Wireless Body Sensor Network

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Abstract – Wellbeing is one of the fundamental parts of our life. In order to make the human life free from all the crucial diseases there are numerous frameworks which help to defeat with the medical issues. This paper presents a kit which consists of a GSM module, GPS module and three different types of sensors i.e. Heartbeat, Pressure and Temperature Sensor and all of this sensor is programmed using an Arduino. This system is implemented using Internet of Things (IOT). The high and low limits can be set by the user for its blood pressure, the pulse rate as well as its body temperature and if the user's body crosses any of the limits an alert message will be send to the user register device along with a medical health guideline and if the body symptoms cross the critical range then an alert message will be sent to the nearby hospital along with its GPS location.

Keywords: GSM, GPS, Heart beat Sensor, Pressure Sensor, Temperature Sensor, IOT, Arduino

1. INTRODUCTION

Many people among us lose their life through heart attack, raising body temperature, high blood pressure and this is all because of their diet, age, less physical activity and many other factors. If we check our health regularly on daily basis then we can detect so many different diseases and can able to understand them before they cause any harm to our body. The main motive of this paper is to make people aware of the diseases which are going to be faced in future if no initiatives are being taken by them. The number of elderly people in 2050 is expected to double that of the year 2018, going from 901 million to 2.1 billion and reaching an astonishing 3.2 billion in 2100. In this scheme our motto is to receive the ejecting signals from body sensors 24/7 and detect the type abnormalities in the rhythm of heart with respect to the signals.

In this paper we are presenting the new generation of wireless body sensor network, our prototype is developed by different parameters sensors embedded in Arduino. When the expectation of a healthy person's health limit exceeds the abnormalities, said to cross the warning point. Then the exceeding warning limit warns and prescribes precautions for the worse possibilities of the risk conditions which can prevent minimum probability of health risks, even though we cannot guarantee the perfect rescue of the disable/heart patient, but at most saves the least number of lives.

2. PORPOSED MODELLING

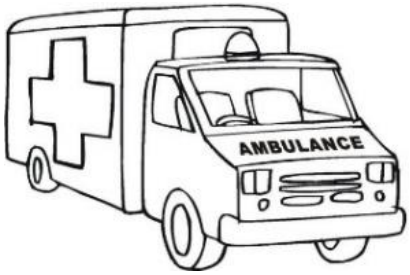
2.1 System Architecture

In the existing system the IOT changed the way of existence for the past decade in health care sector by the way we operate it. IOT is a real-time-connection and communication of gadgets and sensors and wearable machines which are easy to communicate through possible means. In case of healthcare units in IOT we are able to monitor many parameters of our body like pulse rate, blood pressure, temperature, etc. In this way the technology in our surroundings where we can access most of the circumstances by all our needs are finally tend to boost the productivity and improves quality of human existence. And IOT is mostly available in low and affordable costs.

IOT makes infinite opportunities for the medical units to gather required information about their patients, both by transmitter and by the receiver signals or sites. This provides the hospitals an opportunity to act immediately and provide patients with good care and long run. There are also many options where the doctors can monitor the patient freely, by remote-patient monitoring which is notably cost reduction availabilities. Additionally, the hospitals need not pressurize for the bed availabilities in hospital and the receivers/doctors can keep an eye on transmitters/patients remotely and respectively they can feel more lively at home which can make them recover faster and generally make them relaxed.

2.2 Working

This paper describes about a system implemented by using IOT. In this framework there are sensors which are utilized to distinguish different parameters of body and set different levels for checking that parameters are in typical state or not.



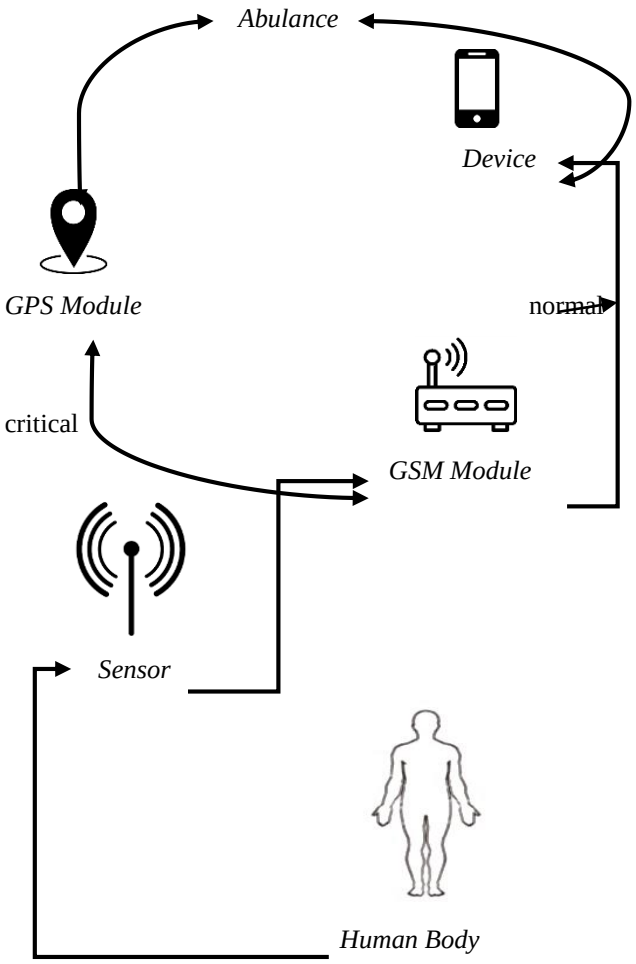


Fig 2.1 – Working Procedure

The system has three unique kinds of sensors for breaking down human body. The Heart beat sensor is utilized to examination the heart rate of the body. For adults 60 – 100 beats per minutes (bpm) is normal and for children age between 6 – 15, the normal heart rate is 70 and 100 bpm. The lower and the higher limit for this sensor is set around 53 – 95 for adults and if the limit is crossed by the body an alert message will be send to the user registered device through GSM module. Similarly, the pressure sensor is used to measure the blood pressure of the body which is 120/80 mmHg for the normal body and if the body crosses this range message will be send to the user along with the prescribed medicine for time being. And, the temperature sensor is used to measure the body temperature, normally which is around 98.6° F.

In this paper the Arduino is programmed such that is the body symptoms are around the limits set by the user then it will send an alert message to the user with the prescribed medicines but is the body is in critical situation, let's say 57 – 97 bpm then an alert message will be send to the user and to the nearby hospital or the registered emergency number along with the GPS location traced by the GPS module. In this manner by actualizing this framework we can spare a portion of the lives by checking our wellbeing on consistent schedule and monitoring the issues to be looked in future.

2.3 Components Used

2.3.1 Heart beat sensor

Heartbeat Sensor is an electronic gadget that is utilized to gauge the pulse i.e. speed of the heartbeat. Pulse can be observed in two different ways: one path is to physically check the beat either at wrists or neck and the other route is to utilize a Heartbeat Sensor. Checking pulse is critical for competitors, patients as it decides the state of the heart (just pulse). There are numerous approaches to gauge pulse and the most exact one is utilizing an Electrocardiography. In any case, the simpler approach to screen the pulse is to utilize a Heartbeat Sensor. It comes in various shapes and sizes and enables a moment approach to gauge the heartbeat. Heartbeat Sensors are accessible in Wrist Watches (Smart Watches), Smart Phones, chest lashes, and so forth. The heartbeat is estimated in pulsates every moment or bpm, which shows the occasions the heart is contracting or growing in a moment.

Fig 2.2 - Heartbeat Sensor

2.3.2 Temperature Sensor

Basically, temperature is the level of hotness of the body which is a proportion of the warmth content in the body. Most normally, temperature sensors are utilized to quantify temperature in circuits which control an assortment of equipment's. In the modern mechanization, the Temperature Sensor is utilized to gauge the temperature. The temperature sensor utilizes the converter to change over the temperature incentive to an electrical esteem. In the middle of the distinctive kinds of sensors, we can make expansive characteristics and the sensors will have the diverse properties like temperature go, contact-way, detecting component, and aligning techniques. The temperature sensor comprises of a detecting component together in lodgings of plastics or metal. By utilizing the conduction circuit, the sensors will mirror the charge of ecological temperature.

Fig 2.3 – Temperature Sensor

LM35 sensor is utilized to gauge the temperature of the human body. The LM35-arrangement gadgets are accuracy coordinated circuit temperature sensors, with a yield voltage directly corresponding to the Centigrade temperature.

2.3.3 Pressure Sensor

The Pressure sensor is utilized to gauge the systolic and the diastolic weight level utilizing the gadget. It is estimated in millimetre mercury (mmHg). Pulse changes from moment to minute.

Fig 2.4 – Pressure Sensor

Arterial blood pressure is most usually estimated by means of a sphygmomanometer, which truly utilized the stature of a section of mercury to mirror the circling weight. Blood pressure values are generally reported in millimeters of mercury, though aneroid and electronic devices do not contain mercury.

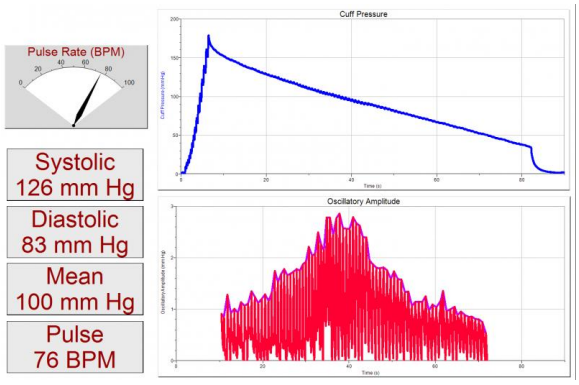


Fig 2.5 – Blood pressure measurement with animated, real – time displays

2.3.4 Arduino

Arduino is an open-source platform used for building electronic gadgets. Arduino consists of both a physical programmable circuit board (microcontroller) and a bit of programming, or IDE that keeps running on your PC, used to compose and transfer PC code to the physical board.

The Arduino stage has turned out to be very prevalent with individuals simply beginning with gadgets, and all things considered. Dissimilar to most past programmable circuit sheets, the Arduino does not require a different bit of equipment keeping in mind the end goal to stack new code onto the board – you can just utilize a USB link. Moreover, the Arduino IDE utilizes a streamlined adaptation of C++, making it less demanding to figure out how to program. At last, Arduino gives a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

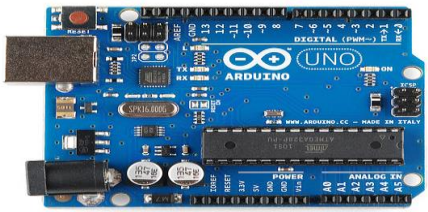


Fig 2.6 – Arduino

3.2.4 GPS module

It was developed by the DOD of the USA. Something between 24 to 32 MEO satellites are used that transmit spot-on microwave signals. From these signals the GPS tracks the movement and velocity and time of the object.

The outcome is given as longitude and latitude bearing a precision of 10 to 100 meters, which in turn are utilized by different programming applications to provide directions while exploring amid a drive or a walk.

2.3.5 GSM module

Fig 2.7 – GSM Module

It is a versatile correspondence modem. The possibility of GSM, these days essential decision for versatile correspondences, was created at Bell Laboratories in 1970. GSM, which works somewhere in the range of 850MHz and 1900MHz recurrence groups, is an open source cell innovation utilized for granting portable administrations, both voice and

information included. We insert the sim card which sends the alert message to the registered phone number whenever the body symptoms exceed the limit.

3. RESULTS AND DISCUSSIONS

This paper describes about the use of various Body Sensor Network (BSN) required for the Public who are in needs of immediate medical facilities. The population in our era mostly consist of more numbers of elder people which suffer from most of the diseases and long-lasting health issues and they are unaware of problems being faced. In order to prevent such issues this paper presents a handy medical kit which will transmit different alert signals according to the patient condition along with immediate medical guidelines.

Our proposed architecture and system have been successfully simulated and implemented in real situation. The results show that our algorithm significantly reduces the health issues and trying to save most of the human lives. The efforts made in this paper are intended to improve the health conditions in every aspect and accordingly meaning to improve the quality existence of individuals.

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