

Transforming Healthcare Using Internet of Things

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Abstract:

The objective from claiming this specialized foul paper will be exhibit transforming healthcare and the role of Information Technology in healthcare using Internet of things (IOT). The IoT gives IP connectivity on different things separated starting with all desktops, laptops furthermore versatile apparatuses. The various health care devices used to sense various health parameters of patient like glucose, blood pressure, heart rate, ECG signal, EMG signal, airflow, body positioning, etc. The key role of IOT to connect those devices with internet and convert it from the physical world into the digital world. Various processor and controller are used to gather and share information directly with each other and the cloud, making it possible to collect record and analyze data. This majority of the data gives knowledge done of the wellbeing what are more supplements movements should enhance health, without that prevention of the every day schedule. The Required magic take away starting with this paper will be present trends, challenges, research endeavor Furthermore a true venture administration experience. This paper proposes details of various useful health monitoring sensors and its significance to improve health needs of the societies.

Keywords:

health care, Internet of Things, networks, architectures, platforms, services, applications, networks, architectures, platforms, security, technologies, challenges.

1. INTRODUCTION

In today's era there has been drastic change in urban population. To provide a smart infrastructure and

services IOT play vast role. Over the last 10 year, the ability of remote sensing the environment and individually tracing objects have attracted researchers' project and have become essential in many business entrepreneur. Such needs are substantially contributing to establish the concept of a global network of interconnected addressable objects, underpinned by standard communication protocols [1]. Now a day all devices are connected to the Internet [2]. One of the banalities in the Information Technology is Internet of Things (IOT), which convert real world object into virtual object. Internet of Things(IOT) which create the network for physical object, vehicles, buildings, and other product which are connected with electronics , sensor, software to collect the data and exchange the data.

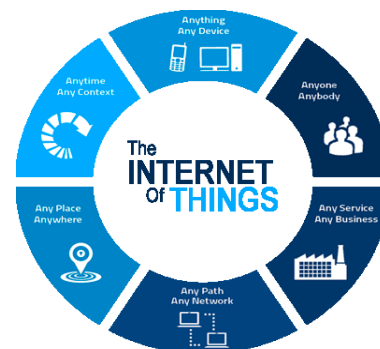


Figure 1. IOT based interconnection [3]

2. RELATED WORK

Tam Vu Ngoc [1] has published paper about various wireless technologies which can be used in medical application. Furthermore he has mentioned about couple of medical product named CIMIT and Code blue which takes data of human body wirelessly. But here, because of lack of IoT patient's data cannot be accessed from anywhere around the world. Nai-Wen Kuo [2] has made an IT application named CGA which stands for "Comprehensive Geriatric Assessment". In this application, he had taken patients database from a medical center situated at

Taiwan. They provided functionality of assessment of data. In this application, real time monitoring of patient is not included. It can be used for data base collection and access of it. Benny P.L.Lo and Surapa [3] has made a body sensor network with the help of wireless sensors for healthcare monitoring. It takes the data of patient by respective sensors and makes it available to the PDA via RF Link for monitoring. Here, due to the use of RF link the range for the communication is limited. Toshiyo Tamura [4] has published about home health care monitoring to prevent recurrence of strokes. he has used Blood pressure parameter and ECG for the suitable required information for strokes occurrence. He had used chair based blood pressure monitor and Bed ECG monitor to know about strokes. With the help of this he can able to monitor patient's status continuously. System collects data from respective sensors and makes it upload to server. With the help of that server monitoring can be done at a particular location not remotely. Kosuke Motoi, Sayaka Taniguchi, Tadahiko Yuji [5] and their other mates has published about development of a ubiquitous healthcare monitoring system combined with Non-conscious and Ambulatory Physiological Measurements and its Application to Medical Care. In which they have shown their proposed architecture of this system. By which we can know that they have used wireless sensors using Bluetooth technology. In which there are chances of lack of communication between Bluetooth modules, because they required pairing and sometime due to no acknowledgement pairing cannot be take place. Which results in to loss of data [8-11]? K.C. Kavitha [6] has published healthcare monitoring system for driver's community in which they have used cellular network for communication of data from sensors. Here this system collects data from various sensors and make database of it. Moreover to it for the monitoring they have used android phone with Bluetooth connectivity [12]. So the range of monitoring is very much limited and cannot access remotely out of it. Anurag, Sanaz Rahimi Moosaviet al [7] has presented two case studies for healthcare monitoring system based on IoT. In which they can have data access remotely but there is no provision of alarm or any kind of notification system which put patient's life in danger in critical situation.

3. IOT HEALTH CARE

The Remote patient monitoring (RPM) is a technology to enable monitoring of patients outside of conventional clinical settings (e.g. in the home), which may increase access to care and decrease healthcare delivery cost [7]. "Vital Signs" or "Vitals" are the most basic parameters of Human Body. Vitals are used to measures body's basic function. These are

used every time when ever body checkup take places. Furthermore, depending on the clinical setting these may include other parameters too. Early warning scores that combines individual scores of these vitals into a single score. These score is used in detection of different diseases.

Monitoring of vital parameters most commonly include at least "blood pressure" and "heart rate", and preferably also "Body temperature". Multimodal monitors that simultaneously measure and display the relevant vital parameters are commonly integrated into the bedside monitors in critical care units. These allow for continuous monitoring of a patient, with medical staff being continuously informed of the changes in general condition of a patient.

As shown in figure 1, Sensor module which contains 20 sensors are connected with each patient and sensed data are acquired by Arduino board via Health development board. Then Arduino acquired all data and send to Rasberry PI board though ArduinoWi-Fi module. Raspberri Pi get the data from different patients and process it to transfer to internet via Wi-Fi router. End user or doctor use the android application to see the various patient body measurement data using a smart phone.

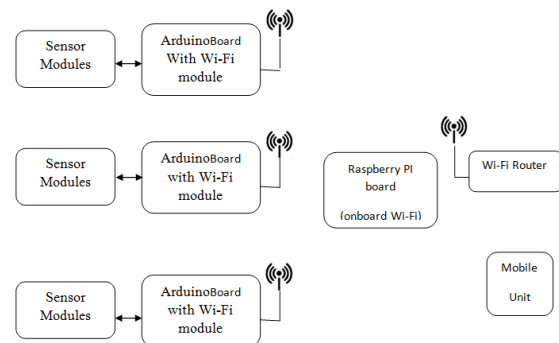


Figure 2: Block Diagram of Remote healthcare monitoring System

3.1 Body Temperature

Measurement of temperature indicates "core body temperature" which controls the rate of chemical reactions in human body. Temperature is recorded for establishing a baseline of normal body temperature of individuals' body. The main reason for checking body temperature is to know signs of systemic infection in presence of fever. Fever is considered when temperature is greater than 38.5 °C or 101.3 °F.

3.2 Heart Rate

The pulse or heart rate is the rate at which the heart beats while pumping blood through the arteries. Its rate is usually measured either at the wrist or the

ankle and is recorded as beats per minute. The pulse rate is a measurement of the heart rate, or the number of times the heart beats per minute.

3.3 Blood Pressure

Blood pressure is the pressure of the blood in the arteries as it is pumped around the body by the heart. When your heart beats, it contracts and pushes blood through the arteries to the rest of your body. A normal blood pressure would be 120 being the systolic over 80, the diastolic. There are various systems existing for the healthcare monitoring and other health care purposes.

3.4 Pulse and Oxygen in Blood (SPO2)

Pulse oximetry is a noninvasive system for demonstrating the blood vessel oxygen immersion of utilitarian hemoglobin. Oxygen saturation is defined as the measurement of the amount of oxygen dissolved in blood, based on the detection of Hemoglobin and Deoxyhemoglobin. Two different light wavelengths are used to measure the actual difference in the absorption spectra of HbO₂ and Hb.

3.5 Electrocardiogram Sensor (ECG)

The ECG need developed with make a standout amongst the mossycup oak regularly utilized medicinal tests over advanced drug. Its utility in the finding of a horde of cardiovascular pathologies extending from myocardial ischemia and localized necrosis should syncope. What's more palpitations need been precious on clinicians for decades.

3.6 Airflow

Anormal respiratory rates. Also transforms clinched alongside respiratory rate would an expansive pointer for real physiological instability. What's more to a lot of people cases, respiratory rate may be a standout amongst the most punctual indicators of this unsteadiness. Therefore, it may be basic with screen respiratory rate. Likewise a pointer for tolerant status. Wind current sensor could give a punctual cautioning from claiming hypoxemia. What's more apnea. [16].

3.7 Blood Pressure Monitor

Blood pressure is the pressure of the blood in the arteries as it is pumped around the body by the heart. When your heart beats, it contracts and pushes blood through the arteries to the rest of your body.

3.8 Glucometer

Despite widely variable intervals between meals or the occasional consumption of meals with a substantial carbohydrate load, human blood glucose levels tend to remain within the normal range [18]. However, shortly after eating, the blood glucose level may rise, in non-diabetics, temporarily up to 7.8 mmol/L (140 mg/dL) or a bit more.

3.9 Electromyography (EMG)

The EMG will be a electro symptomatic solution procedure for assessing. What's more recording those electrical action generated all the Toward skeletal muscles. EMG may be performed utilizing an instrument flying known as an electromyography, to process a record called an electromyogram. An electromyography detects those electric potential created. Eventually Tom's perusing muscle phones. The point when these phones need aid electrically or neurologically actuated. Author Name(s) and Affiliation(s)

4. TECHNOLOGY FOR SMART HEALTH CARE

The Internet of things (IOT) is the inter-networking of concrete devices, vehicles, buildings, and added items—embedded with electronics, software, sensors, actuators, and arrangement connectivity that accredit these altar to aggregate and barter data. IOT is acceptance by the developments of assorted altar as able-bodied as advice technologies. IOT is accumulating of wide-and local-area connectivity processing technologies including Bluetooth, Wi-Fi, 3G, 4G LTE and baby beef advice to backpack efficiency, assurance and anarchy of the fast-growing burghal environments. Some of the IOT-related technologies are discussed in the following.

4.1 Radio-Frequency Identification (RFID)

RFID tags have vital tasks in framework of IOT. Basically RFID divided in to three categories: Active RFID, Passive RFID and Semi Passive RFID. The main components of RFID are tag, reader, antenna, access controller, software and server. Radio-frequency identifies usage of electromagnetic fields to automatically identify and track tags attached to objects. Passive tags collect energy from a nearby reader's interrogating radio waves [5].

4.2 Wireless sensor network (WSN)

A wireless sensor network (WSN) is a wireless network consisting of spatially distributed independent devices using sensors to monitor physical or environmental conditions. It monitors parameters are temperature, soil, pressure, wind direction and speed and structural monitoring of buildings and bridges. WSN would be combining with RFID systems to increase some goals likes

obtaining information regarding the position, movement, temperature and many more.

4.3 Beacon

Beacon is small device which send radio signal to nearest smart phones and tablets. Beacon only operate in one direction. Beacon work with BLE (Bluetooth Low Energy) which work on low power, although it is required that user must turn on the Bluetooth in mobile to receive signal [15]. The wide usage of Beacon is to track the people or position of vehicle, advertisement and message security as well as for locking or unlocking computer automatic.

4.4 Zigbee

ZigBee is one of the protocols to changing the features of wireless sensor networks. ZigBee is a open source for wireless communication to use low power digital radio signal for private networks. Low cost, low data rate, relatively short transmission range, scalability, reliability, flexible protocol designs are Characteristics of ZigBee [16]. It is mostly used in home entertainment and control, wireless sensor and networks, digital agriculture, industrial controls.

5. CONCLUSION

The Internet of Things transformed those social insurance industry, expanding efficiency,. Bringing down costs and placing those centering over with respect to better tolerant forethought. In. The IoT may be developing from fabricating squares of mechanization Furthermore machine-to-machine. Correspondence of the littlest sensors. We think as of also how IoT camwood make used to. Increment social insurance what's more entryway IoT aides individuals and administrations to enhance Every day. Exercises for personage Furthermore general population level. In spite of the fact that there would security issues to providing for. Area information, we might provide for a portion reasonably to kin in place to permit. Instruments to prevent individuals from abusing. Yet there would a considerable measure from claiming remaining. Meets expectations with a chance to be finished in place to make the best utilization of this IoT engineering organization. We need. Should develop these provisions later on until the fancied level about wellbeing goes over.

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