

Heart Rate Monitoring Using GSM Technology

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Abstract -- Cardiovascular disease is one of the major causes of death in many countries which accounts for about 14 million deaths worldwide. In recent days, the lifestyle of people has been changed and becoming independent. In the fast running world, the demand for personalized non-hospital based care also been increased. From the statistical analysis, it is recommended to prevent the death rate of cardiovascular disease by periodically monitoring the patient's heart. Recent trends in wireless technologies are the key elements which help patients suffering from heart disease to know about their health condition regularly and to have proper medications prescribed by the doctors. In this paper, the heart beat monitoring system using GSM technology has been discussed. This system can be used in hospitals and also in patient's remote location to provide continuous monitoring of their heart rate. In this system, heart beat sensor continuously monitors the patient's heart beat and in case of any abnormalities the system will send message to the doctor or relatives of the concerned person. To perform these operations, the system uses heart beat sensor, GSM module and to control all these devices Arduino is used.

Keywords - Heart rate, GSM, heart beat sensor, Arduino

I. INTRODUCTION

The human heart is the most important organ which makes the human body system to work properly and continuously. The heart pumps the blood to all organs like lungs, kidney and so on. The normal heart rate ranges from 60 to 100 beats per minute. If a person has heart rate greater than 100 beats per minute it is known as tachycardia. It is also analyzed that if the person has higher heart rate then the functioning efficiency of the heart will be decreased soon and finally causes cardiovascular diseases like heart attack. In order to reduce the risk of cardiac disease the heart's condition should be monitored frequently. This paper deals with heart beat monitoring using GSM technology. It is used for periodic monitoring of patients those who are suffering from heart disease. The heart beat sensor named pulse oximeter is

interfaced with GSM modem to send the heart rate to the user interfaced with the system. For every heart beat, the sensor senses the blood circulation rate. Depending upon the rate of blood circulation, the heart beat per minute is calculated. Then the calculated value is compared with the set value and finally sends the alert message to the concerned person. This device can be used to measure and monitor the heart rate from child to elder person.

II. LITERATURE SURVEY

The Infrared sensors and photodiodes are used for detection of volume of blood flow rate in the finger which is placed between the sensor and detector. Arduino is used to provide the warning signal when the heart rate is not within the predefined limit. [2] The working of heart beat sensor using infrared pulses has been discussed. [3] It has described about the monitoring of patients heart beat and transfer of information to the smart phone using raspberry pi algorithm. [4] The parameters like temperature, heart beat rate and glucose level of the patient are measured using different sensors and the data are processed using microcontroller. Based on the obtained parameters the status of the patient's health is monitored regularly. [5] A prototype has been developed to measure the human body temperature, Pulse Rate, blood pressure (BP) and ECG and to track the patient location. [6] PPG based heart beat monitoring is described. [7] It has described the concept of Internet of things used for monitoring the patient's health.

III. HEART BEAT MONITORING SYSTEM USING GSM TECHNOLOGY

In this system the sensor used is heart beat sensor; the control action is taken by Arduino Uno and the communication control is taken care by the GSM module. The pulse oximeter continuously senses the patient's heart rate. In pulse oximeter, the photo-

detectors are placed next to each other. In the reflective method when finger is placed, the light gets reflected back to the sensor. For every heart beat the volume of blood gets increased in the finger which results in increased light reflection back to the sensor. Figure1 shows the block diagram of the heart beat monitoring system.

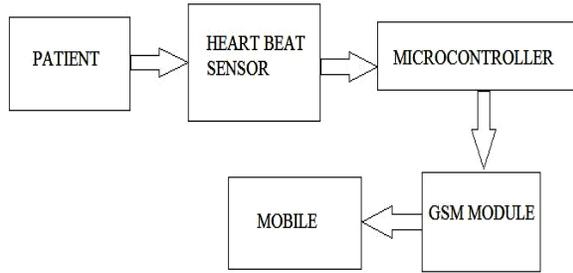


Figure1 Block diagram of Heart beat monitoring System

Hence, the peak in the waveform of the received signal indicates the heart beat rate. The sensed heart rate is continuously compared with the threshold value which is provided in the microcontroller. When the continuously sensed heart rate falls below or above the given limit, the microcontroller sends an automated message to the patient’s doctor or relatives using the standard GSM module which is interfaced to the controller unit. Also, the doctors can access the updated patient’s record from the database using which the required treatments can be provided to the patient.

IV. RESULT OF THE PROPOSED SYSTEM

The heart beat sensor senses the heart rate of the patient and transmits the data through the GSM module to the patient's mobile phone or the doctor's phone where the readings are monitored and the health conditions are under control. This system measures the heartbeat of a person and the measured data is send to a mobile as SMS through GSM module. Using this system an analytical data sheet is created by measuring the heart beat rates of various patients. The Figure 2 shows the output of the heart beat monitoring system.



Figure 2 Heart beat monitoring system using GSM

The table1 shows the heart beat rate of five persons. It is measured and analyzed using heart beat monitoring system. The data are tabulated and compared with the standard value. The health condition report are stored in the database and transmitted to the user’s mobile phone using GSM modem.

Table1 Record of heart beat rate

S.No	Person’s Age (Years)	Heart Rate (Beats/min)
1	21	70
2	22	71
3	20	67
4	23	71
5	22	69

Cardiovascular disease is one of the major causes of untimely deaths in world, heart beat readings are by far the only viable diagnostic tool that could promote early detection of cardiac events. By using this we can measure one’s heart rate through fingertip. This paper aims on the monitoring of heart rate and an alert message system. The system determines the heart beat rate per minute and sends short message service (SMS) alert to the user’s mobile phone. It is cost effective and portable. It is an efficient system and thus provides greater flexibility and serves as a great improvement over conventional monitoring and alert systems.

The device can be used by non-professional people at home. In future, the system can be miniaturized into a

small wearable device like a glove or a ring that can monitor the heart rate continuously. The continuous monitoring allows doctors to predict any abnormal conditions in the heart. Machine learning and deep learning algorithms can be implemented for predicting the heart diseases based on the recorded data. It also finds applications in the medical industry and biomedical engineering.

V. CONCLUSION

In this paper we addressed the problem of transferring the energy generated by an on-board solar cell system to the main battery pack of an electric vehicle. Three alternatives were presented and one was selected due to the improved efficiency thanks to the reduced number of conversion steps required. For this solution, based on the interaction with the BMS devices, we performed additional analyses and presented an algorithm for balancing the SOC of the battery cells during the charging phase. The analysis and results of the simulations performed in realistic conditions demonstrate that the proposed architecture is suitable for extending the driving range of electrical or hybrid vehicles, by maximizing efficiency and by guaranteeing a good battery cells balancing. By the latter improvement, it is also reasonable to expect an extended battery life

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