Advanced Electronic System for Human Safety (Smart Watch)

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ABSTRACT: Science and technology if used effectively can ensure safety and comfort of human beings and environment. The state of art technology has reached to a level that even one can't imagine.

But even with this progress also there are certain areas where science and technology has not reached yet. As an example we consider the tragedy that happened naturally in "UTTARAKHAND" just few months before and number of people died from which some of bodies we got and some not. If there would have some provision to identify their location then we could have saved them.

I. INTRODUCTION

We think that advanced system can be developed that can detect the location and health condition of person, will enable us to take action accordingly. The project will be developed that can detect the location and health condition of a person using electronic gadgets like GPS receiver, GSM, pulse rate sensor, body temperature sensor. The Advanced Electronic System for Human Safety (AESHS) maintains real-time status of all unit elements in the tactical combat zone. The GPS based end-unit is carried by person is connected via Wrist unit to other network sharing units. Implementation of the AESHS can be realized as part of the human monitoring and alarm system (MAS) to provide automatic tracking, monitoring and reporting of individual person.

II. BLOCK DIAGRAM:

1. Control unit-

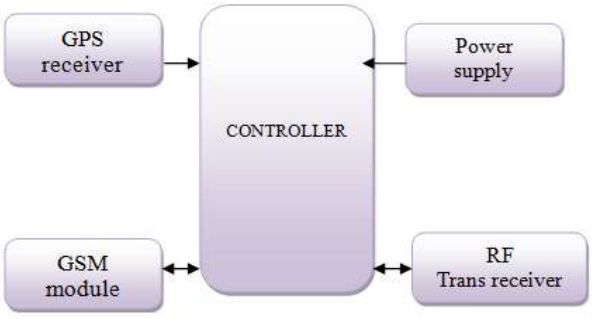

Fig .1: CONTROL UNIT

2. Wrist unit-

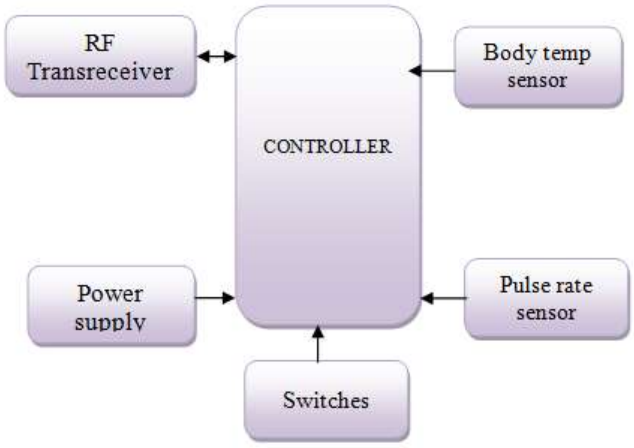

Fig .2: WRIST UNIT

3. Base station unit-

Fig .3: BASE STATION UNIT

III. BLOCK DIAGRAM EXPLANATION:

In Advanced Electronics system for Human Safety we are going to locate position of person using GPS. Health details will also gathered by using sensors such as Body temperature, pulse rate sensors that are send to base station with help of GSM module. So these all things are mentioned in above shown block diagrams.

data from wrist unit to control unit. At base station unit we can get the location and health condition of person on pc or mobile.

Element of block diagram:

1) Control Unit
2) Wrist Unit
3) Base station Unit

Control Unit collect information from wrist unit and GPS receiver. GSM module send all these information from control unit to base station.
Wrist unit collect the data from human using body temperature sensor, pulse rate senor and switches. RF module is used to send data from wrist unit to the control unit.

CONTROLLER:
In this project we are using Atmega16 controller.

Fig .4: ATMEGA16 CONTROLLER

It is 8-bit Microcontroller with 16K Bytes In-System Programmable
Flash .It has Advanced RISC Architecture with 131 Powerful Instructions, 32 x 8 General Purpose Working Registers, Two 8-bit Timer/Counters with Separate Prescalers and Compare Modes, 8-channel, 10-bit ADC, Programmable Serial USART, 32 Programmable I/O Lines, operating voltage of 4.5V - 5.5V ,speed grade of 0 - 16 MHz .

BIOMEDICAL SENSOR:
The human senses are only the sensors available effectively in biomedical field. But with progress in science and technology various sensors has immersed and out of those we are using LM35 Temperature sensor and Heart beat sensor.

LM35 TEMPERATURE SENSOR:
Human body temperature is of vital importance to maintain the health and therefore it is necessary to monitor it regularly. We are measuring body temperature using Lm35.
Lm35 series are precision integrated circuit temperature sensor whose output voltage is linearly proportional to the Celsius temperature. It operates linearly + 10.0 mV/°C scale factor with 0.5°C accuracy.

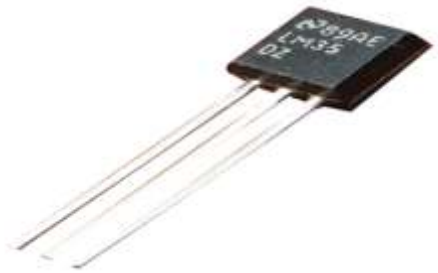

Fig.5: LM35

FEATURES:
Rated for full −55° to +150°C range
Operates from 4 to 30 volts

PULSE RATE SENSOR:
Heart beat sensor gives digital output of heart beat when finger is placed on it. When heart beat detector is working the beat led flashes with every heart beat. This digital output will be connected to microcontroller directly to measure the beats per minute (BPM) rate. It works on the principle of light modulation of blood flow through finger at each pulse.

Fig .6: PULSE RATE SENSOR

SENSOR TESTING:

Fig .7: PULSE RATE SENSOR TESTING

GPS MODULE:

Global positioning system (GPS) is able to determine the latitude and longitude of a receiver on Earth by calculating the time difference for signals from different satellites to reach the receiver. A satellite-based radio navigation system run by the U.S. Department of Defense .It was designed so that signals from four satellites would be available at any point on the earth surface. These signals are used to derive three questions

By solving these equations , a receiving unit can find its current location (longitude and latitude) as well as altitude.

In six different orbits approximately 12,500 miles above the earth, 24 MEO (Medium-Earth Orbit) satellites revolve around the

earth 24 hours and constantly transmit location as well as time of day from atomic clocks. By monitoring network satellites are tracked to uplinks data for synchronization. The system uses four frequencies in the L-band from 1.2 to 1.6GHz .

Fig.8:GPS GR-87

GPS interfacing:

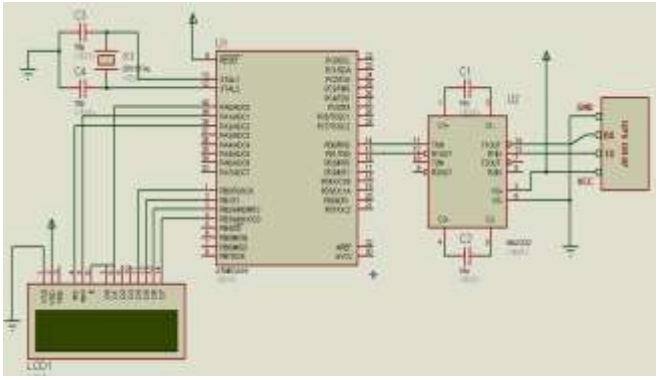

Fig.9: GPS INTERFACING

GPS module is interface with the Atmega16 using Max232and the coordinate are displayed on the LCD. MAX 232 is used to making conversion between TTL output to RS232 and vice versa.

TESTING OF GPS:

Actual testing of GPS module using Atmega16:

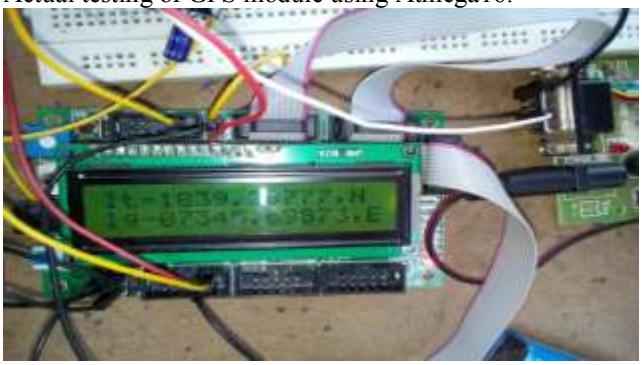

Fig .10: GPS RESPONSE ON CONTROLLER

In this actual coordinates are displayed on LCD using MAX232 and Atmega16 controller.Such coordinates are given below

Latitude-1839.28777, N
Longitude-07345.69873, E
These coordinates are transmitted using the GSM module.

GSM MODULE:

GSM is used to send data from control unit to base station .We have used the GSM 300 which operates at frequency 900MHz. It has up link band of 890MHz to 915MHz and down link Band of 935MHz to 960MHz . GSM takes advantages of both FDMA & TDMA. In 25MHz BW, 124 carriers are generated with channel spacing of 200KHz (FDMA). Each carrier is divided into 8 time slots (TDMA) At any specific time 992 speech channels are made available in GSM 300.

Fig.11: GSM MODULE

GSM interfacing:

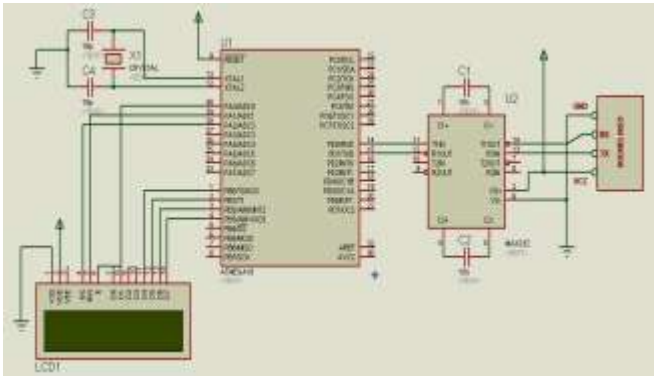

Fig.12: GSM INTERFACING

GSM module is interface with controller using MAX232 and the controller Atmega16.GSm modem is used to send the coordinates of the GPS to the base station.

TESTING OF GSM:
Testing of GSM on hyper terminal of pc:

Fig .13: GSM MODULE WITH HYPER TERMINAL OF PC

GSM module is tested on the hyper terminal of th PC using serial to USB converter. For the GSM testing different AT commands are used.

Response of GSM:

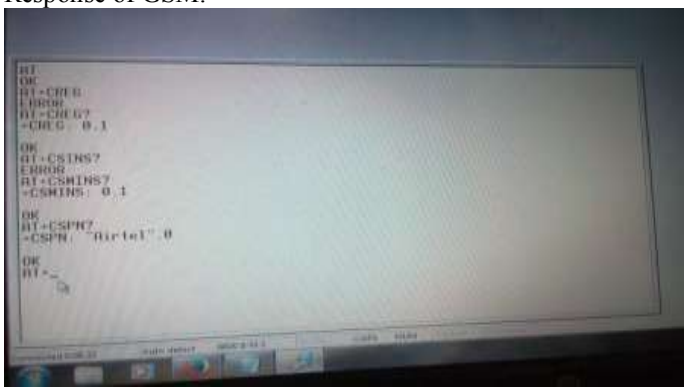

Fig .14: GSM RESPONSE ON HYPER TERMINAL

Above figure shows the response of different AT commands on the hyper terminal of PC. Such commands are used to test GSM modem. AT commands are also used to find faults in the GSM modem.

RF TRANS-RECEIVER:
As name suggests, operates at Radio Frequency. In this RF system the digital data is represented as variation in the amplitude of carrier wave. This kind of modulation is known as Amplitude shift keying(ASK). The transmitter/receiver pair operates at frequency of 434 MHz. Data rate is 200bps to 3Kbps depending on the supply. Transmitter require supply voltage of 3~12V while receiver require 5v supply voltage. Receiver IF frequency is 500 KHz.

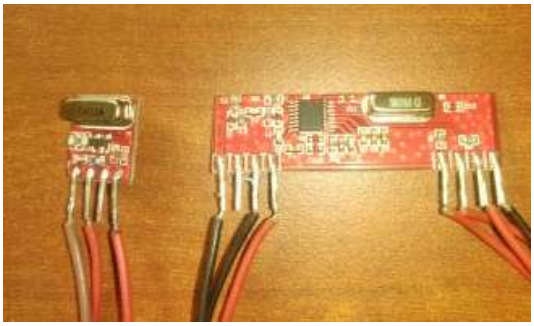

Fig.15: RF TRANS-RECEIVE

RF transreceiver interfacing:

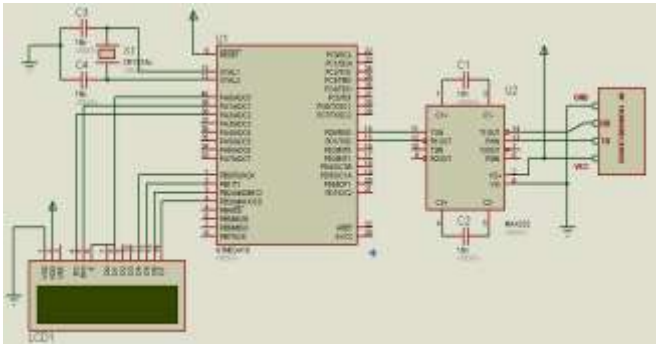

Fig.16: RF TRANSRECEIVER INTERFACING

RF transreceiver is used to send the health information of human from wrist unit to the control unit.
Above figure shows the interfacing of RF module to the controller Atmega16.

IV. APPLICATION

1] In future same system with little extra provision can be used for "WOMEN SAFETY".

2] It is also used in military application to detect location of soldiers and their health information.

3] In case of daily routine jobs any owners can use such device to keep track of their employee e.g pizza hut, transportation services etc.

4] It used to find number of animals present in the forest.

V. CONCLUSION

In this paper we presented how the technologies can be used for human safety. The main advantages of Atmega16 controller is that it is user friendly and we can easily interface it with any devices.

VI. ACKNOWLEDGMENT

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BIOGRAPHY

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