IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 8, August 2016

GPS Based Vehicle Navigation System

S. Mohanapriya[1], K. Priyadharshini[2], V. Ramya[3], G. Vignesh[4], V. Anand Kumar[5]

UG Student [1, 2, 3, 4], Assistant Professor[5]

Abstract: This paper aimed at developing a System to prevent an unauthorized person from boarding the Bus. This is done by using RFID. Using GPS, the system gets the satellite information such as positioning and navigational parameters of the Bus like latitude, longitude, velocity, altitude, the name of the current location of the bus. The RFID technology is used to identify the members, who enter into the bus. If an unauthorized person enters into the vehicle, the door will lock automatically and the buzzer will be set to ON. An antenna is connected to the GPS receiver to acquire the signals from the Satellite. Line of sight is maintained between the antenna and the Satellite. All the information is displayed on Graphical User Interface (GUI). In the receiver side, the system provides a website application where the values of the parameters on the GUI are displayed. The parameter values are continuously updated and are displayed on the GUI. The main feature of this system is the ease of use of the system and visual display of the results which can be seen on android mobile phone using application.

Keywords: RFID, GPS, latitude, longitude, velocity, altitude, Graphical User Interface, mobile phone using application

I. INTRODUCTION

GPS (Global Positioning System), which is used to give the latitude and longitudinal information of the place to reduce the difficulty in boarding the Bus. An antenna is connected to the GPS receiver to acquire the signals from the Satellite. Line of sight is maintained between the antenna and the Satellite. All the information is displayed on Graphical User Interface (GUI).The parameter values are continuously updated and are displayed on the GUI. The main feature of this system is the ease of use of the system and visual display of the results which can be seen on android mobile phone using application.

This paper is divided into the following sections. The proposed RFID and Power supply designs are present in Section II. The information about longitude and latitude parameters are analysed in Section III. The simulation and hardware designs are displayed in Section IV. Some conclusions of this paper are discussed and shared in Section V.

An AC powered linear power supply usually uses a transformer to convert the voltage from the wall outlet (mains) to a different, usually a lower voltage. If it is used to produce DC, a rectifier is used. A capacitor is used to smooth the pulsating current from the rectifier. An RFID reader is a device that is used to interrogate an RFID tag. The reader has an antenna that emits radio waves; the tag responds by sending back its data.. The converter features a high impedance chopper stabilized comparator, a 256R voltage divider with analog switch tree and a successive approximation register. The Global Positioning System (GPS) provides reliable positioning, navigation, and timing services to worldwide users. The PIC16F877A CMOS FLASH-based 8-bit microcontroller is upward compatible with the PIC16C5x, PIC12Cxxx and PIC16C7x devices. It features 200 ns instruction execution, 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, a synchronous serial port that can be configured as either 3-wire SPI or 2-wire I2C bus, a USART, and a Parallel Slave Port. A relay is an electrically operated switch. Electric current through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. A DC motor in simple words is a device that converts direct current(electrical energy) into mechanical energy. A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem.

II. PROPOSED SYSTEM DESIGN

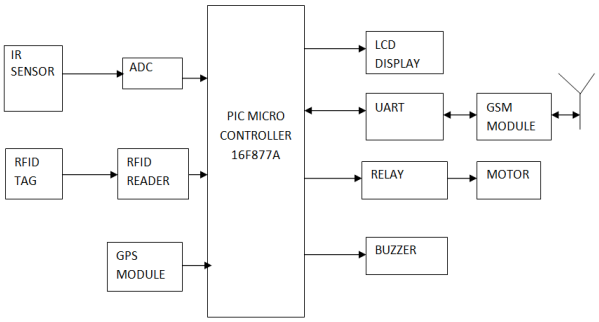


Fig1. Proposed schematic of RFID and navigation system

II. POWER SUPPLY

The present chapter introduces the operation of power supply circuits built using filters, rectifiers and then voltage regulators. Starting with an AC voltage, a steady DC voltage is obtained by rectifying the AC voltage, then filtering to a DC level, and finally regulating to obtain a desired fixed DC voltage. The regulation is usually obtained from an IC voltage regulator unit, which remain

IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 8, August 2016

the same if the input DC voltage varies or the output load connected to DC voltage changes.

RFID READER AND TAG

An RFID reader is a device that is used to interrogate an RFID tag. The reader has an antenna that emits radio waves . The tag's antenna picks up signals from an RFID reader or scanner and then returns the signal .The reader senses the data from the Tag and transmits the sensed data to microcontroller via serial port.

IR SENSOR

Upon careful observation, you will notice that amongst the two 'legs', one has a much wider base within the diode.

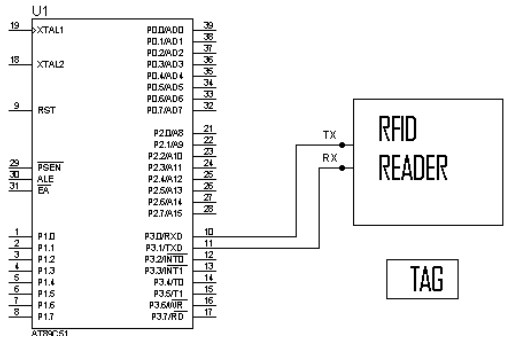


Fig 2. Configuration of RFID with PIC

That is normally the cathode (negative) whereas the leg having a smaller base would be the anode (positive terminal).

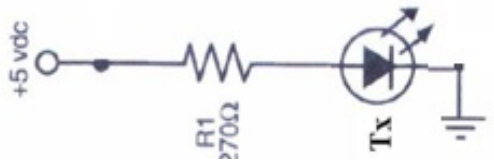


Fig 3 Transmitter circuit

The resistance R1 in the above circuit can vary. It should not be a very high value (~ 1Kohm) as then the current flowing through the diode would be very less and hence the intensity of emitted IR would be lesser. By increasing the current flowing in the circuit, you can increase the effective distance of your IR sensor. However, there are drawbacks of reducing the resistance. Firstly, it would increase the current consumption of your circuit and hence drain the battery (one of the few 'precious' resources for any embedded system) faster. Secondly, increasing the current might destroy the Tx. So, the final choice should be a calculated tradeoff between these various factors.

You can also modulate the IR to achieve better distance and immunity. The receiver diode has a very high resistance, typically of the order of mega Ohms when IR is not incident upon it. However, when IR is incident upon it, the resistance decreases sharply to the order of a few kilo Ohms or even lesser. This feature forms the basis of using IR as a sensor. You will need to connect a resistance of the order of a few mega Ohm in series with the Rx. Then tap the output voltage at the point of connectivity of these two resistors. A complete Tx-Rx circuit is given below.

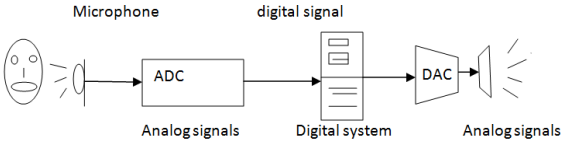


Fig 4. Design of ADC

GPS

GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location. Essentially, the GPS receiver compares the time a signal was transmitted by a satellite with the time it was received. The time difference tells the GPS receiver how far away the satellite is. Now, with distance measurements from a few more satellites, the receiver can determine the user's position and display it on the unit's electronic map.

GPS Satellite

The length of the delay is equal to the signal's travel time. The receiver multiplies this time by the speed of light to determine how far the signal traveled. Assuming the signal traveled in a straight line, this is the distance from receiver to satellite. In order to make this measurement, the receiver and satellite both need clocks that can be synchronized down to the nanosecond. To make a satellite positioning system using only synchronized clocks, you would need to have atomic clocks not only on all the satellites, but also in the receiver itself.

PIC 16F877A MICROCONTROLLER

A microcontroller is meant to be more self-contained and independent, and functions as a tiny, dedicated computer. The microcontroller includes a CPU, RAM, ROM, I/O ports, and timers like a standard computer, but because they are designed to execute only a single specific task to control a single system, they are much smaller and simplified so that they can include used, but the predominant architecture is CISC (Complex Instruction Set Computer), which allows the microcontroller to contain multiple control instructions that can be executed with a single macro instruction.

RELAY

A relay is an electrically operated switch.

Electric current through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and there are double-throw (changeover) switches. It consists of a coil of wire surrounding a soft iron core, an iron yoke, which provides a low reluctance path for magnetic flux, a movable iron armature, and a set, or sets, of contacts. In this condition, one of the two sets of contacts in the relay pictured is

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 8, August 2016

closed, and the other set is open. The P0_0, P0_1, P0_2 and P0_3 pin of controller is assumed as data transmit pins to the relay through relay driver ULN 2003. ULN 2003 is just like a current driver.

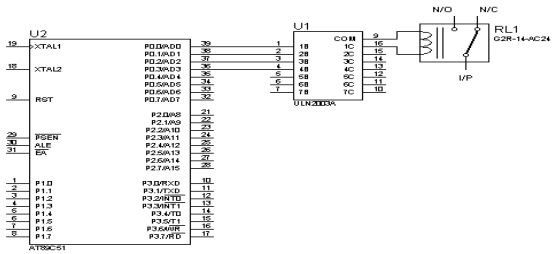


Fig 6 Configuration of relay with PIC

DC MOTOR

A DC motor in simple words is a device that converts direct current(electrical energy) into mechanical energy. It's of vital importance for the industry today, and is equally important for engineers to look into the working principle of DC motor in details that has been discussed in this article. The direction of current through the armature conductor at all instance is perpendicular to the field. Hence the force acts on the armature conductor in the direction perpendicular to the both uniform field and current is constant

GSM MODEM

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. The working of GSM modem is based on commands, the commands always start with AT (which means A T tention) and finish with a <CR> character. For example, the dialing command is ATD<number>; ATD3314629080; here the dialing command ends with semicolon. The AT commands are given to the GSM modem with the help of PC or controller. The GSM modem is serially interfaced with the controller with the help of MAX 232. Here max 232 acts as driver which converts TTL levels to the RS 232 levels. For serial interface GSM modem requires the signal based on RS 232 levels. The T1_OUT and R1_IN pin of MAX 232 is connected to the TX and RX pin of GSM modem

GSM CIRCUIT

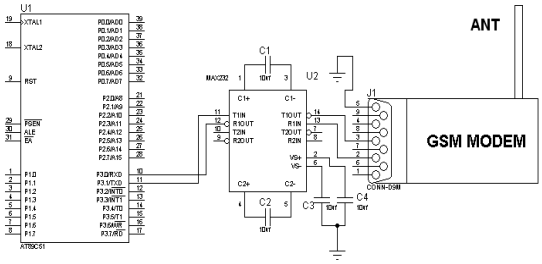


Fig 7. GSM configuration

Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz.

THE GSM NETWORK

GSM provides recommendations, not requirements. The GSM specifications define the functions and interface requirements in detail but do not address the hardware. The reason for this is to limit the designers as little as possible but still to make it possible for the operators to buy equipment from different suppliers. The GSM network is divided into three major systems: the switching system (SS), the base station system (BSS), and the operation and support system (OSS).

LCD DISPLAY

Liquid crystal cell displays (LCDs) are used in similar applications where LEDs are used. These applications are display of display of numeric and alphanumeric characters in dot matrix and segmental displays.When sufficient voltage is applied to the electrodes the liquid crystal molecules would be aligned in a specific direction. The light rays passing through the LCD would be rotated by the polarizer, which would result in activating/highlighting the desired characters. The power supply should be of +5v, with maximum allowable transients of 10mv. To achieve a better/suitable contrast for the display the voltage (VL) at pin 3 should be adjusted properly. A module should not be removed from a live circuit.

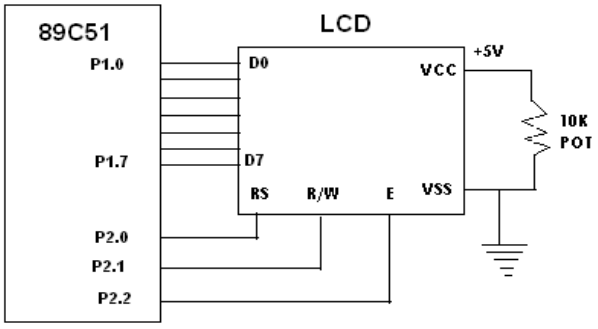
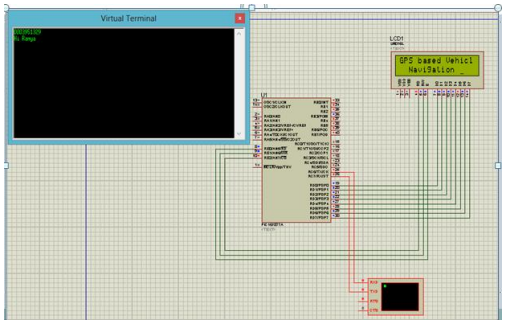


Fig 8. LCD Display

IV. RESULT



IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 8, August 2016

V. CONCLUSION

The system is designed and developed in hardware as well as in software. Hence, the system consists of hardware module as well as software module. The system provides positioning and navigational information in terms of number of parameters. Also information regarding the satellites which are being tracked by the system is also displayed. The future enhancement of this project is mobile based messaging applications like OTP will be created.

REFERENCES

[1] W. Stone, "Electromagnetic Signal Attenuation in Construction Materials" NIST Construction Automation Program Report, no. 3, Oct. 1997.
[2] G. Lachapelle et al., "HSGPS Signal Analysis and Performance Under Various Indoor Conditions," Navigation, J. Inst. Navigation, vol. 51, no. 1, 2004.
[3] T. Pany et al., "Performance of a Partially Coherent Ultra-Tightly Coupled GNSS/INS Pedestrian Navigation System Enabling Coherent Integration Times of Several Seconds to Track GNSS Signals Down To 1.5 dBHz," Proc. 22nd Int'l. Technical Mtg. of the Satellite Division of the Inst. Navigation), Savannah, GA, Sept. 2009, pp. 919–34.
[4] Soloviev, S. Gunawardena, and F. van Graas, "Deeply Integrated GPS/Low-Cost IMU for Low CNR Signal Processing: Concept Description and In-Flight Demonstra- tion," Navigation, vol. 54, no. 1, 2008.