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# Blind Guider – A Smart Blind Stick

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***Abstract:*** **- To provide innovative idea in order to enhance the leaving of visually disabled. Just to add more independent action in their lives. The visual identifier helps to detect and identify the obstacle via Ultrasonic sensors and will provide a voice message, distance between the person and an obstacle, where the distance is calculated through the ultrasonic sensor. Additive feature to the previous version which indicated with vibration is the distance calculation and the voice. Thus making movement process much easier. This is a kind of venture which will totally change the way of living of a blind people. It will provide awareness of every single thing around them. The innovative project will guide visually disabled while crossing roads and daily activities nearby areas visiting new places with ease as normal people. Sensor will alert about the presence of obstacles and provide the exact location through GPS as well. Also the IR sensors are used to detect change in level for detection of stairs.**

***Index Term*- Visually Impaired, Ultrasonic sensor, IR sensor, Raspberry Pi.**

## I. INTRODUCTION

It is a smart stick to improve visually impaired person's mobility. This paper focuses on obstacle detection, level detection and finding location in order to reduce navigation difficulties for visually disabled people. Moving through an unknown environment becomes a real challenge when we can't rely on our own eyes. Since when the blind people are walking in environment the moving obstacle makes noise, blind people enlarge their sense of hearing to localize them. A visionless person commonly uses a white cane for navigation. This system presents a concept to provide a smart electronic based aid for blind people. The system is aid to visually impaired person by providing object detection, distance calculation, level detection, positioning system (GPS). The aim of the overall system is to provide a smart assistant for blind which gives a sense of artificial vision by providing information about the environmental scenario of objects around them. In this system the main role is of embedded system. In this system we are using the Ultrasonic sensor, IR sensor, Vibrator, speaker or headphone, embedded system (Raspberry Pi) and Battery. Ultrasonic sensors works same as radar or sonar which send and receive the waves to calculate depth of sea, here we use ultrasonic sensor to calculate distance between blind person and obstacle. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensor calculate the time interval between sending the signal and receiving the echo to determine the distance to an object. After that embedded system will calculate the distance. IR sensor is used to analysis level change in the path this signals also send to embedded system and after that embedded system will make a message and send it to speakers or headphone. By using an ultrasonic sensor we can detect object is present in front of stick and the distance from that stick to object are send through voice to speakers or headphones. Battery present in the system is used to give power to all the units present in the system.

## II. LITRATURE REVIEW

1. Kunja Bihari Swain, Rakesh Kumr Patnaik, Suchandra Pal, Raja Rajeswari, Aparna Mishra and Charusmita Dash, Arduino Based Automated STICK GUIDE for a Visually Impaired Person, 2017 (IEEE), The designed blind stick working efficiently with low power rechargeable battery. It can help the visual impaired person appreciably in guiding in their way. The model can further improved by employing the small comparable solar cell.

2. Md. Mostafa Kamal1, Abu Ibne Bayazid1, Muhammad Sheikh Sadi1, Md. Milon Islam1, and Nazmul Hasan, Towards Developing Walking Assistants for the Visually Impaired People, 2017 (IEEE), The obstacle may reside on the left, right or straight. The responses will be given on the basis of the obstacles position and distance. This paper can be enhanced in a way such that only one single device can be developed which will be integrated into a spectacle. The visually impaired people just wear the spectacle and walk on the road with the assistance of this spectacle.

3. Akshay Salil Arora, Vishakha Gaikwad, Blind Aid Stick: Hurdle Recognition, Simulated Perception,

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Android Integrated Voice Based Cooperation via GPS Along With Panic Alert System, 2017 (ICNTE), The proposed sys tem combines various existing easily technologies and real time system sensors that help in monitoring the position of user and also help in effortless navigation. The different duration buzzer further improves the efficiency and reduces complication.

## III. PROPOSED SYSTEM

*Fig 1. Blind Person with Smart Stick*

In the proposed methodology, two ultrasonic sensors are used for object detection in front of the blind and distance calculation. By using these ultrasonic sensors, the distance from the object to the user is measured. The lesser the distance is the more the vibrator vibrates. Distance is calculated by ultrasonic sensor. Whenever the a blind person want to check the distance from the object he or she will press the button then the result is calculated by the Raspberry Pi using output of ultrasonic sensor. According to distance embedded system will creates some intelligent voice instructions which can guide the user to move safely.

Tools to be used-

- Hardware:
- Raspberry Pi.
- Stick
- Ultrasonic sensor.
- IR Sensor
- Vibrator Motor
- Software:
- Programming Languages:
- Python

**Components:**

**A. Ultrasonic Sensor**

There are two ultrasonic sensor placed on the stick in order to detect different obstacle like any vehicle or a wall in a room or poles in the road and for distance calculation. First ultrasonic sensor is use for the closed object detection. If any object is very close and camera not detect it then this ultrasonic sensor will send alert signals to vibrator so the blind person will move side. Second ultrasonic sensor is used for the distance calculation. HC-SR04 is a commonly used module for non-contact distance measurement for distances from 2cm to 400cm. It uses sonar (like bats and dolphins) to measure distance with high accuracy and stable readings. It consists of an ultrasonic wave transmitter, receiver. The transmitter transmits short bursts which gets reflected by target and are received by the receiver. The time difference between transmission and receiving of ultrasonic signals is calculated. Using the speed of sound and Speed = Distance/Time equation, the distance between the source and target can be easily calculated.


*Fig 5. Ultrasonic Sensor*

- **Distance Calculation**

Time taken by pulse is actually for to and from travel of ultrasonic signals, while we need only half of this. Therefore time is taken as time/2.

Distance = Speed * Time/2

Speed of sound at sea level = 344m/s or 34400 cm/s

Thus, Distance = 17200 * Time (unit cm)

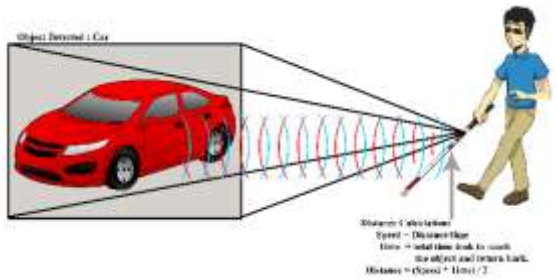

*Fig 6. Distance Calculation*

**B. Raspberry Pi**

For communicating with different sensors, switches, speakers or headphones and vibrator motor the Raspberry Pi is used, which is work as decision making controller based on the various signal obtained from the different

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sensor it makes the actuation output signal and actuate Vibration of motor based on the distance between person and obstacle it has faced.

*Fig 7. Raspberry Pi*

**C. Level Detector**

The level detection is done by using infrared sensor. It work like ultrasonic sensor but the IR sensor range is less it sends infrared beam. On changing level or height of surface the vibrator will be vibrate and a voice message is transfer to speaker or headphones. This is used to for the stair case detection or pit detection.

*Fig 8. IR Sensor*

**D. Vibrator Motor**

For generating the alert signal we have used a mobile vibrator which generate different pattern of vibration depending upon the distance between the person and obstacle. This motor is also use to give alert at the time of level change.

*Fig 9. Vibrator Motor*

## IV. CONCLUSION

This is a solution is proposed to help visually impaired to move safely, detect obstacles in their path and travel from one place to another. Solution was composed of a stick with sensors mounted on it. Connected to a speakers or headphones to alert the blind with speech warning message about the detected obstacles information. Ultrasonic sensor was able to give distance from an obstacle and also vibrate a vibrator if then object is too near. Additionally, system takes the blind person to the destination by direction identification, obstacle detection, path recognition and navigation. Navigation is performed with the help of GPS and maps.

In future we can make that stick as assistant for a visually impaired. This stick can have the built-in real time image processing algorithm.

## REFERENCES

[1] Kunja Bihari Swain, Rakesh Kumr Patnaik, Suchandra Pal, Raja Rajeswari, Aparna Mishra and Charusmita Dash, Arduino Based Automated STICK GUIDE for a Visually Impaired Person, 2017.

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