Smart Blind Stick

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Abstract- **Visually impaired people use blind stick to aid obstacle detection and avoidance. But still requires assistance of people to go to unknown places or during crossing of the road. But with the advent of technology [2-4] there comes many different smart sticks which helps the visually impaired people to travel on their own with full confidence and protection in the outdoor environment. This project uses PIC microcontroller embedded with Global Positioning System (GPS) for location tracking, Ultrasonic sensor for obstacle detection, buzzer and vibrator to notify the obstacle. Global System for Mobile (GSM) to notify his/her guardian about the present location when panic button is pressed and RF remote to locate the blind stick.**

Keywords - obstacle detection, MiKroC, tracking, visually impaired

1 INTRODUCTION

According to a survey,India is now abode to world's largest number of visually impaired people [1]. Usually visually disabled people uses cane sticks for the obstacle detection. But still they requires some assistance when they travel in the outdoor environment. As there is lot of traffic in the road and today in this busy world no one has time to think and speak to the blind or help them to cross the roads. So the blind people might feel alone and restless. So by using this smart sticks the visually impaired can travel freely without any assistance, which boost their self-confidence. So our main goal is to create a portable system that will allow visually impaired individuals to travel in the outdoors without any guidance certain drawbacks [2-4]. They are either expensive or usually uses Braille interface. In this project effort has been made to overcome some of the drawbacks.

The project described here has PIC 18F46K22 microcontroller as the main frame of the project. This also includes a Global Positioning System(GPS) [7-9] for

tracking the location, Ultrasonic sensor [4] for the obstacle detection, buzzer and vibrator [5] to notify the visually impaired about the obstacle, Global System Module(GSM) to notify his/her parents or guardians about the present location of the blind person when the panic button is pressed in case of danger and a RF remote is used to locate this stick in case of misplacement.

2 SYSTEM DESIGN

The block diagram of the system is as shown in the figure 1.

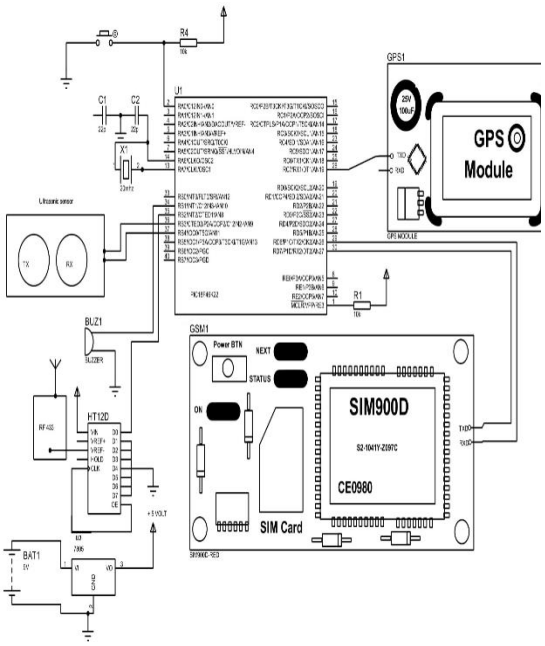

Fig 1. Block diagram of Hardware Componen

I.PIC 18F46K22 Microcontroller

This is the main frame of the system which enables the controlling and proper operation of the other modules connected to it. It has an EEPROM of 1024 bytes withmemory addressing to 64 Kbytes and data memory address to 4Kbyte, which can perform 16 MIPS operation. It has 16 bit wide instruction and 8 bit wide data path.

It is a 40 pin IC, which are divided into 5 ports i.e. port-A, port-B, port-C, port-D and port-E. As shown in the figure 2.

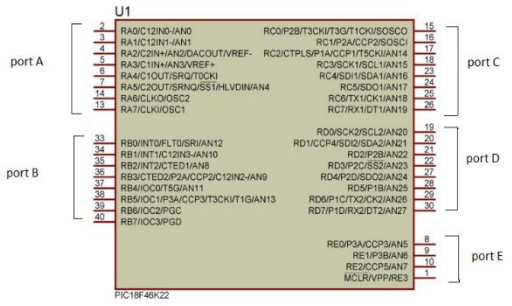

Fig 2. Pin Diagram of PIC 18F46K22 microcontroller

II. Ultrasonic sensor

The ultrasonic sensor emits short, high frequency ultrasonic waves at a regular interval of time. When this waves strikes an object they get reflected back and from this the distance between the object is calculated based on the interval of time between the release of the waves and the reception. The chirp part of the sensor emits the waves and the echo part of it receives the reflected signal. They are available in wide range measuring from distance of 20mm to 10m and has an accuracy of 0.025mm

III. SIM-900D GSM Module

The sim 900D delivers GSM/GPRS900 MHz performance, with a small form factor and with low power consumption. 33mm*33mm*33mm is the configuration of the module, which can fit in space requirements in our application. It uses TCP/IP protocol with voltage range of 3.4V- 4.5V.

IV. NEO-6M GPS Module

The Global Positioning System(GPS) is a US owned service that provides services like positioning, navigation and timing(PNT) services.

The NEO-6M GPS module has a GPS receiver with a built in 25*25*4mm ceramic antenna, and an inbuilt EEPROM, which helps in strong satellite searching capabilities. By using this we can monitor the status of the module. It has a backup battery that can save the data when there is accidental power cuts or failure in the system. It uses RS232 TTL interface for the working.

V. Buzzer

It is generally an audio signaling device. In the project it is implemented with the vibrator in order to notify the obstacle. It consists of the piezoelectric element, which is run by an oscillating embedded circuit. Whenever the voltage is applied the ceramic plate vibrate generating the soundwaves. It has an operating voltage of 4-8V DC and rated current of less than 30mA.

VI.HT-12D decoder

HT-12D decoders are integrated circuits belonging to class series of2^{12} decoders, which is generally used in remote control system applications like burglar alarm, security system etc. This module transforms the serial input to parallel output. It is can decodeup to 12 bits of data out of which 8 are address bits and four data bus.

VII.RF 433 remote controller

The RF module comprises of 433 MHz RF transmitter and receiver. The transmitter draws 0V of power while transferring logic zero while it is fully on i.e. it uses 4.5mA when conducting the logic one, thus consumes considerablylow power in battery operations. This receiver receives at a frequency of 105Dbm. Transmitter supply voltage is of range 3V-6V and the receiver supply voltage is of range 4V-12V.

VIII.Voltage regulator 7805

A regulated power supply is essential for the electronic devices in order to provide the stable rate of current as well as the voltage. The electronic devices get damaged if there is a small deviation in this. So regulators of family 78XX, which are linear voltage regulators provides regulated 5V as output.

IX.Pushbutton switches

X.

The switches are the device that usually helps in making or breaking of the circuit. It is an electromechanical device. It completes the circuit on pressing the button allowing electricity to pass through it. The pushbutton in this project is used as the panic button which on pressed complete the circuit and send the present location of the visually impaired person to his parents or guardians.

3 SYSTEM SOFTWARE

We are using MikroC PRO for PIC[10], which uses ANSI C style for PIC controllers. It is anabsolute IDE for coding, simulating, programming and debugging. The installation of this is similar to that of any windows application. It supports many hardware libraries, ANSI C libraries along with some miscellaneous libraries.

Installation oftheMikroC And Interfacing It To Pic Microcontroller:

Step1: Downloading the mikroC IDE for PIC microcontroller and install it.

Step2: once it get started create a new project, where the PIC 18F46K22 controller is to be selected with the operating frequency.

Step3: After the new project creation,a window opens, where all the library files should be included.

Step4: Finally a blank page appears where you can write your program

Step5: select project at menu bar and select Edit project, where PIC 18F46K22 controller is to be selected. Further on the left panel oscillator, PLL, Brownout reset and MCLR pin should be set

Step6: Now the program can be written in embedded C language

Step7: different registers are used to write/read or perform some operations on the port pins

Step8: After completion of the code, Build it from the menu bar, if there is no error, a message of finish successfully is displayed in the below window

Step9: MikroC has an inbuilt bootloader to burn the PIC microcontroller

Step10: go to tools, MiKroBootloader then a window will appear

Step10: select the COM port as the program is dumped to the controller using a USB

Step11: selecting the same port in the setup window and click the ok button.

Step12: clicking on the connect button, a message appears on the history window as 'PIC response waiting; Disconnected', then you should reset to get connected.

Step13: after it is connected, select the program hex file and click start bootloader. After the burning process, "reset PIC" appears click ok then booting is done.

Main Program Flow:

- The microcontroller and the IDE is initialized.
- The ultrasonic sensor continuously check the obstacle distance for <=10cm
- If the obstacle is detected within 10cm distance, the buzzer rings and the vibrator starts to vibrate to alert about the obstacle.
- If in case the pushbutton is pressed at the times of danger, the GSM module gets the location coordinates from the GPS module[6]
- The guardians/parents numbers which is initially stored in the GSM module, a message notification is sent to the parents/guardians about the present location of the blind.
- If RF remote controller button is pressed, the buzzer goes so that it is easy for the blind to know about the misplaced stick.

4 CONCLUSION

Blind people uses stick to aid in obstacle detection and avoidance. Sometimes they even need someone's assistance to travel. Several guidance systems has been invented for vision impaired people, but these systems are either expensive or bulky.

The main motto is to help visually impaired people to pilot with ease using advance technology. In order to overcome the above issues the project is focused on the development and evaluation that makes use of GPS, ultrasonic sensor for hurdle detection and a panic button to send their location via sms to the corresponding friends or relatives.

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