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A Study on Internet of things (IoT) Based Applications for Health Care

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ABSTRACT: ***The Internet of Things enables smart objects, which are the building blocks of cyber-physical smart pervasive frameworks. The healthcare industry is one of the places in which the Internet of Things (IoT) is successful. The Internet of Things revolution is reshaping contemporary healthcare in ways that hold great potential in terms of technology, economy, and society. The medical profession is one of the most active areas of research. This study provides a summary of key aspects of IoT in healthcare. Some of the most important IoT healthcare services and the benefits they provide to communities at large are discussed, and projects are described from across the world. . This study analyses the development of the Internet of Healthcare Things (IoHT) application in terms of providing technology, health services, and algorithms for addressing various healthcare issues. Possible stumbling blocks and worries in the IoHT infrastructure are discussed as well. In conclusion, the current research provides a comprehensive resource on the different sectors of application of IoT to help future academics who are interested in working in and making improvements to the field get an understanding of the problem.***

KEYWORDS: ***Devices, Internet of things (IoT), Internet of Healthcare Things (IoHT), Sensors.***

1. INTRODUCTION

In technology, the phrase "Internet of Things" (IoT) refers to the interconnection of devices, data, people, places, services, and networks. The Internet of Things (IoT) is a massive phenomenon in emerging technologies that could have far-reaching effects across all sectors of industry. It might be characterized as the extended benefits of individually recognized smart objects and gadgets being connected inside the current internet architecture. One of the benefits is often the increasing connectivity of multiple components, applications, and devices beyond the machine-to-machine (M2M) situation [1]. As a result, almost every industry may benefit from the use of automation. Smart cities, road congestion, wastewater treatment, structural health, safety, emergency responders, transportation, retail stores, factory automation, and healthcare are just some of the many areas where the IoT has shown to be an effective solution [2].

In recent times, the healthcare business has exhibited remarkable expansion and has been a primary factor in income and jobs. Only after undergoing a thorough physical examination at the hospital could illnesses and abnormalities in the human body be diagnosed only a few short years ago. Most of the patients had to remain in the clinic during their treatment term. This led to higher healthcare expenditure and also stressed the healthcare facilities in rural and distant places [3]. Only after undergoing a thorough physical examination at the hospital could illnesses and abnormalities in the human body be diagnosed only a few short years ago. As a result of their medical conditions, the vast majority of patients had to spend their entire treatment time in the hospital. The healthcare budget ballooned as a consequence, and the healthcare infrastructure in outlying areas was put

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under severe stress. Technology advancements have made it possible to employ small devices like smartwatches for health monitoring and disease diagnosis. In addition, medical attention has transferred from hospitals to individuals as a result of technological developments [4].

Given the growing number of people suffering from health issues, telemedicine has become an increasingly important aspect of our everyday lives. Wearable sensors have become more popular in recent years, and cheap solutions for checking one's health and ordinary routines are now widely available. Medical data collection, management, and continuous patient health monitoring are all areas where experts contemplated using such cutting-edge technology. The Internet of Things is a rapidly developing technology that might significantly improve healthcare in the future [5]. It guarantees that patients have access to low-cost, durable, and practical devices that could be embedded in their bodies or carried on their person, facilitating interactions between patients, medical devices, and clinicians. Continuously, sensors would collect signals, which will be connected with essential physiological features and transmitted over wireless networks. This data is incorporated into current medical records for preservation, storage, and evaluation.

2. DISCUSSION

The IoT system relies heavily on data storage and accessibility as a result of the copious amounts of data collected from several sources (software, applications, sensors, mobile phones, and e-mail). Information collected by the aforementioned sensors is shared with medical professionals, caretakers, and other authorized individuals. By uploading them to a central computer, doctors can quickly analyze them and treat patients if required. For reliable and safe data transfer, users, patients, and the communication module all must work together. Most Internet of Things (IoT) systems includes some kind of user interface (UI) that serves as a monitor for healthcare providers and allows for the management of many functions, such as visualization techniques, user control, and anxiety. There are several articles detailing the growth of the IoT system in monitoring patients, administration, security, and privacy [6].

2.1.IoT Healthcare Architecture (IoHT):

The advantages of the Internet of Things (IoT) and cloud computing are easier to incorporate into medical practice thanks to the IoT framework utilized for healthcare operations. It also details how to connect numerous sensors and medical devices to a central database for patient records. An IoHT topology is the arrangement of interconnected nodes inside a healthcare-related IoT network. Each part of the IoT network and clouds in the healthcare system plays a specific function and is brought together to form a hybrid grid by the IoHT. Since IoHT architecture differs according to healthcare needs and applications, it's hard to provide a standard foundation for it. Several structural changes have already been done for an IoHT system. It is crucial to make a thorough list of all key activities while developing a new IoT-based health service for continuous monitoring of patients. The effectiveness of the IoT system in healthcare will depend on how happy doctors and nurses are with it. Since the standards used during diagnostic purposes are specific to each ailment, they must be reflected in the network's architecture.

2.2.Technologies for Health care (IoHT):

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Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 6, June 2022

It would be impossible to overestimate the value of the innovations used in the development of an IoHT system. This is because certain technologies may improve an IoT system's performance. Therefore, different state-of-the-art technologies have been implemented to connect several healthcare apps to an IoT infrastructure. The identity technology, the communications technologies, and also the location innovation shown in Figure 1 may be grouped to form the three main categories that can be used to classify these techniques [5].

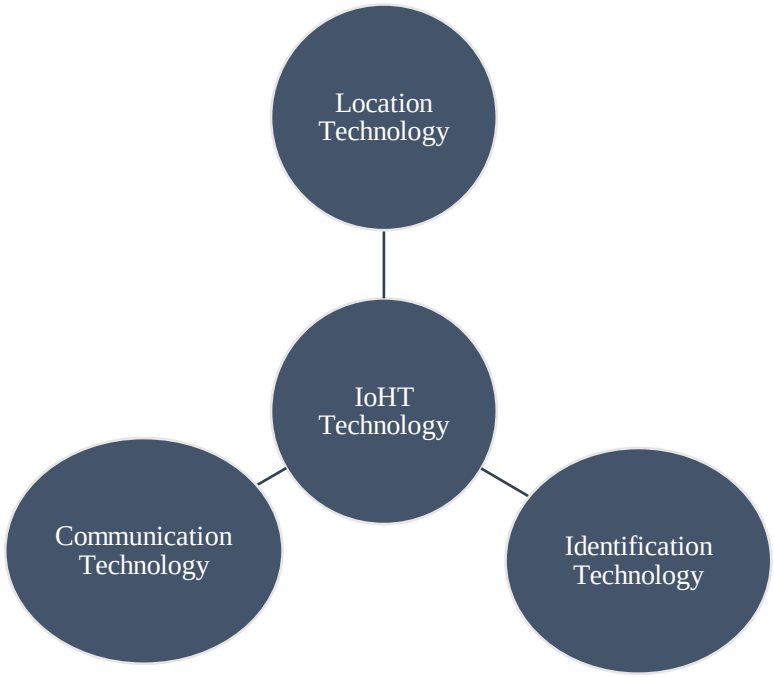

Figure 1: Displays The Technology In The Internet Of Things Categorized.

2.2.1. "Identification Technology":

One important consideration while building an IoHT system is the ease with which clinicians can get patient information from the authorized node (sensor), which may be placed in a remote location. As the first step in this direction, determining the healthcare channel's nodes and sensors is essential. The process of identification involves the allocation of a unique identifier (UID) to every legitimate entity, allowing for unambiguous recognition and information exchange. In the modern healthcare system, a unique identifier (UID) is assigned to every component of the system [7]. In a healthcare network, the actuators and sensors are detected and then handled independently, which contributes to the system's correct operation. To keep up with the rapid pace of innovation in IoT-based technologies, a component's unique identifier may evolve during an IoT system's lifetime. To keep the healthcare equipment/system secure, the device must include a method for upgrading this data. That's because misdiagnosis is possible, and the process for continuously monitoring components can be altered, whenever there's a configuration modification. Additionally, the introduction of IoT in healthcare requires the creation of new technologies that can (1) recognize things based on a global identification number, (2) safely handle the individuality of the components utilizing numerous verification and encrypted

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communication methodologies, as well as (3) effectively explore IoT services under UUID system by searching a worldwide system.

2.2.2. "Communication Technology":

Many different kinds of communication systems work together to provide connections in an IoHT network. These instruments may be categorized as either short-range or medium-range communications technologies. The methods used to build up a body area network (BAN) are examples of short-range communications technology, whereas medium-range communication technologies often facilitate communication over greater distances, like those between an access point and also the central node of a BAN. When conversing at close range, the range between both the sender and receiver might vary from a few millimeters to several meters. Many Internet of Things uses cases prefer short-range communication solutions. The most widely used wireless communication and transmitting data technologies today are RFID, Wi-Fi, Zigbee, Bluetooth, and others [8].

2.2.3. "Location Technology":

A real-time location system (RTLS) or similar location technologies could be employed to detect and monitor the movement of objects throughout a healthcare network. Furthermore, it keeps tabs on the therapeutic process following the resources available. One of the most well-liked modern inventions is the Global Positioning System (GPS). It employs satellites for spying purposes. To pinpoint the location of an object utilizing GPS technology, there must be a clear line of sight between it and four satellites in orbit. It may be used to track the location of an ambulance, doctor's office, nurse's station, patient, etc. in a healthcare IoT setting. However, GPS can only be used in outside settings, since buildings and other structures might interfere with the signal sent by the item to the satellite. A local positioning system (LPS) network is useful in these circumstances. By monitoring the radio signal broadcast by a moving item and picked up by a network of prepositioned receivers, LPS can keep tabs on its whereabouts [9].

2.3.Health IoT Services and Applications:

This variety and creativity in IoHT applications have emerged over the past decade as linked networks and the inclination of gadgets to build widespread ad hoc systems have proliferated. The growing use of wearable medical gadgets and the rise of tailored healthcare services are two examples of these revolutionary shifts. Countries have made several initiatives to promote the growth, acceptance, and use of IoT applications and services in the medical sector as a result of the promising advantages these technologies may provide in the future.

2.3.1. Personalized Medical Services Using IoT:

Recent advances in IoT-enabled technologies have cleared the way for the introduction of individualized medical care. Whereas, the word "service" is used to refer to a wider concept that includes a set of solutions operating inside a certain service domain. Another crucial IoT-based service is Ambient Assisted Living (AAL). It has the potential to satisfy a desire that has been felt by human communities throughout. It's a new way of thinking in which smart items are placed in the homes of the elderly or those with physical limitations so that they can provide round-the-clock assistance and monitoring. Thus, they can feel safer and more self-reliant [10]. Due to recent

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Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 6, June 2022

developments in IoT technology, medical devices can now do analyses in real-time, something that was previously impossible for physicians to accomplish. It has helped medical facilities treat more patients at once and provide high-quality treatment for less money. Big data and cloud computing have also improved patient-doctor communication. As a consequence, the patient felt less financial strain throughout therapy and was more actively involved in their care.

2.3.2. Wearables in Healthcare:

Wearable medical tech and applications that use the Internet of Things to improve patient care. Wearable healthcare technology enabled by the Internet of Things may take the shape of anything from a simple utility item to an article of clothing. In turn, they gather and share health data with medical staff, off-site servers, and loved ones. In only the last decade, the world has seen an explosion of groundbreaking wearable devices. Wearable technology provides an economical solution for healthcare providers and patients to address a wide range of medical concerns. These gadgets are harmless and may be created by combining different sensors with human-worn items like watches, wristbands, bracelets, shirts, shoes, handbags, hats, etc. Data about the patient's surroundings and health may be gathered using the associated sensor. As soon as these particulars are gathered, they are entered into the databases. Some fitness trackers and other wearable devices are connected to smartphones through health-focused applications. The linked sensor may collect information about the patient's environment and condition. After that, these particulars are stored in the server's databases. Some wearable devices are connected to smartphones via health-related applications. When it comes to remote healthcare monitoring, Castillejo et al. provide a method that makes use of a wireless sensor network to identify any motion [11].

2.3.3. Community-Based Healthcare Services:

Community-based health monitoring is the concept of establishing a healthcare infrastructure to track the well-being of a specific geographical area, whether it is a commercial hospital, a modest residential neighborhood, a hotel, etc. Connected networks in a community-based system may pool their resources to provide a unified service. A four-layer structural architecture for exchanging health information, including patient medical data, was created in this paper. This information may be accessible by health facilities to offer adequate medical advice to people who live in the area [12].

ISSN PRINT 2319 1775 Online 2320 7876

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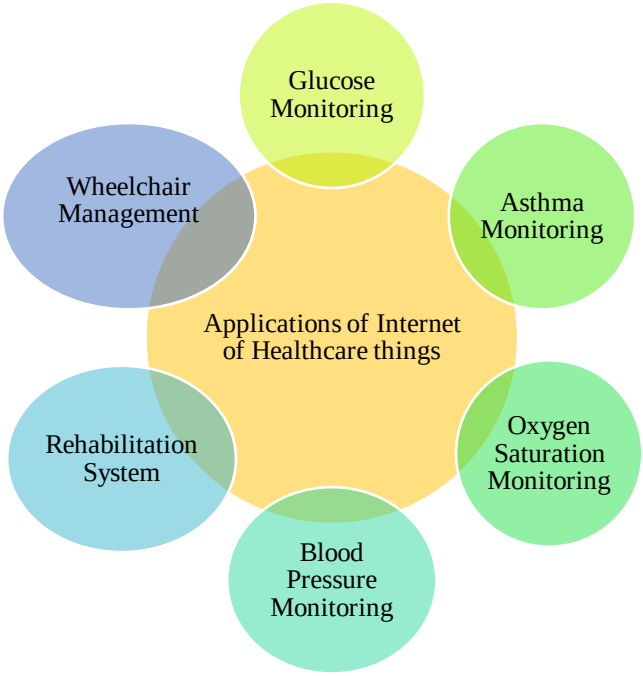

Figure 2: Displays the Classification of an application for the IoHT.

IoHT's services and concepts are used to develop a wide range of IoT-based applications. Different notions have been offered by researchers in the aforementioned domains to benefit humanity. It may be summed up as follows: ideas are more focused on the developer, whereas applications are focused on the end user. Fast progress in IoT technology has resulted in cheaper and more convenient wearable sensors, portable gadgets, and medical equipment. As seen in Figure 2, such a system might be used to do the following: gather patient data, diagnose illnesses, track patients' vital signs, and sound alarms in the event of a medical emergency.

3. CONCLUSION

Since the global technological and application frameworks for innovative and novel applications and approaches are always altering, the Internet of Things (IoT) has emerged as one of the most pressing topics of research today. Indirect emergency care, ambient assisted living, negative pharmaceutical responses, children's health information, and communal healthcare are all examples of services made possible by the Internet of Things. It's also exciting to see the advent of novel and novelly intriguing wearable technologies. With these ideas in mind, IoT technology has helped healthcare professionals monitor and diagnose a wide range of health problems, measure a wide range of health parameters, and provide diagnostic services in previously inaccessible locations. As a result, the healthcare industry has switched its focus from hospitals to individual patients. The author also discussed the existing state and prospects for several applications using IoHT systems. Concerns and issues with the HIoT system's conception, manufacturing, and deployment have also been resolved. Future advancement and research goals over the next several years would be based on solving these problems. In addition, readers who are just getting started in the field as well as those who wish to further their knowledge have access to the most recent data available on IoHT devices.

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 6, June 2022

REFERENCES:

[1] J. Holler, V. Tsiatsis, C. Mulligan, S. Avesand, S. Karnouskos, and D. Boyle, *From Machine-To-Machine to the Internet of Things*. 2014. doi: 10.1016/C2012-0-03263-2.

[2] L. Tan and N. Wang, "Future Internet: The Internet of Things," 2010. doi: 10.1109/ICACTE.2010.5579543.

[3] Z. Ali, M. S. Hossain, G. Muhammad, and A. K. Sangaiah, "An intelligent healthcare system for detection and classification to discriminate vocal fold disorders," *Futur. Gener. Comput. Syst.*, 2018, doi: 10.1016/j.future.2018.02.021.

[4] G. Yang *et al.*, "A Health-IoT platform based on the integration of intelligent packaging, unobtrusive bio-sensor, and intelligent medicine box," *IEEE Trans. Ind. Informatics*, 2014, doi: 10.1109/TII.2014.2307795.

[5] Y. YIN, Y. Zeng, X. Chen, and Y. Fan, "The internet of things in healthcare: An overview," *Journal of Industrial Information Integration*. 2016. doi: 10.1016/j.jii.2016.03.004.

[6] A. Gatouillat, Y. Badr, B. Massot, and E. Sejdic, "Internet of Medical Things: A Review of Recent Contributions Dealing with Cyber-Physical Systems in Medicine," *IEEE Internet Things J.*, 2018, doi: 10.1109/JIOT.2018.2849014.

[7] S. G and S. G, "An Investigation on IoT Healthcare Analytics," *Int. J. Inf. Eng. Electron. Bus.*, 2017, doi: 10.5815/ijieeb.2017.02.02.

[8] G. Cerruela García, I. Luque Ruiz, and M. Gómez-Nieto, "State of the art, trends and future of bluetooth low energy, near field communication and visible light communication in the development of smart cities," *Sensors (Switzerland)*. 2016. doi: 10.3390/s16111968.

[9] R. Peng and M. L. Sichitiu, "Angle of arrival localization for wireless sensor networks," 2006. doi: 10.1109/SAHCN.2006.288442.

[10] A. S. Hwang, K. N. Truong, J. I. Cameron, E. Lindqvist, L. Nygard, and A. Mihailidis, "Co-Designing Ambient Assisted Living (AAL) Environments: Unravelling the Situated Context of Informal Dementia Care," *Biomed Res. Int.*, 2015, doi: 10.1155/2015/720483.

[11] P. Castillejo, J. F. Martinez, J. Rodriguez-Molina, and A. Cuerva, "Integration of wearable devices in a wireless sensor network for an E-health application," *IEEE Wirel. Commun.*, 2013, doi: 10.1109/MWC.2013.6590049.

[12] W. Wang, J. Li, L. Wang, and W. Zhao, "The internet of things for resident health information service platforp research," 2012. doi: 10.1049/cp.2011.0745.