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Advanced Navigation System for Visionless Person using Pharos Technique

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ABSTRACT

The proposal of ablind stick model is made for the visually impaired persons to guide their respective paths without any disturbances, and it will provide a better walking experiences which consists of Global Positioning System (GPS) Modules in addition with ultrasonic sensor and infrared sensor. GPS Module is used to detect the exact location of the person, that position and information will inform through short message service. Sound waves and distance to an object are measured using ultrasonic sensor, it is also used to detect the object, and Infrared sensor are used for detecting infrared radiations and it is also capable of detecting the objects. The objectiveaim of this paper is to help visionless persons to lead a safe life.

KEY WORDS: ARDUINO, GLOBAL POSITIONING SYSTEM (GPS), IR SENSOR, STICK, ULTRASONIC SENSOR

INTRODUCTION

Chaitrali K. (2016), designed a headway of modern innovation has made the life of outwardly impeded individual simpler. In the antiquated days, the visually impaired individuals are absolutely reliant on their relatives or some other pet creatures. The cutting edge innovation has given the basic answer for this issue. The visually impaired stick is equipped for distinguishing the article in front of the individual and impart that individual astutely by vibration and it causes the visionless to achieve their way. Roughly 37 million individuals over the globe are visually impaired.

Gaikwad, (2016), describes the visionless individuals are a term that regularly utilized for the general population who are totally visually impaired. The nearness of these issues in the visual framework can be brought about by various things. Some of visionless individuals are conceived in the condition of visually impaired, regular birth, mishap, ailment, and so forth. Rizzo (2009),

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describes a visionless people, more often than not utilize a mobile stick to walk or go some place as a relative to know the bearing and express the state of the passing street. Be that as it may, the elements of the traditional stick itself is as yet restricted in guiding and advising the article to a visually impaired individuals particularly when they are approaching the ideal goal. Steve (2015), describes a visual impairment is the condition of being visionless in which eyes experience the ill effects of all out loss of vision. The weakness isn't joined, even using glasses, Contact focal points or at times, surgery. A stick, the essential versatility device for the outwardly hindered.

In the 21st century, the most recent visually impaired stick is utilized to hit the market was presented by the Indian Technology Delhi's Assistive Technologies Group (Assistech). This hardware encourages the visionless individuals to explore around an article by estimating the separation through vibration recognition and sonar innovation. Dazzle individuals encounter challenges when driving to their planned goal. One of the more noteworthy deterrents is to distinguish outside items over their strolling way. A relative separation between a visually impaired individual and a hindrance is distinguished by utilizing sensor. The walking stick contains arduino, ultrasonic and IR sensors, and buzzer. The whole system is designed using arduino based upon its reliability. All sensors data are taken by the arduino through micro-controller and it produces the output. The main aim of this moduleis tohelp the blind person walk self dependently without stick as information related to distance to the obstacle.

MATERIALS AND METHODS

Figure 1 shows the different types of components used. The ultrasonic sensor provides an easy method of distance measurement. The Global Positioning System (GSM) controls the sending and reception of signals to the other components. The push button sends the message to the receiver through GSM. The prototype is designed to sense an object within 1.8m. It uses ultrasonic sensor, infrared sensor, push buttonand GSM. Ultrasonic sensors are used to detect the obstacle for user.

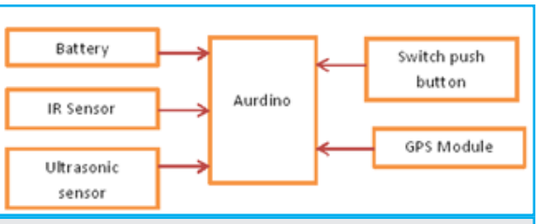

Figure 1. Block diagram of blind stick using arduino

A. ULTRASONIC SENSOR

An Ultrasonic sensor (Fig. 2) is a device that can be used for distance measurement between the object and the stick by using sound waves. Sound waves are measured by an ultrasonic sensor by sending a specified frequency. By measuring the time expanded among the sound wave that have been produced by the sound wave returning back, there is a possibility for measuring the distance for both the ultrasonic sensor Fig. 3 and the object.

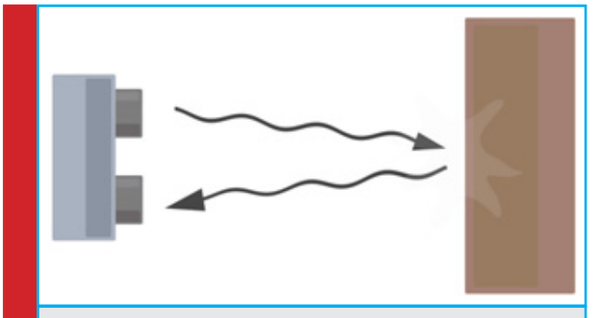

Figure 2. Basic ultrasonic sensor

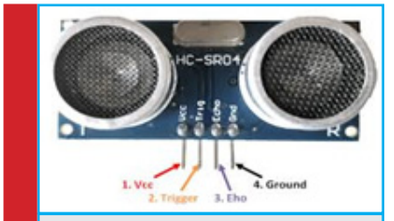

Figure 3. Ultrasonic sensor

Since the ultrasonic sensor is specific that sound waves travelling through air at about 344 m/s (1129 ft/s), as we can hand over the time for the sound wave to returns back and then repeats it by 344 meters (or 1129 feet) to measure the total turn around distance of the sound wave. Round trip is the multiply of speed of sound and time taken. Here, the distance can be calculated by half of the round trip.

B. IR SENSOR

An IR radiations falling on the gadget can be distinguished by IR sensor. The warmth of an article can be estimated by IR sensor (Fig. 4) just as it identifies the motion.IR sensor work by utilizing a particular light sensor for recognizing a predefined light wavelength by utilizing Infra-Red (IR) Spectrum. This kind of sensor can be utilized to gauge how "splendid" the item is.

For human eye the IR beam are not unmistakable. In the electromagnetic range, infrared radiation can be found among the unmistakable and microwave areas.

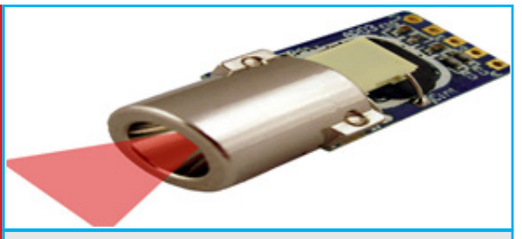

Figure 4. IR sensor

The infrared waves principally have wavelengths in the scope of 0.75 and 1000µm. Infrared innovation discovers driving positions in progressively ordinary items. TVs utilize an infrared identifier to translate the signs sent through a remote control. The fundamental advantages of infrared sensors incorporate their necessities of intensity in least, the hardware in straightforward and the highlights.

C. GPS MODULE

Worldwide Positioning System (GPS) is a system of circling satellites that send supreme data on their area in space back to earth. The produced signs are acquired by GPS recipients, for example, route gadgets are utilized to compute the correct position, speed and time at the engines or article area. GPS is outstanding for the military uses and was first created by the US.

D. BUZZER

Buzzer an electrical device (Fig. 5) that makes a buzzing sound and is used for signaling and it also attract someone's attention. It makes buzzing sound as a signal. Buzzers are used commonly in indicating devices, computers, relays and confirmation of user input such as a computers mouse click and keystroke.

E. ARDUINO

The Arduino is a microcontroller based board (Fig. 6). It consist of electronic input and output pins, a power jack,a resonator, USB connector and a reset button. The microcontroller needs each and everything to be supported by arduino and connected to a computer through USB cable.

Figure 5. Buzzer

Figure 6. Arduino

RESULTS AND DISCUSSION

The project starts an organization to questionnairethe visionless persons about which type of module that would be showed on the stick. As the inventionof this project, they need an any other module for finding the disturbances and fast moving objects .This module has to help the blind persons.

At the time of starting when the first on/off catch is squeezed, it will enact the ultrasonic sensor. The blurring sound will dynamic if identify any hindrance, openings, hitch around the visually impaired position from the separation 150cm until 3 cm, the speed of the sound signal will be quicker when the visually impaired individuals walk drawing nearer to the hitch or gap. Then if the client needs to discover the position, squeezed the second on/off catch to enact the infrared and the framework will give the data about their situation through the GPS

Arduino, sensors, GPS Module,GSM Module Push get switch and the battery all are connected together and shown in Figure 7. When the object is detected by the sensors, it gives the intimation to the visionless person through noise or vibration .If that person needs any help, he presses the push button automatically the message will sent to their relatives or friends through GSM along with their position where they are located through GPS.

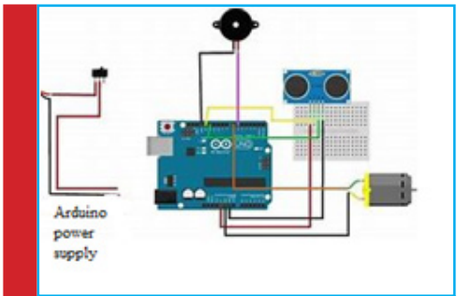

Figure 7. Design of the system

Type of		*Sensor outputs*	
Obstacle	*IR*	*Ultrasonic-1*	*Ultrasonic- 2*
	Sensor		
Down	Off	Not accounted	Not accounted
Stair			
Up Stair	On	D<15cm	D>136cm
			& D<160cm
Wall	On	D<15cm	D>106 cm & D <
			120cm
Vehicle	On	D> 300cm	D>300cm &D
			<450cm
Small	On	D< 15cm	D>300cm
stone			

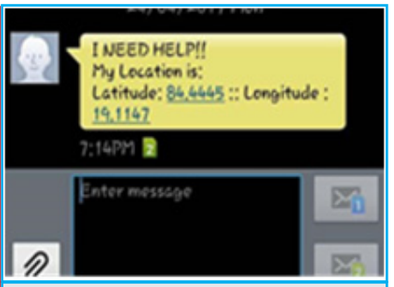

Figure 8. SMS output

The below Fig. 8 shows the SMS that have been received at the relative number, when the blind man miss the way he presses the push button for asking help by informing through GPS location to hiscolleagues and friends.

CONCLUSION

The investigation has effectively built up a shrewd stick for alarming the visually impaired client of the looming deterrents. These were acknowledged through usage of ultrasonic sensor which is fit for estimating separation to the article. The recurrence of blaring increments as the client strolls nearer to the hindrance. The situation and introduction of the sensor on the stick was additionally effectively broke down regarding exactness and point. The upper situated sensor with edge of 90° has been found to the most down to earth setup. When all is said in done, a shrewd stick with range notice include has effectively been produced and its particulars checked.

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