

Survey on E-Healthcare in Internet of Things (IOT)

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Abstract: Internet of Things is a fast emerging technology now a day which helps in continuous monitoring to the health of the patient in low cost and in less time by providing better health care system. IOT has many applications in every industry whether it is sharing of information with the remotely person or whether it is measuring of sugar level or heartbeat of the patient. Internet of Things has wonderful feature that we can monitor and control anything. With networked sensor devices we can collect rich information of the mental health condition of the patient. The main objective of this paper is to provide better healthcare to the patient so that they remain fit and feel healthy throughout their life.

Keywords: Internet of Things (IOT), healthcare, technological advancements, medical sensors, smart phones, smart watches.

I. INTRODUCTION

Emergence of Internet of Things (IOT) leads to huge technological advancements in present times, as compared with earlier times. Many devices such as sensors, actuators etc. lies under the category of IOT. These devices play an important role and act like a backbone for this emerging technology. Any device that has the capability of getting himself registered on the Internet and can work in gathering the values is considered to be a sensor. An actuator performs the specific action that on the particular event, as triggered by the administrator of that corresponding device. Thus, the internet of things is a branch of science in which values are fetched using the sensors and correspondingly some events are triggered according to the need of the hour or as set up by the administrator of the device.

Internet of Things is an emerging technology which is connected to the network to collect and exchange of information and measure patient's health such as diabetes, sugar level with the help of sensors world widely. With IOT sensors can sense any disease and help in early treatment of the patient with less time and in low cost. In this fast moving World, no one has enough time to frequently visit to the hospital for routine check-ups from doctor and for doctor also to examine the individual patient, so here IOT plays an important role to remotely assess the patient's condition. The main aim is to focus on the health of the patient's as it is very important for everybody. In this modernized approach everyone wants to take advantage of technology and sensors is one of them.

This scenario presents how IOT is connected to all the things such as Sensors, Stakeholders, Smart vehicle, Doctors. To avoid any risk with the health of the patient, wearable sensors can easily detect if patient is suffering from any chronic disease and immediately inform to the doctor and doctor can easily communicate and share information

through Internet of things and cellular devices and wireless network.

DESIGN FLOW

The flowchart describes different steps that were followed in order to identify the circular object in the image. Figure 1 shows the flowchart of steps. Firstly the reference image was read which contained objects of different shapes. This cluttered image is used for the identification of the circular object in the image. Then the image is converted into the grayscale. The grayscale image is further converted into the binary image. This conversion of image from grayscale to binary is the most important step and which greatly defines the detection of the circular image. Then the radius of the circles are defines to be detected [20]. Then the circular objects are being detected using the modified algorithm through Circular Hough Transform (CHT). This method is quite efficient as it decreases the computational time and storage required for its implementation. And then in the last step finally, the circular objects are detected. All the steps given in the algorithm clearly defines the flow or process followed while identifying the circular objects.

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Smart vehicles are also connected through wireless network in critical situation of the patient.

IOT is the combination of various technologies such as Wearable sensors, Gateway, Wireless network and cellular network. Sensors can easily help to detect any skin disease, heart beat and sugar level.

Wearable devices are biosensors which can be used for telemedicine and monitoring of inpatient with wireless communication.



Figure1:Emergence of IOT in Monitoring Healthcare.

II. Applications of IOT

a. Emergency care of the patient with IOT:

IOT plays an important role when emergency care of the patient is needed as it saves a lot of time by providing proper care of the patient. With medical sensors doctors can easily get to know the disease of the patient.

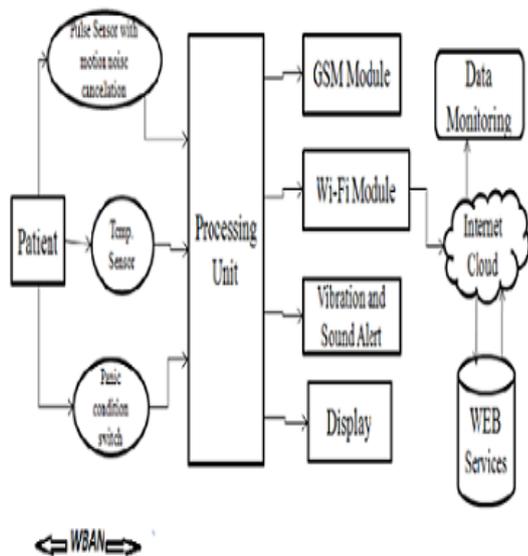


Figure 2.IOT Healthcare System.

In this IOT Healthcare System temperature sensor is used to measure the temperature of the patient. And pulse sensor records the pulse of the patient, there is panic cancellation

noise which will share noise free data to the doctor through Wi-Fi Protocol.

Hence, Doctor can access data at anytime and anywhere and verify the record of the patient and accordingly prescribe for a medicine and proper diet which helps to the patient to remain fit. Doctors can also video call to the patient through Wi-Fi mobile system to know about patient's health.

b. World-Wide Access of Information

Accessing of information world widely through IOT has become much easier. Smart Internet of Things leads to people's life much easier. If any member of the family is outside home due to some work then he can easily access the information and can keep track of the patient health.

c. Accurate Distribution of Medical Information

Managing medical information has also become much easier with the help of smart phones. People can collect information accurately with the help of actuators and send to the doctor for medical care without any error.

Online sharing and communication through web base system is grateful to us and plays an important role in our daily life.

As fixing of the problem costs lot of money, so we can collect data through sensors easily and use it for maintaining the record.

d. Monitoring of Hand Cleanliness through IOT

In order to avoid or spread any infection, it's very essential to clean our hand in a better way from our busy schedule so that germs cannot enter our body. Most of the people fall ill because our hand are not properly cleaned and bacteria can directly enter in the body when we eat or when we touch to other person, the other person also gets infected due to this. It is also very necessary for the person who is taking care of the patient to always clean the hand.

With Internet of Things doctors can easily monitor the cleanliness of hand and saves the patient to get infected.

e. Monitoring of Physicians with Wearable

With the help of wearable such as smart watches physicians can keep a track of the patient's health more effectively. As smart watches can be used to measure the Blood Pressure level, sugar level, pulse rate, number of steps in a day and helps in keeping the record. This reduces the risk of the patient to fall ill.

Physicians can recommend the patient for regular exercise and medication through fast internet technology. They can also motivate the patient to live a happy and better life. Actuators can sense and keep monitoring to the health of the aged patient who face difficulty in walking. They can take advantage of the IOT and stay fit at home.

III. Advancement of IOT in Health Care System

As IOT is emerging day by day in various fields. With IOT doctors can directly communicate with the patient and provide proper medication and care whenever they need.

Monitoring of the patient remotely

Main focus is on continuous monitoring of the patient because health is very important for everybody.

With this Remote Monitoring Technology, physicians can monitor upper and lower limits of health easily such as pulse rate, sugar level, heart rate, respiratory rate or any fatal headache. The physicians can communicate with patient at any point of time

Whenever a sign in the graph crosses upper or lower limit, an instant alert with message in the smart phone is shown which inform to the physician that critical situation has been breached providing the reliable information.

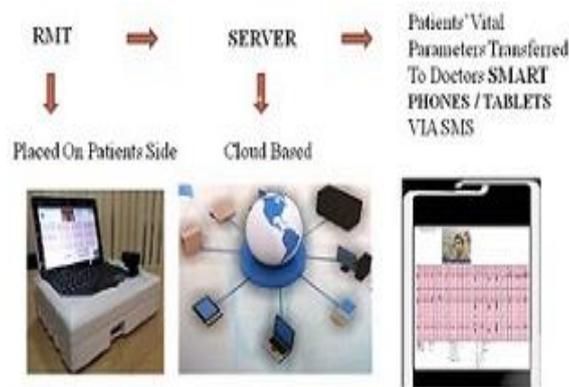


Figure3. Working of The Remote Monitoring Technologies.

This Remote Monitoring System can be used very easily to achieve greater flexibility. The physician can also log in to the system and makes the necessary modification in very less time. Physicians can note down all parameters through Tablets via SMS and maintain a history.

Monitoring of Fraud in Insurance Companies

Most of the insurance companies collect the information through health monitoring devices like cloud based devices so that they can claim for any operations. Today's insurance companies are encouraging the customers to how to handle the claim and are also providing knowledge to detect fraud claims and any risk.

IV. Benefits of using IOT in Health Care

Cost effective way to track and trace

IOT enabled assets helps in tracking of the important assets through IOT sensors without involvement of the humans. Devices keep tracking automatically and useful in generating the solution in less cost. Now it's possible to directly communicate with the doctor by reducing wait time as well as decreasing the travel time.

Timely and Proper Treatment

Routine check-up is very important for all of us. With Internet of Things proper treatment about the condition can be made by the expert doctors at remote place.

Less Time Consuming

It is very boring and tired to stand in a long queue for the treatment, but Internet of Things has done a grateful work, with this we can take appointment directly online and communicate with the doctor for health regarding issues.

Ability to access real time data

IOT has made our life easier, now we can connect our home AC to our smart phones, so when we reach home the room temperature is maintained already. We can also monitor television to smart phones and watch our favourite shows remotely.

Smart watch also sense and input the data which will be later on used for the useful information.

Improved health Management System

Smart medical devices plays an important role in regulating the health. Alarm system attached triggers with message which shows the health of the diseased person.

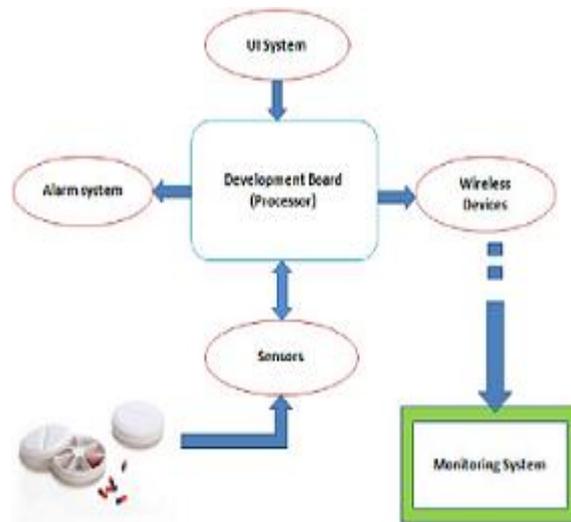


Figure4. Block Diagram of Health Management System.

User Information system takes the message with connecting sensors and wireless devices which manage the health.

V. Conclusion

This paper concentrates on the rapid advancement of IOT-enabled healthcare system plays an important role in smart healthcare from the traditional healthcare. Smart watches and smart phones measure the chronic disease of the patient and helps to live life healthy.

Information sharing to the remotely person and maintaining record is also possible through IOT. Information analyst can predict the health risks for a person with disability and generate appropriate health alerts.

An estimation has been made that near about 25 billion IOT devices would be installed by 2020 and the IOT market would extent around 2.1 trillion by 2025.

VI. Future Directions

There are few areas which needs to be enhanced like sensors used should work more efficiently and should respond quickly and comfortably wearable. Much progress has been made but still needs some enhancement in sharing of information on internet should be reliable and more accurate so that patient can be treated in a better way. Main focus should be on the accurate measurement of the Blood Pressure level, Sugar level and pulse sensors.

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