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Indoor Dead Reckoning System

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ABSTRACT: The project aims at developing a navigation system which helps the pedestrian to locate his current position, when the well-known technology like GPS used in navigational systems fail. The proposed system has a GSM modem to trace the current location. GPS is a navigation system that provides instantaneous sub-meters accuracy position information for users worldwide. It is based on the multilateration principle where the user on the surface of the earth determines position using range information from multiple satellites. Because of its superior performance and capabilities, GPS is slated to be the primary means of navigation for all sectors. Dead reckoning is a form navigation whereby the current position of pedestrian is deduced by knowing speed and direction of travel since the last known position.

KEYWORDS: GPS, Navigation, Location, Dead reckoning, Position, Pedestrian, Speed, Direction.

I. INTRODUCTION

The project aims at developing a navigation system which helps the pedestrian to locate his current position, when the well-known technology like GPS used in navigational systems fail. The proposed system has a GSM modem to trace the current location. To make the signal loss using one button for GPS. Using panic button send the emergency alert through GSM and audible alert using buzzer. The primary advantage of dead reckoning is that it relies on sensors contained within and, therefore, provides a navigation system that requires no interaction with the world outside. A self-contained navigator such as this is desirable especially as a backup navigation system. The controlling device of the whole system is a Microcontroller. The microcontroller continuously reads data from GPS receiver. When the system is not able to read the data from GPS receiver, it automatically switches to the backup navigational system from the last stored GPS location. This back up navigational system has a Digital compass and Pedometer button which helps in locating the movement direction. The GPS values and the heading direction and the digital compass values are fed from ATmega328 microcontroller to the PIC Microcontroller. Also, the heading direction, steps moved is shown through an LCD display. The pedestrian location can be received by simply sending an SMS to the system.

II. DESIGN METHODOLOGY

The major features of this project are:

1. Developing a backup navigational system.
2. Does not rely on GPS completely.
3. Intelligent pedestrian location sending using GSM.

The project “Dead Reckoning Pedestrian Tracking System” using PIC16F877A microcontroller and ATmega328p microcontroller is an exclusive project which is used to find the developing a navigation system which helps the pedestrian to locate current position of pedestrian, when the well-known technology like GPS used in navigational systems fail.

An embedded system is a computer system designed to perform one or a few dedicated functions often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. By contrast, a general-purpose computer, such as a personal computer, is designed to be flexible and to meet a wide range of end-user needs. Embedded systems control many devices in common use today.

Embedded systems are controlled by one or more main processing cores that are typically either microcontrollers or DSP. The key characteristic, however, is being dedicated to handle a particular task, which may require very powerful processors.

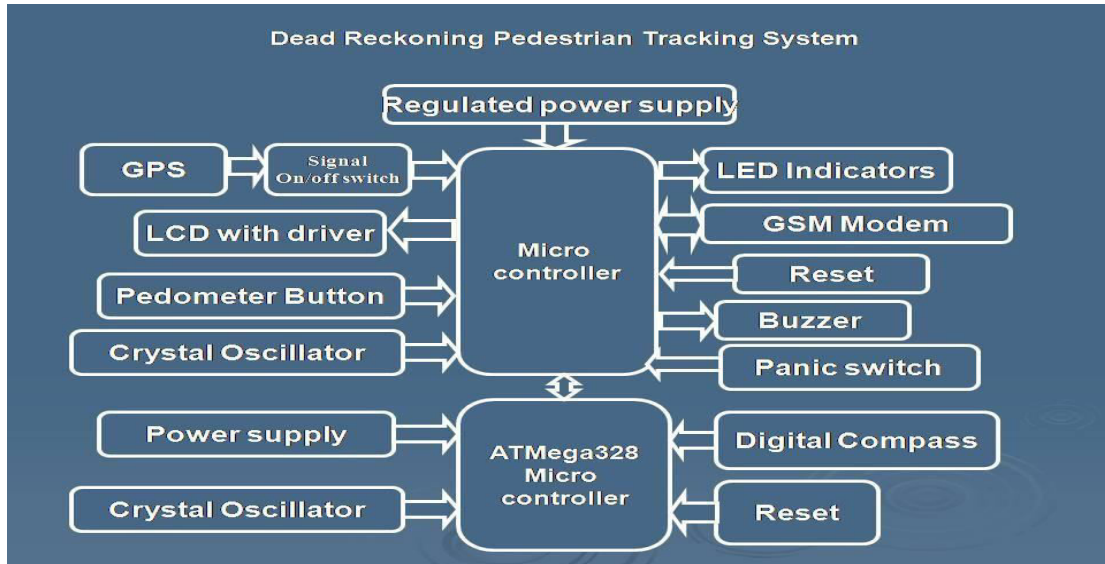


Fig 2.1:Block diagram of Indoor Dead Reckoning Pedestrian Tracking System

The main blocks of this project are:

- 1.Regulated Power Supply
- 2.GPS Receiver
3. Digital Compass
- 4.PIC Micro controller.
- 5.ATMega328p microcontroller
- 6.GSM Modem
- 7.LCD display with driver
- 8.Crystal oscillator
- 9.LED indicators.
- 10.Reset
11. Buzzer.

II . GSM(A)

The SIM800A Quad-Band GSM/GPRS Module with RS232 Interface is a complete Quad-band GSM/GPRS solution in an LGA (Land grid array) type which can be embedded in the customer applications. SIM800A support Quad-band 850/900/1800/1900 MHz, it can transmit Voice, SMS and data information with low power consumption.

The SIM800A modem has a SIM800A GSM chip and RS232 interface while enables easy connection with the computer or laptop using the USB to the Serial connector or to the micro-controller using the RS232 to TTL converter. Connect the SIM800A modem using the USB to RS232 connector, to find the correct COM port from the Device Manager of the USB to Serial Adapter.

Then open, Putty or any other terminal software and open a connection to that COM port at 9600 baud rate, which is the default baud rate of this modem. Once a serial connection is open through the computer or micro-controller than start sending the AT commands. Once AT commands send for example “ATv” than there will be a reply from the SIM800A modem saying “OK” or any other response depending on the command sent.

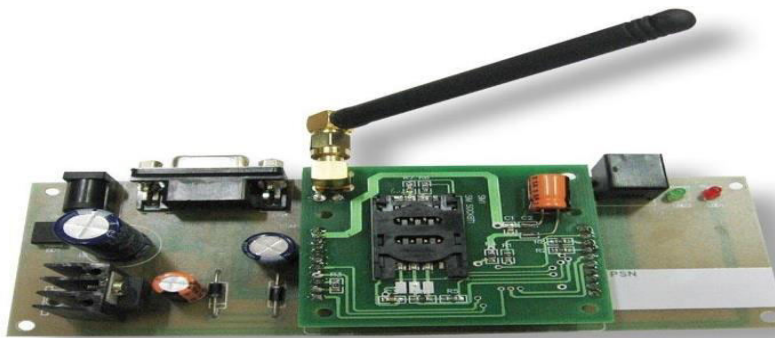


FIG 2.2 GSM

II.GPS(B)

The Global Positioning System is a burgeoning technology, which provides unequalled accuracy and flexibility of positioning for navigation, surveying and GIS data capture. The GPS NAVSTAR is a satellite-based navigation, timing and positioning system. The GPS provides continuous three-dimensional positioning 24 hrs a day throughout the world. The technology seems to be beneficiary to the GPS user community in terms of obtaining accurate data up to about 100 meters for navigation, meter-level for mapping, and down to millimeter level for geodetic positioning. The GPS technology has tremendous number of applications in GIS data collection, surveying, and mapping.

Usually, static positioning is used in surveying and the kinematics position in navigation. To compute a position in three dimensions, we need to have four satellite measurements. The GPS uses a trigonometric approach to calculate the positions, The GPS satellites are so high up that their orbits are very predictable and each of the satellite is equipped with a very accurate atomic clock.

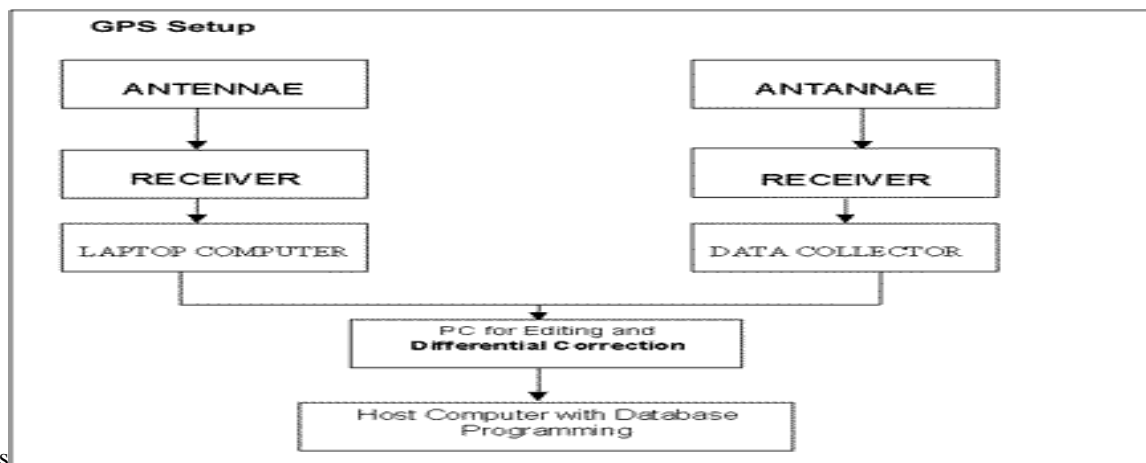


Fig 2.3 GPS setup

SOFTWARE DESCRIPTIONS

This project is implemented using following software's:

- 1.Express PCB – for designing circuit
- 2.PIC C compiler - for compilation part
- 3.Proteus 7 (Embedded C) – for simulation part

III.RESULTS

Dead reckoning is a form navigation whereby the current position of pedestrian is deduced by knowing speed and direction of travel since the last known position. The primary advantage of dead reckoning is that it relies on sensors contained within and, therefore, provides a navigation system that requires no interaction with the world outside. A self-contained navigator such as this is desirable especially as a backup navigation system. The proposed system has a GSM modem to trace the current location. To make the GPS signal loss using button. Using panic SWITCH to send the emergency alert through GSM and audible alert using buzzer.

IV .FUTURE SCOPE

The project “**Dead Reckoning Pedestrian Tracking System**” aims at developing a navigation system which helps the pedestrian to locate his current position, when the well-known technology like GPS used in navigational systems fail. The proposed system has a GSM modem to trace the current location.

V. CONCLUSION

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced



ICs with the help of growing technology, the project has been successfully implemented. Thus, the project has been successfully designed and tested.

The controlling device of the whole system is a Microcontroller. The microcontroller continuously reads data from GPS receiver. When the system is not able to read the data from GPS receiver, it automatically switches to the backup navigational system from the last stored GPS location. This back up navigational system has a Digital compass and Pedometer button which helps in locating the movement direction. The GPS values and the heading direction and the DIGITAL COMPASS values are fed from ATmega328 microcontroller to the PIC Microcontroller. Also, the heading direction, steps moved is shown through LCDS display. The pedestrian location can be received by simply sending an SMS to the system. The Microcontroller is loaded with an efficient program written using embedded 'C' language.

We can also extend the project using Zigbee module so that there is no loss of signal.

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