A Blind Stick with Multiple Uses for the Visually Impaired

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Abstract— Indoor and outdoor navigation is two of the most significant challenges for the visually impaired. On top of that, they already have a hard time navigating outside due to the poor road conditions. Consequences such as sliding on damp ground, climbing or descending stairs, or colliding with stationary or moving things need them to remain vigilant at all times. On sometimes, individuals may be in danger and want to notify someone of their location by SMS. Technology often steps in to help blind persons with these issues. The suggested approach bridges the gap between the visually impaired and their surroundings by using the IoT paradigm. In order to identify unusual things, such as stairs, obstructions, or damp soil, a number of sensors may be used. This concept might be a low-cost, high-tech smart blind stick with a number of Internet of Things (IoT) sensors and modules. This system also includes a means of informing the relevant parties of the user's current location. In addition to the features already mentioned, a companion app will allow the visually impaired person's loved ones to customise the stick according to their needs, such as adding or removing contact numbers for alarm messages. Another major problem is losing the stick inside. This issue is also resolved by this solution.

I. INTRODUCTION

Nearly 285 million individuals worldwide have a visual impairment; of them, 86% have impaired vision and 14% are completely blind, according the World Health Organisation. For human survival, vision ranks high among the senses. Connecting with one's environment is facilitated by vision. Blind persons often rely on other people or basic walking aids to go about. Localised familiarity, like that of a home's interior, allows them to commit site directions and potential obstructions to memory, allowing them to traverse with ease. On the other hand, blind people shouldn't constantly rely on their memories to get about. Particularly when they're outside. The need for a tool, such as a cane, to aid the visually impaired in all aspects of life arises since blind individuals are not often provided assistance by others. The stick's primary features will be beneficial to everyone with vision impairments.

someone with a disability in order for it to save time and money. In the outside, blind individuals face things like cars and stones; inside, they face things like stairs, walls, and furniture. A built-in speaker on the blind stick makes a variety of noises to warn the user of potential hazards. The stick can also detect moist surfaces and raise a vibratory sensor that is user-aware. If you're visually impaired and you ever find yourself in an unfamiliar place, a mobile phone won't be able to help you send a distress message. Sending a message to the blind person's pals is as simple as pressing a button on the stick. The friends may update, add, or remove phone numbers using a software programme. The provider, who has administrative power to change the phone numbers, may also help the user find them. An included button on the remote activates the stick's buzzer, which might be useful in case the user loses control of one of the sticks.

The goal of the suggested technique is to build a smart blind stick for those who are visually impaired. Physical development presents unique challenges for those with visual impairments. It might be difficult for them to identify obstacles as they arise, and they may not be prepared to move from one area to another. In times of need, they turn to their families for support and direction. Because of their adaptability, they avoid social activities and people.

In the past, many frameworks were built with limitations in mind, and visually impaired people were unable to fully understand them. Over the years, analysts have worked to develop a perceptive and cunning stick that can advise the outwardly vulnerable on how to overcome obstacles and provide information about their surroundings. Those without sight may find it challenging to engage with their surroundings. It's rather challenging for someone who is blind to perceive the difficulties ahead of them until the stick makes contact with them. If they are using a regular stick, they will try tapping the ground repeatedly to locate an optical close, but this won't be enough. You are

It is why they rely on those close by them, whether it is family or friends. This issue can be resolved using this approach. The idea behind this technology is to provide the visually impaired access to intelligent electronic devices in both public and private settings. Inside the ultrasonic apparatus are A water sensor, a radio transmitter and receiver, a GPS, a GSM module, a vibrator, an Arduino, and a buzzer are all part of the planned sensor. The two kinds of ultrasonic sensors that make up this suggested technique are a proximity sensor for detecting obstacles that are near to the stick and an ultrasonic wave emitter for obstacles that are far away. Assuming the obstacle is inside the sensor's field of view, the sound level is proportional to the square of the distance, hence the sound level varies with the distance. One possible aid for the visually impaired is a smart walking stick with built-in obstacle detection capabilities. Accidents will be significantly reduced thanks to the beep notifications that keep the user attentive. Included in this system's design are an RF transmitter and receiver. If the blind person trips and falls, the cane will fall at a certain distance from them. In such instance, the user will be equipped with an RF receiver that takes the shape of a button. When the user presses the button, the stick begins to beep. A person who is blind but has excellent hearing may locate the stick with ease. Only visually impaired individuals may use this feature.

It is difficult to locate the digs and surface water in a typical blind stick. One component of this system is a water detector that can identify surface and underground water levels. The unique thing about this method is that the user may notify their loved ones if they become trapped or feel uneasy. The user's current location (latitudes and longitudes) is also shared with relatives along with the alert message. The addition of GSM and GPS modules to the stick allows it to achieve this. Upon receiving the user's coordinates, the relative may use Google Maps to follow their current whereabouts. There are a lot of professionals on staff at schools for the visually impaired who are happy to teach students with visual impairments how to navigate safely and independently around the house and the internet. They can also enchant people into figuring out certain routes they'll use often, like the one that goes from their house to a convenience shop. Acquiring familiarity with a course or website may greatly facilitate productive exploration for a visually impaired user. Those who are visually impaired will benefit greatly from this equipment. The gadget is small, lightweight, and easy to carry along. Its inherent size, however, limits its potential range. It provides the most basic travel assistance to the user. The person who is vision challenged can independently go from one area to another. The core idea behind the framework is to give visually impaired individuals with a reliable means of navigation that allows them to perceive their surroundings and the objects in it.

Part II: Literature Review

Vehicle tracking systems were created in 2014 by Thiyagarajan Manihatty Bojan and Umamaheshwaran Raman kumar. Theft vehicle recovery, asset tracking, surveillance, and fleet management are just a few of the many uses for this technology. A new generation of vehicle monitoring systems is emerging because to developments in cutting-edge technology such as ubiquitous computing, the Internet of Things (IoT), and the availability of affordable hardware components. An accurate, resilient, adaptable, cost-effective, and extensible vehicle tracking system based on GPS, GSM, and GPRS technology is introduced in this work called VER-TIGUO (VEhiculaR TrackInG Using Opensource approach). Our vehicle tracking system infrastructure is open sourced, so researchers may test it out, add features, and make improvements. This is in contrast to the typical COTS (Commercial Of The Shelf) systems, which are closed and limited to smartphones and PCs. We build the hardware (HW) by using our knowledge of open source HW platforms. by an online interface on PCs and smartphones or by an SMS on regular GSM based feature phones, the SW infrastructure can follow the cars. To use this software, all you need is a mobile phone that is connected to a GSM network. In this article, we will go over the design of our system, the prototype we used, and the outcomes of our field tests. Iwan Ulrich and Johann Borenstein may have come up with a new gadget in 2010 called the GuideCane to help those who are blind or visually impaired get about more easily and securely. While using the lightweight GuideCane, the user just pushes it ahead. When an impediment is detected by the GuideCane's ultrasonic sensors, the internal computer decides on the best course of action to guide the device and the user around it. The steering motion generates a discernible force inside the handle, allowing the user to effortlessly navigate without exerting any deliberate effort.

In 2010, researchers Jack M. Loomaris and Reginald G. Golledge worked on a blind navigation system.We are now working on a navigation system for the visually impaired, and this study is a part of that endeavour. We want to one day create a portable, self-contained device that can enable the visually impaired navigate both familiar and new places without the use of guides. First, a module for finding the traveler's position and orientation in space; second, a geographic data system with an extensive database of our test site and software for route planning and retrieving information from the database; and third, the interface. These components make up the system as it currently exists. Here we present an experiment that concerns itself with a single navigational function: leading the user along a predetermined path. Using four distinct display modes—one with spatialized sound from a virtual acoustic display, three with verbal cues—we assess the performance of the guiding system.

orders given via a voice-activated computer system. When comparing guide performance and user preferences, the virtual display option came out on top. A new kind of binaural display is outlined in Professor L. Kay's plans for an air sonar system that will help the visually impaired see their surroundings. Several constraints imposed by human perception data are examined, along with the impact this has on device specifications. Also covered are the binaural aid's built-in performance and technological limits. In order to evaluate the machine's performance, the article outlined the requirements of a man-machine system in a mobile environment and went over methods for doing so. The 2012 auditing work of Sharga Shoval, Johann Borenstien, and Yoram Koren using Navebelt. Having the kinematic capacity to execute the motion and being connected up to a sensory system to identify and avoid obstacles is a critical characteristic shared by both a blind traveller going through an unknown area and a mobile robot navigating through a crowded environment. The use of an obstacle avoidance system for mobile robots as a guiding system for the visually handicapped and the blind is detailed in this study.

II. PROPOSED SYSTEM

The proposed system model consists of the following units and which monitor the situation and act accordingly these components are connected to the ardunio digital and analog pins via jumper wires.the proposed system operates on 9v/12v. It can scan the surroundings for various obstacles of different sizes and raise appropriate auditory and vibratory alerts. It can detect both damp and wet surfaces and can alert the user. Also, it is able to send the user’s location to their acquaintances via SMS in case of an emergency or distress and it can be locatable when misplaced via a RFremote control.

III. FLOW CHART

1. With respect to detecting obstacles the algorithm makes use of two ultrasonic sensors: one mounted closed to the bottom of the stick and the other mounted at 2/3rds of the length from the bottom end of the stick. This setup can detect obstacles of various shapes and sizes. After processing the input from these sensors, the type of obstacle is determined by the logic in the below ‘Table 1’ and the appropriate pre-recorded audio response or vibration patternis played to the user using the speaker module or vibration motor. 2. The IR sensor is mounted at the bottom of thestick in order to support detection of stair and small obstacles on the ground. 3. The working of the moisture sensor is simple: the sensor gives a boolean output after scanning the surface using which the algorithm raises a vibratory alert

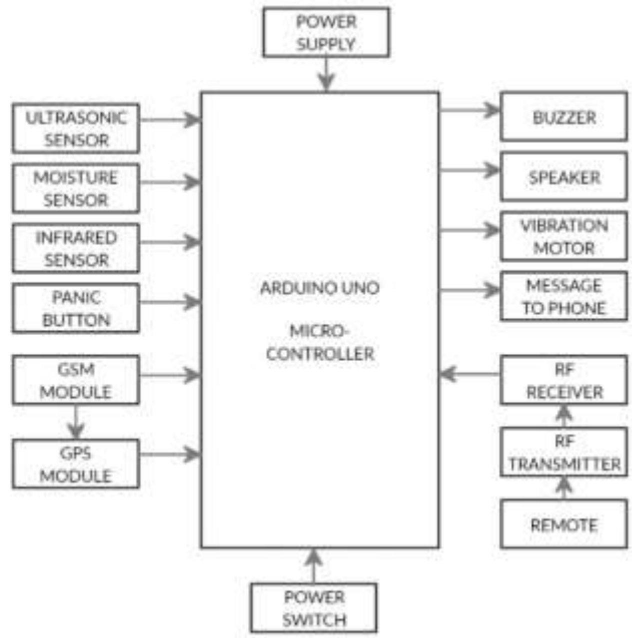

Fig. 1. Block diagram of proposed system.

to the user using the vibration motor mounted at the top end of the stick. 4. On detecting a button press from theuser the GPS module is polled for the user’s coordinates. These coordinates are formatted as a google maps link i.e “http://maps.google.com/maps?q=loc:¡latitude¿,¡longi tude¿”. Then the link is prepended with an appropriate message such as “I’m in danger please find me here” and this processed message is sent to the User’s caretakers using the GSM module. 5. Also the algorithm keeps polling the RF receiver mounted on the stick for RF signal, from an RF transmitter mountedon a simple remote controller. This remote controller also hasa simple push button along with the RF transmitter, which when pressed transmits aRF Signal via the RF transmitter on

TABLE I. CLASSIFICATION OF OBSTACLES BASED ON SENSOR READINGS

Type of obstacle	Type of alert	Sensors (Proximity and Distance readings)		
		IR Sensor	Ultrasonic- 1	Ultrasonic- 2
Stairs	Voice1	HIGH	< 20 cm	>50cm & <100cm
Small Obstacles	Voice2	HIGH / LOW	< 100 cm	>400 cm
Large Obstacles	Voice2	HIGH / LOW	< 100 cm	>150cm & <200cm

the remote, which can be detected by the RF receiver on the blind stick (see Fig. 16). The algorithm, upon receiving the signal, raises a buzzer alert for a few seconds thus helping the user to locate it

IV. FUTURE ENHANCEMENT

It can be used in real time safety system. It can be implement the hole circuit into smallmodule later. all aboutour research we take care about one problem that is visual disability. To make a solution we did this low cost project.We believe that this project will spread all around society and convert disable to able. This is our hope, to consider this stick as smart eye for the visual impairments

V. CONCLUSION

The paper's suggested blind stick may enable the vision impaired user overcome obstacles and traverse various terrains. In the event of an emergency or difficulty, the stick may also communicate the user's location to others responsible for their care. The stick may also be found with the use of an RF remote. The design and use of space on the stick may be further improved with the addition of small-scale, high-performance sensors. There is room for improvement in the location of the sensors; instead of placing them at a static angle, they should adapt to the angle of the stick relative to the ground, ensuring that they always point straight. To make it even better, the stick's body may be made of a superior material like carbon fibre, which would make it lighter and more flexible to wield.

VI. REFERENCES

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