

Smart Walking Stick for Visually Impaired People

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ABSTRACT

There are numerous issues over which people have no control blindness is one of such issues. It grabs the striking visual excellence of the world from a person's life. In any case, missing the magnificence of nature gets one of the last concerns of such individuals as they need to confront various troubles so as to perform even the most nuts and bolts of assignments in their everyday life. One of their most predominant issues is of transport, for example, going across streets, going in trains, or other open spots. They generally require human help to do as such. Be that as it may, once in a while they are rendered vulnerable when no such help is advertised. Their conditions disintegrate their certainty. Customarily they have been utilizing the customary stick to manage themselves by contacting/jabbing obstacles in their way. This causes a ton of mishaps and consequently is risky for them and others. As this is a mechanically determined period we chose to help these distinctively abled individuals by thinking of an innovation using arrangement. We call it the "Smart Blind Stick". It is a gadget that manages the client by detecting obstacles in the scope of the stick. It will distinguish all obstacles in the way with the assistance of different sensors introduced in it. The microcontroller will recover information and pass it on as vibrations which will tell the client about obstacles in transit. It is an effective gadget and will end up being a major aid for blind individuals.

Keywords : Electronic Stick, Visually Impaired, Blind People Electronic Assistance, Smart Stick

I. INTRODUCTION

Our primary plan to take a shot at this undertaking is to center the blind populace of the world and to help them in varying social statuses through the guide of innovation. As indicated by the acquired information from the World Health Organization (WHO) [1] and National Federation of the Blind [2], there are around 253 million individuals who are visually hindered out of which 36 million individuals are blind overall [3].

As indicated by the report by Times of India, India is currently home to the world's biggest number of blind individuals. Of the 36 million individuals over the globe who are blind, more than 15 million are

from India [4]. Then again, while India needs 2.5 lakh gave eye each year, the nation's 109 eye banks (five in Delhi) [5] figure out how to gather a limit of only 25,000 eyes, 30% of which can't be utilized.

The smart telephones permit those individuals to tune in to phone messages and even compose and send messages. Another model is a laser or ultrasonic innovation. Right now, waves are discharged ahead and it is reflected from obstacles in the way of the client and recognized by a coordinating sensor. In this way, the separation to the obstacle is determined by the time change between the two signs.

As of late, there has been a ton of electronic travel that helps intended to assist blind individuals with navigating securely and autonomously. To distinguish the position and area of the blind individual, those arrangements depend on GPS innovation. Such a framework is appropriate to be utilized outside to follow the specific area of the blind individuals at whatever point there is any crisis happens. This area is followed in the types of directions. Then again, to upgrade the implies that help blind people to explore rapidly and securely in a new domain, different undertakings were presented utilizing various innovations like Radio-recurrence identification (RFID), GPS, Ultrasonic, Laser and GSM.

Laser stick transmits imperceptible laser shafts to recognize obstacles at that point produces explicit sound sign. The laser stick has unmistakable sound ultrasonic sensors to follow the obstacle at a particular separation. Ultrasonic sensors are significantly more proficient than other obstacle discovery sensors. Another motivation behind why ultrasonic innovation is well known is, it is generally cheap and furthermore the ultrasound producers and indicators are convenient without the requirement for complex hardware. With this kind of framework, creation new element of continuous help and fake vision alongside a devoted obstacle identification framework is given.

These days individuals are substantially more worried about creating a new guide to support visually disabled individuals. There are a few different frameworks relating to the guide portability of visually debilitated is existing. In [3] the creator utilizes GPS area data with building maps and significant spatial data to give headings to blind individuals inside a grounds domain. Then again, RFID based framework to help the blind in the assignment of shopping for food is proposed in [5]. The framework depends on the RFID labels that are put in different areas in the store and gives the guides simply inside the store (indoor). A smart stick was meant to help blind individuals using locally available sensors for obstacle shirking [6]. The framework

depends on an ultrasonic sensor wherein it identifies obstacles and orders the two-wheeled controlling pivot. The blind feels the directing order through the deal with and follow the stick effectively with no cognizant exertion.

Another framework that utilizes the ultrasonic sensor was expected to illuminate the client about the separation regarding the recognized articles by methods for vibrations. The creator in [7] proposed an insightful guide stick it has crisis trigger which causes visually disabled individuals to be more wellbeing on roads utilizing ultrasound or ultra-sonic sensors. The extent of this paper is to build up a minimal effort canny framework equipped for helping the blind and visually impeded without the assistance of located individuals. The framework is a GSM-GPS based with the goal that it takes the benefits of the GSM system, for example, the prominence and cost-adequacy. Furthermore, the GSM-GPS module has been utilized in various regions of human action, for example, the route of vehicles and route helps to manage visually debilitated persons on foot empowering them to keep away from obstacles and arrive at their goal. In this manner here rather for vehicle utilization, it gives an additional guide for blind to get help effectively with the utilization of GSM and furthermore GPS for the area following framework.

So as to address all the above-characterized issues and to enable 36 million blind individuals around the world, we are presenting an answer to what is dedicated as "Smart Stick". The stick is coordinated with different sensors like an ultrasonic sensor, water sensor with GPS-GSM module and with microcontroller and so forth. Sensors fill in as its eyes and the microcontroller as its mind, which will recover information from the environment and give orders to the client notice arrangement. GPS continues checking the area of the blind individual.

II. LITERATURE REVIEW

In this Paper [8] author has planned a smart stick for blind which can give early admonition of an obstacle utilizing Infrared (IR) sensors. Subsequent to distinguishing the obstacles, the stick alarms the visually impeded individuals utilizing vibration signals. Anyway the smart stick concentrated uniquely for obstacle identification however it can't for crisis purposes required by the blind. And furthermore the IR sensors are not so much proficient enough since it can identify just the closest obstacle in short separation.

In this Paper [9] author has proposed the smart white stick, called Blindspot that joins GPS innovation, interpersonal interaction and ultrasonic sensors to assist visually weakened individuals with navigating open spaces. The GPS distinguishes the area of the obstacle and alarms the blind to maintain a strategic distance from them hitting the obstacle utilizing ultra-sonic sensors. Be that as it may, GPS didn't show the proficiency in following the area of the obstacles since ultra-sonic tells the separation of the obstacle.

In this Paper [10] author had built up a smart stick utilizing laser sensors to identify the obstacles and down checks. Obstacle discovery was signalized by a high pitch "Blare" utilizing an amplifier. The plan of the laser stick is exceptionally basic and natural. The stick can just distinguishes obstacle, yet can't offer subjective and mental help. There exists just signal sound that triggers any obstacle and there is no any help to guide them.

In this Paper [11] author has built up an electronic stick for blind individuals that would give relevant data on the earth around the client. They utilized RFID chips which are embedded into road signs, customer-facing facades, comparative areas, and the stick peruses those and takes care of the data back to the client [11]. The gadget likewise includes a ultrasound sensor to assist with recognizing objects in front of the stick tip. The Smart Cane, which has a

ultrasonic sensor mounted on it, is matched with a messenger-style sack that is worn over the shoulder. A speaker situated on the pack tie voice cautions when an obstacle is distinguished and furthermore guides the client to move various way.

Here in [12], the author has built up a stick could speak with clients through voice alarm and vibration signal). Ultrasonic sensors are utilized to recognize obstacle in front, since ultrasonic sensors are acceptable in distinguishing obstacle in not many meters range and this data will be sent as voice signal. This voice signal is send by means of speaker to the client. Here blind individuals may think that its troublesome in going with no crisis alert as opposed to having just ultrasonic sensors.

In this Paper [13] author has planned an assistive innovation gadget called the electronic long stick to fill in as a versatility help for blind and visually impeded individuals. The creator actualizes the stick with an ergonomic structure and an inserted electronic framework, which fits inside the handle of a customary long stick. The framework was planned utilizing haptic sensors to distinguish obstacles over the waistline. It works in such a manner when an obstacle is recognized; the stick vibrates or makes a sound. Anyway this framework just identifies obstacle over the waistline.

In this Paper [14] author has planned a smart stick model. It was little in size, modest and effectively wearable route help. This blind stick works by tending to the worldwide route for directing the client to some fate and neighborhood route for arranging ways, walkways and passages, even with shirking of static just as moving obstacles)[14]. Instead of that, they concocted a sound system camera worn at chest stature, a compact PC in a shoulder-lashed pocket or pocket and just a single headphone or little speaker. The framework is unnoticeable, and with no impediment while strolling with the stick.

Additionally it doesn't square typical sound in the environment.

In this Paper [15] author has planned a fake vision and article identification with real-time help by means of GPS to give an ease and productive route help for blind which gives a feeling of fake vision by giving data about the natural situation of static and dynamic items around them.

III. PROPOSED SYSTEM

The microcontroller then processes this data and calculates if the obstacle is close enough. If the obstacle is not that close the circuit does nothing. If the obstacle is close the microcontroller sends a signal to sound a buzzer. It also detects and sounds a different buzzer if it where detects water and alerts the blind. We have also introduced a Panic Button in the stick. If due to some reason the blind person gets lost or could not find the path way back home, he/she can press this panic button. A soon as the button will be pressed, the GPS connected in the stick will fetched the exact geo-location and an SMS will be sent to the relative of the user. This SMS will contain the geo-location which can be traced by the Google Map. Figure 1 shows the Block Diagram of the system.

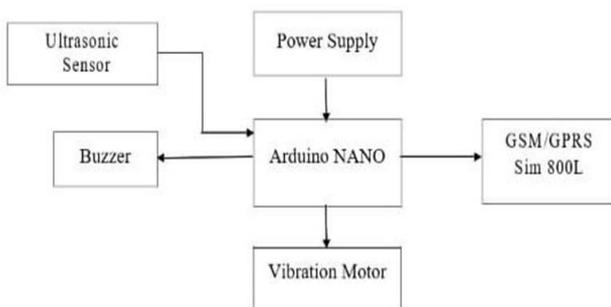


Figure 1. Block Diagram

Component of The System

The various components involved in our innovation are as follows:

1. Water sensor: A water sensor in an electronic sensor that is designed to detect the presence of water in the path of blind people and provide an alert in time to avoid chances of slipping and drenching of the blind people [7]. Fig. 2. Shows the water sensor used in our smart stick.

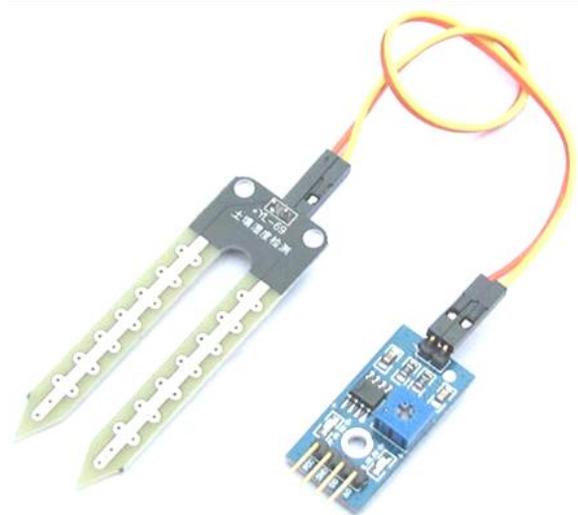


Figure 2. Moisture Sensor

2. Ultrasonic sensor: An ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listing for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the ultrasonic sensor and the object [8]. We are using this sensor in our stick to detect the obstacles like pits, pebbles, and cars etc. Fig. 3. Shows the ultrasonic sensor used.



Figure 3. Ultrasonic Sensor

3. GPS-GSM module: We are using the SIM900 module in our stick to get the real-time location of blind people. SIM900 is a GSM and GPS two-in-one function module. It is based on the latest GPS-GSM module SIM900 from SIMCOM, supports GSM/GPRS Quad-Band network and combines GPS technology for satellite navigation [10]. This is a cheaper solution than a two-way GPS communication system where in communication is done in both ways with GPS satellites. This project uses only one GPS device and two-way communication is achieved using a GSM modem. GSM modem with a SIM card used here implements the same communication technique as in a regular cellphone [11]. Fig. 5. Shows the SIM900 GPS-GSM module used.

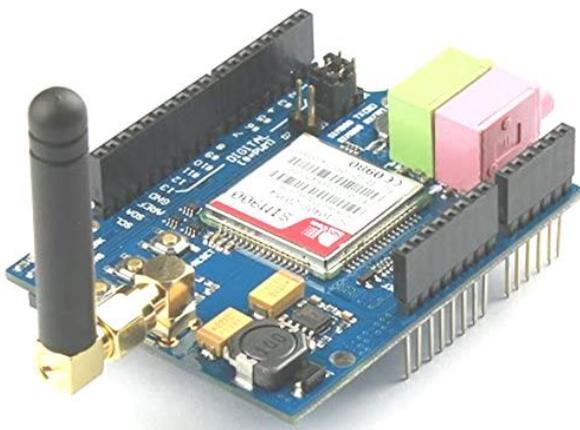


Fig. 4. SIM900 Module

4. Microcontroller: The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.0) or ATmega168 (Arduino Nano 2.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and

works with a Mini-B USB cable instead of a standard one.

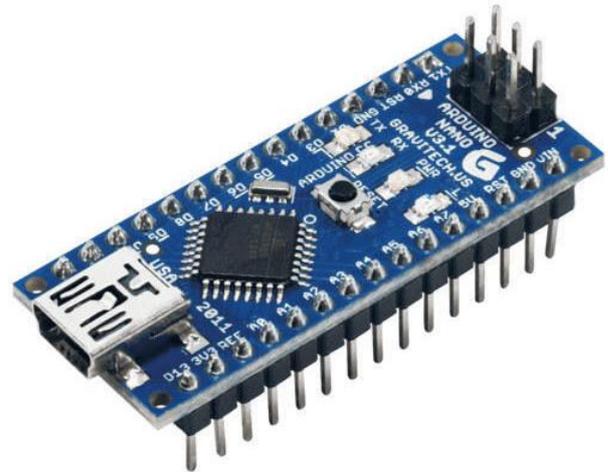


Fig. 5. Arduino Nano

5. Battery: We are using 12 V rechargeable Li-ion battery. It is a type of rechargeable battery in which lithium ions move from the negative electrode to the positive electrode during discharge and back when charging. Li-ion battery uses an intercalated lithium compound as an electrode material, compared to the metallic lithium used in a non-rechargeable lithium battery [13].

6. Buzzer and Vibrator: To notify the user about the hurdle arriving on his path we are using buzzer and vibrator which is operated by motor driver L293D.

IV. WORKING PRINCIPLE

The principle part in the framework is the microcontroller that controls different segments in the framework. At the point when the ultrasonic sensors recognize any articles or obstacle in 180 degree way it will actuate the bell and the vibration engine. Notwithstanding that, when the GSM modem get a message it will be sent to the microcontroller which will get the area of the stick from the GPS modem and transmit the area to the GSM modem in light of the sender. In the regions with low signals cameras can be use, this framework works by fitting a camera on the people head, it will utilize certain calculation to recognize the highs and obstacles in front the blind individual. In the event of a crisis, the client of the stick will press the crisis button and the

sign from the catch will go to the microcontroller which will get the area from the GPS modem and transmit the area to the GSM modem which will send a SMS messages to the every single spared number in the framework.



Figure 6. Working of Stick

V. CONCLUSION

This device is an exceptionally practical creation that helps blind clients by going about as his assistant detects. It has a straightforward structure that is simply centered around general utilization. In any event, for large scale manufacturing, it doesn't require substantial hardware. In view of the above realities, we can unhesitatingly reason that: The smart stick is a basic, modest, simple to deal with electronic direction gadget, which is proposed to give helpful collaborators and backing to blind and visually weakened people. The gadget is effective and one of a kind in its capacity in indicating the source and separation of the articles that might be experienced by the blind. It can check regions left, right, and before the blind individual paying little heed to its tallness or profundity. It is easy to understand gadgets and can fill the need for potential recipients.

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