AN INTELLIGENT WALKING STICK FOR VISUALLY CHALLENGED PERSON

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Abstract: A navigation system for visually impaired and blind people in unknown indoor and outdoor environment is presented. In this paper we are going to propose the concept of an intelligent system for blind person. Here we are going to implement the project by using PIC micro controller. An IR proximity sensor is used for detecting the obstacle before certain distance. After detecting the obstacle by the sensor, the vibration motor and buzzer will alert the visually challengeable people. Here we are employing GSM and GPS to find their location and share information to relatives or well wishers. By this we can able to find the location of the blind people if they were missing.

Index Terms - **Smart, Blind Stick, IR proximity sensor, GPS, GSM, PIC Micro controller 16F877A.**

I. INTRODUCTION

Blindness is defined as the state of being sightless in which both eyes suffer from complete loss of vision. The impairment is not fixable, even through the use of glasses, contact lenses or in extreme cases, surgical procedure. The disability is mostly caused by diabetes, macular degeneration, traumatic injuries, infection and glaucoma. Other causes include blocked blood vessels, complications of premature birth, complication of eye surgery, stroke and tumors. Blind people experience difficulties when commuting to their intended destination. One of the greater obstacles is to detect foreign objects across their walking path. [1] Based on, a safe distance between a blind person and an obstacle is in the range of 20 cm to 250 cm. According to a recent survey, roughly 90% of the blind population is unable to travel alone.3% of them are dependent on their pet while the remaining 7%uses the white cane. Even with the white cane, their mobility is still limited; both indoor and outdoor.

This project presents design and implementation of an IR sensor based walking stick. [2] This sensor is used for obstacle detection and it will alert them by buzzer and vibration motor. The proposed system is implemented using PIC microcontroller 16F877A. Blind persons can use this walking stick for safe navigation and in case if they were missing their location will be shared to their relatives by using GPS and GSM. The main aim of our project is to help the blind person to walk along the road without anyone's support.

II. PROPOSED SYSTEM

Fig.1 shows the block diagram here the power supply of 12V is given to the PIC Controller and an IR sensor is used for detecting the obstacle. After detecting the obstacle, the buzzer sound is heard and the vibration will be provided by the vibration motor. The GPS and GSM are used to track the location of the person if they were missing.
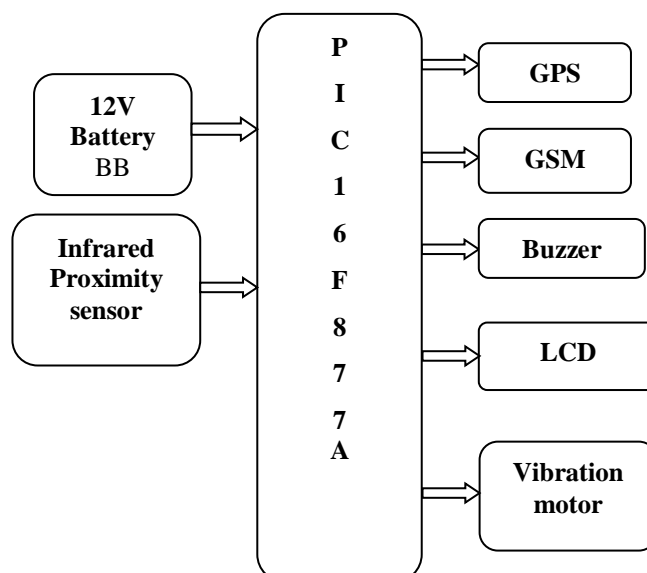

Fig.1 Block diagram

A. PIC MICROCONTROLLER

The PIC microcontroller PIC16f877a is one of the most renowned microcontrollers in the industry. This controller is very convenient to use, the coding, debugging and programming of this controller is also easier. One of the main advantages is that it can be write-erase as many times as possible because it use FLASH memory technology. It has a total number of 40 pins and there are 33 pins for input and output.

The PIC16F877A features 256 bytes of EEPROM data memory, self-programming, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI) or the 2-wire Inter-Integrated Circuit bus and a Universal Asynchronous Receiver Transmitter (USART). All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances and consumer applications.

MPLAB is a proprietary freeware integrated development environment for the development of embedded applications and it is developed by Microchip Technology. It is used for programming PIC micro controller.PIC kit is also supported by MPLAB.PIC kit 2 is a debugging tool used in PIC microcontroller.

B. INFRARED PROXIMITY SENSOR

Infrared technology addresses a wide variety of wireless applications. The main areas are sensing and remote controls. In the electromagnetic spectrum, the infrared portion is divided into three regions: near infrared region, mid infrared region and far infrared region.

The basic concept of an Infrared Sensor which is used as Obstacle detector is to transmit an infrared signal, this infrared signal bounces from the surface of an object and the signal is received at the infrared receiver.

This IR Proximity Sensor is a multipurpose infrared sensor which can be used for obstacle sensing, color detection, fire detection, line sensing, etc and also as an encoder sensor. The sensor provides a digital output.

The sensor outputs a logic one (+5V) at the digital output when an object is placed in front of the sensor and a logic zero(0V), when there is no object in front of the sensor. An onboard LED is used to indicate the presence of an object. This digital output can be directly connected to an Arduino, Raspberry Pi, AVR, PIC, 8051 or any other microcontroller to read the sensor output.

C. GSM

SIM900A SIM Com presents an ultra compact and reliable wireless module. The SIM900A is a complete Dual-band GSM/GPRS module in a SMT type. Featuring an industry-standard interface, the SIM900A delivers GSM/GPRS 900/1800MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mm x 24mm x 3 mm, SIM900A can fit almost all the space requirements in your applications, especially for slim and compact demand of design. The GSM connected to the UART port by Controller is used to send/ receive messages and make/receive calls just like a mobile phone by using a SIM card by a network provider.

The **GSM library** contains many methods of communication with the shield. This GSM Modem can work with any GSM network operator SIM card just like a mobile phone with its own unique phone number. Advantage of using this modem will be that its RS232 port can be used to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily using this.

D. GPS

GPS Module comes with a POT (Patch on Top) ceramic antenna which makes it a small and complete solution for enabling GPS navigation to your embedded devices and robots. It supports 66 Channels and external antenna input compatibility for maximum sensitivity. The module comes with a standard 2mm DIP pin headers which provide easy interface to the devices. The module works on TTL Serial protocol which used with any microcontroller or PC. It can be directly plugged to USB and can be connected to the software.

E. VIBRATION MOTOR

It is consists one coin type motor which is a Permanent Magnet coreless DC motor. It vibrates when the input is logic HIGH. It is very easy to drive and Grove compatible.

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This project can help the visually challenged people for detecting the obstacle before certain distance and it will alert them. By using GPS and GSM their location can be tracked as well as it can also be sent to their relatives. Hence it can help those people for safe navigation.

III. RESULTS AND DISCUSSIONS

Fig.2 Stick with sensor

Fig .2 shows the stick that is used in our project an IR sensor is fitted to the foot of the stick and a vibration motor is attached to the handle.
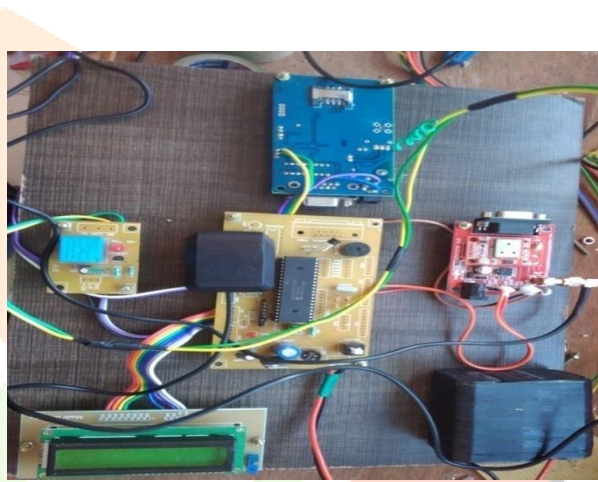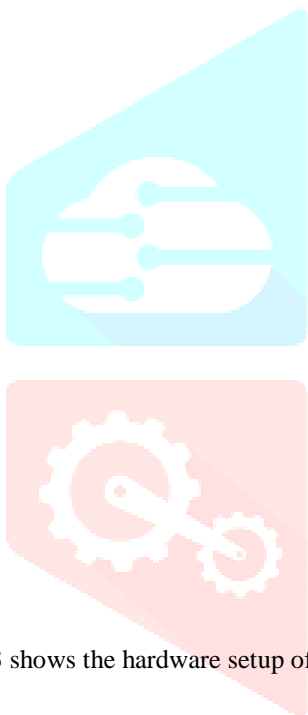

Fig.3 Hardware setup

Fig.3 shows the hardware setup of this project. It consists of pic 16f877a micro controller, GPS, GSM, Battery, LCD and relay circuit for buzzer

Fig.4 Overall view of the project

Fig.4 shows the overall project which consists of the stick along with the controller board.

IV. CONCLUSION

One of the most important difficulties faced by the visually challenged persons is constraints in independent mobility and navigation. They primarily use the white cane as a mobility aid allowing them to detect close by obstacles on the ground. This project aimed at the design and implementation of a detachable unit which acts to augment the functionality of the existing white cane. It will help the blind people in the world to make them easier to walk everywhere they want. Our future improvement is to develop the project by using VLSI technology to design the PCB unit. This can make the   System more compact. Use of specially designed boards and high quality ultrasonic sensors makes faster response which makes the device capable of working in crowded.

V.   REFERENCES

[1]   M Narendran, Sarmistha Padhi, Aashita Tiwari" Third eye for the blind using arduino and ultrasonic sensors" National Journal of Multidisciplinary Research and Development, Volume 3; Issue 1; January 2018

[2]   Rajakumar G., Andrew Roobert A., 'Design of Low Power VLSI Architecture of Line Coding Schemes'in Wireless Personal Communications, ISSN: 1573-1979 (electronic version). DOI: 10.1007/s11277-018-5286-4, ISSN: 1572-834X. Volume 99 ,pp 1455–1473January 2018

[3]   Md. S.Arefi and, T. Mollick, ―Design of an Ultrasonic Distance Meter,‖ International journal of scientific and engineering research Vol. 4, Issue3, March, 2013.

[4]   Rajakumar G., Andrew Roobert A., 'Low Power VLSI Schematic Design of PC/BPSC Generation and Degeneration' in Asian Journal of Research in Social Science and Humanitics, Vol. 7, No. 2, February 2017, Page No. 160-164, ISSN1682-3915.

[5]   A. Agarwal , D. Kumar and A. Bhardwaj, ― Ultrasonic Stick for Blind,‖ International journal of engineering and computer science, ISSN:2319-7242 Vol. 4, Issue 4, April 2015, pp. 11375-11378.

[6]   Rajakumar G, Andrew Roobert A., 'Area and Power Optimized Hardware Design of Bi-Phase Space Coding Technique / Phase Coding Technique for Wireless Sensor Applications' in Asian Journal of Information Technology, 15(19); Page No.3657- 3663, 2016, ISSN 1682-3915.