

Obstacle Sensing Walking Stick for Visually Impaired

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Abstract - White stick with the ultrasonic sensor, IR sensor and various other equipped technologies (Arduino IC, sensors etc.) is the boon for blind people. The application of ultrasonic ranging scheme along with location tracing (GPS Module) for producing electronic walking stick with improved features for the blinds is a technological advancement. Visually impaired people use their senses like touch or sound for walking in a particular area, which is not possible for outdoor walking. To overcome these problems of blind people, need to develop a project by using simple available technologies. This walking stick for blind people which have multiple sensors, (Ultrasonic and IR) with the help of sensors it has possible to enhance more features to the walking stick. The features are to detect the obstacle for collision avoidance, it detects the object in all the possible direction from the subject. The other sensor placed near bottom tip of the walking cane to find the pits on the ground. The output of these sensors are taken with Voice record in the different tracks; respond for different sensors to give the audio message to the blind person by the speaker to alert. In this project, sensors play key role to detect the objects and with the use of GSM Module safety is also concerned.

Key Words: GPS Module, GSM Module, Arduino, Ultrasonic Sensor, IR Sensor.

1.INTRODUCTION

Blind stick is a unique and effective tool designed for visually disabled people for improved and easy navigation. We know that visually impaired people are dependent on other human beings or some animals like trained dogs or a wood stick for their movement indoor or outdoor. We proposed an innovative blind stick that allows visually challenged people to navigate with ease using advanced technology. We introduced the features of safety by using GSM Module which will help the guardian of the blind Subject to trace the location as they will receive the SMS of the location on their phone if their subject is lost somewhere or is in some Panic situation. We also made the stick efficient to work in rainy environment also through fabrication of entire module. Our project is Voice based Blind walking stick which makes use of programmed voice for guidance and uses GSM technology for navigation purpose.

1.1 SYSTEM ARCHITECTURE:

Fig.1 shows the working of the Ultrasonic Stick.

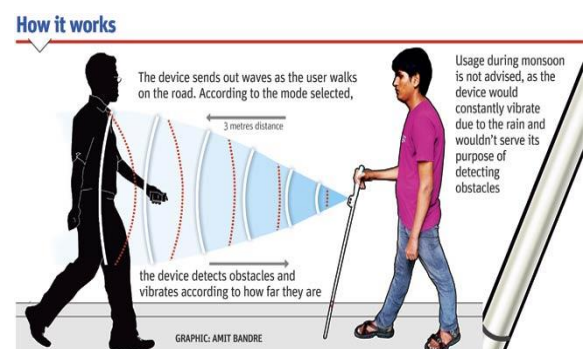
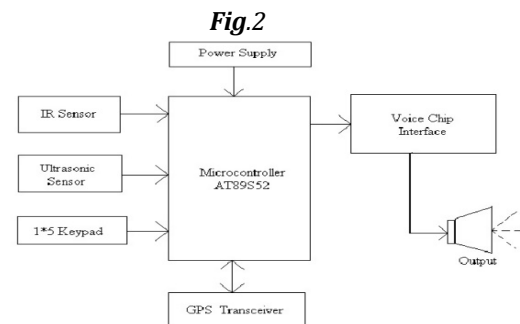


Fig.1

BLOCK DIAGRAM:-



1.2 HARDWARE & SOFTWARE DESCRIPTION

A. Hardware used:

- ATmega328
- GSM SIM 900 module
- GPS Module
- Ultrasonic Sensor
- IR Sensor

ATmega328:



Fig.3

ATMega328 is the ATMEL Microcontroller on which Arduino UNO is based. The Atmel 8-bit AVR RISC-based microcontroller combines 32 kB ISP flash memory with read-while-write capabilities, 1 kB EEPROM, 2 kB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS per MHz. Serial data to the MCU is clocked on the rising edge and data from the MCU is clocked on the falling edge. Power is applied to VCC while RESET and SCK are set to zero. ATMega328 is commonly used in many projects and autonomous systems where a simple, low-powered, low-cost micro-controller is needed.

GSM SIM 900:



Fig.4

The words, "Mobile Station" (MS) or "Mobile Equipment" (ME) are used for mobile terminals Supporting GSM services. A call from a GSM mobile station to the PSTN is called a "mobile originated call" (MOC) or "Outgoing call", and a call from a fixed network to a GSM mobile station is called a "Mobile Terminated call" (MTC) or "incoming call". AT commands are instructions used to control a modem. AT is the abbreviation of Attention. Every command line starts with "AT" or "at".

GPS MODULE:

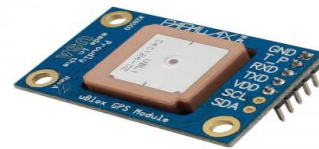


Fig.5

GPS Module with built-in antenna and memory back-up for projects. This unit features low power consumption, high sensitivity. It for navigation systems, distance measurements, vehicle monitoring and recording, boating direction and location, together with hiking and cross country exploring.

Ultrasonic Sensor:



Fig.6

Ultrasonic sensor provides a very easy method of distance measurement. This sensor is perfect for applications that require you to perform measurements between moving or stationary objects. Naturally, robotics applications are very popular but it is also useful in security systems or as an infrared replacement. Ultrasonic sensors or ultra-motion detectors are an electronic kit that contains many sub electronic circuit in it and has many applications. The ultrasonic sensors contain ultrasonic crystal control transmitted 40 KHz and a very sensitive receiver. Usually ultrasonic sensors can detect with the range of 3 meters to 7 meters. It is an 8 bit 18 pins microcontroller that provides 200nanosecond instruction executions. It has a flash program memory of 3.5 KB and CPU speed up to 5 MPS. Also, it has 4MHz internal oscillator, 224 Bytes RAM and 128 bytes EEPROM. Addition to that, it has two comparator and operating voltage 2 V to 5.5 V with temperature range - 40 C to 125 C.

IR Sensor:



Fig.7

The basic concept of IR (infrared) obstacle detection is to transmit the IR signal (radiation) in a direction and a signal is received at the IR receiver whenever the IR radiation bounces back from a surface of the obstacle.

B. Software Description:



Fig.8

Arduino uno board IC is programed with Language C and used for the interfacing of various sensors and GPS , GSM module.

2. FUTURE SCOPE

This project has innovative potential and may be used in various other ways, due to its efficient design. Many improvisations can be made in this work. One of them could be VLSI SoC. Another could be introducing a rechargeable battery. Apart from this stick concept, a fully automated car can be designed using the same concept.

3. CONCLUSIONS

On sensing obstacles the sensor passes the data to the microcontroller ATmega328. The microcontroller then processes this data and calculates if the obstacle is close enough or a distance apart. If the obstacle is not close to subject the circuit does nothing. If the obstacle is close the microcontroller sends a signal to voice module. GPS and GSM is also used for security purpose of the stick and blind, with a panic button. The hardware specifications or requirement of this project is not complicated and it has a minimal software requirement.

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BIOGRAPHIES



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