle$$

Which ψ, represents the state of the qubit, and α, β represents complex numbers and the probability of appearance are represented by its module.

In other words, this equation is the probability to obtain a $|0\rangle$ or $|1\rangle$ at the moment that is observed. In this case, the system is affected for the principle of observation, and the variables p1 and p2, represent the following [4]:

p1 = $|\alpha|$ 2 The probability of finding $|\psi\rangle$ in the state of $|0\rangle$ p2 = $|\beta|$ 2 : The probability of finding $|\psi\rangle$ in the state of $|1\rangle$

The Fig.1 represents the qubit and its probability, and a classical bit with values 0 or 1. [5]

D. Entanglement

The most incredible and unusual property of quantum particles is the entanglement. This means that no matter if the particles are at long distances, their properties are correlated. If a particle A is entangling with particle B, particle B will assume the same opposites properties than particle A.

V. CURRENT PROBLEMS

There are some difficulties that have been found in the processing of build Quantum computers, researchers are continuous working on improvement.

First one is that Qubits can be disturbed by noise, temperature change, electrical fluctuation or vibration and this can cause lose data. The way to stabilize qubits is to keep them very cold. Companies used helium as a coolant to the refrigeration and keep the quantum computer in a temperature above absolute zero (-273 degrees Celsius).

Moreover qubits are susceptible to changes in data, like phase error, which can incorrectly flip the superposition sign of the phase relationship and cause errors in measurement.

Another problem is with the quantum algorithms that are mainly probabilistic. One operation in a quantum computer returns many solutions where only one is the correct. This trial and error for measuring and verifying the correct answer weakens the advantage of quantum computing speed [11].

VI. APPLICATIONS

Thanks to the wide range of possibilities that quantum computers bring, they have many applications in different fields, in this part, we briefly described the mainly used and examples that are being implemented.

A. Optimization

Optimization is the process or methodology of make something effective as possible is used in many fields such as systems design, mission planning, airline scheduling, financial analysis, web search, and cancer radiotherapy.

For example, traffic jam is a daily problem in the capital cities which the amount of cars in certain hours exceed the capacity. Researchers from Volkswagen investigated the quantum computers to solve this kind of problem, they showed how to map certain parts of a real-world traffic flow optimization problem to be suitable for quantum annealing. They showed that time-critical optimization tasks, such as continuous redistribution of position data for cars in dense road networks, are suitable candidates for quantum computing [12].

B. Machine learning

Machine learning is the field that uses statistical framework to solve problems where exact algorithms are hard to develop. The huge amount of data included in the process, and the multiple potential combination of data elements make that this become a computational expensive optimization problem. Artificial intelligence, medical applications, image and speech recognitions, autonomous systems are example of field with problems that are complex to solve.

Researchers in NASA, analyzed the possibly applications on Machine Learning with Quantum computing; for example the majority of data are being collected daily is unlabeled. Photos, videos, audio recordings, medical imaging, financial and sensor data are being stored online. Labeling is a process of tagging this information, this task often requires human experts. An unsupervised Machine Learning algorithm could be the solution, it would extract the information and structure from unlabeled data [13].

C. Material simulation

Feynman's idea of simulation of quantum systems in computers is becoming real. Quantum computers

could be used to find advanced materials.

In 2018 researchers from D-Wave Systems report the prototype of quantum simulation hardware to understand better the magnetic phase's transition on a spin-glass. A 3- dimensional cubic lattice was programmed with 512 quantum spins in order to study the magnetic properties as a function of energy and intentionally induced disorder. By tuning the degree of disorder and effective transverse magnetic field, they could observe phase transitions between a paramagnetic, an anti ferromagnetic, and a spin-glass phase [14].

C. Cryptography

Cryptography is used in electronic communication system to secure passwords, financial transition, email, e- commerce. This ensured that only parties involved in the process can read encrypted message with a secret or a public key, that are commonly a password with large list of numbers.

These techniques are based on mathematical algorithms that are very difficult to break. Modern algorithm would take decades or centuries to read and intercepted public key. However, with a quantum computer, all the cryptographic secrets keys can be calculating in a short period of time and the system would be vulnerable. IT researchers analyzed the possibility of used hybrid systems and quantum algorithm to make systems encryption more secure and also incremented the numbers in secret and public keys [15].

VII. ACTUAL COMPUTERS IN THE MARKET

In March 2018, the company Google released is 72 Qubits microprocessor called Bristlecone as seen in Fig.8, this is a gated- base superconducting system that is used to provide a test bed into system error rates and scalability of our qubits technology. Google Quantum AI Lab purpose is to build quantum computers that can solve real-world problems in machine learning, optimization and simulation. They analyzed the way to implemented near-term applications using systems that are forward compatible to a large-scale universal

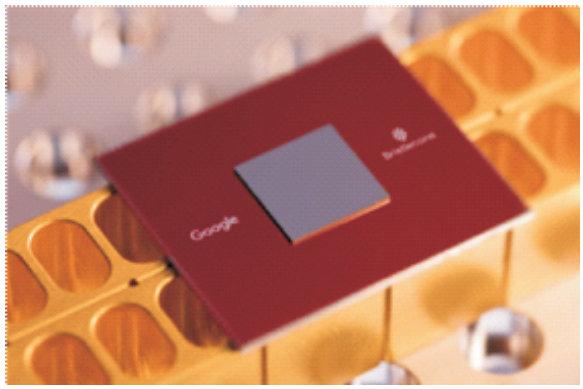

Fig. 8.Bristlecone: Google's quantum processor [16]

VIII. CONCLUSION

Theories of quantum mechanics and the development of quantum computers, seems to be, until now, understandable and complex for most of the scientists. Nevertheless, it is a technology that is solving the actual problematic: humans demands more powerful and faster machines in smaller spaces.

We summarized quantum computers as well as explaining its operations in a simple language and analogies so it could be understood without having experience in the subject. We complemented this theoretical explanation with some of the physical constructions of the actual computers, using both of the most popular quantum computers. From this extensive information it is evident that quantum computing is a growing subject that, although not fully understood, can be theoretically and practically developed in a vast number of directions.

Quantum computing is the key to solve many problems that classical computer cannot handle, for example: optimization, machine learning, data encryption and material simulation, we would be able to improve some process that now are difficult to calculate.

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