A Brief Analysis on Internet of Things for Health Care

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ABSTRACT

This paper presents reviews on healthcare services based on Internet of Things (IoT) and comparison between these services. IoT is the medium for information retrieval from elemental world to a digital world. Healthcare becomes one of economic and social problems across the world, especially for an ageing population. The inclination towards new trends in healthcare are continuously improving with the help of Internet of Things (IoT) which it may help us to be more health conscious. Due to internet of things hospitals are transforming to remote monitoring for patients, which helps them with greater rate of independence of their health and also provides the equipment for emergency propose for patients.

Key Words: Internet of Things (IoT), healthcare, services, remote monitoring.

1. INTRODUCTION

"The Internet of Things (IoT), a new emerging technology domain which will be used to connect all objects through the Internet for remote sensing and control". IoT can impact the entire business spectrum and can be thought of as interconnection of unique devices within the internet connectivity with some extended benefits. The IoT can be thought as the expansion of internet services. When devices can exhibit themselves digitally, they can be composed from anywhere. The correspondence then helps to occupy more data from more places, securing more ways of increasing competency and improving security.

The IoT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more-direct integration between the physical world and computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention [5]. The applications of IoT can be assembled into discipline like (i) Transportation (ii) Environmental monitoring, (iii) Health care (iv) Personal and Social. In Transportation, initiates to optimize the public transportation routes, reduce infrastructure costs, minimizes traffic congestion etc., are the achievements in the field of IoT. Healthcare represents one of most important and attractive application area of IoT. As health is the most fundamental element that human require. Healthcare domain is obligatory, which targets the intra body observation as well as controls the healthcare records. IoT has made possible to provide many medical applications such as remote health monitoring, chronic diseases, elderly care. IoT based healthcare services has the potential to reduce costs, increases the quality of services and provides better user experience. IoT advances the patients involvement and pleasure by allowing the patients to give much time to keep in touch with their doctors.

This paper is organized as follows. Section 1 provides brief introduction of IoT based healthcare. Section 2 describes various existing Healthcare services. Section 3 summarizes various existing Healthcare services. Section 4 gives the overall conclusion.

2. EXISTING IoT HEALTHCARE SERVICES

The IoT based healthcare services in which each service provides a set of solutions related to healthcare. The following sections include various types of healthcare services.

2.1 Health monitoring using WSN

The IoT based healthcare system tries to work on the available wireless sensor networks based technologies. As IoT based systems need to provide the services top anytime and anywhere to any person. So the architecture to implement the IoT based healthcare system should be more efficient and with low cost[1]. It mainly consists of sensors related to health, smart phones, wireless devices and server system to manage the information. In this system, sensors will be attached to the human body and these sensors will collect the data continuously in order to keep track of patient details. These sensors will also help them in tracking of patients even after discharge. In case of emergency, these wireless devices report the health condition of patient to the respective doctors. In such situation doctor or hospital can send ambulance or may take some necessary actions to help the patient.

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2.2 Context aware Intelligent Wallet for Healthcare

Goal of this system is to create an intelligent wallet for individuals to store their bio-signals and context in which biosignals were collected[2]. If any abnormal pattern is found, then wallet shares the data with medical system or with appropriate person. Data in the wallet is managed by some user-defined policies. System is arranged in a layered architecture where first layer collects and processes data from the sensor nodes. Second layer collects rearranged data from context sensors and multiple sensor nodes. After processing, this data is sent to upper layer. Third layer obtains the data from personal devices and stores it in database. If any anomalous data is found in the wallet, then a message is sent to appropriate person or medical system.

2.3 An IoT-Aware Architecture for Smart Healthcare System

This system is designed to implement Smart Healthcare System for continuous monitoring environmental conditions of a hospital and health conditions of a patient[3]. Sensors are used to sense the surrounding environmental conditions such as temperature, humidity, etc. and staffs in the hospital are engaged in tracking the hospital ward conditions. Radio Frequency Identification Technique (RFID), which is used to identify the sensors and to ensure Authenticity and Integrity. Based on description of patient the patient id will be generated and sent to the nurse. The nurse continuously monitors the patient health condition and updates it in the nurse page. Based on details such as heart rate and temperature, dynamic graphical chart is generated and these details will be sent to doctors for the further process. The PDF file is created for the graphical chart and prescription, then it is sent to the respective patient. This proposed system provides effective remote patient monitoring and immediate response to the emergencies.

2.4 Around the Clock Personalized Heart Monitoring Using Smart Phones

This system is designed for patients who have known cardiovascular disease and need to be continuously monitored [4]. It provides the mechanism to locate the user in case any emergency, whether the patient is inside or outdoor. Sensors (e.g. ECG, Oxymeter) is attached to the patient's body. Sensors used are either Bluetooth enabled or integrated into the smart phone. Further processing of sensor data is done by smart phone and in any case of emergency, it automatically calls ambulance to the location of the patient and sends warning SMS to the respective family member of patient. Data collected in the smart phone is transmitted to healthcare server via the internet. Doctor can access server via secure internet in order to remotely monitor the patient.

2.5 Internet Of Things In Mobile Health Care (IOT-m HEALTH)

In this paper [6], m-health is enforced as a small live healthcare system which uses different biomedical sensors. This system is designed to fulfill the requirements of the independent patient who are staying alone, especially for old age people, people in the corporate world .As this technology is related to the healthcare system, security is the most important parameter. Fingerprint scanning could solve illegal access and authentication issues in mHealth services. This system is designed as it delivers drugs directly to the patient on time and can check patient health parameters(heartbeat, SpO2, NIBP). This system has two sections which are Medi-box and care section. In order to access the Medi-box patient need to show identity card i.e. his/her own fingerprint for security purpose. After verification, patient can take the medical process using bio- medical sensors. These sensed values are updated through the Zigbee in care taker section. Each medicine is attached with RFID tag, this helps system to detect that whether the correct medicine is given to the patient. Buzzers are employed here to intimate the neighbors, in case of emergency.

3. EVALUATION OF EXISTING HEALTHCARE SEFRVICES

Some of existing healthcare services are discussed to know the technologies used and services provided by them. They are briefly explained in the table. 1 along with sensors used and technology used and services provided.

Table 1 Summary Of Existing Healthcare Systems

Existing healthcare services	Sensors used	Technologies used and services provided
Health monitoring using WSN	Motion sensors, ECG sensor, temperature sensor	Remote monitoring, tracking of patient to manage emergency situation

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Context aware Intelligent Wallet for Healthcare	Environment sensors, Motion sensors	layered architecture, Intelligent wallet for remote monitoring of individuals
An IoT- Aware Architecture for Smart Healthcare	Temperature sensor, ECG sensor, barometric pressure, ambient	Effective Remote monitoring, management during emergency conditions
Around the Clock Personalized Heart Monitoring Using Smart Phones	ECG sensor, accelerometer and Oxymeter sensor	Manage the emergency situation by automatically calling an ambulance
Internet Of Things In Mobile Health Care (IOT-m HEALTH)	ECG sensor, temperature sensor	Fingerprint scanning to solve illegal access and authentication, direct delivery of drugs to patient

4 .CONCLUSION

IoT can be used to provide services to patients and remote patient monitoring. This paper briefly reviews the certain aspects of The internet of things (IoT), devices collect and share the among existing IoT-based healthcare services and the comparison them. It ranges from wearable devices to IoT based healthcare systems. Use of IoT based technology in healthcare improves the quality of life and remote monitoring of patients. Also need to make sure the confidentiality and quality of life of every individual.

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