Aid for the Blind

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Abstract—- **All the senses of the human being are the immediate contact for a person with the environment. Sight is one of these senses, vision enables a person to be conscious and discern the surrounding world. Currently, the visually challenged people use a simple cane or dog as a tool for directing them towards the destination. Although, the cane is the most extensive means that is used today by the visually impaired people, but, it could not help them to detect hurdle from all levels of obstacles. The smart stick comes as a advanced solution to permit the visually impaired to identify the world around. A unique smart system could be employed to enable blind to move with self assurance as a sighted people. The system consists of ultrasonic sensor, GPS and GSM module, microcontroller. The sensor helps to detect obstacles in front of the user so as to avoid the collision, the GSM module tracks the location of the user and the GPS module will send the information regarding the position of the user to the pre-saved number, when the person presses the panic switch. In case of any hurdle in the path of the user then, the user would be informed regarding the same by the pre recorded message. Microcontroller who is the master is used to control and maintain all the instructions and situations. Thus, it could definitely assist the blind, to effortlessly, elegantly to move gracefully from one place to another with the help of tracking and navigation system.**

Keywords – PIC Microcontroller, Ultrasonic Sensor, GPS and GSM Module, Panic Switch, Blindness, Electronic Travel Aid, Smart Stick.

I. INTRODUCTION

Blindness is a big pitfall and helpless condition for the people who are enduring from it, which cannot be felt by those who have eyes. There are nearly about 10 million people who have been suffering from the blindness in India. The universal number of the blind people shoots up to approximately 37 million people. In order to move without a guide in an unknown space a visually challenged person needs to firstly identify some points of reference that would allow him to guess the optimal movements for covering the distance to move from one place to another one. Accordingly, unsighted fellowmen need to use various types of aid for their mobility. The guide dogs that are specially trained or a simple stick which is unsophisticated is used to help the blind people for their motion. However, this method has some difficulty to follow the direction by these dogs. Recently, many techniques have been developed to boost the mobility of blind people. These techniques are called electronic travel aid (ETA) devices that assist the purblind to move efficiently in an environment regardless of its dynamic changes. The proposed smart stick which would serve the visually challenged to move with great ease. Using the smart blind stick, a visually disabled person could walk without anyone's help and would be able to automatically detect the barrier in one's way.

The proposed blind stick uses ultrasonic sensor along with GPS & GSM based Navigation/Tracking system. The ultrasonic sensor which would be used to sense the obstacle in the path and then the system acknowledges the user regarding the hurdle along the path by the means of the pre-recorded voice through the speaker. The GPS module would locate the position of the user. Also, the panic switch is proposed in the system, which would manage to send the position of the user to the pre-saved by the means of GSM module.

II. LITERATURE SURVEY

A equipment which could be worn consisting of head hat that helps the blind person to navigate appropriately and to avoid any obstacles that may be encountered, may it be fixed or movable, to avoid any possible tragedy. The crucial component of the system is the infrared sensor which is used to scan a predetermined area around user by emitting infrared waves having the frequency of about 700nm. The reflected signals received from the barrier objects are used as inputs to PIC microcontroller. The microcontroller is then used to determine the direction and distance of the objects surrounding the blind. Moreover, it controls the peripheral components that alert the user regarding the obstacle's material, direction and shape [2].

Another system which is co-ordinate with a GSM-GPS module to pin-point the location of the blind person and is used to set up as a two way communication path in a wireless manner. Moreover, the GPS-GSM Module provides the direction information and information to avoid obstacles based on ultrasonic sensors as well. A buzzer, a vibrator and accelerometer sensor are also piled up to the system. The entire system is designed to be compact, light weight and is used in conjunction with the cane [3]. The hurdle detection firstly, identifies and detects, after which the information of the barriers are sent to the visually challenged people by using different modalities such as voice, vibration, tactile, etc. one more system that is, an assistive system for visually impaired people based on the matrix of electrode and mobile Kinect. The system that comprises of two vital components namely the environment information acquisition and another one is the analysis and information representation. The first component objective is to capture the environment by using a mobile Kinect and analyzing it in order to detect the predefined obstacles for blind people whereas the second component tries to represent under the form of electrode matrix [1]. A smart spectacle along with the footwear designed and developed for the mobility and safe navigation of the visually impaired fellowmen. The Ultrasonic transducers are mounted on the shoes and are placed on the central, median, and on the lateral side of the shoe so as to detect ground-level barrier of different heights and pits and holes as well. The tactile outputs are provided by three miniature-

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sized vibrating motors embedded within the collar of shoe. The spectacles are with a pair of ultrasonic transducers mounted centrally above the bridge, and with a buzzer at one of the temples. This are used to detect obstacles at head level. The developed shoes and spectacles are controlled via a battery-operated, microcontroller-based belt pack unit

III.   SYSTEM OVERVIEW

Aid for the blind is made to assist the blind for travelling. The entire circuitry is powered by 12V DC power supply which consists of bridge rectifier including diodes and step down transformer. Transformer steps down the 230V AC power supply down to the desired supply but, this step down voltage is AC, whereas the project requirement is DC. To convert power supply from AC to DC power supply, bridge rectifier is used. Further, when the rectification is done, electrolytic capacitor is applied for smoothening the output. The electrolytic capacitor mainly filters out the ripples in the waveform. Voltage Regulator IC is used to regulate the input voltage supply to the circuit. If adequate heat sinking is provided, they can deliver over 1A output current.
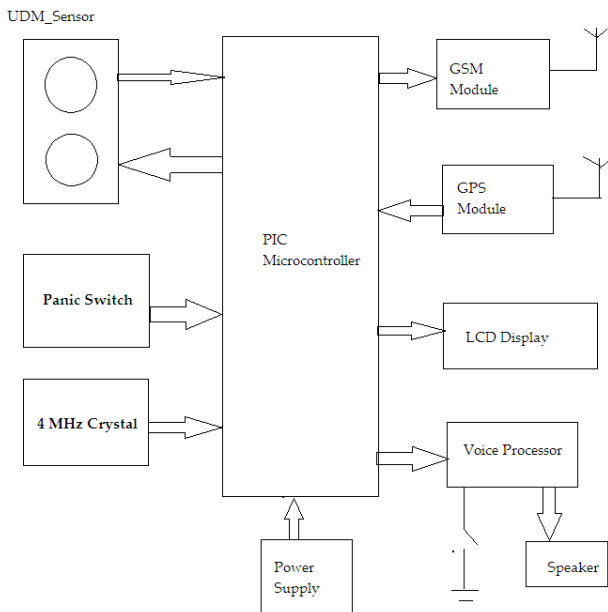

Fig no 1. Block diagram

The Ultrasonic Sensor dispatch a high-frequency sound pulse and then takes times for the reverberation of the sound to reflect back The ultrasonic sensor refine the barrier in the way at the span of 4m from the user, that is the ultrasonic distance sensor has range of 4m. It is able to estimate range from 2cm to 400cm with a precision of about 3mm. This module includes ultrasonic transmitter, ultrasonic receiver and its only detects the barrier.

The 4MHz Crystal Oscillator is used to provide clock signal to the microcontroller. The microcontroller is a prime part that

The crucial computing device used for this project is PIC Microcontroller. To detect barrier recognition system for visually challenged people respond swiftly, it should be equipped with advanced microcontroller to reduce computational complications. PIC microcontroller is a compact stand alone com-

controls and commands the entire circuit. A 4 MHz crystal provides precise timing and an easily separable clock source for the interior hardware timers. This high frequency clock input is used to control the sequencing of CPU instruction.

Connection for interfacing PIC microcontroller with the GPS and GSM module. Peripheral Interface Controllers (PIC) is one of the advanced and forward microcontrollers evolved from the microchip technologies. The microcontrollers are application specific are widely used in electronics applications. PIC microcontroller is the amalgamation of all types of advanced features including interfacing ports and memory modules which has the excellent capability for the quick computation. But, it fails to provide ample of capacity for storage of data. Though it depends on type of PIC microcontroller version being used, then too, the clock has maximum operating frequency to about 20MHz and the memory to write the program is about 1K to 4K words.   The clock frequency is responsible as of how fast could the instructions of the program could be read and executed. The output cannot be examined at the clock frequency.

PIC16F887 Micro controller is used abundantly because it has two ports for connection and the project would essential two RS232 cable The GPS module continuously navigates the present location of the user. Global Positioning System (GPS) satellites transmit signals from space that GPS receivers, use to provide three-dimensional location (latitude, longitude, and altitude) plus precise time. GPS receivers provides authentic positioning, navigation, and timing services to global users in all weather, day and night, anywhere on or near the Earth. Even a GSM module will be connected having pre-defined contact number saved in it. The GPS sends the incorporated data along with the longitude and latitude along with the direction to the GSM module. The GSM Modem is able to receive any SIM card of the GSM network operator and is capable enough as like the cell phone along with its unique sequenced digital number. The benefit of using this modem will be such that, one could use its RS232 port to interface and enhance the application for embedded technology. The applications such as data transfer, remote control, SMS Control, and logging can be developed easily. This GSM modem has a highly malleable plug and play quad band GSM modem for undeviating and simple integration to RS232 applications. Also, the panic switch which is integrated with the system would alert the pre defined GSM user when it is pressed.

GPS and GSM module has antenna for communication. All this communication will be handling by the microcontroller, and user will be confessed by the 8E loud speaker. APR9600 Voice Processor is used to pre-record the voice for the future use. For voice announcement use the voice processor APR9600. The APR9600 device offers true single-chip voice recording, non-volatile storage, and playback capability for 40 to 60 seconds.

IV.   HARDWARE AND SOFTWARE

puter and it stores a set of instructions. It consists of a processor core, memory, and programmable input/output peripherals. PIC Microcontroller is a master of this system which deals with a Embedded C programming code which was installed in it. For non-contact distance measurement function, HC-SR04 Ultrasonic Distance Sensor can be used which is low

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cost and popular solution measure range from 2cm to 400cm. It includes of transmitter and receiver. It consist of 4 pins namely VCC, GND, TRIG, E CHO. TRIG and ECHO pins can be used to interface this module with a microcontroller unit. GPS and GSM module is also vital components of this system. The GPS module continuously navigates the current position of the user satellites broadcast signals from space that GPS receivers, use to provide three-dimensional location (latitude, longitude, and altitude) plus precise time. Even a GSM module will be connected having pre-defined contact number saved in it. There is panic switch attached on which emergency would alert the user of pre defined GSM user The GPS can send information of user's location through SMS when user press this panic switch. Embedded C is used because of it's ease for programming. It is easy to understand, portable that is it can be carried from one system to another system. Embedded C is programmer independent that is it can be easily understood by another programmer.

CONCLUSION

Hence, the system would definitely aid the blind to travel independently. A prototype would be designed and developed to facilitate safe and secure navigation and mobility for the visually-impaired so that they could travel independently.

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