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Microcontroller based Healthcare Monitoring and Tracking System for Soldiers

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Abstract: Soldiers health monitoring can provide useful physiological information in the home. It is useful for elderly or chronically ill Soldiers who would like to avoid a long hospital stay. Wireless sensors are used to collect and transmit a signals of interest and a processor has been programmed to receive and automatically analyze the given sensor signals. In this project, appropriate sensors choosed to detect. Using a single parameter monitoring system an approach to a remote health monitoring system was designed that extends healthcare from the traditional clinic or hospital setting to the Soldier's home. The given system to collect a heartbeat detection data, fall detection system data, temperature data and few other parameters. The single parameter monitoring systems was then availed for remote detection from the given data.

Keywords: heartbeat detection, MEMS, Bluetooth module, PIC, LCD, ECG

I. INTRODUCTION

The system enables to soldiers health monitoring using temperature sensor , heart beat sensor , MEMS sensor and Bluetooth module. The data coming from sensors are transmitted wirelessly using Bluetooth module. When soldier is in the critical situation he can get help from the available control room and communicate with other soldier present in the transmission and reception range by using an emergency switch.

II. BLOCK DIAGRAM

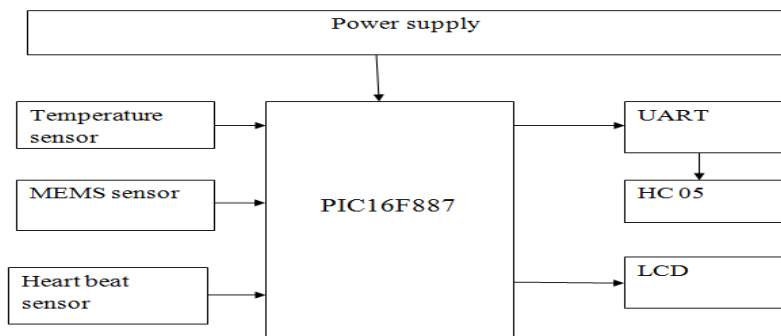


Fig- 1 Block diagram of soldier healthcare monitoring system

III. COMPONENTS USED

A. DC Power Supply

The function of DC power supply is nothing but it supplies a voltage of either positive or negative polarity to its load. DC power supply has been powered from a DC source or from an AC source such as the power mains. For energy source some DC power supplies use AC mains electricity. These power supplies employ a transformer to convert the input voltage to a higher or lower AC voltage. A rectifier used in power supply is to convert the transformer output voltage to a varying DC voltage, which in turn is passed through an electronic filter to convert it to an unregulated DC voltage.

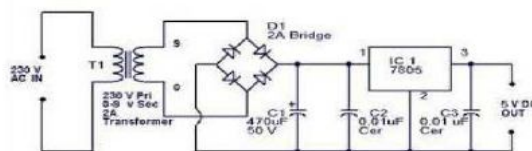


Fig- 2 12V Power supply(DC)

Ripples arise when the filter removes most of the AC voltage variations and the remaining voltage variations. Power supply provides the minimum amount of filtering and the electric load's tolerance of ripple dictates. In few applications, high ripple is tolerated and therefore no filtering is required.

B. Microcontroller

This powerful yet easy FLASH-based 8-bit microcontroller packs Microchip's powerful PIC® in a 40- or 44-pin package. The PIC16F887 Microcontroller features 256 bytes of data memory EEPROM, self programming, an ICD, 2 Comparators, 14 channels of 10 (A/D) converter, 1 capture/compare/PWM and 1 Enhanced capture/compare/PWM functions, a synchronous serial port is to be configured as by using 3 Peripheral Interface (SPI™) or 2 Enhanced Universal Asynchronous Receiver Transmitter (EUSART). All of the above mentioned features make it ideal for more advanced level various A/D applications in automotive, industrial, appliances or consumer applications. easy-to-program only 35 single word instructions CMOS 10-bit Analog 2-wire Inter-Integrated Circuit (I²C™) bus.

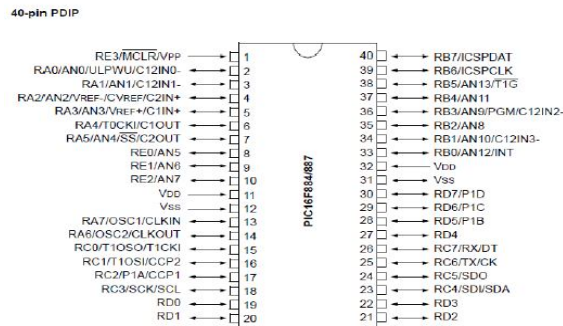


Fig -3 pin diagram for PIC16f887

C. LCD

1) Monitoring section Module: PIN-(RB0-RB7)(RD5-RD7)

A liquid-crystal display (LCD) is a display device used for all kind of displays and it consists of a small flat panel display, video display or visual display. It uses the light modulating properties of all the types of liquid crystals. Normal property of these type of crystals will not emit the light directly to the device. LCDs are available to display arbitrary images as in a general purpose computer display or fixed images which can be displayed or hidden. The applications of various displays are using preset words, digits & 7-segment displays as available in digital clock. Some type of displays have the larger elements and use the same basic technology, except that arbitrary images are made up of a large number of small small pixels.



D. MEMS

1) Soldier section Module: The mems sensor is used to sense the activity of human that when they sitting, walking or sleeping and doing all kind of activities etc. MEMS-based accelerometers are available in different range of configurations as 1-, 2- and 3-axis with an analog or digital output with in low-g or high-g sensing ranges.

E. MAX232

The MAX232 used here in order to supply EIA-232 voltage levels from a single 5-V supply and it is a dual driver and also receiver that it includes a capacitive voltage generator. Each and every receiver converts the EIA-232 inputs to a 5-V TTL/CMOS levels. These type of receivers have a typical hysteresis of 0.5 V, and typical threshold of 1.3 V and can accept 30-V inputs. Each driver converts TTL/CMOS input levels into EIA-232 levels. The parts of the MAX 232 are voltage-generator functions, driver, receiver are available as cells in the Texas Instruments Lin ASIC library.

F. ECG

In order to measure the electrical activity of the heart AD8232 Single Lead Heart Rate Monitor is used here. This activity is used to charted as an ECG or Electrocardiogram and an analog reading is considered as an output.

ECGs are considered to be extremely noisy, and the AD8232 Single Lead Heart Rate Monitor acts as an operational amplifier to help obtain a clear signal from the PR and QT Intervals easily. AD8232 is helpful an integrated signal conditioning block for ECG. ECG are helpful in design part used to extract the signal, amplify to get high signal strength and filter small biopotential signals in the presence of noisy conditions, all these are created by the motion or remote electrode placement. The Pin configuration of AD8232 Heart Rate Monitor breaks out all the nine connections from the given IC part that it having solder pins, wires, or other connectors to. SDN, LO+, LO-, OUTPUT, 3.3V, GND to provide essential pins for operating this monitor with an PIC or other development board.

In order to construct the custom sensors provided on this board are RA (Right Arm), LA (Left Arm), and RL (Right Leg) pins to attached. Additionally, LED indicator light is available so that it will pulsate to the rhythm of a heart beat.

G. UART Communication

It is called Universal Asynchronous Receiver/Transmitter, and it is a piece of computer hardware that translates information data between serial as well as in parallel forms.

IV. SOFTWARE REQUIREMENTS

Various softwares have been used in this module and it is listed below.

- 1) Real time operating system
- 2) MP Lab v8.63
- 3) Proteus8.
- 4) Embedded C
- 5) Hyper terminal

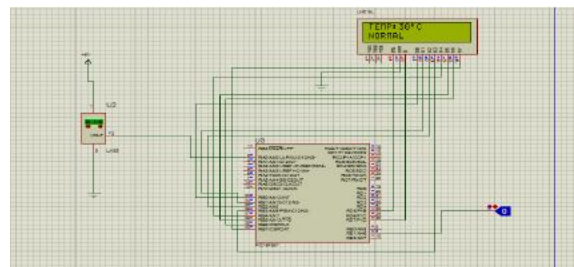
Software used in this proposed module are Real Time Operating System only, because this type of proposed system design is minimal cost so it doesn't need any higher end and costly software but it needs reliable, secure, multi tasked, preemptive and real OS software.

V. RESULT AND DISCUSSION

A. Hardware Output



B. Simulation Output



VI. CONCLUSION

Soldering health monitoring system used here is to provide better results and it can be further optimized in order to produce a final single circuit. All the individual modules like Heartbeat detection module, Temperature and humidity module etc. and remote viewing module helps to produce the intended results. For remote health detection system all the circuit components used are easily we get from external source. In order to increase the processing speeds, miniature size and power efficient that With the development in the integrated circuit industry, and microcontrollers have become affordable, have increased processing speeds, miniaturized and power efficient. The Remote soldier Health Care system utilizes these concepts to come up with a system for better quality of life for people in society.

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