Real –Time Health Monitoring System

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***Abstract*— Around 1, 47,649 incidences of accidental death in the year 2017 were recorded in a survey by Government of India. In this paper, we have proposed Real Time Health Monitoring system based on IoT (Internet of Things). This system measures pulse, SpO2 level, breathing rate, Electrocardiogram (ECG), Electro dermal activity (EDA), body temperature, glucose concentration in blood, myoelectric activity, blood pressure, patient positions and sends these values to a database on cloud through the use of APACHE which is an open source web server. The main objective of this system is to acquire the physiological parameters and upload these parameters to cloud for further analyses by medical practitioners worldwide which are otherwise inaccessible or remotely located. This system can be integrated in ambulance wherein all the vital and essential parameters can be recorded and studied beforehand by the doctors in hospital while the patient is still in ambulance or at understaffed areas, such as rural health centers, ships, trains, and airplanes, as well as for home monitoring[3].Various kinds of physical parameter recorders are available in market manufactured by reputed organizations, but till date there are very less devices which can measure various vitals together and upload them to the cloud for various uses. Our system incorporates all the vital measures a doctor requires for the physical analysis of an individual.**

I. INTRODUCTION

Things (IoT) has come up as a new computing paradigm for building the next generation health care applications. The basic concept behind the IoT is the presence of different objects around us. The IoT involves radio frequency identification (RFID) tags, sensors, actuators, and mobile phones. These objects will collaborate with each other to achieve a common objective, that is, better healthcare facilities for all [7]. Presently we are very well versed with the medical conditions in India both in rural and urban areas. This problem is increasing day by day with increase in population. General reports of India report that cardiovascular diseases, unidentified ailments, and slow availability of help are adding to the total number of deaths. Thus the number of adult deaths in rural areas has increased many a fold. Every financial year the Government of India provides a huge amount of money for the health budget which is utilized physically or performing operations and providing medical help to people at a very low cost. Increased device intelligence has begun on a journey to change a whole paradigm of personal health monitoring[5].The proposed system basically, aims at measuring all the necessary vitals required for a complete body checkup. This system helps facilitate the process of examination and then the pre and post attention required by the patient. The integration of healthcare with the Internet and mobile technologies has led to increased accessibility to healthcare providers, more efficient processes and higher quality of healthcare services[6]. Using the system the practitioner can use the cloud to extract all information and all test reports of any individual, thus leading practitioners all over the world can be consulted that in turn bridges the gap between medical excellence and the patients. Also no specific environment is required to use the system so a person can use it from the comfort of their home or from remote places where no medical help is available. The primary task of this system is to update the data to the database and alert the doctors for any aberrancy. This system has much future scope as the data gathered by monitoring is so valuable and can be used for scientific research by the medical community. By determining the patterns in the parameters observed, the nature of disease can be predicted.[1] Presently in the market, there are various products that measures different parameters but there are very few which measures all of them together for a holistic analysis of the human body. Thus by bringing this system into picture we can reduce the hassle to evaluate the condition of the whole body and send it to best of physicians all over the world for the expert advice and application.

II. PROPOSED SYSTEM

Proposed system consists of two blocks
1. Patient monitoring location
2. Signal analysis location
All the process is represented in figure 1

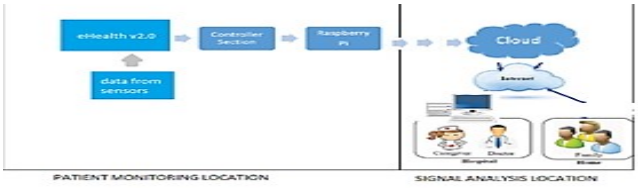

Figure 1

1. PATIENT MONITORING SYSTEM

The most important part of our proposal is the eHealth module V2.0.It works on Atmega 328 microprocessor .eHealth is the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health-care services ,health surveillance, health literature ,health education, knowledge and research.The 9 sensors used with this module are Blood pressure sensor, Body temperature, patient monitoring sensor, GSR,EMG,SPO2, airflow sensor, glucometer and ECG. As shown in figure

2.

Figure 2

Blood Pressure Sensor is used to measure the systemic arterial blood pressure for humans. . The sensor produces an output voltage that changes in accordance with the pressure measured by the cuff .Measurement body temperature helps in detection of various diseases. Also, the course of certain diseases can be monitored and predicted by measuring body temperature. In a temperature sensor, also known as a thermistor, the resistance is proportional to the temperature Patient Position Sensor or Accelerometer helps in monitoring five different patient positions namely standing/sitting, supine, prone, left and right. accelerometer-based movement sensors are also used to provide the information of user activity in the case of increased heart rate[4]. This is required to detect sleep apnea which is a sleep disorder causes one to stop breathing while asleep which can have adverse effects on memory , alertness ,sex drive and restless legs syndrome in which due to uncomfortable sensation in legs .Skin conductance, also known as galvanic skin response (GSR) is a method of measuring the electrical conductance of the skin measured at fingers of the palm, which varies with its moisture level .An electromyogram (EMG) records the electrical activity of skeletal muscles at rest and during contraction. EMG is used for diagnosis of neuromuscular diseases Blood Oxygen Saturation(SpO2)measures percentage of hemoglobin molecules that have four oxygen atoms in the body's arteries are carrying normally between 95-99%.Symptoms like Trouble breathing, Increased heart rate, headache, organ failure indicate Low SPO2 called Hypoxemia. Airflow Sensor consists of flexible thread and two probes placed behind the ear and nostrils use to monitor airflow of patient during respiratory problem. Glucometer measures the glucose in the blood by pricking a drop of blood on a disposable test strip in the units mg/dl or mmol/l. ECG (electrocardiograph) records electrical activity of the heart and provides information about various cardiovascular diseases as the heart undergoes polarisation and depolarisation electrical currents are passed through the body, it being a conductor. These currents are measured by electrodes and are thus traced. The sensor then measures potential difference between selected electrodes to plot a graph. Electrodes are placed on each arm and leg (limb leads) and six of them are placed on fixed locations on the chest (chest leads).The ECG plotted on serial monitor is shown in figure3.

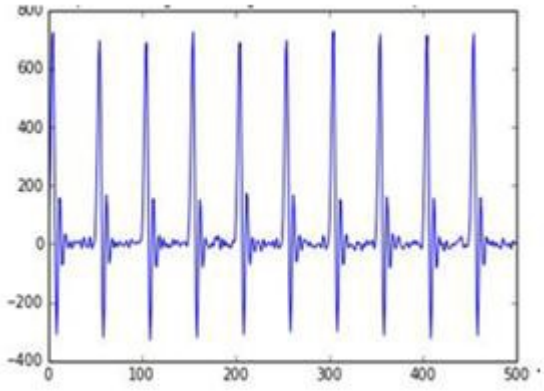

Figure 3

The Microcontroller send the sensors data serially to a single board called Raspberry Pi. A Raspberry Pi is a credit card-sized computer based on Linux with low–power consumption level .We have used this system because it is a portable computer which can be used in any moving vehicle like ambulance and requires dc voltage to operate which is also available in a vehicle. The Raspberry Pi sends the data to the cloud through the use of APACHE – an open source web server.

2. SIGNAL ANALYSIS LOCATION

Telemedicine can be defined as the delivery of health care and the sharing of medical knowledge over a distance. It aims at providing expert-based medical care to any place where health care is needed.[2] The doctor's analyses the data collected by different sensors and uploaded on internet by this system. Through this the doctors can alert the patient if there is abnormal values from the sensors .The doctors can also analyze the signals of the patient in ambulance before the patient reaches hospital.

All the process is represented in figure 3.

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III. ADVANTAGES

1. Privacy

- Restricted access to patient information, i.e. only the information that the individual wishes to share is shared with the doctors
- All access is electronically tracked, monitored and recorded to prevent misuse and manage any sort of discrepancy

2. Physicians

- Easy access to diagnostic and patient drug information, thus doctors can easily judge past treatments and former medicines that have been given to the patient and the effect they have on the person.
- Reduction and elimination of duplicated calls to labs and other doctors. This prevents two things, first being it saves time and energy and secondly it preserves the authenticity of the problem.

3. Health Authorities

- Reduction in lab operating costs as management decreases
- More efficient emergency room operations as the authorities know prior to a treatment what needs to be done and can thus be prepared well in advance.

4. Patients

- Fewer delays in treatment because it helps lay out the problem to the doctors immediately
- Less duplicate testing as all results are visible to all practitioners at once
- Patient information is secure and is accessed by only those who need to know

5. Portability is extended to a great extent

- As the size of the system is quite small so it can be carried at various locations with ease.

IV. LIMITATIONS

1. The shortage or absence of internet connection as system requires good internet connectivity at all the times so that it can be accessed by doctors at any time
2. Although it saves time but the drop down menus in health information may lack detailed description of information.
3. Medical history of a patient is not always available

V. CONCLUSION

This research paper aims at analyzing different body parameters and uploads it on cloud making it accessible worldwide. Using this model, thousands of life can be saved and many diseases can be cured at an early stage.

REFERENCE

[1]Healthcare based on IoT using Raspberry Pi published in:Green Computing and Internet of Things (ICGCIoT), 2015 International Conference

[2]C. S. Pattichis, E. Kyriacou, S. Voskarides, M. S. Pattichis, R. S. H. Istepanian, C. N. Schizas, "Wireless telemedicine systems: An overview",IEEE Antennas Propagat. Mag., vol. 44, no. 2, pp. 143-153, Apr. 2002.

[3]E. Kyriacou, S. Pavlopoulos, D. Koutsouris, A. Andreou, C. Pattichis, C. Schizas, &Multipurpose Health Care Telemedicine System",Proceedings of the 23rd Annual International Conference of the IEEE/EMBS, 2001.

[4]B. Wheelock,Autonomous real-time detection of silent ischemia, 1999.

[5]D. Starcevic, Z. Obrenovic, E. Jovanov, V. Radivojevic, "Implementation of virtual medical devices in internet and wireless cellular networks",1st IFIP Workshop Internet Technologies Applications and Societal Impact, pp. 229-242, 2002-Oct.

[6]U. Varshney, "Pervasive healthcare and wireless health monitoring", Mobile Networks and Applications, vol. 12, no. 2-3, pp. 113-127, 2007.

[7]IoT-cloud based framework for patient data collection in smart healthcare system using raspberry-pi, Published in:Electrical and Computing Technologies and Applications (ICECTA), 2017 International Conference