

HEART BEAT MONITORING SENSOR USING GSM AND PIC 16F887A

Dharanidharan K T¹, Prof.Dr.Azha.Periyasamy²

¹Department of Electronics and Instrumentation & Bharathiar University,Coimbatore-641046,TN,India

²Department of Electronics and Instrumentation & Bharathiar University-641046,TN,India

Abstract - This a device work presents a system that is capable of providing real time remote monitoring of the heart beat with improvements of an oxygen flow and SMS alert.Using GSM technology, this project intends to build and execute a low-cost, efficient, and flexible cardiac monitoring and warning system.It is constructed in such a way that the sensors detect and measure the heartbeat rate, sending the data to the control unit for correct processing and calculation of the heartbeat rate., The supply of oxygen is subsequently increased, and an SMS is sent to the medical expert's or health personnel's cell phone. As a result, this system presents continuous, real-time, remote, safe, and precise cardiac rate monitoring, which aids in patient diagnosis and early and preventive treatment of cardiovascular illnesses.

Key Words: GSM Moudle, pic 16f877a, 16*2 lcd display, heart beat sensor

1.INTRODUCTION

Heart disease has progressed to a severe level, resulting in human death. Constant patient monitoring is challenging, as clinicians are unable to observe a patient for the whole working day. Continuous patient monitoring is not practical in many important situations, such as when a patient is placed distant from a hospital or when an elderly patient has heart disease or other physical diseases. This module addresses the issues mentioned previously. The heart pulse sensor in the module measures the heart rate and sends an SMS to the medical advice for prior precautions so that the patient is not put in a dangerous scenario before arriving at the hospital. The PIC16F877A controller device is used for temporary data storage. LCD is utilised as a display to measure the values of heart beat.

2. LITERATURE SURVEY

In this fast pace of life, it is difficult for people to be constantly available for their near ones who might need them while they are suffering from a disease or physical disorder. So also constant monitoring of the patient's body parameters such as temperature, pulse rate, sugar level etc. becomes difficult.Hence to remove human error and to lessen the burden of monitoring patient's health from doctor's head, this paper presents the methodology for monitoring patients remotely using GSM network and Very Large Scale Integration (VLSI) technology. Patient monitoring systems measure physiological characteristics either continuously or at

regular intervals of time[1]. Homecare is the provision of health care services to patients in their own home. One of the main purposes of homecare telemedicine is to develop a wireless, low-cost and use-friendly system which allows patients to measure their own vital signs, such as heart rate and temperature, and provide the health care professionals with the facility to remotely monitor the patient's vital signs quickly and easily. The gadget would then activate a GSM modem (SIM based) and also a GPS (global positioning system). The gadget would then take out the location reading from the GPS. Other vital information such as Heart Rate and temperature is taken and sent to predefined numbers. The receiver will get an SMS which will contain information of the senior person with his/her position co-ordinates and his/her current status (Heart Rate). An onscreen display will start scrolling the person's name, address and contact details so that people who try to help such a person get the complete information from the device[2]. In this module we used advanced technology for patient monitoring those who are suffered from heart diseases & physical disorder. Therefore heart rate sensor and temperature sensor are used for patient monitoring. Sensors gives accurate output therefore it rules out the use of traditional medical instruments such as thermometer and other devices. For continuously sending message from patients location to medical advisory GSM modem used. This module provides relief to medical advisory for patient monitoring and also to patients for freedom of movement[3]. In this module we used advanced technology for patient monitoring those who are suffered from heart diseases & physical disorder. Therefore heart rate sensor and temperature sensor are used for patient monitoring. Sensors gives accurate output therefore it rules out the use of traditional medical instruments such as thermometer and other devices. For continuously sending message from patients location to medical advisory GSM modem used. This module provides relief to medical advisory for patient monitoring and also to patients for freedom of movement[4]. The heart rate or pulse rate, has been defined as a sign basic of medicine, and it is directly to a humans cardio health. Now we are going to make a computer – based heart rate monitor system using an Arduino software board and Pulse sensor, pulse detecting sensor that uses the principle by the Arduino, then it transfers the data to the computer through a serial monitor. A computer application is developed using processing programming java language to display the received PPG signal and instantaneous heart pulse rate. Of transmission photo-plethysmography (PPG) to sense the pulse signals from a fingertip. The sensor output is read by the Arduino board, which then transfers the data to the PC through a serial interface. A PC application is developed using Processing programming language to display the

received PPG signal and instantaneous heart rate[5]. Health monitoring is repeatedly mentioned as one of the main application areas for Pervasive computing. Mobile Health Care is the integration of mobile computing and health monitoring. It is the application of mobile computing technologies for improving communication among patients, physicians, and other health care workers. As mobile devices have become an inseparable part of our life it can integrate health care more seamlessly to our everyday life. It enables the delivery of accurate medical information anytime anywhere by means of mobile devices. Recent technological advances in sensors, low-power integrated circuits, and wireless communications have enabled the design of low-cost, miniature, lightweight and intelligent bio-sensor nodes. These nodes, capable of sensing, processing, and communicating one or more vital signs, can be seamlessly integrated into wireless personal or body area networks for mobile health monitoring. This paper, presents a mechanism for estimation of elderly well-being condition based on usage of house-hold appliances connected through various sensing units. Two new wellness functions are defined to determine the status of the elderly persons on performing essential daily activities. The developed system for monitoring and evaluation of essential daily activities was tested at the homes of four different elderly persons living alone and the results are encouraging in determining wellness of the elderly[6]. Ongoing patient health checking framework with remote sensor system using delicate registering is an innovative concept that has been already introduced in developed country in recent years. Body Area network is implemented by using compact sensors that gather and assess body parameter and development. The device gives few assistant capacities that satisfy the living request of patients. What's more it uses different sort of sensors to obtain ceaseless key signs of patients counting heart rate and body temperature. Transmission of these patients' records over web is done by GSM module to web server where database is stored. Moreover, it will produce a prediction on patient's wellbeing condition based on summation of all records of patient. Generated report will be shown on web application. With the assistance of web application both doctor and patient can have real time communication. The prototype has been effectively implemented where data has been obtained and shown. The purpose to build the prototype is to help people in developing countries as they still lack access to medical technology and proper diagnosis and treatment in proper time. In medical field, electronics industry gaining to develop medical equipment at very high advanced level techniques, they use electronics system every time for patient caring. Patient monitoring system can be defined as the system used for monitoring physiological signals that includes the parameters like electro-cardio graph, respiratory signals, invasive and noninvasive blood pressure, body temperature, gases related parameters, etc. This paper proposes to develop medical field and provide another patient caring facility to medical service for patient monitoring[7]. The heart rate is one of the significant physiological parameters of the human cardiovascular system. Heart rate is the number of times the heart beats per minute. Heart rate data reflects various physiological states such as biological workload, stress at work and concentration on tasks, drowsiness and the active state of the autonomic nervous system. Human cardiac dynamics are driven by the complex nonlinear interactions of two competing forces: sympathetic regulation increases and

parasympathetic regulation decreases the heart rate. Thus, monitoring of heart rate plays a significant role in providing the status of cardiovascular system and clinically correlated information to medical professionals. Heart rate measurement is also regarded as an essential parameter in patient care monitoring system. Heart rate can be measured either by the ECG waveform or by sensing the pulse - the rhythmic expansion and contraction of an artery as blood is forced through it by the regular contractions of the heart. The pulse can be felt from those areas where the artery is close to the skin. This paper highlights on the design of a microcontroller (PIC series) based heart rate counter that is able to capture the pulse from finger tip by sensing the change in blood volume. The heart rates of fifteen healthy normal subjects (students of age 21 - 22 yrs.) both in relaxed and excited states were measured using the designed device and a standard heart rate measuring device. The outputs of the measured device were satisfactory. Also, the designed device, being noninvasive one, can easily find its place in health care monitoring system.

3. BLOCK DAIGRAM

Sensor delivers heart pulse data to PIC when a patient's heart rate rises or falls. After receiving a signal, PIC deducts it and turns on and sends an increase in oxygen supply to the patient based on a programme. By the way, using GSM, it will send an SMS to the caregiver or physician informing them of the patients' condition.

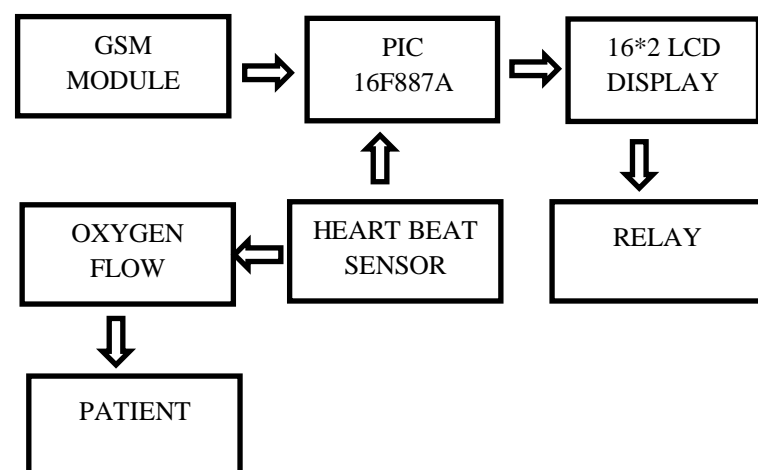


FIGURE 1: BLOCK DAIGRAM

3.1 ADVANTAGES

- We do not need to stay with a patient to check their pulse
- It helps to save lives
- The oxygen supply will increase as a result of the patient's stress being reduced;
- And it will notify the doctor via SMS.

4.PROGRAM FLOW

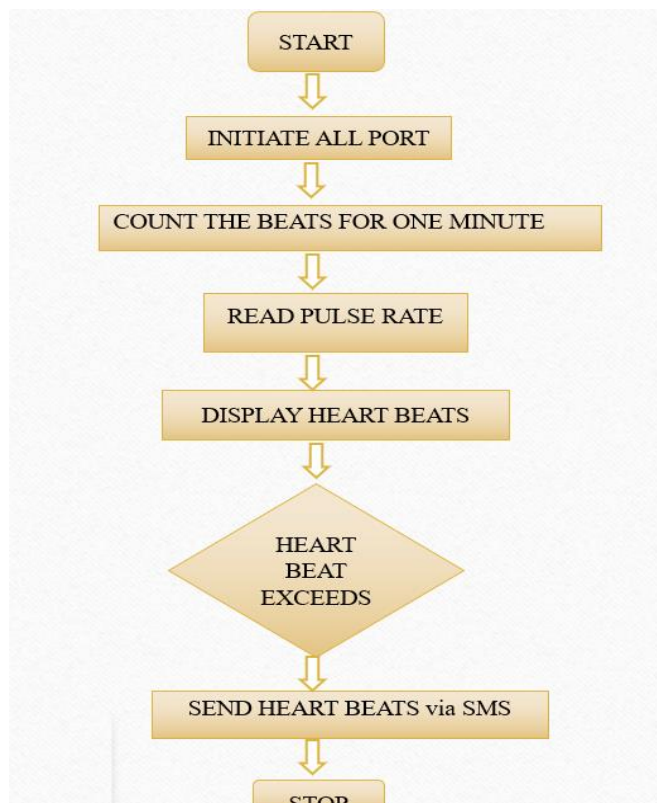


FIGURE 2: FLOW CHART

5.HEART RATE SENSOR

When a finger is placed on the heart rate sensor, it produces a digital output of heart rate. When the heart beat detector is operational, the beat LED on the sensor flashes with each heart beat. The sensor's output is then immediately connected to the PIC controller, which measures the BPM. Every minute, the pulse is counted.

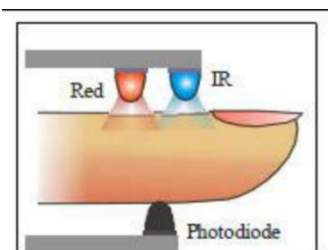


FIGURE 3: HEART BEAT OBSERVE

Age span	Heart rate (bpm)
Less than 1 month	120–160
1–12 months	80–140
12 months – 2 years	80–130
2–6 years	75–120
6–12 years	75–110
More than 12 years	60–100

FIGURE 4: HEART RATE

5.1 PIN CONFIGURATION

Three pins make up the pulse sensor pin configuration, which are explained below.

Pin1 (Ground): This is a black color wire, used to connect to the GND terminal of the system

Pin2 (Vcc): This is a red color wire, used to connect to +3.3V/+5V voltage supply

Pin3 (Signal): This is a purple color wire, used to connect the output signal which is pulsating

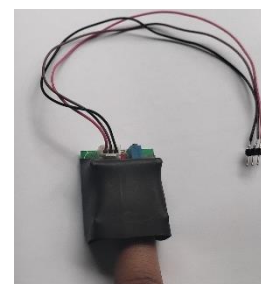


FIGURE 5: PULSE SENSOR

6.GSM

GSM stands for global system for mobile communication, and it is used to connect a GSM modem to a mobile device. To communicate with the network, GSM modems require a 12V power source, a communication interface such as RS232, and a SIM (Subscriber Identity Module) Card, similar to mobile phones. The following AT-Commands are used in GSM modem communication.

7.16F877A

This CMOS FLASH-based 8-bit microcontroller bundles Microchip's strong PIC architecture into a 40- or 44-pin package, making it powerful yet simple to write (just 35 single word instructions). The PIC16F887 has 256 bytes of EEPROM data memory, self-programming, an ICD, 2 Comparators, 14 channels of 10-bit Analog-to-Digital (A/D) converter, 1 capture/compare/PWM and 1 Enhanced capture/compare/PWM functions, a synchronous serial port that can be configured as either a 3-wire Serial Peripheral Interface (SPITM) or a 2-wire Inter-Integrated Circuit (I2CTM) (EUSART). All of these characteristics make it appropriate for higher-level A/D applications in automotive, industrial, appliances, and consumer electronics.

8. CONCLUSIONS

We were able to save a patient's life from a potentially fatal step by using this strategy. When a patient has a heart attack, this device assists in obtaining pure oxygen. We can't bring the dead back to life, but we can pause them.

REFERENCES

1. Jaiee Sitaram Adivarekar, Amisha Dilip Chordia, Harshada Hari Baviskar, Pooja Vijay Aher, Shraddha Gupta, **"Patient Monitoring System Using GSM Technology"**, International Journal of Mathematics and Computer Research, Page No.73-78, Volume 1 issue 2, March 2013
2. Sanjay Verma, Namit Gupta, **"Microcontroller-based Wireless Heart Rate Telemonitor for Home Care"**, IOSR Journal of Engineering, Page No. 25- 31, volume ,Issue 7, July 2012.
3. P.S. Kurhe, S. S. Agrawal, **"Real Time Tracking & Health Monitoring System of Remote Soldier Using Arm7"**, International Journal of Engineering Trends and Technology, Page No. 311-315, Volume 4, Issue 3 2013.
4. Sudhindra.F, Annarao.S.J, Vani.R.M, P.V. Hunagund, **"A GSM Enabled Real Time Simulated Heart Rate Monitoring & Control System"**, International Journal of Research in Engineering and Technology, Page No. 6-10 ,Volume: 03 May 2014.
5. Bhagya Lakshmi.J.M Hariharan.R Udaya Sri.C3 Nandhini Devi.P Sowmiya.N **"Heart Beat Detector using Infrared Pulse Sensor"** IJSRD - International Journal for Scientific Research & Development| Vol. 3, Issue 09, 2015.
6. R.Aravind, Syed Musthak Ahmed, **"Design of Family Health Care Monitoring System Using Wireless Communication Technology"**, International Journal of Advanced Research in Computer and Communication Engineering, Page No.-3666-3671 volume 2, Issue 9 September 2013.
7. J.G. Sempere, **"An overview of the GSM system"**, Department of Electronic & Electrical Engineering, University of Strathclyde, Glasgow, Scotland, 1999.
8. Souvik Das **"The Development of a Microcontroller Based Low Cost Heart Rate Counter for Health Care Systems"** International Journal of Engineering Trends and Technology- Volume 4 Issue 2- 2013.