Advanced Navigation System Blind Stick

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Abstract - Advanced Navigation System Blind Stick enables the visually impaired or disabled to navigate and complete their tasks more effortlessly and comfortably. A traditional stick does not detect obstacles and potholes thus making it very ineffective for people who are visually impaired. Considering that a blind individual has no idea what kind of things or objects are in front of them; the person is unable to gauge the size of the object or it's distance from them and also many have stepped directly into potholes. Moving around is tough for someone who is blind. In a smart walking stick, the object is located with the aid of an ultrasonic sensor that calculates the object's distance from the user.

Keywords —Arduino, Blind stick, GPS, Ultrasonic sensors, Rain Drop sensor

I.INTRODUCTION

People who are visually impaired find it challenging to engage with and perceive their surroundings. Physical movement can be difficult for people who are blind or visually impaired because it can be difficult for them to differentiate obstacles that are in their path. Since they are unable to travel from one location to another, they rely on their family for both financial support and mobility. Their immobility prevents them from engaging in social interactions and other activities.

Several studies have been conducted in order to develop such a smart blind stick. The following is the review for the research done:

A navigation tool was created that uses GPS, a voice module, and an ultrasonic sensor to detect obstacles. By giving instructions, it directs the user of the stick. However, this could not be used indoors since there was no GPS detection [1]. Another design of this stick incorporates sensors like proximity sensors , GPS, stereo cameras but there were certain disadvantages if this , The stereo cameras on the helmet provide information about the height of the objects in the path. Obstacle detection is handled by the proximity sensor and ultrasonic sensor unit. The GPS module determines the obstacle's location in relation to the blind. The user can get directions from a voice navigation system. However, the circuit's complexity makes it difficult to design and the tool is expensive [2].

In this paper we have proposed a design of navigation stick that will detect the presence of obstacles and also potholes or gutters in the path of a visually impaired person. The technology is very much cost effective and small enough to be accommodated on a walking stick. An ultrasonic sensor on the stick measures the distance between the objects and the Visually impaired. When an ultrasonic sensor detects an obstruction, a buzzer sounds. The wet sensor detects a puddle or ditch and alerts the user to prevent any accident.

II.METHODOLOGY/EXPERIMENTAL

Synthesis/Algorithm/Design/Method

Arduino Nano is fixed on bread board. The proposed walking stick is based on an Arduino Nano board that is fixed on a breadboard. Two ultrasonic sensors are connected to the board, with one sensor's Trig and Echo pins connected to pins 22 and 21, respectively, and the other sensor's Trig and Echo pins connected to pins 20 and 19, respectively. A raindrop sensor is connected to pin 23, a buzzer is connected to pin 11, and a GPS Neo module is connected to pins 13, 14, and +5V. A LM2596 module is also used to supply power to the system. The system detects obstacles and hazards using the ultrasonic and rain sensors and alerts the user with a buzzer. The GPS module provides location information to the user.
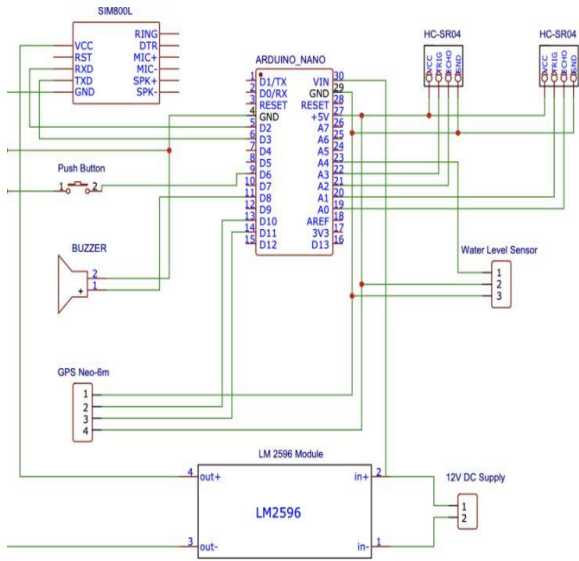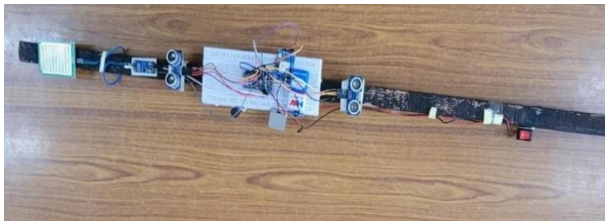
Fig. 1 Circuit diagram of the system

Fig. 2 Smart blind stick

III.RESULTS AND DISCUSSIONS

The Blind Walking Stick has been eventually made into prototype which can be used to guide the blind peoples. Its points to break the problems faced by the blind people in their diurnal life. The system also takes the measure to ensure the safety of visually impaired people. Smart blind Stick will operate to help all the blind people in the world to make them easier to walk far and wide as they want independently without fear of getting lost or colliding with something. It was done to help the eyeless to move in front veritably well.

Although this project is hard-wired with sensors and other components, weight is much less. Future aspects of this system can be improved by using wireless connectivity between the system components thus extending it's application to calculating distance of speed vehicles, also direction sense can be given to him via voice after he selected the reaching destination via speech.

IV.CONCLUSION

So now the design and implementation of the Advanced Navigation Walking stick for the blind has been fully achieved. It focuses to solve the problems faced by the visually impaired people in their day to day life. This project offers cost effective, reliable, portable, energy efficient and strong solution for navigation with obvious short response time. This system can be improved by establishing wireless connectivity between the components. In the future, features like increased range of obstacle detection; speed and nature of obstacle can also be introduced.

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