

## Malfunctioning Detection and Patient Tracking Device

Devidas Temghare<sup>1</sup>, Pratiksha Katkar<sup>2</sup>, Abaji Bhalerao<sup>3</sup>, Asst.Prof.M.N.Khan<sup>4</sup>, Asst.Prof.Sitaram Longani<sup>5</sup>

<sup>1</sup> Electronics & Telecommunications, ISB&M School of Technology, [rkhdevidas@gmail.com](mailto:rkhdevidas@gmail.com)

<sup>2</sup> Electronics & Telecommunications, ISB&M School of Technology, [pratiksha\\_katkar@rediffmail.com](mailto:pratiksha_katkar@rediffmail.com)

<sup>3</sup> Electronics & Telecommunications, ISB&M School of Technology, [abajibhalerao@gmail.com](mailto:abajibhalerao@gmail.com)

<sup>4</sup> Electronics & Telecommunications, ISB&M School of Technology, [wwwnadeem@gmail.com](mailto:wwwnadeem@gmail.com)

<sup>5</sup> Electronics & Telecommunications, ISB&M School of Technology, [sitaramlongani@gmail.com](mailto:sitaramlongani@gmail.com)

### Abstract

The heart Diseases cause millions of death worldwide because of the increase in the aging population and the rising of healthcare costs. Heart malfunctioning is one of most feared diseases in today's world which is increasing as a drastic level causing the increment in death rates. The main reason behind this is that many of us neglect any kind of minor changes in our human system and do not refer to any doctors or do any kind of check-ups. Technological advancements in the field of medical electronics and communication can help decreasing the cost of healthcare. For that purpose we are going to implement such a system which is "Heart malfunctioning detection and patient tracking device". This system senses the heart bit rates and humidity of human body continuously and tells to the microcontroller. The microcontroller having predefined levels are given to the microcontroller which then checks the heart rate level, and if it cross the predefined level then the GSM/GPS installed which sends the message and gives a call to the contacts saved in the list and also provides the details of location to the contacts.

**Keywords-**16F877A PIC microcontroller, D.C motor, sensors, GSM/GPS.

### I. INTRODUCTION

Heart attack is one of the most feared diseases in today's world which is increasing at a drastic level causing the increment in death rates. The main reason behind this is that many of us neglect any kind of minor changes in our human system and do not refer to any doctors or do any kind of check-ups. On the other hand, if a person gets to know about the problem before he gets seriously attacked by it, he can take proper precautions or refer to a doctor or call a friend or family members, thus saving his own life which is very precious.

In order to overcome this problem we are implementing Heart malfunctioning device which will be carried by the person. The electrical activity of human body is represented by bioelectric signal. These bio electric signals are generated due to depolarization of muscle cells. The measure of this electrical activity associated with the heart muscle is known as the heart rate. The main feature of this device is that it will detect the heart rate signals accurately, it allows for the proper detection and classification of any heart disorders that a patient might have. Any change in the heart rate signals will be detected and the alarm will ring, thus the person will be aware of the upcoming problem.

Another feature added to this device is that it has been installed with the GPS and GSM system which can be used to make calls and track the patient, thus providing efficient and on time help to the patient.

It provide voice signal to self-awareness of patient and first aid medication kit, which is helpful to controlling heart malfunctioning.

Need of this project is to provide on time help and save valuable life of people. If a person gets to know about the problem before he gets seriously attacked by it, he can take proper precautions or refer to a doctor or call a friend, thus saving his own life which is very precious. Heart related conditions such as high blood pressure and poor blood

supply to the heart muscle due to coronary artery disease , heart valve disease, heart failure, heart muscle disease.[2]. These conditions of heart cannot measures directly ,for this purpose heart malfunctioning detection system is helpful.

### II. METHODOLOGY

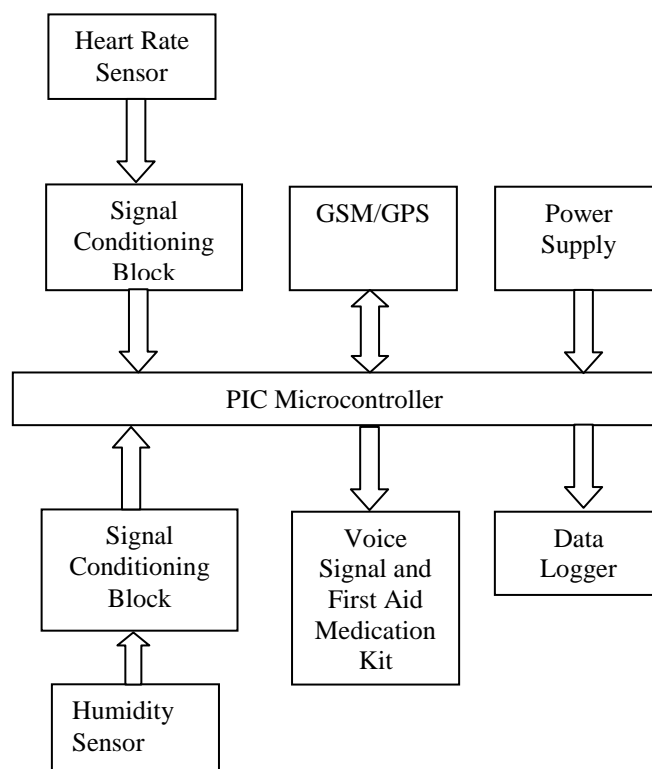


Figure 1. Functional figure

The sensors used in this project are humidity sensor and heart rate sensor. The humidity sensor senses the sweat on the body and the electrical signal is given to the signal conditioning which amplifies the signal and is given to the microcontroller. Similarly, the heart rate sensor senses the heart beats and gives the signal to the microcontroller. Now the values and range of the normal heart beat is loaded or we can say its predefined in microcontroller through programming. If the received rate exceeds the predefined value stored in the microcontroller, the microcontroller will give a call to the numbers stored in it and checks the location of the patient and forwards it to those lists of numbers. After this, the patient will be tracked and even precaution would be possible as it will call the numbers which can be of relatives or parents of the patient. The microcontroller will also generate a voice signal situated on the first aid kit and it will open the kit by using motors so that the nearby people or doctor or he/she personally can take medicines from it. The day to day data of heart rate and humid rate will be shown on the LCD placed on the kit.[3].

### 2.1 16F877A PIC MICROCONTROLLER:-

The system consist of PIC Microcontroller which senses the condition of the patients continuously as soon as it senses some irregularities in the health of the patients it starts recording the data, analyzing it with the stored data and if it finds out the resultant data matches the stored suspected data then it fires the alarm and also contact the hospital for ambulance and also the relatives.

#### 2.1.1 Peripheral Features:

It has three timers namely, Timer0: 8-bit timer/counter with prescaler of 8-bit, Timer1: 16-bit counter/timer with prescaler, and Timer2: 8-bit counter/timer of 8-bit, prescaler and postscaler, two Capture, Compare, PWM modules where it has capture of 16-bit.

#### 2.1.2 Analog Features:

It has 10-bit, up to 8-channel Analog-to-Digital Converter (A/D). It also has analog Comparator module with two analog comparators, on-chip programmable voltage reference module, input programmable multiplexing from device inputs and internal voltage reference.

#### 2.1.3 Program Memory Organization

The PIC16F87XA devices have a program counter of 13bit which has addressing of 14 bit program memory space x 8K word. The PIC16F877A devices have 14 bits of Flash program memory x 8K words, while PIC16F8774A devices have 14 bits x 4K words. Wrap round is caused due to access of location which is above the physically implemented address.

#### 2.1.4 Data Memory Organization

The data memory consists of multiple banks which contain the SFR that is Special Function Registers and the General

Purpose Registers. Bits RP1 with Status<6> and RP0 with Status<5> are the bank select bits. The Special Function Registers (SFR's) has its reservation at the lower locations of each bank.

## 2.2 SENSORS:-

### 2.2.1 Humidity Sensor

In our system we used swet sensor which is nothing but humidity sensor (SY-HS-22) for the purpose of swet sensing specifically it operate on 5v dc with the power of 3.0ma. Basically range of the humidity sensor that means it operate 30% to 90% of swet sensing. Tolerance of the humidity sensor is 5%.[4].



*Figure 2. Humidity Sensor*

### 2.2.2 Heart Rate Sensor

The data output of heart rate sensor can be useful whether we design an routine of exercise, studying our anxiety levels just want our shirt to get blinked with our heartbeat. The main problem experienced is that it is difficult to measure heart rate. The Pulse-sensor can also solve the query. The Amped Pulse Sensor can be portable heart rate sensor easily for Adriano. It can be used by students also artists also athletes and game & designer of mobile who wants to incorporate live heart rate basic data in their operated projects. It is important to combine a simple small heart rate sensor circuitry of noise cancellation and amplification making it easy and fast to get more reliability readings of pulses. It is good for applications based on mobiles as it takes power only with 4mA current which is drawn at 5V.

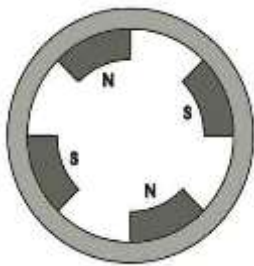
Now clip and put the Pulse sensor to your ear fingertip or earlobe and also plug into your 5V or 3V Adriano. The standard male headers are used to terminate the pulse sensor so that no soldering is required for it. Adriano code is there available and also sketch for visualization of heart rate data.[1].



*Figure 3. SEN 11574 Heart Rate Sensor*

### 2.3 D.C MOTOR:-

To know the operating principle of DC motor, it's important to have a basic understanding and knowledge of Fleming's Left hand rule which determine the direction of force on the conductors of permanent dc motor. It says that if we extend the thumb, middle finger and index finger of our left hand in a position that the index finger indicates the electric current carrying conductor placed in a magnetic field which is perpendicular to the middle finger indicating the direction of electric current, then the thumb indicating conductor which experiences a force in the direction of the mutually perpendicular direction of field and the electric current in the conductor. The DC motor types can be listed as follows: DC motor, permanent magnet DC motor, separately excited DC motor, self-excited DC motor, compound wound DC motor, cumulative compound DC motor, differential compound DC motor. We are using the permanent magnet DC motor. Permanent magnet is used to make the field poles of permanent magnet DC motor. A PMDC motor consists of two parts – a armature and stator. The stator is basically a steel cylinder. The inner periphery of this cylinder is attached with magnets. The permanent magnets are mounted such that the S - pole and N- pole of each magnet are faced on the same side of armature alternatively as shown in the figure. That means, if S - pole of one magnet is faced on the same side of armature then N - pole of the next magnet should be faced towards armature. The steel cylindrical stator provides return path with low reluctance for the magnetic flux. It is sometimes found that field coil is used along with permanent magnet.



**Figure 4. Stator of permanent magnet DC motor**

Working principle of PMDC motor is almost same as that of DC motor. The conductor experiences force when a carrying conductor comes into a magnetic field and the direction of this force is given by Fleming's left hand rule. In a permanent magnet dc motor, the magnetic field of permanent magnet consists of the armature. Now here each conductor of the armature goes through the force  $(F) = \text{Magnetic field strength in Tesla (B)} \times \text{Electric current in Ampere(I)} \times \text{Length in meter(L)}$ . The compilation of forces produces a torque as force is experienced by each conductor, which tends to rotate the armature.

### 2.4 GSM/GPS:-

In our system we use GSM/GPS module which is nothing but SIM 900 module. It operates on the frequency ranges like 850/900/1800/1900 mega hertz. The basic purpose or use of this module is to make call to the patient relatives and

family doctor as well as track the patient according to the particular location using longitude and latitude. After that system will send the location in the form of normal messages.

## III. RESULT

**Table 1. Result table describing the relation between heart rate by stethoscope and heart rate by sensor**

	Heart rate by stethoscope	Heart rate by Sensor
1	67%	70%
2	77%	79%
3	81%	86%
4	68%	69%
5	72%	75%

**Table 2. Result table describing the relation between actual sweat and humidity**

Sr No	Actual Sweat	Humidity
1	70%	50-44%
2	60%	50-55%
3	50%	40-45%
4	40%	30-35%

After sensing Malfunctioning duration required for the calling and messaging are-

- SMS Duration: 30-40 sec.
- Calling Duration: Around 50 sec.

## IV. CONCLUSION

Here we conclude that this Heart Malfunctioning Detection and Patient Tracking system is suitable for heart malfunctioning detection and provides the location for tracking of patient. It also provides some medication which is useful to take precaution of the heart in such scenario and it can be also further developed and used for more precise application where very minor symptoms can be detected regarding to heart which can be cured in very less time because of this system. It provides efficient and on time help to the patient and save the life. During short time period we can provide facilities to the patient this is the one of important part of our system. In this way we have try to save the life of patient.

**REFERENCES**

- [1] Kappiarukudil K.J, “Real-time monitoring and detection of heart attack using Wireless Sensor Network”, *Fourth International Conference dated on 18-25 July 2010*
- [2] IZMIR “Portable heart rate monitoring system” *Biomedical Engineering Meeting,2009. BIYOMUT 2009. 14th National Date of Conference:20-22 May 2009*
- [3] Alauddin Al-omary “Heart disease monitoring system using web and smart phone” issue 4<sup>th</sup> April 2014.
- [4][www.efy.com](http://www.efy.com)
- [5][www.ijareeie.com](http://www.ijareeie.com)