ABSTRACT

In the present world, IoT is changing the infrastructure of technologies. Internet of Things (IoT) based smart health monitoring system is a patient monitoring system in which a patient can be monitored 24 hours. Remote Patient Monitoring arrangement empowers observation of patients outside of customary clinical settings (e.g. at home), which expands access to human services offices at bring down expenses. Healthcare is given extreme importance now a- days by each country with the advent of the novel corona virus. With the increase in use of wearable sensors and the smart phones, remote health care monitoring has also evolved. IoT monitoring of health helps in preventing the spread of disease as well as to get a proper diagnosis of the state of health, even if the doctor is at a far distance. By facilitating effortless interaction among various modules, IoT has enabled us to implement various complex systems such as smart home appliances, smart traffic control systems, smart office systems, smart environment, smart vehicles and smart temperature control systems and so on in very little space. Health monitoring systems are one of the most notable applications of IoT. Many types of designs and patterns have already been implemented to monitor a patient’s health condition through IoT.

INTRODUCTION

At present, with the revolution of information and technology, smartphone-based health monitoring systems are becoming more popular. These systems can be used to collect real-time health information and give feedback to patients and medical specialists. Allowing every single person to examine their health, and advising them to find immediate treatment in case of emergencies, can result in saving that person’s life. The use of these monitoring systems can decrease medical fees for the nation in the long run. Nowadays, due to widespread mobile internet access, the combination of mobile internet with a health service system using android open-source design has become very easy. Using a smart device, doctors and patients can continuously observe the heart rate and can get important data and take proper steps to prevent severe damages . Heart rate and body temperature are some of the most important traits of the human body which are major contributors to determining a patient's health condition.

The normal pulse rate of a healthy adult is 60 to 100 beats per minute. The average human pulse rate is 70 beats per minute for males and 75 beats per minute are for females. Females aged 12 and older have faster heart rates than males.

Several life-threatening diseases can be easily monitored by IoT based systems. Cardiovascular Disease (CVD) is a common disease which is the cause behind most of the deaths in the world. The number of heart bits per minute is denoted as the heart rate of the patient. It is also referred to as the pulse rate of the body. The rate changes with illness, due to damage to body, heart, and exercise. Hence heart rate is essential in determining one's health condition.

LITERATURE REVIEW

The authors proposed the health monitoring system that monitors the heart rate in pulses and temperature of the patients along with some environmental parameters that are measured by room temperature sensor, CO sensor, and CO2 sensor. The acquired data is transmitted over wireless networks, maintained in a single database of patients, giving an alert to the authorities, aside from personalization of critical health related criteria. The verified medical team collects the raw data, analyzes, makes and makes decisions virtually using the data, without meeting in person. The advanced prototype supported by experimental result analysis, graphical interpretations and minimal error rate proves the effectiveness of the system.

Deepak et. al, proposed a monitoring system using an ARM controller, bluetooth module(HC-05), SIM800L GPRS modem and 3 sensors(temperature, pulse and MEMS). These sensors attached to the patient body determine temperature, pulse rate and fall detection.

Thereupon this data is sent to the ARM7 controller, and further the data is transmitted with the help of Bluetooth module to Smart phone application and cloud with the help of GPRS module. Thus ARM7, apart from being the core of the entire system acted like an interface between the input(sensors) and output(modules and modem).

In , the authors proposed a system that effectively monitor the patient's pulse rate in real time. The sensor, connected to the Microcontroller in Arduino UNO acted as a source of the data which wa acquired by the sensor node via Microcontroller.The next step involved was data

pro-processing the data model acquired from the data acquisition and identifying them as a label. This data is sent to the cloud/database(Things Speak) for the additional scope of appropriation in data analysis and data mining. This data is taken to observe the parameters for the future observation, predictions etc. The abnormality in the pulse rate is observed with the GSM and the Buzzer.

Tamilselvi et al. proposed an IoT health monitoring system to track the basic symptoms of a patient like percentage of oxygen saturation, heart rate, body temperature, and eye movement within the IoT framework and network. For the implementation purpose, the system used Heartbeat, SpO2, Temperature, and Eye blink sensors to collect data and Arduino-UNO was used as a processing device. The developed system was implemented but no specific performance measures are described for any patient.

In , Authors have done a comprehensive study on the recent advancements in IoT-based healthcare technologies, the IoT network architectures/platforms, applications, and industrial trends. They have also analyzed several other IoT security and privacy features,which includes threat models, security requirements, and attack taxonomies when taken from the perspective of the health care industry. Further, to face the challenges for future research on Io based healthcare, they have proposed a smart collaborative security model that considerably lessens security risk; explains how innovations like big data, Machine learning, ambient intelligence, and wearables technology that can be leveraged in a health care context.

Li et al. proposed a framework with a three stage model  for the monitoring of elderly people. Two accelerometers were set on the mid-region and the thigh, and the information stream was sectioned into one-second windows within the framework. The primary stage monitors whether the patient is static or dynamic, the subsequent stage perceives the lying state of the patient and the last stage is to decide if the change in motion is intentional. They gathered ordinary acceleration amplitude and rotational rate, and observed that it is under 0.4 g and 60° separately. The lying state is recognized when the point between the gravitational vector and the trunk, and the point between the gravitational vector and the thigh are much larger than the threshold value. The last stage which included monitoring intention, was identified when the peak value within a window was larger than the threshold.

Wang et al. used the applications of triaxial accelerometer and wireless sensor network to engineer a fall detection system to distinguish falls in elderly people. However the issue and drawback was that the use of acceleration solely for fall detection led to many false positives. For example, suddenly sitting down gave comparable vertical acceleration data. This led to a huge number of researchers examining the technology of connecting a triaxial accelerometer with a gyroscope to detect the fall events accurately and without false interpretation.

PROPOSED SYSTEM –

The core objective of this project is the design and implementation of a smart patient health tracking system. The sensors are embedded on the patient body to sense the temperature and heartbeat of the patient. These sensors are connected to a control unit, which calculates the values of all the sensors. These calculated values are then transmitted through a IoT cloud to the base station. From the base station the values are then accessed by the doctor at any other location. Thus based on the temperature and heart beat values, the doctor can decide the state of the patient and appropriate measures can be taken.

CONCLUSION

Health-care is given extreme importance nowadays by each country with the advent of the novel corona-virus. So in this aspect, an IoT based health monitoring system is the best solution for such an epidemic. Internet of Things (IoT) is the new revolution of the internet which is a growing research area, especially in health care.

# “Smart IoT based health-care system ” is the project where we have mainly focused on two objectives first one was a smart health monitoring system, to collect the health history of patients with a unique ID and store it in a database so that doctors need not spend much of their time in search of the report and give analysis right from the dashboard. Any health-care that is being done will be updated and reflected in the dashboard itself. And the other one is the Wearable-Sensor-Based Fall Detection System for aged people, to monitor the movements of them, and recognize a fall from normal daily activities by using sensors, and automatically sends a request or an alert for help to the caregivers so that they can pick up the patient.

However, there are few shortcomings to this too. A basic knowledge of the operation are to be learnt by the caregivers . Also both the caregiver and the wearer should know how to protect the sensors from water damage or any physical damage .

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