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PRESENTING THE RECENT DEVELOPMENT, FUTURE APPLICATIONS AND CHALLENGES OF IOT TECHNOLOGIES

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Abstract

The Internet of Things (IoT) brings the concept in a technologically sophisticated world into the real world. This expansion will make humans safer, more pleasant, and happier than they were previously. Because of its diverse uses, the consolidation of the web and things has an influence on economic development. IoT applications touch almost every aspect of human life, allowing the network to be accessed at any time, from anywhere, and to anything in the not-too-distant future. The implementation of this type of network presents a slew of examination issues for the exploration community. IoT sensors may use several kinds of links, for example RFID, Wi-Fi, Bluetooth, and ZigBee, as well as a variety of advances, such as GSM, GPRS, 3G, and LTE, to provide wide-area availability. Many research problems will likely arise as a result of the IoT concept's emergence from diverse technology. Because IoT has such a broad impact on almost every aspect of our life, it is a vital experiment topic for research in a variety of domains that are connected, such as data innovation and software engineering. Individuals, programming frameworks, and various devices will communicate data on the state of objects and the general climate with IoT-enabled items. The world will become smarter in every way as a result of IoT innovation, as it will provide a method for smart cities, smartt medical services, smart homes, and smart working, in addition to numerous significant applications such as smart energy, framework, transportation, squander the board, and observing.

Keywords: *Internet of Things, IoT applications, IoT challenges, future technologies, Smart Cities, Smart Environment, Smart Energy and Grid, Smart Manufacturing, Smart Healthcare.*

1. Introduction

The Internet of Things (IoT), often known as the Internet of Objects, is set to revolutionise everything, including ourselves. Schooling, correspondence, business, science, government, and humanity are all affected by the Internet. Clearly, the Internet is one of the most significant and powerful manifestations across all of humanity's experiences And today, with the notion of the “

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internet of things ", the internet is proving to be a superior method to live a reasonable life from every perspective. Another Internet-based invention is the Internet of Things. The Internet of Things allows items to see themselves and gain knowledge by settling on or enabling relevant options for how they might communicate data about themselves. These objects can access data that has been acquired by many sources or be uploaded to several administrations. Figure 1 depicts How, with the internet of things, anything will be able to communicate data to the web at any time and from any location, allowing any firm to give any type of assistance to everyone. This idea may be applied to a wide range of applications, including smart automobiles and smart homes, to provide a range of services like as alarms, security, energy saving, automation, communication, PCs, and entertainment.

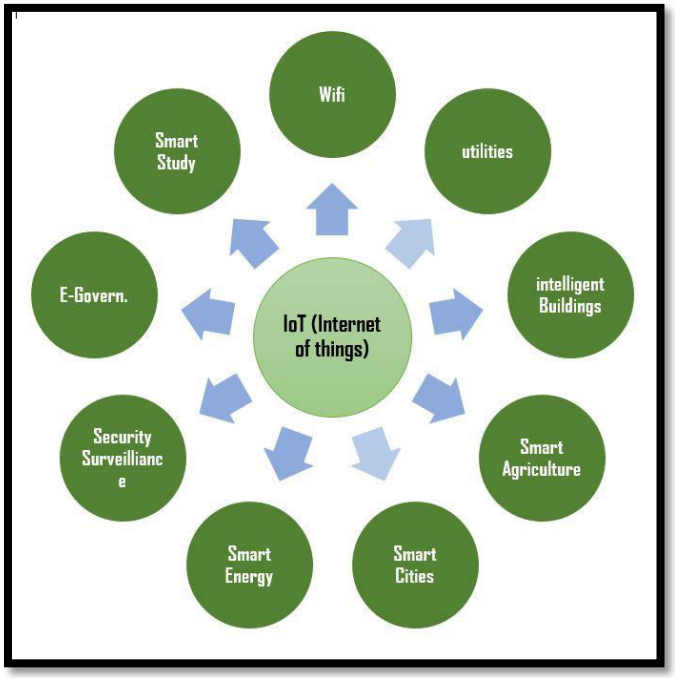

Figure: 1 IOT Concept

1.1.IOT standardization and protocols

By 2025, the internet will have electronically connected 50 to 100 billion devices. Figure 2 depicts the evolution of web-related items from 2020 to 2025 in conjecture. The Internet of Things (IoT) will be a game-changer in terms of enabling devices to communicate with one another and with a diverse set of data. Normalization, which provides interoperability, similarity,

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dependability, and appealing procedure on a global scale, is critical to the success of IoT. Today, there are more than 60 organisations aiming to drive innovation in communications and energy, collaborating with organisations such as the IETF, IEEE, and ITU to announce new IP-based breakthroughs for the Internet of Things.

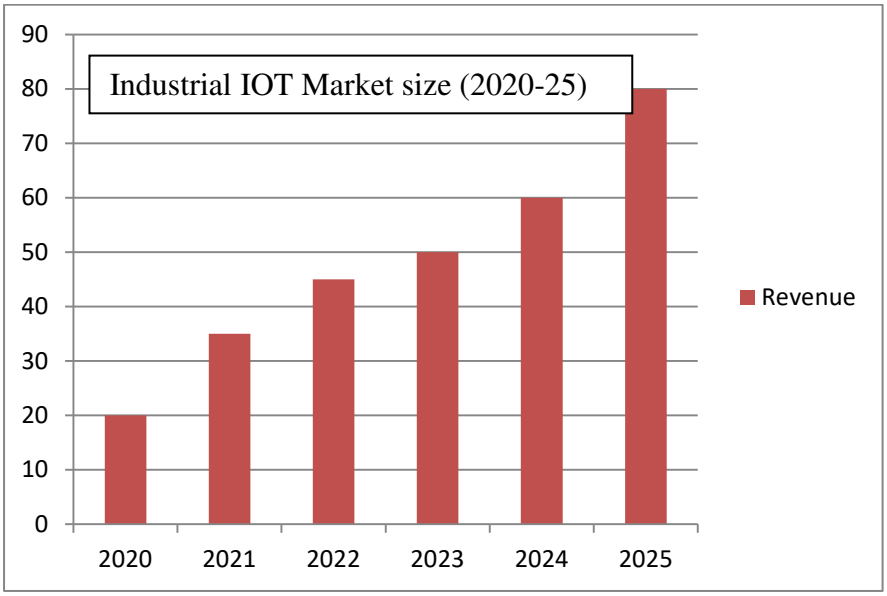

Figure: 2 Growth of IOT

1.2.Potential IoT Application Domains

The Internet of Things is expected to be used for a wide range of purposes, since it will pervade virtually every aspect of people's, businesses', and society's daily lives. IoT applications span a wide range of industries, including manufacturing, healthcare, agriculture, smart cities, security, and disaster relief, to name a few.

- **Smart Cities**

Many large metropolitan societies, such as Seoul, New York, Tokyo, Shanghai, Singapore, Amsterdam, and Dubai, have been sustained by innovative businesses. Smart urban areas may be viewed as cities of the future and vibrant living, and given the current rate of development of savvy urban communities; it will appear to be totally feasible to use IoT innovation in urban area enhancement. Smart cities demand careful planning at each level, with the support of legislators and citizens, to carry out web of things innovation in each aspect. Urban environments may be

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improved on many levels thanks to the Internet of Things, such as by expanding the framework, enhancing public transit, reducing traffic, and ensuring that citizens are safe and engaged in their surroundings. By connecting all frameworks in urban areas, such as transportation, medical services, weather forecasting, and so on, as well as assisting individuals via the web in each location to access data sets of air terminals, railroads, and transportation following predetermined conventions, urban areas will become more intelligent through the web of things.

- **Smart Environment**

Smart Environment incorporates savvy homes, smart structures, and shrewd city. smart homes outfitted with IoT framework gives us an agreeable life and all the more critically, this innovation gives the idea of proficiently using the assets. Smart homes and structures likewise help to decide the requirements of human by gathering the ongoing information. The primary object of this innovation is the sensors that won't just detect the information yet in addition speak with the apparatuses and make them proficient as far as energy assets, usage and security. For instance, Lights will be here and there as indicated by human need. AC temperature will change as indicated by necessities as well as it will turn on and off according to the circumstance. There are numerous different applications in such manner however the idea is to improve the solace level of the human inside the structure premises. Smart city is the idea of cutting edge city framework prepared imaginative administrations and consolidation of innovation inside the city. Shrewd city will actually want to use the idea of IoT to effectively uses the accessible assets and offer the types of assistance to individuals to feel more good, secure and very much aware.

- **Smart Energy and Smart Grid**

A smart grid is a data and control network designed to provide smart energy to executives. A smart grid that incorporates information and communication technologies (ICTs) into the power organisation will enable continuous, two-way communication between providers and purchasers, resulting in a more powerful connection on the energy stream, which will help with delivering power more efficiently and affordably. Detecting and observing innovations for power streams; advanced interchanges foundation to send information across the grid; smart metres with in-home showcase to illuminate energy utilisation; coordination, control, and robotization frameworks to total and deal with different information, and to create a profoundly intuitive,

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responsive power will be key components of data and interchanges advancements. The web of things can handle a variety of applications for dazzling networks, including contemporary, sun-oriented power, atomic power, autos, clinics, and power regulation in metropolitan areas. As a dazzling network standpoint, the primary application may be aided by the Internet of Things.

- **Smart Healthcare**

Most healthcare systems in many countries are inefficient, sluggish, and unavoidably prone to errors. This can easily be modified, as the medical services industry relies on a variety of exercises and devices that may be robotized and enhanced via innovation. Extra innovation that can work with numerous jobs such as report sharing to various persons and regions, record keeping, and apportioning medications would go a long way toward transforming the medical care field. The following of patients, employees, and articles, differentiating and confirming persons, and the programmed assembling and detecting of information are just a few of the benefits that IoT applications provide in the medical care field. Once the patient's stream is followed, the emergency clinic's work procedure may be greatly enhanced. Verification and identifiable proof also reduce potentially harmful occurrences for patients, record upkeep, and the number of bungling newborns. In addition, process robotization, reduction of structure handling courses of events, computerised system inspection, and clinical stock administration all require programmed information collection and transmission. Sensor devices enable patient-centered capabilities, such as detecting illnesses and gaining continuous data on patients' health indicators.

- **Smart Manufacturing**

By incorporating counterfeit insight, AI, automation of information work, and M2M communication with the assembling system, the smart factory gave another quality to the assembly upheaval. The smart plant will fundamentally alter the way goods are designed, manufactured, and delivered. Simultaneously, it will enhance professional security and protect the environment by enabling low-emission and low-occurrence manufacturing. These advancements in the way machines and other things transmit information, as well as the increasing manner in which dynamic passes from humans to specialised frameworks, imply that manufacturing will get "more astute." New advancements such as automation, mechanical

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technology, and independent versatility all provide a method for savvy assembling, but M2M communications enabled by the "modern" Internet of things will provide a full significance of smart industrial facility and savvy producing via the Big Data concept, which in this case refers to the logical potential outcomes presented by the volume and variety of data generated by an oracle.

1.3. **Challenges of the Internet of Things**

The manner in which the Internet of Things applications and scenarios shown above are really intriguing, giving improvements to shrewd each thing, however there are a few issues to the utilisation of the Internet of Things concept in cost of execution. The idea that the invention should be available for a low cost with a large number of publications. IoT is also presented with a variety of other challenges, like as:

- **Adaptability:** The Internet of Items differs from the standard Internet of PCs in that things are cooperated in an open environment. Correspondence and administration disclosure, for example, must therefore function similarly efficiently in both restricted scope and vast scope settings. The Internet of Things necessitates the development of new capabilities and tactics in order to gain a profitable activity for adaptation.
- **Information volumes:** Some Internet of things application scenarios will feature inconsistent correspondence, and get-together data's structure sensor organizations, or structure operations and large scope organizations, will gather massive amounts of data on focal network hubs or servers. The term handle this singularities is big information that necessitates several functional instruments in addition to new developments for storing, handling, and the executives.
- **Data Interpretation**: To assist clients of smart items, it is necessary to decode the not set in stone by sensors as precisely as possible. To profit from the unique information generated, administration suppliers should be able to draw a few generalizable conclusions from the decrypted sensor data.
- **Interoperability:** Each type of amazing object in the Internet of Things has distinct data, handling, and communication capabilities. Different shining goods would also be subjected to diverse conditions such as energy accessibility and interchanges transmission

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capacity requirements. Normal concepts are essential to deal with communication and participate in these articles.

- **Adaptation to non-critical failure:** Objects in the network of things are far more distinctive and portable than web PCs, and they are evolving at a startling rate. Organizing an Internet of Things in a robust and dependable manner would include overt repetition on a few levels, as well as the ability to adapt to changing situations.
- **Power supply:** Because things frequently move and are not connected to a power supply, their ingenuity should be controlled by an independent energy source. Although dormant RFID transponders do not require their own power source, their functionality and communication range are severely limited. Trusts are attached to future low power processors and exchange units for implanted frameworks that can function with significantly less energy. Energy conservation is an important factor not only in equipment and framework design, but also in programming, for example, the execution of convention stacks, where each transmission byte must justify its presence.

1.4. IOT and related future Technologies

Many new technologies are linked with IoT to display the combination of wired as well as remote control, communication, and IT innovations that are accountable for connecting a few subsystems and objects that perform beneath a brought together stage regulated and monitored wisely.

- **Protection and Security:** Because IoT has become a critical component in terms of the future fate of the web with its growing use, it necessitates a need to adequately handle security and trust capacities. Scientists are aware of the flaws that inevitably exist in many IoT devices. Furthermore, because the foundation of IoT is built on present wireless sensor networks (WSN), IoT along these lines fundamentally develops something comparable to WSN protection and security challenges. Various attacks and flaws on IoT frameworks reveal that there is unquestionably a requirement for extensive security plans that will protect information and frameworks from one end to the other. Many assaults, for the the part, take advantage of flaws in specified devices, gaining access to their frameworks and rendering safe gadgets vulnerable.

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- **Observing and Sensing:** Even though innovations concerned with checking and detecting have made enormous progress, they are always improving, particularly with regard to energy effectiveness and structure angle. Sensors and labels are often anticipated to be dynamic constantly in order to obtain immediate information; this perspective is critical for energy productivity, particularly in lifespan expansion. Simultaneously, breakthroughs in nanotechnology/biotechnology and scaling down have enabled the advancement of nanoscale actuators and sensors.
- **Cloud Computing**: The two worlds of Cloud and IoT have advanced rapidly and autonomously. These worlds are completely diverse from one another, but their characteristics are frequently integral in general, in which IoT may profit from the almost endless capabilities and assets of the cloud to remunerate its novel needs such as capacity, handling, and correspondence. Cloud computing can provide a feasible solution for IoT administration the board and structure, as well as for carrying out applications and administrations that exploit the objects or information generated by them. On the other hand, the cloud may benefit from IoT by increasing its capacity to handle real objects in a more suitable and dynamic manner, as well as by delivering new administrations in a wide range of genuine scenarios. In general, the cloud can provide a transitory layer between things and apps, masking all the complexities and features required to carry out the last choice.

2. Review of Literature

Several important IoT initiatives have taken control of the industry in the last few of years. Several prominent IoT initiatives that have captured the great majority of the market. a worldwide dissemination of these IoT projects is displayed among American, European and Asia/Pacifc district. It has been observed that the American mainland contributes more to medical services and dazzling production network initiatives, whilst the European mainland contributes more to smart city projects.

Khajenasiri et al.(2017) performed a review of IoT solutions for smart energy control to benefit smart city applications They stated that IoT is now being deployed in a limited number of application areas to support innovation and people. They extent of IoT is extremely wide and in

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not so distant future IoT can catch practically all application regions. They referenced that energy saving is one of the significant piece of the general public and IoT can help with fostering a smart energy control framework that will set aside both energy and cash. They portrayed an IoT engineering regarding smart city idea.

Heer et al. (2011) created a security flaw in an IP-based IoT framework They stated that the web serves as the foundation for communication between devices in an IoT architecture. As a result, security vulnerabilities in IP-based IoT frameworks are a major concern. Furthermore, security engineering should be developed with the life cycle and capabilities of each item in the IoT framework in mind. It also includes the association of the trusted outsider and the security norms. They security engineering with scalability capability to serve the small scale to large scale items in IoT is really appealing.

Liu et al. (2012) a response was raised for handle validation and access control Affirmation is required to truly look at the giving social situations in order to avoid a shortage of secret knowledge. He presented a validation plot based on the Elliptic Curve Cryptosystem and tested it for several security threats such as snooping, man-in-the-middle attack, key control, and replay attack. They verified that their planned strategies would provide improved permission and access control in IoT-based correspondence. They emphasise that IoT has inspired a better approach for communication among a few items throughout the organisation, and so conventional starting to end web shows are not prepared to give the support that is expected should this correspondence.

Li et al. (2019) advocated a powerful cloud-stage strategy for data-driven IoT applications The requirement for a suitable device, programming design, and establishment necessitates expert replies for a large proportion of IoT applications that function on cloud stages. IoT designers and experts are successfully working on plans that take into account both the massive stages and the heterogeneous nature of IoT things and contraptions**.**

Olivier et al. (2015) stated programming described putting together (SDN)-based design that functions effectively in the absence of a specific plan They proposed that SDN-based security architecture be used for IoT security since it is more versatile and effective.

3. Research Methodology

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By tending to all the above raised general difficulties towards an effective and reasonable execution of IoT innovations, it is obvious that more extreme examination endeavors are expected to prompt further headways in this unique exploration point, with a solid application potential. A cooperative energy of various exploration endeavors in the field, chiefly centered on the designated effective region is required. The fundamental commitment and curiosity of this survey publication is in accordance with that. Further fundamental effective regions are tended to in the in this survey early on article;

- IoT advances in economical energy and ecological issues,
- Smart City driven by IoT.
- E-wellbeing - Ambient-assisted living frameworks
- Transportation and Low-Carbon Product IoT Innovations

4. Data Analysis and Results

Considering above discusses about recent research further fundamental discoveries could be featured:

- The investigations examined beforehand show how the equipment and programming advances empowering the Internet of Things are prompting a computerized change process that focuses on a canny and progressed administration of the whole strategies and transportation framework.
- The really logical difficulties in this field mean to involve sensors to screen the situation with the products moved, to guarantee discernibility or more all to securely and dependably gather telemetry information and deal them to Artificial Intelligence modules for cutting edge handling.
- Moreover, as of late the interest has zeroed in on the up and coming age of blockchain frameworks (the purported blockchain 3.0) which means to apply the advantages of the exemplary blockchain in regular situations of the Internet of Things, for example, strategic and transportations.

5. Conclusion

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The internet of things is another technology that has multiple applications to connect things to things and humans to things via the web. Every thing on the world may be identified and linked to one another using web-based decision-making. All organisations and communication improvements are being used to construct the concept of the internet of things. Portable registration, RFID, remote sensor organisations, and inserted frameworks are examples of such advances, as are various computations and ways to obtain the board procedures, storing information, and security difficulties. IoT necessitates a standardised strategy for structures, distinct proof plans, conventions, and frequencies will occur matches, each aimed at a specific and defined application. Many clever applications emerge in our lives as a result of the internet of things, enabling us to reach and communicate with everything while also providing numerous important perspectives for human existence, for example, smart medical services, smart homes, smart energy, smart urban communities, and smart conditions. The internet of thing may face two big challenges in ensuring consistent organisation access; the first issue is related to the way many companies operate together now, and the second issue is related to the vast information size of the IoT. Other recent issues, for example, address limitation, programmed address arrangement, security capacities like verification and encryption, and capacities to convey voice and video flags proficiently will presumably be impacted in carrying out the concept of the web of things, however these difficulties will be overcome by progressing in innovative advancements. When connected to the cloud, hazy and diffused registration, massive information, and security challenges, the internet of thing ensures future new advancements. More clever applications will be generated as soon as this plethora of concerns is coordinated with the network of things. This study analysed the most major uses of IoT with a special focus on what is generally done despite the problems that confront the implementation of the Internet of things notion, and the other potential advancements that make the idea of IoT conceivable.

6. References

1. M. A. Ezechina, K. K. Okwara, C. A. U. Ugboaja. The Internet of Things (Iot): A Scalable Approach to Connecting Everything. The International Journal of Engineering and Science 4(1) (2015) 09-12.

2. Saranya C. M., Nitha K. P., Analysis of Security methods in Internet of Things. International Journal on Recent and Innovation Trends in Computing and Communication, Volume 3, Issue 4; April 2015.
3. Sapandeep Kaur, Ikvinderpal Singh. A Survey Report on Internet of Things Applications. International Journal of Computer Science Trends and Technology Volume 4, Issue 2, Mar - Apr 2016.
4. S. Misra et al., Security Challenges and Approaches in Internet of Things. Springer Briefs in Electrical and Computer Engineering, 2016.
5. Suwimon Vongsingthong and Sucha Smanchat. A Review of Data Management in Internet of Things. KKU Res. J. 2015.
6. M. H. Miraz and M. Ali, "Applications of Blockchain Technology beyond Cryptocurrency", Annals of Emerging Technologies in Computing (AETiC), vol. 2, no. 1, pp. 1–6, 2018, DOI: 10.33166/AETiC.2018.01.001.
7. Miraz, M.H., "Blockchain of Things (BCoT): The Fusion of Blockchain and IoT Technologies", Advanced Applications of Blockchain Technology, Studies in Big Data 60, 2019, DOI: 10.1007/978-981-13- 8775-3_7, https://doi.org/10.1007/978-981-13-8775-3_7.
8. J. Cooper and A. James, "Challenges for database management in the internet of things"IETE Technical Review,vol.26,no.5,pp.320–329,2009.
9. D. B. Ansari, A.-U. Rehman, and R. Ali, "Internet of Things (IoT) Proto- cols: A Brief Exploration of MQTT and CoAP," International Journal of Computer Applications, vol. 179, pp. 9–14, 03 2018.
10. S. Rajguru, S. Kinhekar, and S. Pati, "Analysis of internet of things in a smart environment," International Journal of Enhanced Research in Management and Computer Applications,vol. 4, no. 4, pp. 40–43, 2015.