GPS & GSM based Human Health Care Monitoring System using Microcontroller

Mr. Abhishek Verma
Electronics & Electrical Engg
BIT, Durg, India

Dr. Anup Mishra
Electronics & Electrical Engg,
BIT, Durg, India

Mr. Amit Agrawal
Electronics & Electrical Engg.
Dr. CV Raman University, Kota
Bilaspur, India

***Abstract*- Now a day's technology is running with time, it completely occupied the life style of human beings. It is being used everywhere in our daily life to fulfil our requirements. We are employing different sensors for different applications sometimes we may even use same sensors differently for different applications. We can not only increase the speed of life but also increase security with good ideas by making use of advanced technology. In this project we are making use of technology to sense serious health problems so that efficient medical services can be provided to the patient in appropriate time. [6]**

This project aims in sending alert messages in emergency times, then alerting messages will be send to the mobile phone, the message consist of location of that person also. Here we get the alerting message from the GSM modem (SMS Message) and the location of that person can be found out with the help of GPS. The GPS is the acronym for Global positioning system. This GPS receiver is capable of identifying the location in which it was present in the form of latitude and longitudes.[9]

I. INTRODUCTION

Our project named "GPS & GSM based HUMAN HEALTHCARE MONITORING SYSTEM" employs the principality of the Microcontrollers to aid importance to human health & care. This houses the concept of GPS (Global Positioning System) along with GSM (Global System for Mobile Communications) in a microcontroller to alert about the human being related to the device.This device basically aims in sending alert messages about the condition of the patient and his/her location in the format of longitudinal and latitudinal coordinates.[9]

Our main aim with respect to the concept of this project was only to initiate a kind thought of providing suitable aid and treatment to the patient in due time. This project of ours alerts the Ambulances or the concerned doctors about the patient whenever the patient gets encountered with any emergency or critical cases.[11]

Our device sends an alert message containing the location of the patient in order that the doctor can locate him/her and reach in time to save the life.[7],[10]

The main objective of this project is:

- Real-time monitoring of health status of a person.
- Patients location can be traced our easily using GPS based positioning system.
- Sends alerts in the form of SMS messages to emergency ambulance or to the concerned doctor.

II. EQUIPMENT UTILIZED

A). AT89S52 Microcontroller

B). Power Supply Circuit

C). GPS Module

D). SIM 300 GSM Modem (with a SIM card)

E). 16X2 LCD (Liquid Crystal Display)

A. AT89S52 Microcontroller

- Compatible with MCS®-51 Products
- 8K Bytes of In-System Programmable (ISP) Flash Memory – Endurance: 10,000 Write/Erase Cycles
- 4.0V to 5.5V Operating Range
- Fully Static Operation: 0 Hz to 33 MHz
- Three-level Program Memory Lock
- 256 x 8-bit Internal RAM
- 32 Programmable I/O Lines
- Three 16-bit Timer/Counters
- Eight Interrupt Sources
- Full Duplex UART Serial Channel
- Low-power Idle and Power-down Modes
- Interrupt Recovery from Power-down Mode
- Watchdog Timer
- Dual Data Pointer
- Power-off Flag
- Fast Programming Time
- Flexible ISP Programming (Byte and Page Mode)
- Green (Pb / Halide-free) Packaging Option [1],[3]

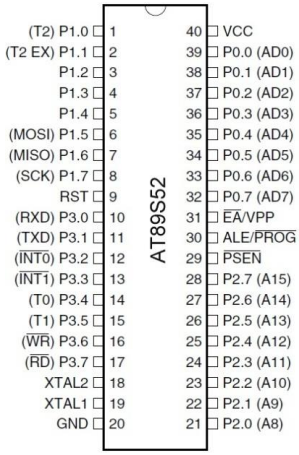


Fig 1. Microcontroller AT89S52

B. *Power Supply Circuit*

- AT89S52 need a regulated power supply of 5V dc.
- The above circuit is used to provide power to the microcontroller as well as other components, such as, LCD, GPS.
- GSM requites 1 amp current for sending the msg, so, a SMPS is used for supply power to it.

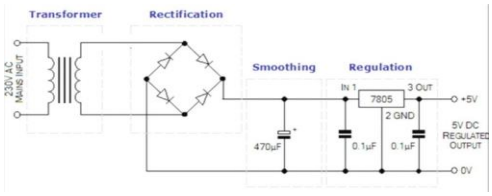


Fig.2 Power supply circuit

C. *GPS Modem*

The Global Positioning System (GPS) is a Global Navigation Satellite System (GNSS) developed by the United States Department of Defence. It is the only fully functional GNSS in the world. It uses a constellation of between 24 and 32 Medium Earth Orbit satellites that transmit precise microwave signals, which enable GPS receivers to determine their current location, the time, and their velocity. Its official name is NAVSTAR GPS. Although NAVSTAR is not an acronym, a few acronyms have been created for it. The GPS satellite constellation is managed by the United States Air Force 50th Space Wing. GPS is often used by civilians as a navigation system.[2]

The GPS is made up of three parts: satellites orbiting the Earth; control and monitoring stations on Earth; and the GPS receivers owned by users. GPS satellites broadcast signals from space that are picked up and identified by GPS receivers. Each GPS receiver then provides three-dimensional location (latitude, longitude, and altitude) plus the time.

- When people talk about "a GPS," they usually mean a GPS receiver. The Global Positioning System (GPS) is actually a constellation of 27 Earth-orbiting satellites (24 in operation and three extras in case one fails)
- A GPS receiver's job is to locate four or more of these satellites, figure out the distance to each, and use this information to deduce its own location. This operation is based on a simple mathematical principle called trilateration.

Fig.3 GPS Modem

- GPS receiver calculates its position on earth based on the information it receives from four located satellites. This system works pretty well, but inaccuracies do pop up.
- The basic format of data send by a GPS is “$GPGGA” which is followed by the longitudinal and latitudinal coordinates of the specific location.

D. *SIM 300 GSM Module*

GSM, which stands for Global System for Mobile communications, reigns (important) as the world’s most widely used cell phone technology. Cell phones use a cell phone service carrier’s GSM network by searching for cell phone towers in the nearby area.

Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication.[5]

The GSM study group aimed to provide the followings through the GSM:

- Improved spectrum efficiency.
- International roaming.
- Low-cost mobile sets and base stations (BS)
- High-quality speech
- Compatibility with Integrated Services Digital Network (ISDN) and other telephone company services.
- Support for new services.

Fig.4 SIM 300 GSM Modem

- A breakout board for the SIM300. The SIM300 is an all in one GSM/GPRS compact module.
- With an industry-standard serial interface, the SIM300 offers GSM/GPRS 900/1800/1900MHz performance for carrying out voice, SMS, data, and Fax operation all in

one small sized module that is perfect for integration in any handheld device.

- The SIM300 module comes with a wire antenna, which provided good performance and reception.
- This breakout board can be easily interfaced with AT commands over a TTL serial interface, which makes it easy to connect it to microcontrollers, computers, and other devices.

GSM AT Commands

a. To Dial a Number

To dial a number you will have to send the command - ATD NUM; where, NUM is the number you want to dial.

- For instance to dial 9008620582, send the command ATD 9008620852;
- To disconnect the number use the command – ATH
- To redial a number use the command – ATDL

b. To Send a SMS

- To send SMS send the command -AT+CMGF=1
- Modem will then send the text - OK
- Then send - AT+CMGS="NUM"

Where NUM is the number you want to send the SMS to. Modem will then send the text - TYPE THE MESSAGE

Enter the message and then press Ctrl+Z to send SMS.[5]

E. 16 X 2 LCD

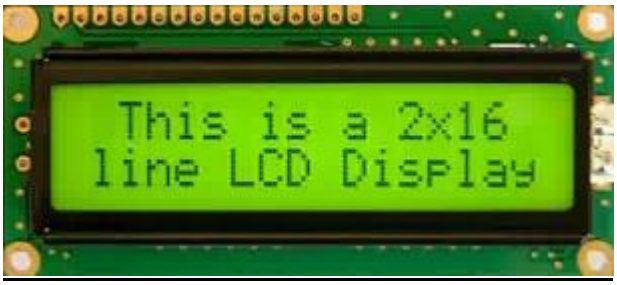
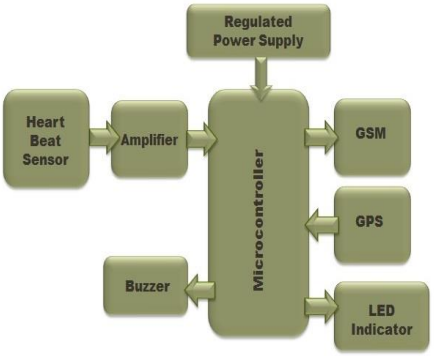


Fig.5 Basic Block Diagram

- LCD (Liquid Crystal Display) is an output device interfaced with any microcontroller.
- Here we are using 16 pin, 16X2 LCD. This means we'll have 16 columns and 2 rows for display.
- Here, this LCD is used for displaying the coordinates and also for notifications, such as, "Message Send", etc.

III. BLOCK DIAGRAM



IV. ALGORITHM

i. Start.
ii. Prepare the microcontroller to work in Serial Communication Mode and 9600 baud rate.
iii. Initialize the LCD.
iv. Adjusting the offset for data pointer in order to store data from GPS.
v. Check the data received from GPS.
vi. If the data received is in the format "$GPGGA", then proceed further and store it.
vii. Otherwise, start again.
viii. Store the data and set the offset to 3CH, so that, the useful coordinates can be utilized.
ix. Continuously check the status of pin P1.0 to monitor the signal.
x. If high, then command the GSM to send this coordinates to the saved number.
xi. If low, then wait to get it high.
xii. Then, go to step X.
xiii. Stop.

V. CIRCUIT DIAGRAM

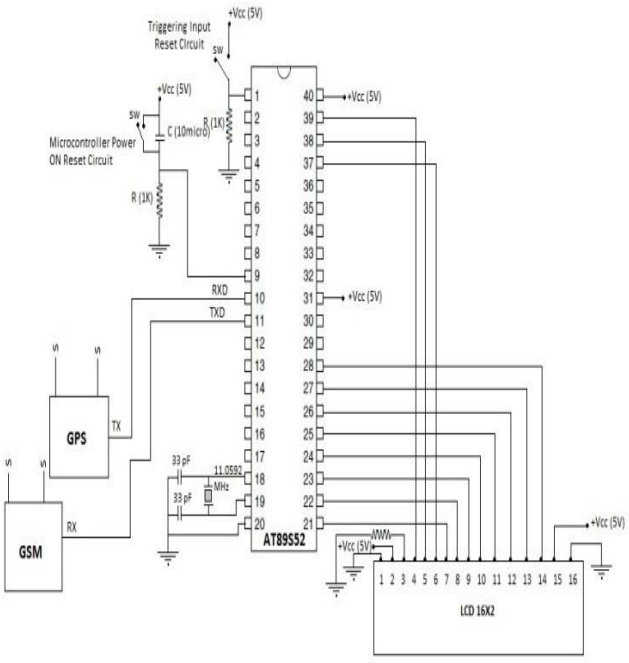


Fig.6 Circuit Diagram for the Human Health

Care Monitoring System

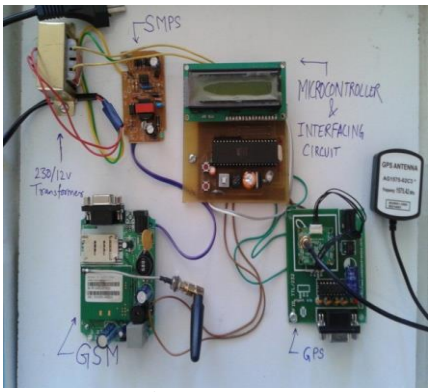


Fig. 7 Finished Model for the Human Healthcare Monitoring System

VI. Result And Output

The main aim of our project was to send an alert message to the concerned doctor if the patient has met with any emergency situations. The desired operation was performed when a triggering signal was send to microcontroller AT89S52 when the patient was not well and the microcontroller receives the longitudinal and latitudinal coordinates of the patient's location. A message containing this data is send with the GSM to the concerned doctor. A prototype of message send is shown in fig. 8:

Fig.8 Output as shown in the concerned contact number

The doctor receives a message containing the coordinates which can be easily converted to the physical location by simply searching the coordinates in any search engine.

VII. Conclusion

Hence, from this project we can conclude that science is still developing and growing up to save human lives and with the help of such systems we can ensure a better care for a life than ever before. Electronics has always been a great contributor of medical science and this is just one step forward to the evolution of modern health care systems. This is what we have inferred from the current project entitled "GPS & GSM Based HUMAN HEALTHCARE MONITORING SYSTEM". A prototype is as shown in fig. 9:

References

[1] The 8051 Microcontroller & Embedded SystemsBy- Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. McKinlay
[2] Wikipedia www.wikipedia.org
[3] NASA www.nansa.gov.in
[4] Atmel Technologies www.atmel.in
[5] NSK Electronics www.nskelectronics.com/sim300_modem_with_rs232.html
[6] Biomedical Instrumentation and measurements -- Cromwell and Weibell
[7] Park Set aI, Real-time monitoring of patient on remote sites. Proceedings of the 20th annual international conference of IEEE EMBS, vol. 20, No.3; 1998
[8] Remote system for patient monitoringusing Bluetooth/spl trade. Sensors, 2002.Proc IEEE. VI.
[9] Wireless fall sensor with GPS location for monitoring the elderlyEric Campo, Etienne Grangereau30th Annual International IEEE EMBS Conference.
[10] Movable Patient Health Monitoringieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=5479388Print ISBN: 978-1-4244-5162- 3Issue Date: 30-31 May 2010
[11] Real Time Health Monitoring Using GPRS Technology. International Journal of Computer Science and Network (IJCSN) Vol 1, Issue 3, June 2012

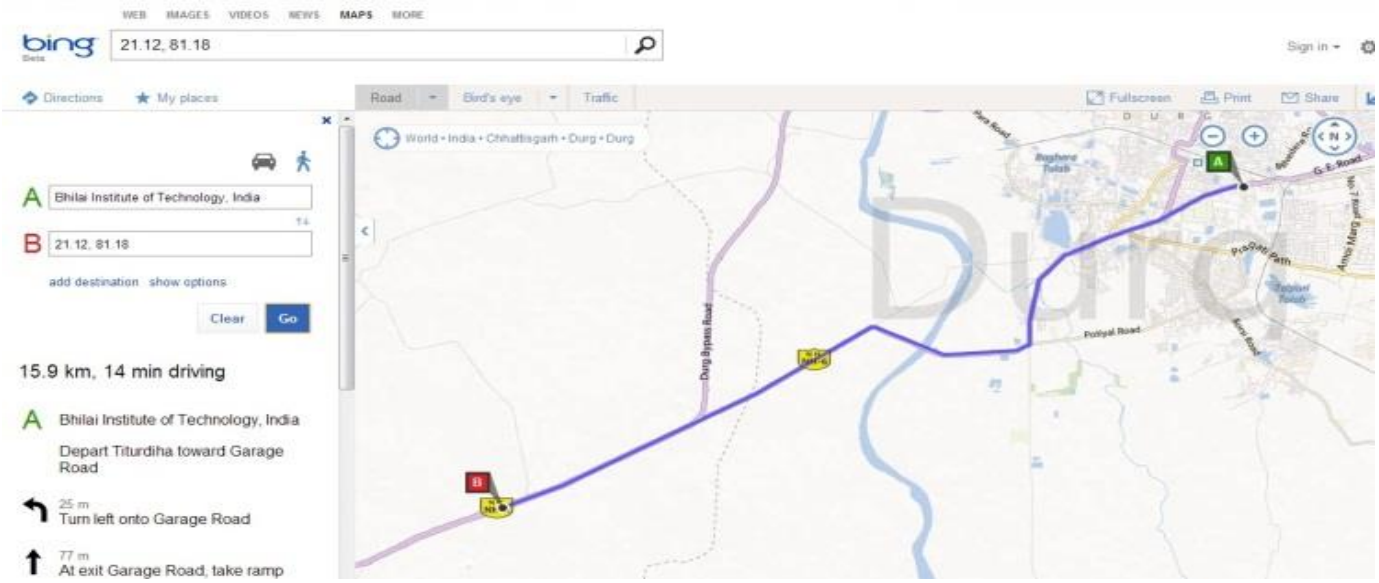


Fig.9 Map showing the position of patient after converting from the coordinates