

Virtual Eye for Visually Blind People

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Abstract: One of the major problems faced by visually impaired people is that they haven't independency. An optimal system should be developed to monitor provide virtual eye and guidance. We propose an innovative method to prevent their life from different Hazards by using the advanced sensor system. The sensors will be attached to smart stick and the data's obtained from sensors and from raspberry pi are transferred to respective impaired person and the respective person becomes alert to take necessary action. Using the data's obtained nearby obstacle can be prioritized and accidents can be avoided.

Keywords: Raspberry pi; Ultrasonic-sensor; Web camera; Earphone.

1. INTRODUCTION

India is a fastest developing country after china. Although 30 million peoples are permanently blind and 285 billion people with vision impairment, developed technologies are not affordable to every blind person. The characteristic of object recognition helps the blind people to identify exactly which object is in front of him. The stick which we are developing is light in weight and easy to handle.

The stick is designed by amalgamation of ultrasonic sensor, raspberry pi 3 and web camera. The ultrasonic sensor senses the obstacle and measure the distance if obstacle is in the range of 2cm to 400cm.

The raspberry pi 3 controls the ultrasonic sensor and web camera. The image is captured by web camera and it gets converted into text by using optical character recognition (OCR), and the captured images colour converted into gray scale by using Python commands. The gray scale image gets compared with images stored in raspberry pi 3. The text which is obtained from OCR is then converted into audio signal using text to speech(TTS), and the audio signal is heard through earphone.



Fig.1 Obstacle detection system

2. Literature Survey:

[1] Title: Advanced guide cane for the visually impaired people
Authors: S. Gupta, I. Sharma, A. Tiwari and G. Chitranshi

Advantages:-

- 1) Avoid the obstacle based on ultrasonic sensor.
- 2) Easy to handle to virtually impaired people.

Disadvantages:-

- 1) In water circuit will be damaged.

The reasons for extending research in this field is 31) It will ensure safety and comfort to user Thus, it is goal of the project to develop system which are able to detect obstacle and alert blind people.

[2] Title:- Wearable Obstacle Avoidance Electronic Travel Aids for Blind: A Survey
Authors:- Dakououlos and N.G. Bourbakis

Advantages:-

- 1) 95% of obstacle distance is understood.
- 2) Obstacle detection algorithms for deployment on devices with limited hardware/software resources

Disadvantages:-

- 1) Less Mechanical strength
- 2) When the distance of the object is more than 0.5m low then the object will not be detected.

For avoiding collision of obstacles, camera should be capture images continuously. Various low cost sensors can be used for collection of such data.

Problem Statement: To detect nearby obstacle and notify the user of the direction of that obstacle, thereby enabling the user to determine the corrective direction to head.

The main objective of system is to alert the blind people about the obstacles through Earphone

3. Proposed Work:

In the proposed system, the raspberry pi 3 is used to control the ultrasonic sensor and web camera. UV sensor is used to find the difference between the obstacle and a user. The raspberry pi is mounted with the ultrasonic detector and web camera using Image Processing.

The stick consists of 4 ultrasonic sensors, camera and earphone. Out of 4 sensors 3 of them used for obstacle detection and fourth is used for pothole detection. The camera is used for object recognition and captured images get converted into text using OCR. The text which is obtained from OCR will get converted into speech using TTS. The output will be from an earpiece.

When power is supplied to the Raspberry Pi, the process starts. As soon as the Raspberry Pi boots up its operating system, to start sending burst signal, it triggers the ultrasonic sensor.

There is occurrence of less delay because all the sensors triggers simultaneously. As soon as the sensor receives the signal as an echo, the Raspberry Pi calculates the time taken from

transmitting and receiving the echo. Using this time we calculate the distance of an obstacle from any of the sensors.

4. Hardware And software Components:

Hardware Requirements:

- Raspberry Pi
- Ultrasonic Sensor
- Web camera
- Earphone

Software Requirements:

- Optical character recognition(OCR),
- Text to speech(TTS)

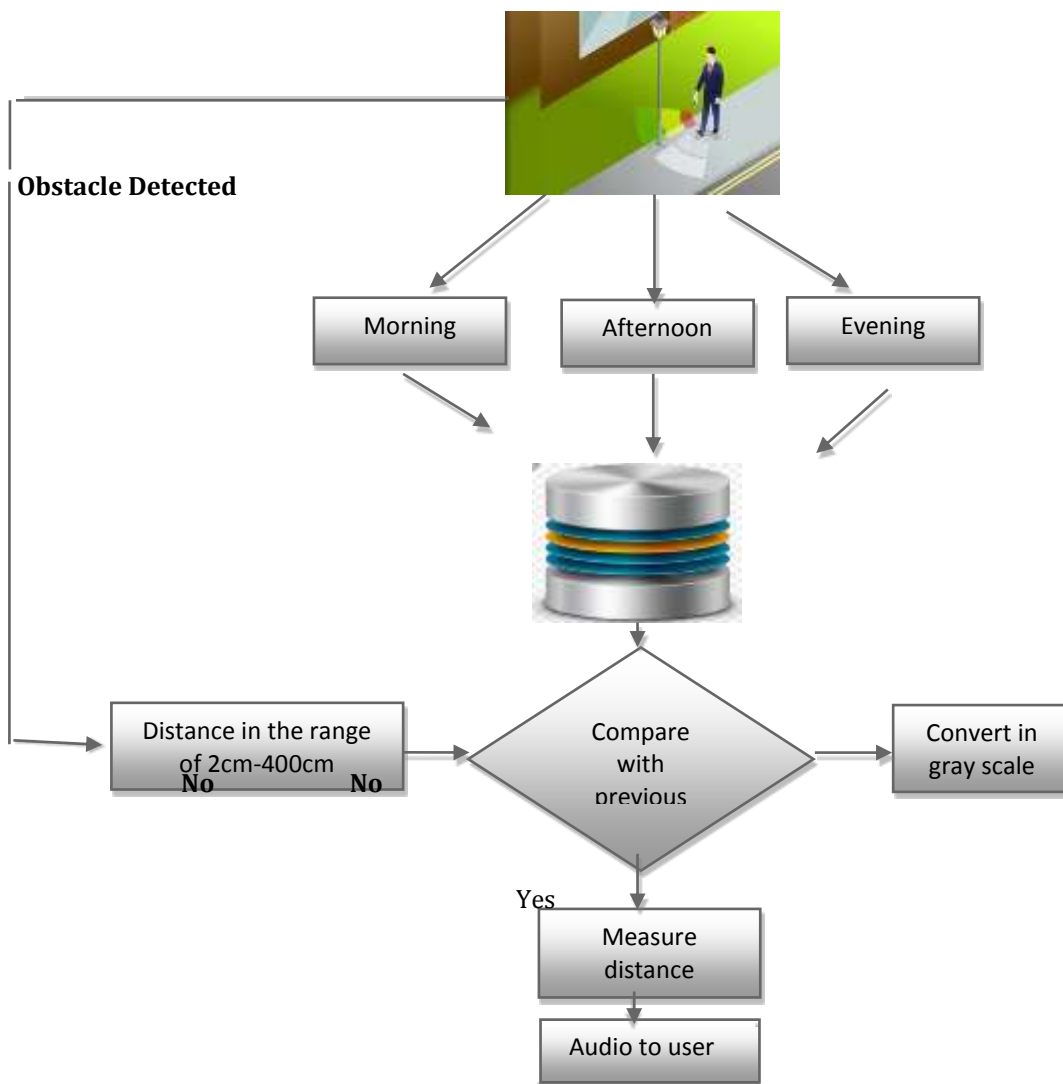


Fig3.Functioning Model

Conclusions:

The system can be made useful as a part of impaired people life. Also, applying image processing based techniques can help the system to identify nearby obstacle clearly based on resolutions of web camera so that they can walk independently through a feedback system.

According to the real time conditions evaluation the life of impaired people can be saved from accidents. As with traditionally where human workers personally check for road condition can be avoided and make it easier and automatic while a vehicle passes through a pit. Identifying the obstacles with the help of sensors would be useful enough for detect or recognise obstacle and implement at low cost. Once human receives the data prioritization is done and the most affected obstacle is recovered first and also notifies the distance of the object.

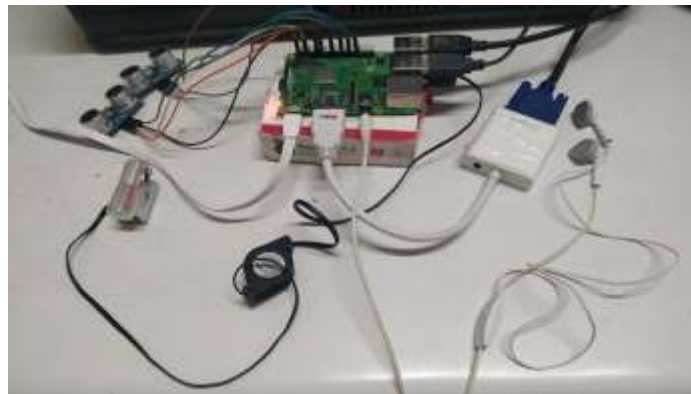


Fig4 .Integrated Model

Future Scope:

It can be further enhanced by VLSI technology to design the PCB unit. This makes the system future more compact. Also use of active RFID tags will transmits the location information automatically to the PCB unit, when the stick is in its range.

Reference:

- [1]. Tarek Mohammad, "Using Ultrasonic And Infrared Sensors For Distance Measurement", Proceeding of the IEEE international Conference on Robotics & Automation, 2001
- [2]. Dakououlos and N.G. Bourbakis, "Wearable Obstacle Avoidance Electronic Travel Aids for Blind: A Survey, in *IEEE Transactions on Systems, Man and Cybernetics, Part C (Applications and Reviews)*, vol.40, no. 1, 25-35, Jan.2010.
- [3]. S. Gupta, I. Sharma, A. Tiwari and G. Chitranshi, "Advanced guide cane for the visually impaired people," 2015 1st International Conference on Next Generation Computing Technologies (NGCT), Dehradun, 2015, pp. 452-455. Doi: 10.1109/NGCT.2015.7375159