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A CRITICAL REVIEW OF INTERNET OF THINGS

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ABSTRACT
One of today's most important technologies in the world is the Internet of Things (IoT). It is a technology that is important in many fields and is rapidly advancing. The current study has critically evaluated IoT from the dawn of technology to the present. According to the study's conclusions, the IoT has several uses in a range of industries, including the development of urban communities, the coordination of required frameworks and resources, flexibility, transportation, and collaborations. This technique operates by using a variety of sensors. IoT is expanding daily as a result of the creation of numerous sensors that can detect a variety of climatic conditions. IoT development has shown that more organised data is being evaluated, protected, and transferred in a number of situations.

Keywords: Internet of Things (IoT), Sensors, Smart Systems, Communication.

INTRODUCTION

One of the most important technologies being used now is the IoT. It is an important technology that is fast advancing in many different industries. From the dawn of technology to the present, IoT has been rigorously investigated in the current study. The study's conclusions indicates that the IoT has a wide range of applications in a number of industries, including the development of urban communities, the coordination of necessary frameworks and resources, adaptability, transportation, and collaborations. This technology works by using various sensors. The development of numerous sensors for sensing diverse situations has led to the daily expansion of the IoT. Its advancements have shown that more organised data is being processed, protected, and shared in a variety of contexts. Since the 1990s, computer engineers have been integrating sensors and processors into everyday objects to make them smarter. The development of things becoming sentient was sluggish because the original chips were big in size. Ultimately, expensive gear was tracked by cheap power computer chips known as RFID. The cost of goods has greatly lowered as a result of the reduction in size of computing systems and the corresponding increase in speed and intelligence of chips over time. This innovation makes it possible to connect MCUs with even less Memory than 1MB to Alexa's speech services. An entire industry, including our homes, businesses, and offices, has become intelligent thanks to IoT gadgets. These IoT-based smart devices have the ability to send and receive data on their own. The collective of all these intangible computing devices and related technology is known as the "Internet of Things." **(Potu et al., 2016).**

Many studies present different viewpoints on the potential applications of the IoT in various industries. Nonetheless, it depends on them how a person uses these ideas for career progression tactics. One of the better ideas for automating various areas is the IoT. Other fields must work with IoT in order to apply this concept to improve many aspects of life. Several academics have used IoT in a range of domains, including smart cities. A few important studies that were undertaken in this field have been assessed.

REVIEW OF LITERATURE

Menon et al. (2013) worked on integrating IoT into Singapore's bus transportation system. The goal of this study was to assess if integrating the Internet of Things into Singapore's transportation system would be practically possible. Although Singapore is recognised for its forward-thinking initiatives, it was found that the development's application to transportation still has potential for growth. Customers must be able to grasp and evaluate specific transportation alternatives persuasively, and here is where IoT architecture might be useful.

Qiang et al. (2013) studied the applications of the IoT and related security issues. They found that there are many uses for IoT security as well as many problems that need to be fixed, including security for RFID labels, remote connections, organised transmissions, security insurance, and security for data preparation. The analysis of the ebb and flow of system security innovation served as the foundation for this study. By examining and minimizing IoT security in various ways, it also provides a distinctive manner of contact with experts in certain IoT applications and designs.

Bhide (2014) supplied very accurate condition monitoring using a variety of sensors, which allowed researchers to examine critical data and improve how comfortable homes are by reducing energy use. As a result, he used estimation to identify and address any issues with the devices. To do this, he is utilizing information mining and the Naive Bayes Classifier. Along with alerting the owner, it will also send an email or SMS to the required management specialist. The cutting-edge home IoT systems are greatly benefited by this.

Kaur & Singh (2014) conducted research on IoT applications. The Internet of Things is still playing a crucial role in the development of information and communication technology and societal change. The most pertinent instances include improvements in correspondence standards, information transfer for sharp items, wired and remote sensor and actuator systems, and differentiating evidence and following advances. Any serious commitment to the growth of the Internet of Things should, as one can easily envision, come primarily from synergistic learning exercises carried out in a range of academic topics, including media communications, informatics, hardware, and sociology. This study is designed for those who must approach this puzzling control and help it improve in such a hazy situation.

Shahet al. (2015) worked on enhancing the traffic monitoring system of the Indian road system in terms of density and flow regulation. Due to the number and size of vehicles, mobility management continues to be a challenge. The current framework for activity regulation functions within the framework of a planned component, which includes a similar timetable. Every intersection is capable of handling a gap. Due to the irregular influx of automobiles, this is wasteful. The need for a framework with flexibility arises as a result. According to the qualifications for each course, courses should have the option of receiving additional scheduling openings. They suggested a flexible architecture for preventing traffic

jams that would allow each course to have a planned opening depending on the intensity of activity.

Lee& Chong (2015) performed a study to understand the relationship between seeming entomb animation and the impact of ads, a dual-factor model was developed to describe the future adoption of smart internet of things services and its ramifications. For this purpose, a commercial that shows IoT breakthroughs is used. Individuals who are the objects of this investigation are given an introduction to the Internet of Things and its related business advances. After viewing an IoT advancements connected ad, a review is then conducted. They contrast the clients who have lower seen entomb liveliness with the clients who have higher seen intuition and close the clients who have higher seen intuition display the positive notice states of mind.

Das &Tuna (2015) studied that, during the course of developing machine-to-machine communications for smart homes, it was found that machine-to-machine advancements can be categorized as those that permit both wired and remote frameworks to connect with other devices of the same capability. Its versatility in monitoring and controlling applications, M2M has a few advantages for business and industry. M2M advances and PDAs are anticipated to become particularly indispensable elements in contemporary residences. Similar to that, this question provides an illustration of the application of M2M technology. The sophisticated aeration and cooling system in the presented application adjusts automatically based on temperature information provided by sensors. M2M has the potential to have an impact in all fields, enhancing our daily lives, even though the demonstrated application is only a basic illustration of its use.

Nandyala & Kim (2016) worked on engineering for IoT-based u-medicinal services, and real-time u-healthcare monitoring for smart homes and hospitals has been worked on watching under the direction and advantageous circumstances of the Cloud to Fog (C2F) registration system, which communicates more by supplying closer to the edge (end focuses) at smart homes and hospitals.

Kaur (2016) developed a presentation on IoT security and privacy difficulties as well as an architectural diagram and application zone diagram. IoT can be seen as a seven-layered structure. Four categories—Business Value, Big Data, Cloud Computing, and Fog Computing—can be made up of the layers.

Guptaet al. (2016) worked to gather money for the Global Water Development (UN) research that projects a significant water deficit for half the population and discussed the necessity for intelligent water infrastructure in India. Developing nations in Asia and Africa, such as Cambodia, Bangladesh, China, and India, will probably experience worsening water shortages. By 2050, it was projected that 70% of the population in India will have left the cities. Due to variables like diminishing water supplies, insufficient precipitation, and other issues, it is difficult to maintain and supply resources like water and power to such a big population. Sensors based on information and communication technology (ICT) can be used to keep an eye on and set aside water resources for future usage. Sensors provide continuous pressure-driven information checking with automated control and disrupting if an occurrence of events, such as water spillages and so on, should occur. Examining facts will assist in carrying out important actions. Intelligent water management reduces non-sustainable water losses and reduces water use in the horticultural industry.

Deshpande & Deshpande (2017) focused on monitoring and managing industrial environmental parameters using IoT and suggested the idea that industry has to safeguard all relevant data, insights, and information related to various current procedures, engines, machines, and devices used in industry premises. This is true for restricted access, increased effectiveness, and excellent outcomes from the manufacture of mechanical products. This calls for the checking and regulation of modern natural parameters. Innovation is growing swiftly thanks to IoT. The Internet of Things is a network of actual physical objects or physical objects that have been integrated with organisational structures, technology, software, and sensors. This network enables these objects to gather and exchange data. In this article, a structure that will screen and manage cutting-edge parameters is being developed using the IoT concept of remote devices, Android, and sensors. It is the best and generally priceless. It has thus proven to have fantastic societal prospects.

Ghute et al. (2017) they developed a smart garbage monitoring and air pollution control system based on the IoT, and they called it an incredibly creative framework that will keep cities clean. This technology looks at the garbage cans and gives website visitors information on how much rubbish has gathered inside them. The device accomplishes this by identifying the rubbish level and comparing it to the depth of the waste canisters using ultrasonic sensors positioned over the containers. This device utilises gas sensors to identify harmful gases that are readily apparent all around. However, a webpage is created to show the status to the customer checking it. The site page lists the quantity of damaging gases present and illustrates the amount of garbage amassed. The trash level and level of harmful gases are displayed on the LCD panel. The framework triggers the notification when the level of rubbish accumulated reaches its maximum. Hence, by giving data on the trash levels of the containers and a graphical representation of the containers using a website page, this system keeps the city clean.

Debauche et al. (2018) developed a web-based Internet of Things bee health monitoring for academics and beekeepers. They proposed whole new data storage architecture designed from the ground up for scientific inquiry. Photos, movies, punctual data, time series data, etc. may all be ingested at high frequency using the lambda architecture. One of this architecture's important new features is the capacity to normalise, share, and exchange data among research teams. A broad range of data from multiple sources can also be transported at a reasonably low cost because to the expanding availability of IoT protocols. The adoption of strong, interference-resistant protocols enables the deployment of monitoring systems in a variety of challenging contexts, including urban areas, particularly in urban beekeeping.

Alexopoulos et al. (2018) worked on the architecture and creation of a framework for industrial IoT to realize services in systems for industrial product service. The architecture provided by this framework makes it possible to build an Internet of Things framework for providing services across numerous industries. A thorough prototype that successfully shows data collection, analysis, and reporting was produced. It also provides a variety of services to accommodate the demands of various roles. The key benefits of this strategy are the systematic information gathering, compilation, analysis, and streamlining of user information. Several graphs and figures are used to present the output to the users. Additionally, this framework may be used in a variety of settings and gives users extended usage.

Mourtzis et al. (2019) noted the ability of IoT to transform industries into far more

sophisticated systems with CPS, sensors, machines, and actuators that can connect and exchange data among them to produce a flexible and aware system in their study. Through research on mapping vulnerabilities in the industrial internet of things landscape was discovered. Yet, an increase in wireless connectivity enhances the ability of data to pass from controlling actuators to machines. The expanded IoT ecosystem also provides opportunities for network misuse, which raises a number of security concerns. In that paper, flaws in the IoT landscape were found, and potential impacts on an industry's machine and human resources were assessed. Due to the fact that the shop floor's equipment is frequently made with a focus on cost rather than security, this framework was used to highlight the need for cyber security at every layer before providing a service to users.

Bouras et al. (2019) performed a research and the results of research on the Internet of Things is the synergy of communication, processing, and caching for smart sensing, indicate that IoT applications are growing and a sizable number of devices are regularly being added to IoT enabled networks. To address the sensing problems, caching must be used in conjunction with computation and communication. Further, issues relating to IoT sensing need to be resolved in order to achieve potential benefits and advance sensing for a smart world in the future. In this study, the authors described how connectivity, processing, and caching come together for IoT smart sensing. Further requirements that must be fulfilled in order to achieve IoT-related smart systems were also stated. The authors both emphasised how CCC and smart sensing intersect. It is necessary for a number of upcoming IoT technologies, such as edge computing, cloud, fog, and 5G networks.

Allah et al. (2020) claimed in their study that the IoT can be used to monitor water quality parameters, they are developing a real-time IoT-based water quality management system to lower or eliminate the cost of water quality tests outside of a lab. IoT can be used to maintain parameters relating to water quality. These characteristics are cleverly maintained using IoT and checked at the input.

Zhu et al. (2020) conducted research on an IoT-based intelligent classroom management system for schools. In this study, they created a method for managing smart classrooms in schools that uses little electricity, is inexpensive, simple to use, and is likely to be well-liked. The storage model based on MySQL and NoSQL has been found to match the ideal system requirements. MySQL is simple to use and satisfies the needs of tiny data volume information. For the vast amounts of data the IoT generates, H-Base offers reliable storage and quick data. The user can swiftly read data while taking readings while using that system.

Aslam & Curry (2021) conducted a survey on the approaches, challenges, and potential directions of object identification for the internet of multimedia things using deep learning and event-based middleware (IOMT). While using IoT's service-oriented architecture (SOA) for the processing of multimedia events, authors looked at the characteristics and challenges of IOMT. They investigated event-based middleware alternatives and their suitability for the IOMT, concluding that middleware is essential for the delivery of general-purpose services and the resolving of heterogeneity among planned events. They also showed how the current multi-media event processing approaches have a limited user interface and are not adaptable. The authors used object detection to show the difficulties in using neural network-based algorithms to interpret multimedia events.

Tariqa et al. (2021) conducted a thorough analysis of the security requirements and problems for smart IoT applications, it was found that the research and industry have focused on a number of security weaknesses, including device vulnerabilities and attain transit connected to IoT devices. Smart IoT applications have a number of security concerns as a result of its limitations, which must be taken into account while developing security solutions. The authors also discussed significant security challenges relating to IoT applications in smart cities, smart agriculture, and smart healthcare.

Hamdy et al. (2022) provided a plan for using Node-RED to incorporate IoT in Warehouse 4.0. The deployment of the IoT approach for controlling warehouses has been suggested in this study utilising a system using Node-RED and MongoDB. The study paper explains how IoT deployment in a warehouse can help operations and avoid problems with existing management systems. A dataset has been used to show the enormous impact that IoT has on operations warehouse, especially on forecasting accuracy. By enabling real-time sight of everything in the warehouse, this system assists in boosting speed and efficiency, lowering labour requirements, and minimising counterfeiting and inventory shortages. This study provided warehouses with a useful road map for using IoT to improve their operations.

Long (2022) performed a study on the monitoring of power equipment status information and showed that the IoT technology has significantly improved the level of online monitoring of the power grid. Online monitoring via IoT is more intelligent, real-time, and unconstrained than traditional monitoring techniques, and its analysis of power equipment is also more automated and intelligent. As a result, monitoring may be more effective and reliable. By data processing and communication, numerous sensors collaborate to build the network layer and perception layer.

Qays et al. (2023) worked on review of key communication technologies, their applications, various protocols and different future guides for IoT based smart grid systems and concluded that Future smart grids will be able to address the problems associated with conventional one-directional information and power flow networks, such as the ongoing rise in energy consumption and device interoperability. The Internet of Things (IoT) technology supports the smart grid by providing cutting-edge IoT devices for system monitoring, analysis, and control. This is a reference to the smart grid system that uses the Internet of Things to support and grow a number of network utilities in the power industry. This study presents a detailed state-of-the-art overview of IoT- enabled SG systems, along with a number of difficulties that need to be resolved through in-depth research and development.

CONCLUSION

The IoT is a rapidly evolving technology with potential applications in a range of industries, according to literature research. It is supported by sensors, which come in a variety of varieties and are capable of sensing a wide range of ambient, natural, and artificial factors. Many researchers employed sensors-based IoT technology to monitor a variety of variables that may be used to monitor a variety of qualities. In addition to using technology, data analysts are necessary to assess the information provided in order to address any problems and make adjustments. Public use of IoT-based systems is widespread in smart cities. The literature study indicates that a number of researchers have used three or four sensors to

monitor the climate or weather. Therefore, it is crucial and required to upgrade the system by including more sensors.

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