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Heart Beat Rate Monitoring System Using GSM

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Abstract- **The design and development of heart beat rate sensor systems for health monitoring has garnered lots of attention in the scientific community and the industry during the last years. Mainly motivated by increasing healthcare costs and propelled by recent technological advances in miniature sensing devices, smart textiles, microelectronics, and wireless communications, the continuous advance of heart beat rate sensor-based systems will potentially transform the future of healthcare by enabling proactive personal health management and ubiquitous monitoring of a patient's health condition. In order to evaluate the maturity level of the top current achievements in heart beat rate health-monitoring systems, a set of significant features, that best describe the functionality and the characteristics of the systems, has been selected to derive a thorough study. The aim of this survey is not to criticize, but to serve as a reference for researchers and developers in this scientific area and to provide direction for future research improvements.**

I. INTRODUCTION

Heart rate measurement is one of the very important parameters of the human cardiovascular system. The heart rate of a healthy adult at rest is around 72 beats per minute. Athletes normally have lower heart rates than less active people. Babies have a much higher heart rate at around 120 beats per minute, while older children have heart rates at around 90 beats per minute. The heart rate rises gradually during exercises and returns slowly to the rest value after exercise. The rate when the pulse returns to normal is an indication of the fitness of the person. Lower than normal heart rates are usually an indication of a condition known as bradycardia, while higher than normal heart rates are known as tachycardia.

More sophisticated methods to measure the heart rate utilize electronic techniques. Electro-cardiogram is one of frequently used and accurate methods for measuring the heart rate. ELECTROCARDIOGRAPH is an expensive device and its use for the measurement of the heart rate only is not economical. Low-cost devices in the form of wrist watches are also available for the instantaneous measurement of the heart rate. Such devices can give accurate measurements but their cost is

usually in excess. Most hospitals and clinics in the UK use integrated devices designed to measure the heart rate blood pressure, and temperature of the subject. Although such devices are useful, their cost is usually high and beyond the reach of individuals.

This paper describes the design of a very low-cost device which measures the heart rate of the subject by clipping sensors on one of the fingers and then displaying the result on a text based LCD. The device has the advantage that it is microcontroller based and thus can be programmed to display various quantities, such as the average, maximum and minimum rates over a period of time and so on. Another advantage of such a design is that it can be expanded and can easily be connected to a recording device or a PC to collect and analyse the data for over a period of time.

II. DEVICE OVERVIEW

PIC16F873A/876A devices are available only in 28-pin packages, while PIC16F874A/877A devices are available in 40-pin and 44-pin packages. All devices in the PIC16F87XA family share common architecture with the following differences:

•The PIC16F873A and PIC16F874A have one-half of the total on-chip memory of the PIC16F876A and PIC16F877A

•The 28-pin devices have three I/O ports, while the 40/44-pin devices have five

•The 28-pin devices have fourteen interrupts, while the 40/44-pin devices have fifteen

•The 28-pin devices have five A/D input channels, while the 40/44-pin devices have eight

•The Parallel Slave Port is implemented only on the 40/44-pin devices

The available features are summarized in Table1-1. Block diagrams of the PIC16F873A/876A and PIC16F874A/877A devices are provided in Figure1-1 and Figure1-2, respectively. The pin outs for these device families are listed in Table1-2 and Table1-3. Additional information may be found in the PIC microcontroller Mid-Range Reference Manual (DS33023), which may be obtained from your local Microchip Sales Representative or downloaded from the Microchip web site. The Reference Manual should be considered a complementary document to this data sheet and is highly recommended reading for a better understanding of the device architecture and operation of the peripheral modules.

Heart Beat Sensor

Heart beat sensor is used to sense patient's heart beat rate with the help of volume of blood and it gives digital output to the microcontroller. Heart beat sensor is designed to give digital output of heat beat when a finger is placed on it. When the

heart beat detector is working, the beat LED flashes in unison with each heart beat. This digital output can be connected to microcontroller directly to measure the Beats Per Minute rate. It works on the principle of light modulation by blood flow through finger at each pulse.

Features

- Heat beat indication by LED
- Instant output digital signal for directly connecting to microcontroller
- Compact Size
- Working Voltage +5V DC Applications
- Digital Heart Rate monitor

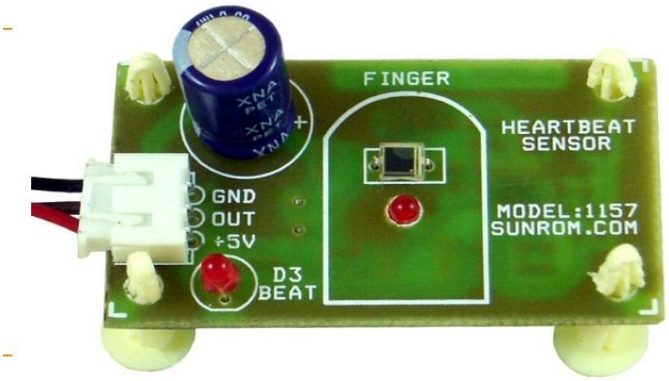

Fig.1 Heart Beat Rate Sensor

RF- Module

RF module is used to transmit and receive data serially, it is interface with the microcontroller to TX and RX pin

This is a RF data modem working at 2.4 GHz frequency in half duplex mode with automatic switching of receive/transmit mode with LED indication. Receives and Transmits serial data of adjustable baud rate of 9600/115200 bps at 5V or 3V level for direct interfacing to microcontrollers.

RF modem can be used for applications that need two way wireless data transmission. It features high data rate and longer transmission distance. The communication protocol is self-controlled and completely transparent to user interface. The module can be embedded to your current design so that wireless communication can be set up easily.

Typical Application

When setting a RF serial data communication between microcontrollers or a microcontroller to PC, the RF modem is most useful and easy to implement.

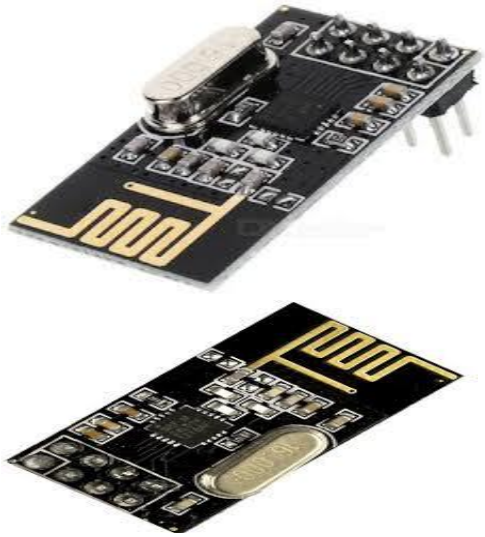

Fig.2 RF-Module with Transmitter and Receiver

Specifications

- Working voltage 3.3V to 5V
- Frequency 2.4 GHz
- Output RF Power 0dbm
- Typical Operating Range: 50-70 meters
- UART baud rate (8 bit data, no parity, 1 stop bit) 9600 bps (default) or 115200 bps (if baud rate jumper shorted)

Pin definition

- RXD = Receive Input: Connected to TXD pin of microcontrollers.
- TXD = Transmit Output: Connected to RXD pin of microcontrollers.
- +3/5V = Regulated 3.3V to 5V supply input.
- GND = Ground level of power supply. Must be common ground with microcontroller.

III. Conclusion And Future Work

- A commercial model should be able to display more than one message at a time. Currently in our project we are using onboard RAM memory to save a single message. To overcome this shortcoming we can interface an EEPROM to save messages. This not only allows more than one message to be displayed at a time but also allows us to retrieve messages from the EEPROM even after a power failure.
- Alphanumeric LCDs have a limitation on size as well as no of characters. These can be replaced with large LED display boards which are not only eye catching but display characters in a moving fashion one after the other.
- In our project we are sending messages via GSM network and displaying on a LCD by utilizing AT commands. The same principle can be applied to control electrical appliances at a distant location.
- Robots can be controlled in a similar fashion by Sending the commands to the robots. These commands are read by using AT commands and appropriate action is taken.

This can be used for spy robots at distant locations, utilized by the military to monitor movement of enemy troops.

- Currently farmers have to manually put on or off pumps, drippers etc by using electric switches. Using the principle of AT commands we can put on or off these appliances remotely.

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