A Survey on Smart Health Monitoring System

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Abstract: *Health-related problems are regarded as one of the main issues that directly impact the quality of lifetime of someone and development of the state. Among the extensive applications enabled by the Internet of Things (IoT), digital healthcare may be principally essential one. Internet of Things (IoT) provides a replacement life to medical field. This enormously improves the quality of data and also the patient care within the healthcare. This paper presents the survey about the use of Internet of Things in healthcare, its issues and challenges and also the need for integration of cloud and IoT.*
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I. Introduction

The development inside the new progressive generation and Internet of Things (IoT) has had a big influence within the Healthcare gadget. Health care is the protection and Betterment of fitness via identification, analysis, treatment and prevention of illnesses, illness, wound and other Bodily and mental harm in people. The ultimate goal of achieving high quality of healthcare practices depends on the ability to effectively integrate data incoming from heterogeneous sources, share the collected data while keeping their security and privacy, use powerful data analytics tools to extract useful information from these data, and the ability to have an expressive and personalized visualization[1].

Fitness care can add to foremost part of a rustic's economic system. But the fragmented nature of the healthcare system, that's further worsened by means of the Lack of equipment for communique between the professionals, Stimulates the need of functional interoperability to ameliorate this coordination. Currently, Information technology is considered as a need rather than a helping tool.

A major aspect within the healthcare system is the tracking of the patient's essential symptoms along with temperature, blood stress and coronary heart rate. However there could be instances in which the medical doctor cannot be alerted in time while there is an Emergency, despite of 24 hours of tracking. Additionally the records cannot be shared remotely with the alternative doctors who are Experts in that discipline and the family individuals. In healthcare IT allows factors with the Sensor information machine to come to be clever through embedding them Right into a system which technique the sensed data and convey Effects efficaciously. Scientific sensors are a grouping of Transducers for sensing electric, thermal, genetic and different Sort of indicators with physiological foundation to suggest someone's Health fame.

According to the World Health Organization study, it is found that from 57 million global deaths, 63 % are dying ofdiseases such as; chronic diseases, pulmonary diseases, heart failure, cancer, Blood pressure, and Glucose[2]. Over recent years, the number of companies that offer systems and services intended at detecting falls has increased radically. Fall detection systems, typically worn across the waist or neck; include intelligentaccelerometers that are differentiating everyday activities from real falls. These structures are already improving the satisfactory of lifestyles of many disabled or aged people residing independently.

II. Related Work

Ahmed Dridi et al[1]presented SM-IoT platform for intelligent, personalized healthcare and dedicated to patients. The aim of this platform is to improve the remote patient monitoring and promote healthcare services. By using SM-IoT platform is able to collect data from heterogeneous information sources, integrate them by using a flexible semantic web, store them in the cloud for further analysis, visualized these data with user-friendly interfaces and facilitate their sharing by taking into account their privacy aspect. Noha MM. AbdElnapi et al[2] presented the survey on Internet of Things Technologies and Project for health care services.In that they provides an overview of the main medical sensors in IoT and a review of the current state-ofthe-art of IoT projects, and technologies required for healthcare services.Mainly focused how IoT could be

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useful and contribute to improve the quality of life.Shreya Rajkumar et al[3] proposes a health monitoring system which monitors vital parameters of the patient such as temperature and heart rate using sensors as well as a fitbit which are connected to a raspberry pi board and also alertingthe doctor through SMS if any vital parameter of the patient deviates from the normal value.Zainab Alansari et al[4]Proposed the study distinguishes different users of IoT in healthcare systems as well as its functions and preferences.

paper depicts the idea of solving health issues using the latest technology, Internet of Things (IoT). It presents the architectural review of smart healthcare system using Internet of Things(IoT) which is aimed

to provide a Better HealthCare to everyone. Using this system architecture, patient's body parameters can be measured in realtime.DurgaAmarnath et al [5]proposed a model that allows thesensor to monitor the patient's symptom. The collected monitored data transmitted to the gateway via Bluetooth and then to the cloud server through docker container using the internet. Proposed system presents a personal healthcare system that is both flexible and scalable[6]. Making use of embedded wearable sensors, the system monitors the health parameters dynamically. The acquired data is transmitted to the Raspberry pi i.e. the processor which will process and analyze the data[7].

III. NEED FOR Integratingiot AND CLOUD

IoT and CC have emerged as new technologies within the ICT revolution of the twenty first century. Cloud and IoT technologies are complementary paradigms so they will complement each other capabilities. The combination of IoT and CC referred to as Cloud of Things provides the solution to the associated issues of IoT comparable to knowledge access, computing method, knowledge analysis, security and privacy. As mentioned within the gap analysis that IoT encompasses a lack of security level attributable to the character of this network and its infrastructure, whereas on the opposite hand, the CC encompasses a high level of security attributable to the strategy that may CC stores knowledge in knowledge centers. Also, CC suppliers will give a high level of privacy and security, or users will shield their knowledge themselves.
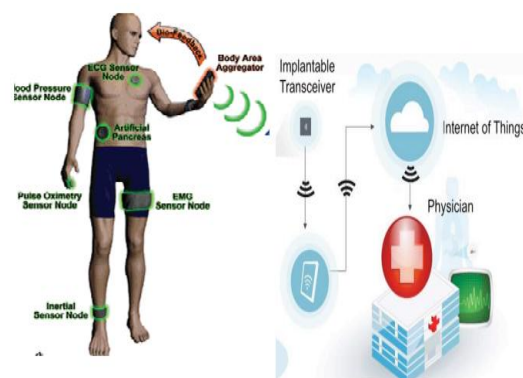

Fig 1. Integration of IoT and Cloud

IV. Security In Healthcare

IoT plays a significant role in healthcare, this requires sensors to gather data and send them to the cloud that analyze and store the data and then it sends the data to healthcare providers for analysis and review. IoT using wireless medical sensor network (WMSN) collects large amount of data must be secured from attacks. By applying algorithm /techniques the data can be prevented from malicious attacks. Security is a main requirement in healthcare applications.

Fig 2: security in IoT healthdata

V. Challenges In Health Paradigm

In this section, it describes some challenges arising from the combination of IoT-Cloud health models for aid systems. In general there square measure common challenges that square measure relating to the safety of knowledge and the privacy of users, performance unpredictability, legal issues that square measure still problem with investigation. The shortage of specific research relating to the adoption of those technologies in the context of mission-critical systems of gathered reliability analyses and also the restricted range of case studies are usually outlined because the major obstacles. Though CC-healthcare and IoT healthcare are separate technologies, they need common characteristics and properties such as unintended, heterogeneous, decentralized, ubiquitous, and distributed. However, the challenge of IoT-Cloud in health aid systems is divided into three levels as follows:

1.Technology level -this level is chargeable for addressing the problems arising from the combination of good things (example:sensors)

2.Communication and networking level- this level addresses the challenges of networking communications.

3. Intelligent level- the intelligent level addresses the problems and challenges of the fusion of knowledge, service discovery and mining of knowledge.

In several things IoT systems use sensitive info like personal info or important infrastructures, thus privacy with devices, cloud and network square measure key aspects. Importance of security and privacy to push the IoT distributed approach into the important world. Moreover, security and privacy square measure one among the most considerations on the cloud adoption. Even though CC will facilitate avoid some IoT limitations, there square measure things like quality support, geo-distribution, the awareness of location, and low latency that require to be addressed and CC lacks means that to tackle them.

A new platform, referred to as fog computing aims to produce storage, computing, and networking services between CC and finish devices. It is named as fog because fog is thought of as a cloud getting ready to the ground and its main purpose is to increase CC to bring nearer to IoT devices.

In bound things, knowledge isn't required for the cloud or should be processed with terribly low. The impact of the hybrid platform of web of things and cloud computing on aid systems:

Latency and quality in order that fog computing will offer the requirements in IoT devices. Due to IoT limitations, fog computing cannot offer functionalities such as complicated analysis, knowledge access to giant numbers of users and strong historical knowledge, that is complemented with CC

Sensors are devices that find physical, chemical, and biological signals and supply the simplest way for those signals to be measured and recorded.

There are various types of sensors used in healthcare which are listed in detail below along with their usage.

Table 1: Medical sensors and its uses

Sensors	Use in health care
Bio sensor	Used to monitor heart beat rate
Mertia sensing device	Used to measure sleep duration and also respiration rates
Smart dust	Used to measure blood pressure
MEDIC	Acquire data from real world and send it to the centralized server
Pulse oximeter	Used to measure pulse rate of patient
Electromyogram	Sensor used to measure heart rate and ECG in stroke patient
Basis	A wrist arm sensor that measures heart rate, caloric burns
Jawbone up	Sensors used to track and analyze exercise, diet and sleep.
Agamatrix	Sensor that track glucose level and also track insulin levels in diabetics patients
Withingwifi body scale	Sensor used to track body temperature, weight loss and weight gain.

The Internet of Things and Cloud computing are both rapidly developing services, and have their own unique characteristics. IoT approach is based on smart devices which intercommunicate in a global network and dynamic infrastructure. It enables ubiquitous computing scenarios. The IoT is characterized by widely-distributed devices with limited processing capabilities and storage. These devices encounter issues regarding performance, reliability, privacy, and security.By combining Cloud Computing and IoT creates a platform (The Cloud-based Internet of Things) which allows for the smart usage of applications, information, and infrastructure in a cost-effective way.

The Table 2 explains about the advantages of IoT and cloud which is integrated.

Table 2: Features of Integrating cloud and IoT

Features	Cloud	IoT	Integrating Cloud and IOT
Storage capacities	Virtually unlimited	Limited	Unlimited, Accessing time is fast.
Coverage	Global	Limited	Unlimited
Internet Usage	Deliver services	Data collection and transmission	Unlimited
Computation	Fast	Slow	Fast
Data	Big Data	Manage Big Data	Big data

VI.   SECURITY CONCERNS IN Iot

Adopting a multi-layered security by design approach to IoT development is important for firmly managed devices, data and mobile and IoT- cloud based apps, and services. Similarly in dealing with threats or problems as they arise. Incorporating security by default is needed because it faces many threats.
The table 3 explains the security threats that occur in every layer of IoT devices.

Table 3: Security concerns in IoT

Front end sensors and equipment	Network	Back-END ofIT systems
Unauthorized access to patient data	Unauthorized access to the sensor data	Safety management of code resources
Provide some threats to internet	Unauthorized access to the network service	Replacement of operator
Attacker performs denial of service attacks	Hacker can steal or change the information	
Attacks and privacy analysis of machine to machine devices	Attacker introduce viruses or malware attacks	
Attacks to availability of machine to machine devices	Breaks the network security	

VII.   Conclusion

Cloud and Internet of Things are two big technologies which are ruling current era of healthcare, when it is combined together in medical, it is a credit to make better move in more success. This survey paper provides better information about the role of Cloud and IoT in healthcare after integration and also discusses issues, challenges andsecurity aspects that are implemented on healthcare IoT sectors.

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