SMART WEARABLE IOT BASED HEALTH MONITORING SYSTEM (HMS) USING BSN

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Abstract - *The recent developments in bio-medical sector and IOT technology have lead to new revolution in medical arena. Health monitoring system is not only used in hospitals for patients, but now-a-days it is also required to monitor the elderly people, who were home alone in the city lives. As elderly population increases day-by-day caretaking demands are also increasing. Hence health monitoring systems are gaining importance these days. This project is based on monitoring the elderly peoples. We have designed and developed a reliable, energy efficient health monitoring system. It enables the caretakers to monitor health parameters (heart rate, oxygen level, blood pressure, temperature, Position) in real time. If any of the parameter values goes beyond the threshold value an alert is given to the caretaker and to the doctor, using an android application installed in the doctor's smartphone. Our project also has special features of monitoring ECG (Electro-Cardiogram), EEG (Electro-Encephalogram), and EMG (Electro-Myogram) by connecting it if necessary. Further, it also has a special function of monitoring and safe guarding the children by tracking their location by GPS via IOT. With the use of heart beat sensor, we provide a security system for women safety.*

***Key Words:* IOT, HMS, GPS, Sensor. etc.**

1. INTRODUCTION

Now days, the number of elderly people is increasing over the time where today in developed countries it is quite normal that elderly people usually live independently in their own homes. In modern life style, in cities where both persons in the family are working and it is difficult to monitor the health of the elderly people who were home alone. In this city culture the elderly persons are hospitalized due their health condition and there is no one to take care of them. When they were in home, one person is required to take care of them personally. Our project is very much helpful to those persons, since it helps in monitoring their health and informs the care taker and also to the nearby hospital in case of emergency. The body sensor network (BSN) technology is one of the recent technologies of IoT developments in Health Monitoring system, where a patient can be monitored using a collection of tiny powered and lightweight wireless sensor nodes. At this generation, heart disease is one of serious diseases that may threaten human life. The electrocardiogram (ECG) is plays major role in the prevention, diagnosis the abnormality of patients and rescue of heart disease. In progress has been made in the development of a remote monitoring system for ECG

signals, the deployment of IoT services over communication network with new applications. We, therefore, are modelling a system having several wireless sensors which will measure health related information like body temperature, blood pressure, heart beat rate, ECG, EEG, EMG, etc. and transmit over internet to be accessed by other user at remote location. Daily basis patient's health database is created and recorded and the same can helpful in analysis by doctor, if needed. This project proposes a health examining system which is having capability of analyzing various parameters and discovering health issues. Threshold values are set based on past data from the database. At time of urgent situation when threshold values are crossed, alerts will be generated automatically which doctor can also see for taking necessary actions. In recent days, in our country children trafficking and women trafficking is becoming more. In order to protect the children and women against trafficking, our product can be used.

2. OBJECTIVE

- ❖ To monitor the health of the elderly people via IOT.
- ❖ To monitor the health as well as the location of the children.
- ❖ To ensure the safety of the women during emergency conditions.
- ❖ Reduced the cost of regular check-up.
- ❖ Today's health care system for patient who stays in home is not reactive so there is need to develop the system.
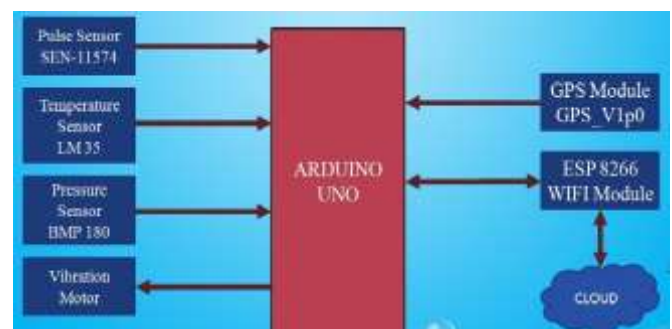
3. METHODOLOGY

Fig.1.Block diagram

The GPS module is used to track the location of the children and women in-case of emergency. The women safety system monitors the heart rate of the women, if it exceeds the

threshold value due to fear, then the vibration motor will be powered. When the vibration is detected the women can turn it off by pressing a button, if it is not turned off in 10 sec, then the location of the women will be sent to person who cares and to the nearby police station. The same principle is followed for children safety also, where the parents can track their child's location. Thus our project can help in reducing the human trafficking.
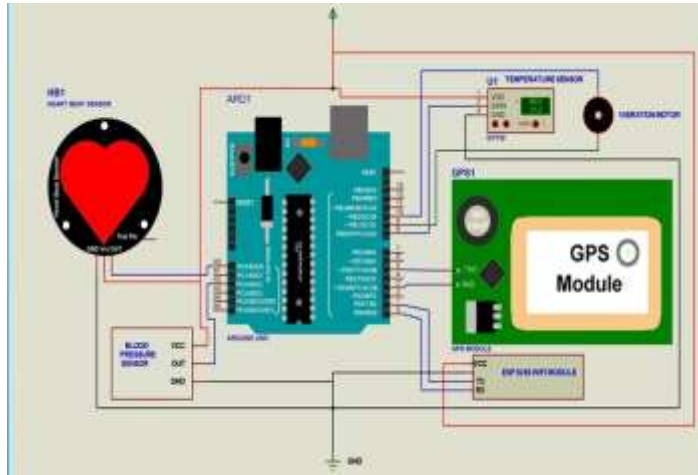

Fig.1.1.Circuit diagram

4. **SYSTEMDESIGN**

   ✓ **Pulse Sensor**

The sensor gives the digital output of heat beat when a finger is placed on it. When the sensor starts, the LED flashes in unison with beat. The digital pulses are given to a microcontroller for calculating the heat beat rate, given by the formula-BPM (Beats per minute) = 60*f. Where f is the pulse frequency

   ✓ **Temperature sensor**

It is a sensor used to measure temperature. The LM35 series are precision integrated circuit temperature sensors, whose output voltage is linearly proportional to the Celsius temperature and it can be converted to Fahrenheit by (1.8*C+32). Where C is the Celsius temperature .It measures temperature more accurately than thermistors

   ✓ **Pressure sensor**

BMP180 sensor used to measure Pressure. Blood pressure is also one of the health parameter to which most of the people are prone to. As the heart pumps, the pressure of the blood circulating in the arteries is called blood pressure. Systolic pressure which is the maximum pressure during a heartbeat and diastolic pressure is the minimum pressure between two heartbeats, 120 mm of mercury is the systolic pressure and 80mm is the diastolic pressure of a full grown human being.

   ✓ **ESP8266 WIFI Module**

❖ **Data collection**

For future use, it is necessary to keep the medical data of a patient who was a patient earlier. This record would help the patient to take certain decisions like if they need to lose/gain weight, which drug would suit the patient, which disease are they more affected to and other information. The doctor would also be benefitted from the database recorded which would interpret the physical problems associated with the patient. The faster the doctor is able to diagnose, the easier ways he can find to cure the patients' illness in case of major health issues. The data is stored in the cloud by using ESP8266 through arduino microcontroller

❖ **Alert System**

The doctors, medical attendants and the relatives get an email or a SMS alert which is the main purpose of the project if any of the measured physiological parameters cross the threshold value. This alert would enable the doctor to do better diagnosis and help the relatives and family members to take good care of the patient. This would also enable the patient to monitor their health and take care of it. Keeping people on right track for better health, which was earlier neglected, will now be a transforming factor in their life.
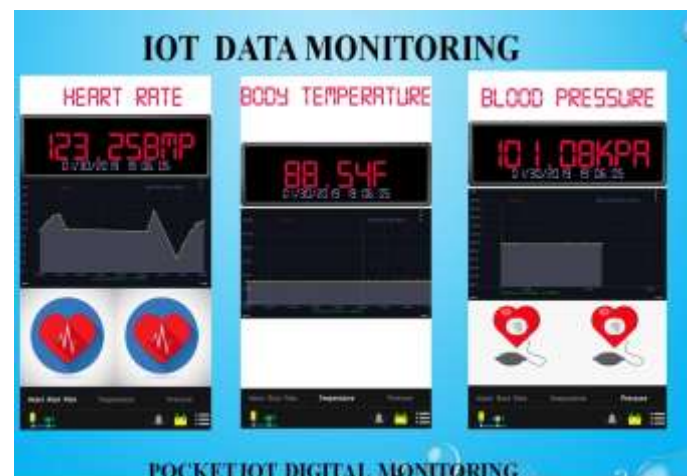
5. **SIMULATIONS**

Fig -2: Digital Simulation using Pocket IOT App.
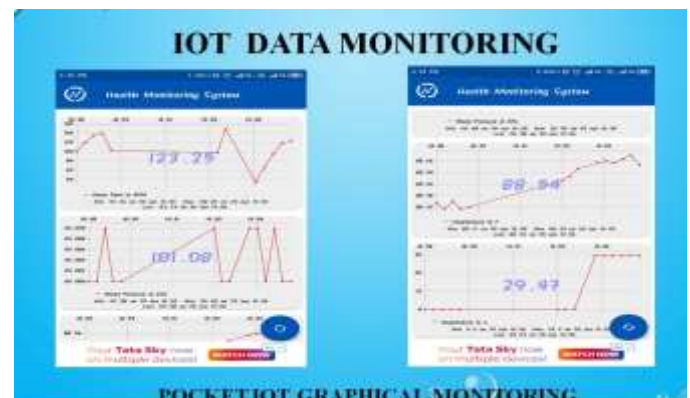

Fig -2.1: Graphical Simulation using Pocket IOT App.

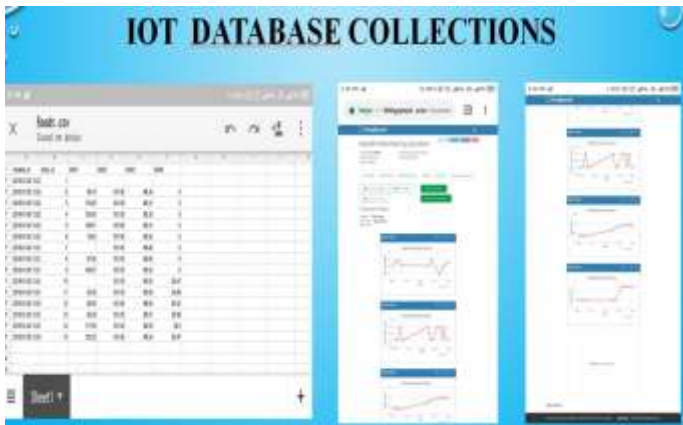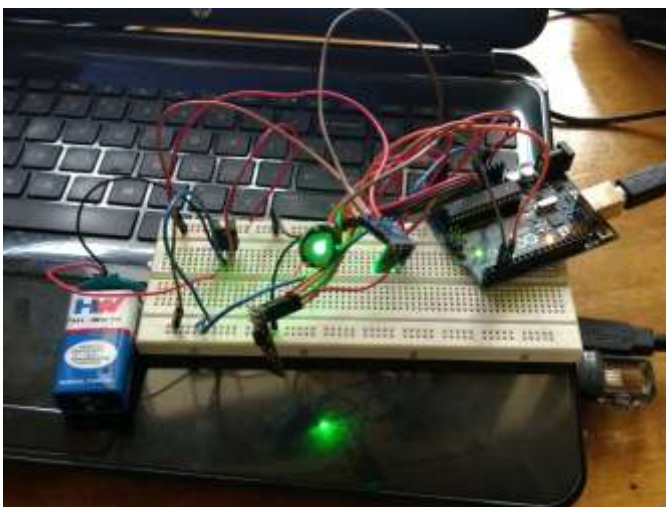**Fig -2.2**: Thing speak Initialization

Fig -2.3: Database Collection & Graphical Representation using Thing speak

6. HARWARE IMPLENTATION

7. CONCLUSION

Internet has brought a great revolution in our society. Internet of things is connecting everything to internet. IoT is seen everywhere now. IoT made cities and homes smart .And now IoT in healthcare play a great role in monitoring patient's health anywhere, especially if patient need to be monitored continuously. IoT in healthcare not only made easy monitoring of patient at their home but also made healthcare cost effective .The data collected by using various form of sensors are sent to doctors and patient relatives for immediate action in case of emergency .The important medical data of patient is stored on cloud which can be tracked by patient or doctor anytime and can also be used for analysis as well for predicting diseases. These paper focuses on various applications running that make smart healthcare systems.

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