"Eyes for Non-Eyes"-A Sensor based Intelligent Guide to Blind

Mr. Rajesh Yadav
Assistant Professor, Department of Computer Science,
V. K. Krishna Menon College.

Abstract **: God's belief - an important part of our lives. Only this way, happy and unhappy people can distinguish the blessings and power of God. On realistic side, blind people choose to rely or depend on others to travel and perform bodily functions. The purpose of this paper is to provide a theoretical and hardware model that combines the latest technology to provide intelligent electronic help for those with less than 0 or no vision by making use an ultrasonic sensor to help the blind by observing obstacles or hurdles around him and use a color detection sensor to measure the specific path they will use. A Bluetooth module using GPS technology and the blind Android mobile app will provide the required location and, in the event of a stress send an SMS alert to the registered contact number. The system will provide the blind with practical and simple navigation aids that will help with artificial vision.**

Keywords: Ultrasonic Sensors, Color Sensors, Micro-controller, Vibration motor, Blue-tooth Module, Android Mobile Application.

1. INTRODUCTION:-

Vision is a major part of human physiology because 85% of human lives the environment through sight. For people with visual impairment, traditional walkers are white canes and guide dogs. The most important shortcomings of these aids are basic skills and preparation phases, range of motion. With the rapid improvement of modern engineering, both intelligent hardware and software provide intelligent navigation. Recently,an electronic travel tool (ETA) was designed and prepared to help blind people navigate independently and safely. One of sayings goes around - “He can’t change the direction of the winds but he can adjust his sails to always reach his destination”. Thus any specific tools that can help the people with impairment act as adjustment to his/her sails. People with low vision may be blind or visually impaired. These conditions often limit people's ability to perform routine tasks and influence their current work of tone. Blindness can be caused by illness, injury or other conditions that limit vision. For the object course, a person with a 10/100 view picks up objects at a distance of 10 feet, and a person with a perfect 10/10 view can pick up at a distance of 100 feet. Recognizing the challenges posed by blindness can help visually impaired people understand the problems that blind people face every day. People who are blind or have impaired vision are often difficult to move outdoors in known environments. It is very complicated for vision-less to move alone. There is possibility of their missing, in such cases it is truely hard for their relatives and family to see them.

The focus of this paper is to support vision-less peoples to carefully move in between obstacles and other difficulties posed by them in their daily life.

2. REVIEW OF EXISTING DEVICES:-

Many ETAs and robot technologies have been applied, to guide the blinds that aimed at improving their mobility in terms of safety, to detect obstacles on the ground, uneven surfaces, holes, steps, and puddles.

A. C-5 Laser Cane

It was presented in 1973 by Benjamin. It depends on optical triangulation with three laser diodes and three photograph diodes as beneficiaries.
The Laser Cane can identify deterrents at head-tallness, drop-offs before the client, and snags up to a scope of 1.5 m or 3.5 m in front of the client.

B. Sonic Torch

It is a battery worked hand held gadget essentially works by transmitting the ultrasound in the forward
bearing and accepting the reflected sound bar from the closest item.

C. Mowat Sensor

It is an economically accessible hand-held ultrasonic-based gadget that advises the client regarding the separation to

recognized items by methods for material vibrations. The recurrence of the vibration is contrarily relative to the separation between the sensor and the item.

D. Sonic Path Finder

It cautions the visually impaired when identifying the impediment by the acoustic contrast. In any case, it doesn't give the exact way and the situation of an impediment.

E. Meldog

It utilizes the man-made reasoning, dissimilar to in the sonic pathfinder. It can give the precise situation of a hindrance utilizing the ultrasound and laser sensors. Be that as it may, when all is said in done, it is generally huge and overwhelming.

F. Navbelt (1989)

It is a compact gadget outfitted with ultrasonic sensors and a PC. It created a 120 degree-wide perspective on the obstructions in front of the client (like a radar screen picture). This picture was then converted into a progression of directional (stereophonic) sound signs through which the client could figure out which bearings were obstructed by impediments.

3. BASIC SURVEY FOR IMPROVIZATION IN SYSTEM DESIGN

The blind stick is an influential theme that is constantly increasing and changing. Currently, commercially available blind sticks do not have much effect due to their increasing cost and lack of transparency. The first project on similar concepts proposed a method for using smart keys for people without vision: to determine obstacles, real-time assistance through GPS.Blind people's comparison exercises use pulse echo technology, which provides an alarm sound when detecting objects. This technology was used by the US Army to discover submarines. When you at the rough surface they produce echoes, the ultrasonic range of these pulses is 23 kHz to 52 kHz, but the power requirements are quite large.

At present, many techniques have been invented to improve the mobility of blind people based on signal processing and sensor technology. These are called Electronic Travel Assistance (ETAs), which help people without vision to move freely in the environment, no matter how much change they make.

4. SYSTEM DESIGN

It comprises of following:

1. Micro-controller Unit
2. Obstacle Detection Unit
3. Blue-tooth Module link with Android Mobile
4. Smart Phone
5. Sensors

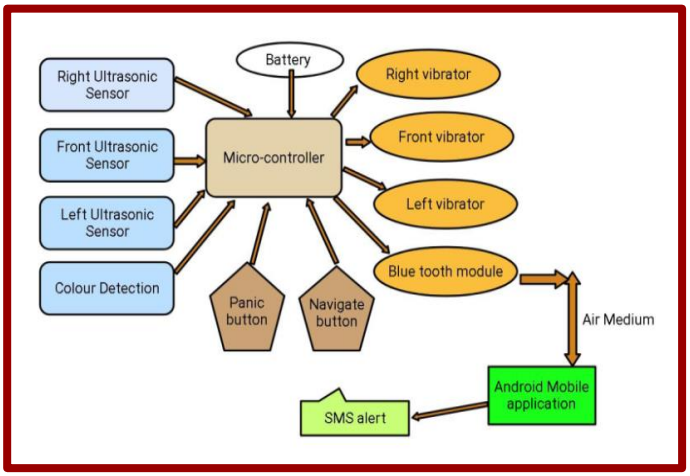

Figure 1-Block Diagram

4.1 Micro-controller Unit: It is a small computer on a single chip of 4 KB flash that can be reprogrammed a thousand times. It is pin integrated circuit that provides 5V supply for pins and the oscillator between pins with two capacitors. The power to start the program is determined by the 5V supply and the capacitor 10micro farad, having resistance of 10 k ohms, and dedicated pin number 3Rx on the ultrasonic sensor that has an approximate obstacle distance. Secure Port on the left sensor and on the right ultrasonic sensor in order to receive the trigger when an obstacle is detected. The medical button in case of a panic connected to one port. One Port connection to the relay contacts by two transistors. Once the obstacle is identified, current flows into a current limiting resistor at the bottom of the two transistors that magnetizes the recoil and then triggers the vibrating motor.

4.2 Obstacle Detection Unit: Three ultrasonic sensors are used on the stick side -left, right and front.It consists of transmitter and receiver. First the transmitter flows an ultrasonic wave, which acts in air and when it becomes stringed with any obstruction it gets reflected back towards the sensor. The reflected wave is then observed by the receiver portion and accordingly vary change his/her path.

4.3 Android Mobile Bluetooth Mobile link with GPS system: A mobile is link with Bluetooth model 05 through an application in Android with common GUI of 2 knobs navigate and panic buttons respectively. These buttons help the vision-less in difficulties when faced by them.

4.4 Smart Phone: It is carried by blind person having fast speed internet along with Android Application. This device plan an important role, this phone can carried by blind person when any accident happens or if the blind person

lost his way by pressing the panic button the relative of blind will receive a message with his location through enabled location based services.

4.5 Sensors: It is a device that receives a signal and responds to it in a distinctive manner. Sensor used in the model works in the same way as the eye in the human being. The sensor used is Right, Front and Left Ultrasonic Sensor.

Below is table for general characteristics of some sensors:

	Laser	Infrared	Radar	Ultrasound
Principle	Transmission and reception of light wave	Transmission and reception of pulse of IR light	Transmission and reception of microwave	Transmission and reception of acoustic waves
Range	SLR: 15cm to 120cm LLR: about 10- 50 m	From 20 cm to 150 cm	about 150-200 m	From 3 cm to 10 m
Beam width	narrow	fairly thin	Depended on size of antenna	wide
Atmospheric condition	affected	affected	Affected	Not affected
Cost	Very high	Low	High	Low

SLR: short laser range, LLR: Long laser range

Description:

1] Laser sensor

It works on principle of transmission and reception of light wave.Short laser range is 15 cm to 120 cm.Long laser range is about 10 to 15 m.It is very costly.The beam width is narrower.

2] Infrared Sensor

It works on principle of transmission and reception of IR light pulse.Short laser range for Infrared Sensor is 150 to 200 m. It is cost effective.The beam width is fairly thin.

3] Radar Sensor

It works on principle of transmission and reception of Microwave. Short laser range for Infrared Sensor is 20 to 150 cm. It is costlier. The beam width depends on size of Antenna.

5. METHODOLOGY AND IMPLEMENTATION

The above model uses micro-controller power as +5V and is generated by using 9V battery. The project H/W and android Mobile Application will work together to achieve its task. First distance on hardware part using Ultrasonic sensors will be scanned, and then it will check if they are too close then send pulse to vibrator to tell the user there is an obstacle ahead. Three vibrators are placed so that when the blind wants to move forward, left or right and as soon as an obstacle is on the way of blind, the vibrator vibrates and then he/she will change his path from that way. Blue-tooth component Use of GPS device and an Android mobile app for non-visual vision will provide the appropriate (exact) location, and in the event of a panic, a SMS notification will be sent to registered contact number. Color sensor has been used at the bottom of the stick to detect the presence of a orange color and identify its exact coordinate across the full color spectrum, if he/she left the color spectrum the vibrator will vibrate in such case.

Following is range of vibration:-

- Front Ultrasonic Sensor : 100-70 cm 250ms(V)
- Left Ultrasonic Sensor : 65-55cm 200ms(V)
- Right Ultrasonic Sensor :65-55cm 200ms(V)

Note: At software part to work efficiently a person with vision disability need to register his mobile number using Android app which will send a SMS alert in case of panic.

6. CONCLUSION

Therefore, for concept of system planning and smart phones, it is very easy to use for users without vision. The only aim is to design this for blinds is to facilitate them and help them out so they may need not dependency of any intruder and thus become self-reliant. Use of vibrators in this project is the way blind will be able to get know how their way. With this system now a blind can go out of home alone too easily. The development can be more transform to extend ranges for obstructions and development in GPS technology continues to improve, accuracy will increase.

REFERENCES

[1] Kanagaratnam, Kajatheepan, “Smart Mobility Cane: Design of Obstacle Detection”, EE 4BI6 Electrical Engineering Biomedical Capstones, 2009.
[2] Diagram drawn using- lekh Diagram, Playstore App
[3] Andrew S. Tanenbaum, David J. Wetherall Pearson, Computer networks, 2013.
[4] Sameul Greengard., Internet of Things, The MIT press, 2015.
[5] KAZEM SOHRABYDANIEL MINOLI, TAIEB ZNATI; WIRELESS SENSOR NETWORKS-Technology, Protocols, and Applications, John Wiley & Sons, Inc, 2007.