

# Real Time Navigation Aid and Object Detector for Visually Impaired People

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## Abstract:

To make visually challenged people live confidently innovative technologies were developed. This project proposes object detecting framework using camera for visually challenged to help them in detecting hand-hold things in their daily life. The proposed system uses a raspberry pi and sensors like Ultrasonic Sensor, Gas Sensor to detect the obstacle or objects and any toxic gases followed by audio guidance to help the visually impaired people.

**Keywords:** Gas Sensor, Ultrasonic Sensor, Object Detector, Raspberry pi 3b 2015 model, SD card.

## 1. Introduction

The advancement and utilization of technology for portability has a history that enveloping the post-war duration. Since some initial efforts contemplate structure replaced the usage of guide by dog or cane. Recently some efforts have focused on appliance by designing and providing a backing system for essential portability tools.

Even today portability aids such as dog guide and walking stick are utilize by the visually impaired people. By advancement of technology, some types of electronic travel aid have been established.

We can use Sonic Pathfinder and Guide-Cane as an obstacle detectors or clear path indicators. These devices are used for the visually impaired people for knowing whether there is an obstacle or not. This process similar to flashlight that has a thin directive. However, Sonic Guide and Nave Belt are like environment sensor because of its wide directive. The long cane is the widely used mobility aid. This has several limitations such as the can length, difficulties finding barrier and difficulties in public places for storage.

The project aimed to create a portable navigation aid and object detector for the pedestrians with visual impairments. The system proposed has a speak output microcontroller. It can offer the visually impaired people with help about walking routes and to point out what decisions to make by using the speech output [2].

To conquer the defect faced by the current electronic travel aids, accelerometer is used. It was used to measure the distance traveled by the visually impaired people. Additionally, the proposed barrier detection system has

an ultrasonic sensor and vibrators for quick and safe cross among obstacles or faced by visually impaired people.

## 2. Methodology

The proposed system uses open CV python for processing the text image or products label be filtered, and characters were recognized. Finally, we are getting audio output by passing a filtered object into this system.

## Block Diagram

In this proposed system, visually impaired people would put the printed text under the camera view to ensure good quality and less distortion. A text localization algorithm used for object detection is then used for an existing blind assistive device.

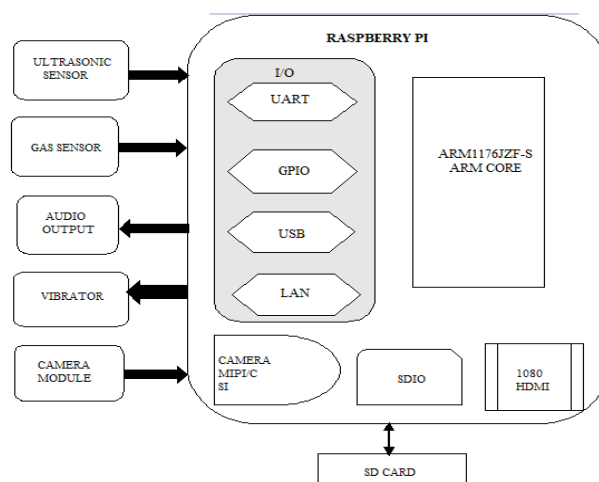


Figure 1: Block diagram of Proposed System

## Hardware Unit

### A. Raspberry PI

It is a device similar to that in the form of a credit card that attaches to a TV or computer display. It is used to explore computing of all ages of people and helps to learn how to program in languages such as scratch and python. This is a low- cost board. This board is used for detecting object and warns the visually impaired people by giving speech recognition.

### B. Ultrasonic Sensor

The ultrasonic sensor works on the principle of SONAR and RADAR system. It works by emitting high frequency sound waves for humans to hear. The obstacle is detected through ultrasonic sensors. The ultrasonic sensors transmit a series of ultrasonic pulses, and then the sound waves will be echoed back to the receiver, once the obstacle is detected. This is used to detect obstacles and helps the visually impaired people by

measuring the approximate distance from the obstacle to impaired people.

### C. Camera

Web camera is a video camera. It is used in real time application of image streaming or feeding. These are commonly used due to their low cost of manufacturing, high versatility and low cost method of video telephone making. This is used to capture the object in front of the visually impaired people.

### D. Gas Sensor

A gas sensor is an appliance which is used to identify the existence or concentration of gasses in the atmosphere. They are commonly used for detecting toxic, or explosive gasses and measuring gas concentration. This sensor is used to protect the visually impaired people from toxic gases or smoke in the surrounding atmosphere, and keep them safe and secure.

#### Specification of Gas Sensor

Table 1: Standard Work Condition

Symbol	Parameter Name	Technical Condition	Remarks
VC	Circuit voltage	5V±0.1	AC OR DC
VH	Heating voltage	5V±0.1	AC OR DC
RL	Load resistance	Can adjust	
RH	Heater resistance	33Ω±5%	Room Temperature
PH	Heating consumption	Less than 800mw	

Table 2: Environment condition

Parameter Name	Technical Condition	Remarks
Using Temperature	-20°C-50°C	
Related humidity	Less than 95%	
Oxygen concentration	21%(standard condition) Concentration of oxygen will impact sensitivity	Minimum value is over 2%

Table 3: Sensitivity Characteristics

Symbol	Parameter Name	Technical Condition	Remarks
RS	Sensing Resistance	3KΩ-30KΩ(1000ppm Iso-butane)	Detecting concentration scope: 200ppm-5000ppm LPG and propane 300ppm-5000ppm butane 5000ppm-200000ppm methane 300ppm-5000ppm H2 100ppm-2000ppm alcohol

## Software

## OPENCV

Computer Vision Library is an open source tool. It contains many algorithms that are used to detect face recognition, object identification, extracting 3D models and for many usages. IDLE-An integrated development environment (IDE) written specifically for python language. This software is used for detecting objects and warns the visually impaired people with a speech recognition using earphone.

### 3. Flowchart

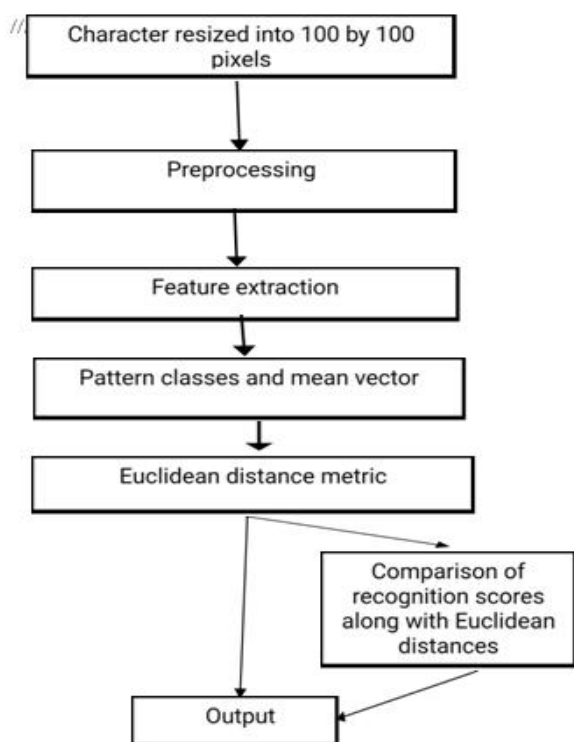


Figure 2: Flowchart of Character Recognition System

## 4. Results and Discussion

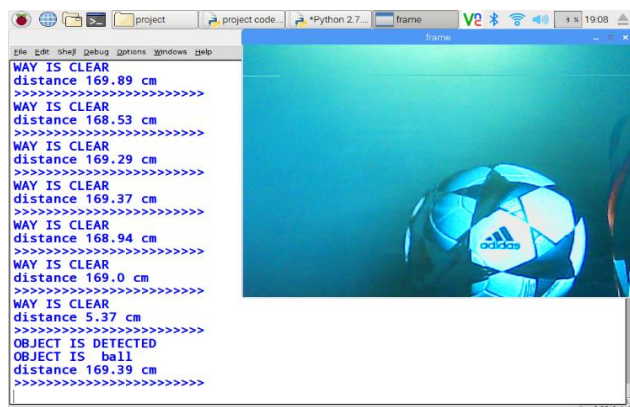


Figure 3: Software Result

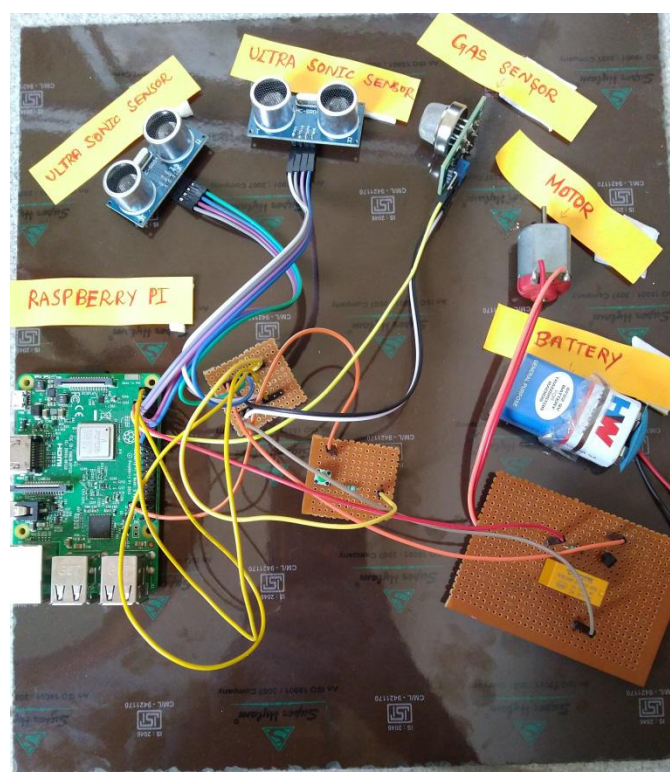


Figure 4: Hardware Result

## 5. Conclusion

Thus, the project makes the visually impaired people to be confident in their daily lives, and helps to detect the obstacles or objects which is lying ahead of the users and it alerts the visually impaired people. The giving the warning voice message and vibration. The electronic guiding kit performs as a primary stage for forthcoming genesis of navigating aid objects to make more secure and safe navigation. Even though, the system is merging with different type of sensors, it is less in wait and effective, in addition, vibrator also added for a better convenience and ease of usage. By employing different type of sensors it can be used in many applications. This project helps the easier way for the visually impaired people and makes them to walk independently wherever they want to go.

## 6. Future Work

In the future, speech recognition has a great role in controlling objects such as robotics and computers. Whenever this technology gets mature, speech recognition have a vast commercial market.

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