

A PIC controlled based heart rate miniaturization using GSM

¹Shaik Irfan Babu, ²Gade Nagi Reddy

¹Assistant Professor, Department of CSE, Mahatma Gandhi Institute of Technology, Hyderabad, Telangana, India.

skirfanbabu_cse@mgit.ac.in

²Assistant Professor, Department of CSE, Mahatma Gandhi Institute of Technology, Hyderabad, Telangana, India

nagireddysptl@gmail.com

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Abstract

We used advanced technologies in this module to track patients suffering from heart failure and physical disorders. As a consequence, a heart rate sensor and a temperature sensor are utilized to track the patient. Sensors provide precise results, obviating the need for conventional medical instruments such as thermometers and other devices. GSM modem is used to transmit messages from the patient's position to the medical advisory. This module relieves medical advisors of the burden of patient monitoring while also allowing patients to travel about freely.

Keywords – GSM Modem, Heart rate, LCD, PIC controller, Temperature.

I. INTRODUCTION

These days, coronary infection has superior to a volatile degree, bringing about human passing. Consistent affected person checking is difficult, and doctors cannot display a affected person for the entire working day. Constant staring at of a affected person is absurd in positive important conditions, as an instance, when the affected person is organized some distance faraway from the medical clinic or whilst the patient is older and reports coronary illness or different real handicaps. This module facilities round tending to the problems recorded formerly. The module consists of a pulse sensor and a temperature sensor that display screen the affected person's pulse and inner warmth degree and sends a SMS to the clinical warning through the GSM module, making them aware of play it secure earlier than the patient suggests up on the sanatorium. The PIC16F877A regulatory framework was utilized to in brief store the data. LCD is utilized to cope with the decided estimations of pulse and inner warmth degree.

II. PROPOSED SYSTEM

Figure 1 depicts a block diagram of the proposed scheme. The GSM modem and other components in this module are powered by 12V and 5V, respectively.

All devices are instated when the framework starts off evolved. The pulse and temperature sensors at that factor compute pulse and internal warmth stage, and all yields are shipped off the PIC regulator. Since the PIC regulator has an ADC inherent, it could alternate easy records over to superior. This data is distributed off medical warning by means of GSM modem and AT-Commands. The TTL to CMOS stage converter is applied in the center of the PIC regulator and the GSM stage converter to exchange TTL over to CMOS stage and the alternative way round. The MAX232 IC become utilized to change over levels. We are given restriction degrees for pulse and internal warmth level in this module. The ringer will activate whilst the pulse and inner heat stage reach or fall under the threshold level.

III. COMPONENT INTEGRATED

A. PIC Controller

Microprocessor Technology Corporation dispatched the PIC, a eight-bit microcontroller, in 1989. Peripherals Interface Controller [1] is the shortened form for Peripherals Interface Controller. The PIC16F877A is a rapid RISC processor. The yields of sensor circuits are treated by way of the PIC regulator. The little, flexible size joined without any problem with which the product can be refreshed and modified. PIC16F877A is a microcontroller that is applied in equipment and control frameworks [1].

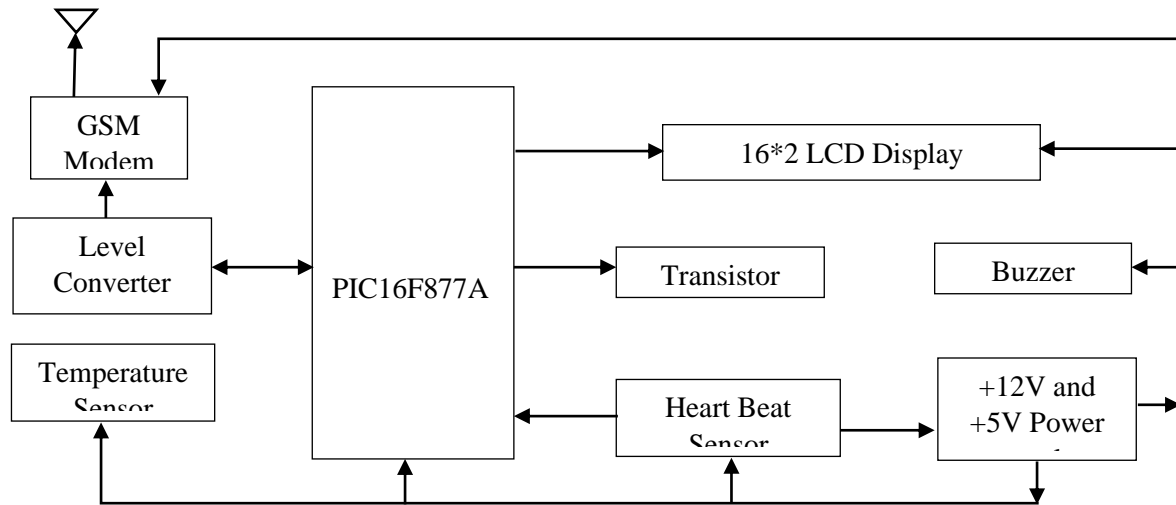


Figure. 1 Block Diagram of System

Specifications: -

- The PIC controller needs a DC-20MHz clock input.
- ADC is 10 bit and can accommodate up to 8 channels.
- Memory for flash programs is up to 8K*14 words.
- Up to 368*8 bytes of data memory
- Data memory in EEPROM is up to 256*8 bytes.
- There are three types of timers: Timer0- an 8-bit timer/counter, Timer1-16-bit timer/counter, and Timer2- an 8-bit timer/counter.

B. Heart Rate Sensor

At the point whilst a finger is placed on the heartbeat sensor, it creates an advanced yield of pulse. At the factor whilst the heartbeat indicator is operating, the thump LED on the sensor streaks with every heartbeat. The sensor's yield is then straightforwardly associated with the PIC regulator, which estimates the Beats per Minute (BPM) rate. At each heartbeat, it works on the rule of thumb of light law thru blood flow through the finger.

Specifications: -

- The operating voltage is limited to +5V DC.
- The operating current is 100 mA.
- The output data levels are TTL 5V.
- LED is used to monitor heartbeats and produce high-pulse output.
- 660nm Super Red LEDs are used as the light source[10].

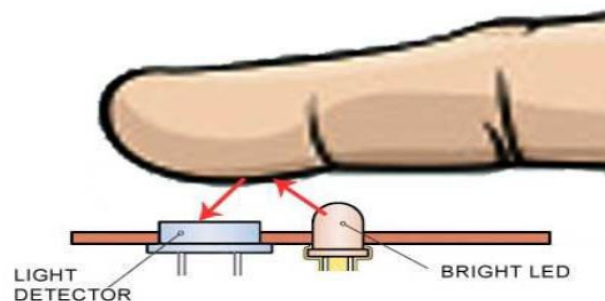


Figure.2 Hearts Rate Sensor

C. Temperature Sensor

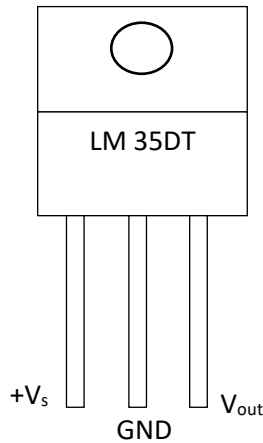


Figure.3 Temperature Sensor

The LM35 is a temperature sensor that produces yield voltage this is at once relative to the temperature in Celsius. The LM35 needn't trouble with outer adjustment. It works somewhere within the variety of 4 and 30 volts and has a low impedance yield.

Specifications: -

- Directly calibrated in degrees Celsius (Centigrade).
- Scale Factor Linear + 10 mV/°C.
- 0.5°C Accuracy Guaranteed (at +25°C).
- Temperature Range: 55°C to +150°C.

D. GSM Modem

GSM represents global framework for portable correspondence that is applied to interface a GSM modem to a cell telephone. To talk with the organization, GSM modems need a 12V pressure deliver, a correspondence interface like RS232, and a SIM (Subscriber Identity Module) Card, like phones. The accompanying AT-Commands are applied to speak with a GSM modem.

TABLE I
AT-Commands for GSM

AT-Commands	Description
AT	Enter
AT+CMGF	Select SMS Message Format
AT+CMGS	Send SMS Message

E. LCD Display

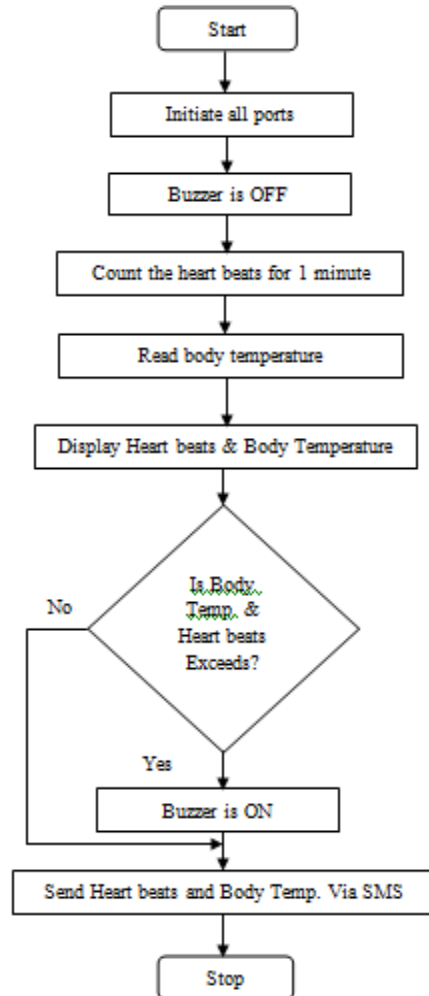
A liquid crystal display (LCD) is a type of display that uses liquid crystals to display information. There are 14-pin and 16-pin LCD displays on the market. We are using a 16 pin 16*2 LCD display in this project. There are two lines of 16*2 characters per line, and each character is shown in a 5*7 matrix on the LCD.

IV. SOFTWARE DESIGN

A. Software

The strong programming mikroC PRO for PIC gives development apparatuses for PIC regulators. It gives the developer the least tough attainable solution for planning programs with out forfeiting execution or force.

B. System Design Flow



C. Design

The equipment circuit is instated while the switch is grew to become on. Subsequent to squeezing the reset button, the pulse and temperature are anticipated. Check the heartbeat for 30 seconds and in a while make an interpretation of it to beats each second using the formula below:

$$\text{CountRead} = \text{TMR0} * 2 \quad (1)$$

All the at the same time as take your internal heat level and convert it to tiers Celsius using PIC (Celsius). At lengthy last, utilizing the AT+CMGS request, estimated temperature and pulse readings were shipped off the concerned medical counselor thru GSM modem. This facts is also appeared on a LCD display.

V. EXPERIMENTAL ANALYSIS

A. Tested Results

Screen displayed after switch on kit



Figure.6 LCD monitoring

Display heart rate and Temperature



Figure.7 LCD analysis

TABLE II
Results and discussion

Sr.No	Initial Condition		Tested Results		Time
	T	HB	T	HB	
Person 1	28	0	30	73	After 1 min
	28	0	32	69	After 5 min
Person 2	28	0	31	70	After 1 min
	28	0	30	68	After 5 min

B. Hardware Setup

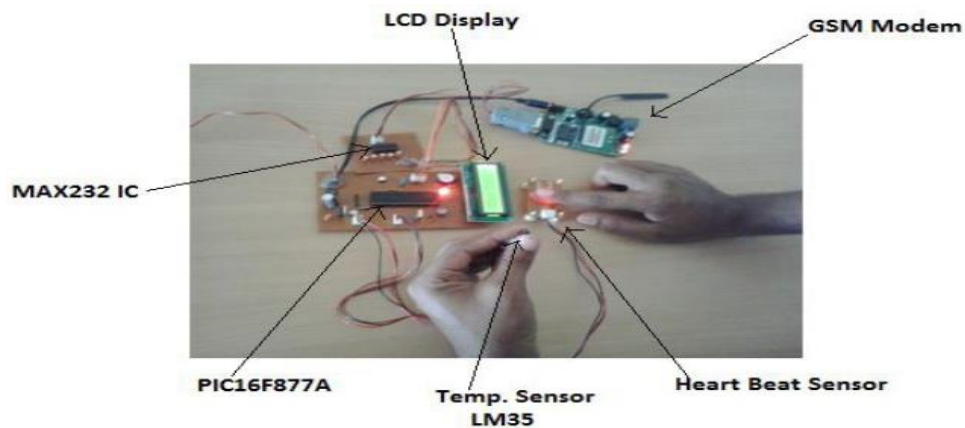


Figure 8 Working Setup of Developed System

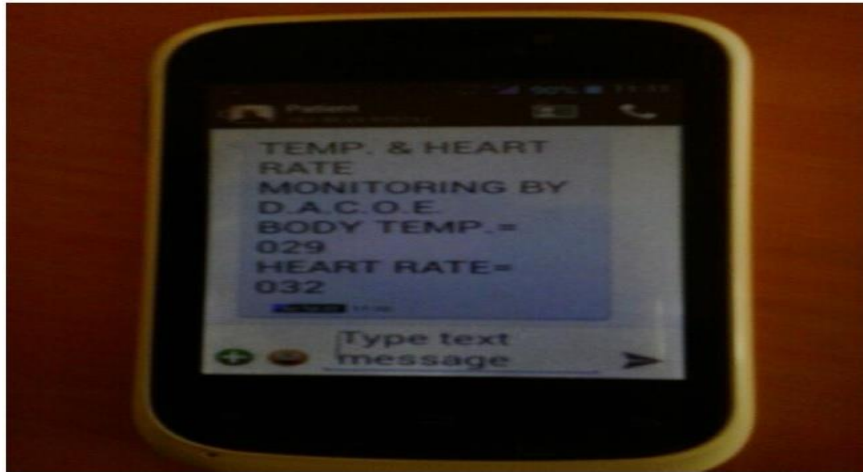


Figure.9 Output of Developed System

VII. CONCLUSION

The fundamental point of this module is to ship a SMS warning to scientific guides about the patient's gift ailment. At the point when the internal warmth stage and pulse reach or fall under the threshold, the bell will sound. It accomplishes the inducement at the back of computing pulse and inner warmth degree. This module is treasured whilst persistent patient checking is needed in a simple condition. This module may be discovered in clinical clinics, houses, and ambulances.

The GSM modem, however, requires a postpaid SIM card for this module. Without network coverage, no message can be sent to medical advisory.

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