

# THIRD EYE - An Artificial Eye for Visually Impaired Individual

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## Abstract:

*Blind individuals have no idea about outside obstacles and need direction. Third Eye represents the innovative technology to help visually impaired peoples find their way to any destination. This technology aims to assist visionless people by providing navigation and obstruction detection system with the use of wearable goggles. Low technology is found in currently utilized frameworks for outwardly disabled along with issues like cost, reliance, and ease of use. The Proposed system uses YOLO algorithms for object detection and Google maps API for navigating the path.*

**Keyword: -**

*Deep Learning, Hearable Environment, Google Maps API, IOT, Visually Impaired Peoples.*

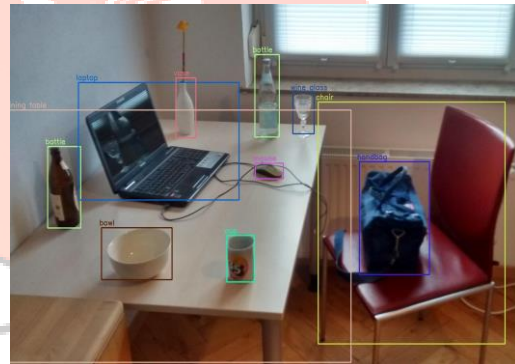
## Introduction:

World outside for blind people has been a difficult place to live in, and to make that problem fade away, Third Eye makes it easy and self-reliant like never before. This technology aims to assist visionless people by providing navigation through Google Maps API and obstruction detection system using YOLO algorithms as wearable technology. Low technology is found in currently utilized frameworks for outwardly disabled along with issues like cost, reliance, and ease of use. The Introduced technology is more accurate, convenient, user-friendly and easy to use. The Introduced Technology is more accurate, convenient, user-friendly and easy to use. Ultimately Third Eye result in God's Eye for the sightless peoples to do on their works by themselves. To carry out the detection, the image is divided in a PxP grid. Each of the box cell will detect the R possible "bounding boxes" and the level of certainty of each one of them, this means PxPxR boxes are calculated.

The algorithm starts to delete the boxes which have very low probability or that are below a certain threshold.

The boxes which remains are passed through a process called "No Maximum Suppression" that removes identical detections and led to the most precise of output.

SSD (Single Shot MultiBox Detector) is a famous algorithm in object detection. It fastens up the process by removing the need for a region proposal network. To recover the drop in accuracy, SSD applies some upgrades including multi-scale functions and default boxes. These improvements allow SSD to match the Faster R-CNN's accuracy using lower resolution images, which further improves the speed.



**Figure 1 - Deep Learning**

The key idea here is a single network (for speed) and no need for region proposals. Instead, it uses differed bounding boxes and then adjusts the bounding box a part of the prediction. Different bounding box predictions are achieved by each of the last few layer of the network responsible for predictions for progressively smaller bounding box and final prediction is a union of all these predictions.

## Literature review:

### 1. A brief introduction to OpenCV:

The goal of the paper is to present and quickly make a reader accustomed to OpenCV (Open-Source pc Vision) basics while not having to travel through the drawn-out reference manuals and books. OpenCV is AN ASCII text file library for image and video analysis, originally introduced over decade past by Intel. Since then, variety of programmers have contributed to the foremost recent library developments. these days the library has >2500 optimized algorithms. it's extensively used round the world, having >2.5M downloads and >40K individuals within the user cluster.

### 2. Multiple Object Detection using OpenCV on an

#### Embedded Platform:

This paper presents a developed application for multiple objects detection supported OpenCV libraries. The complexity-related aspects that were thought of within the object detection victimization cascade classifier area unit represented. what is more, paper discuss the identification and porting of the applying into an embedded platform and scrutiny the results with the regular platform.

### 3. A calibration technique based on OpenCV:

In this paper, the camera model in OpenCV (open-source pc vision library) is mentioned, the non-linear distortion of the tangential and radial distortion aberration is taken into account. supported these, paper introduce the corner extraction of the Camera activity tool chest for MATLAB, And an arithmetic of camera activity supported OpenCV is given. The planned algorithmic program are able to do correct results. it's options like process potency and sensible cross-platform movability. it's ready to meet the wants of 3D pc vision systems.

Experimental results show the practicableness of the planned technique.

### 4. An Object Detection System Based on YOLO in

#### Traffic Scene:

In this work, AN object detection system for pictures in traffic scene is made. YOLO a superb object detection approach supported deep learning presents one convolutional neural network for location and classification. All the fully-connected layers of YOLO's network area unit replaced with a median pool layer for the aim of reproducing a brand new network.

### 5. Multi-object Detection Method based on YOLO and

#### ResNet Hybrid Networks:

As a sub-discipline associated with computer science, machine vision has become a hotspot in recent years. Object detection, as a part of machine vision, has been wide employed in numerous fields. However, the present object detection strategies supported deep learning theory cannot accurately acknowledge multiple objects. Thus, during this paper they propose a brand new hybrid network supported YOLO and ResNet (Yolo-resnet) for multi-object detection. Our technique integrates ResNet into the feature extraction of the YOLOv3 framework and also the detection results demonstrate that our hybrid network is economical for police investigation multi-objects from a picture of advanced natural scenes.

### 6. Voice-based Road Navigation System Using Natural Language Processing (NLP):

In this paper, they propose a user-centric roadmap navigation mobile application known as "Direct Me". to come up with the user's most popular path, the system can initial convert audio streams to text through ASR victimization the Pocket Sphinx library, followed by tongue process (NLP) by taking advantage of Stanford Core information processing Framework to retrieve navigation-related data and handle the trail within the map victimization the Google Map API at the user's request. this method is employed to supply an efficient approach to translating tongue commands into a format which will be absolutely understood by machine and can profit within the development of human machine-oriented interface.

### 7. Object Detection based on YOLO Network:

In this paper, they planned AN Object detection supported the deep learning has achieved superb performances. However, there area unit several issues with pictures in real-world shooting like noise, blurring and rotating interference, etc. These issues have a crucial impact on object detection. victimisation traffic signs as AN example, they established image degradation models that area unit supported YOLO network and combined ancient image process strategies to simulate the issues existing in real-world shooting. once establishing the various degradation models, they compared the results of various degradation models on object detection. They used the YOLO network to coach a sturdy model to boost the typical exactness (AP) of traffic signs detection in real scenes.

#### 8. xYOLO: A model for real time object detection in Humanoid Soccer on Low-End Hardware:

With the emergence of aboard vision process for areas like the web of things (IoT), edge computing and autonomous robots, there's increasing demand for computationally economical convolutional neural network (CNN) models to perform time period object detection on resource constraints hardware devices. Tiny-YOLO is usually thought of jointly of the quicker object detectors for low-end devices and is that the basis for our work. during this paper, they need shown that Tiny-YOLO are able to do zero.14 frames per second (FPS) on the Raspberry Pi three B, that is just too slow for football game enjoying autonomous golem robots police investigation goal and ball objects. during this paper they propose AN adaptation to the YOLO CNN model named xYOLO, which will succeed object detection at a speed of nine.66 Federal Protective Service on the Raspberry Pi three B. this is often achieved by commerce a suitable quantity of accuracy, creating the network close to seventy times quicker than Tiny-YOLO. bigger reasoning speed-ups were additionally achieved on a desktop central processing unit and GPU. in addition, they need contributed AN annotated Darknet dataset for goal and ball detection.

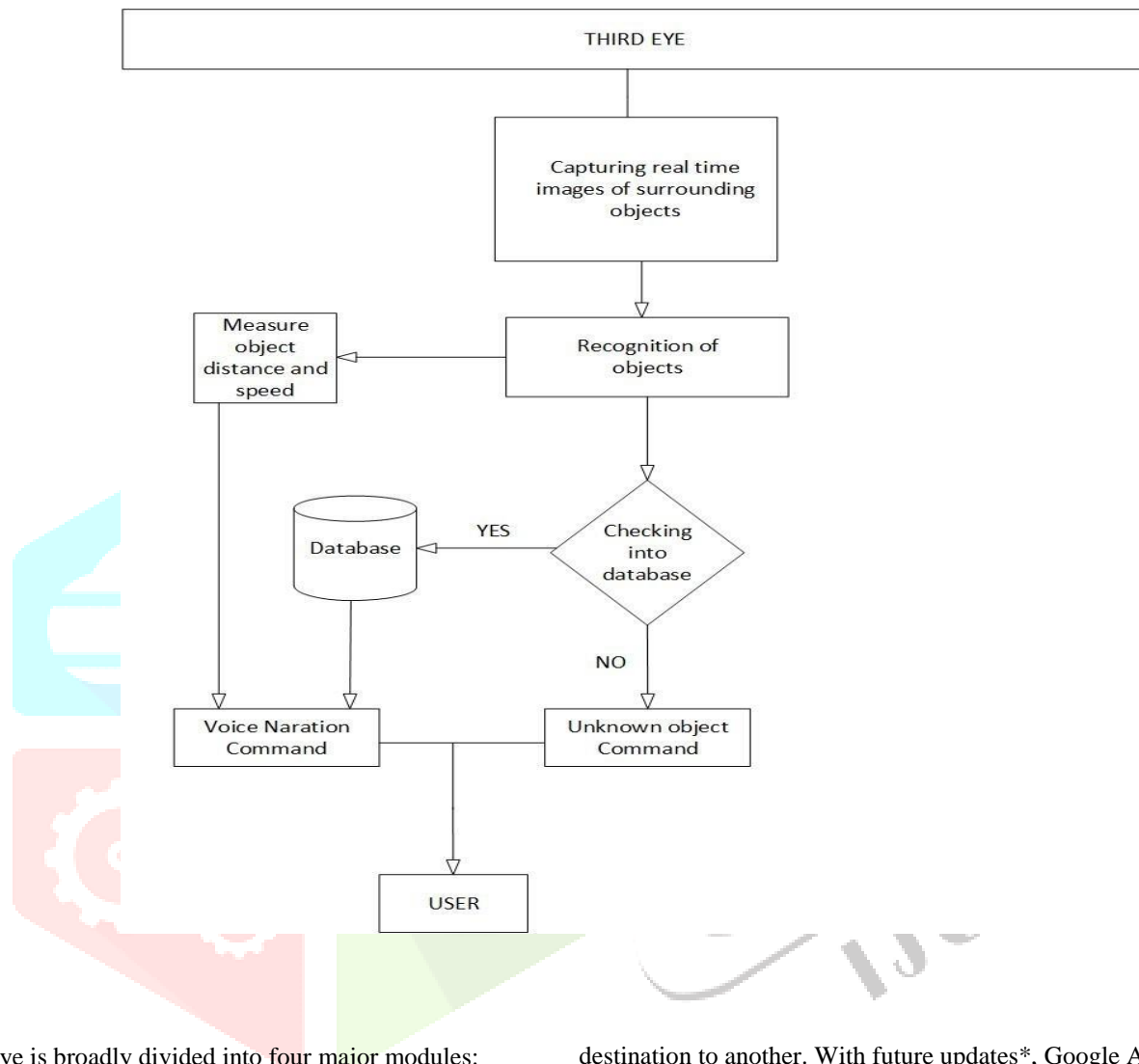
#### 9. Realtime object detection in IoT (Internet of Things):

Realtime object detection is one amongst the foremost interesting subjects because of its reason prices. Gaps in methodology, unknown ideas mathematical modeling makes it more durable for planning these computing algorithms. Algorithms in these applications is developed with in machine learning and/or numerical strategies that are accessible in scientific literature. These operations are attainable on condition that communication of objects at intervals their selves in physical house and awareness of the objects near . Artificial Neural Networks could facilitate in these studies. during this study, yolo rule that is seen as a key component for period of time object detection in IoT is researched. it's accomplished and shown in results that improvement of computing and analyzation of system aside this analysis that takes Yolo rule as a foundation purpose.

Year [Citation]	Methodology	Features	Challenges
2020 [1]	Recognition of Hand Gestures Based on techniques such as computer vision, hand segmentation, and classification algorithms.	In contrast to the sensor data glove, one of the methods, Color-Based Recognition using Glove Marker, is simple to use and inexpensive.	Problems with techniques in the interaction system like the Open-NI library or OpenCV, as well as the Dataset Glove approach, include illumination variation, accuracy difference, and so on.
2020 [2]	A sensor-based motion tracking device that uses an angular velocity approach to capture 3D	Both static and dynamic movements can be recognized in real-time using this method. This experimental results show	Challenges are minimal display space, deep and complex sorting menus, and a lack of technical support to take inputs

**Table: Literature review**

## Proposed System



Third Eye is broadly divided into four major modules:

- **Module 1:** Taking input from the webcam of different objects and converting it into a form that can be processed easily.
- **Module 2:** Intercepting the objects from the input of the webcam.
- **Module 3:** Recognizing the objects from a database of gestures.
- **Module 4:** Detecting the distance of object from user and giving output in audio format.

It takes input from camera and converting into format which is supported and can be easily used. From the camera inputs, it detects object and through audio supp it helps to navigate user from one destination to another. All the objects are gone through database of gestures and is determined. Distance of object from user and giving output in audio format. Integration of Google Maps helps user to navigate very easily through ne

destination to another. With future updates\*, Google Assistant can be used to set the destination and use the whole other bunch of features.

Updates are given by authors in their own given period of time.

### Product Scope:

With great Ease of Use, one can use this in best possible way and use all of the features listed below:

- **Audio Support:**  
Navigation through audio supports wide variety of features.
- **Google Maps Integration:**  
Google Maps integration makes this all-rounder equipment for disabled people and makes it best offering. With variety of features offering in Google Maps, it makes it a powerful tool.



- Object Detection:

Object detection is a computer technology related to computer vision and image processing that detects and defines objects from digital images and videos (MATLAB).

- USB Mic:

Mic would be used for audio support and it could be usb or pi camera.

## Components:

- Raspberry Pi 4:

Raspberry Pi is a single-board computer, which means that the microprocessor, memory, wireless radios, and ports are all on one circuit board. The Raspberry Pi is whole and sole Linux computer, so practically it can do anything a Linux computer can do, such as email and Web servers, acting as network storage, or be used for OBJECT DETECTION.

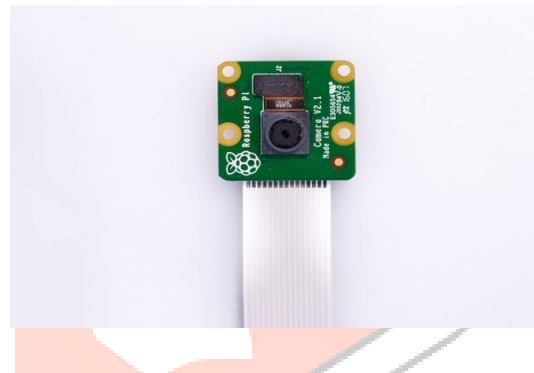
Technical Specifications:

- 1.5GHz 64-bit quad-core CPU
- 2.4 GHz and 5.0 GHz IEEE 802.11ac wireless, Bluetooth 5.0, BLE Gigabit Ethernet
- 2x USB 3.0 ports; 2x USB 2.0 ports.
- Raspberry Pi standard 40 pin GPIO header
- 2 × micro-HDMI ports (up to 4kp60 supported)
- 2-lane MIPI DSI display port
- 2-lane MIPI CSI camera port
- 4-pole stereo audio and composite video port 265 (4kp60 decode), H264 (1080p60 decode, 1080p30



- Pi camera:

The Pi camera module is a portable light weight camera that supports Raspberry Pi. Pi camera interface with Raspberry Pi using the MIPI camera serial interface protocol. It is normally used in image processing, machine learning in surveillance projects.



- GPS Module NEO-6M:

The NEO-6M GPS module is a well-performing complete GPS receiver with a built-in 25 x 25 x 4mm ceramic antenna, which provides a strong satellite search capability. The status of the GPS module can be detected using the power and signal indicator.



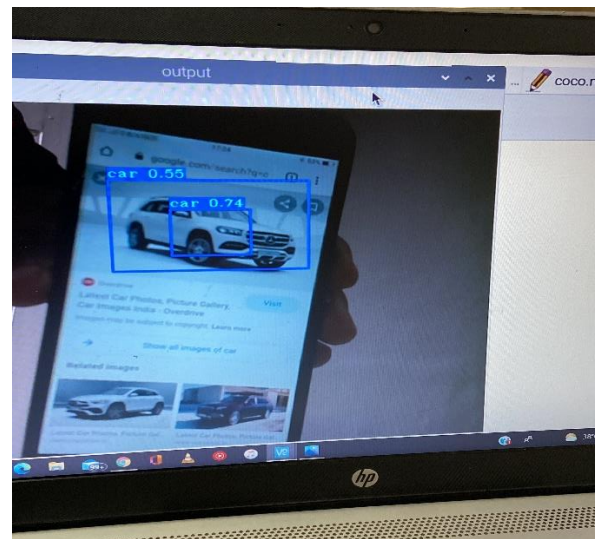
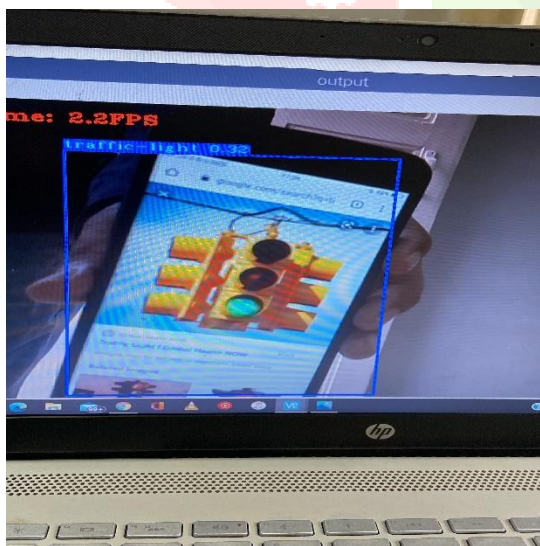
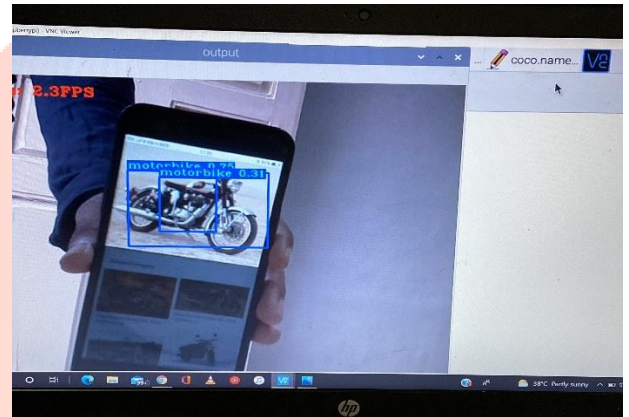
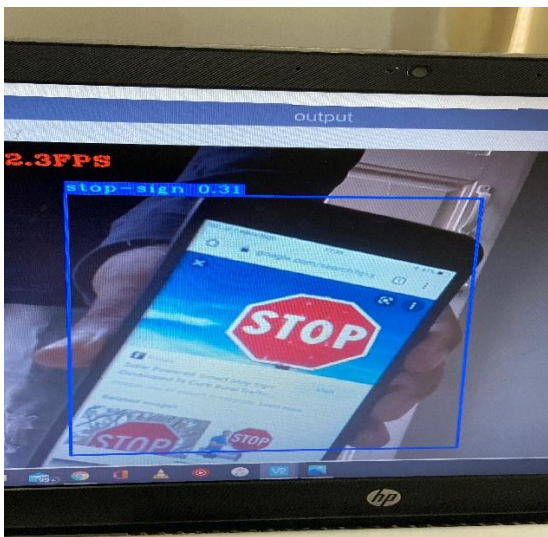
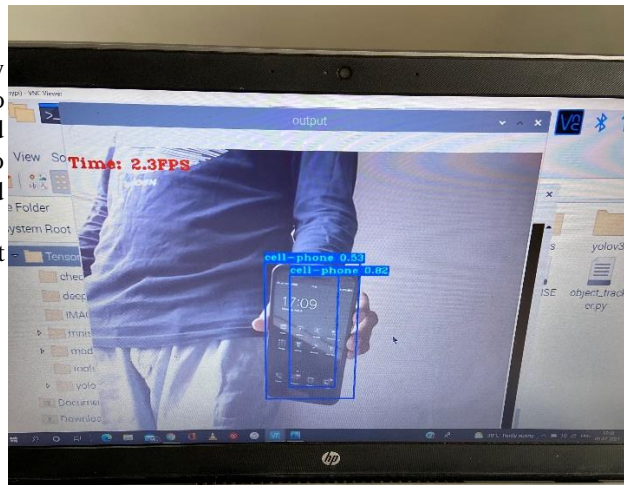
## Result/Output:

By using this project (Third Eye), the individual with disability would be able to navigate freely and safely. With best in audio support and with Google Maps (Google Maps is widely used and is a reliable source of navigating from one destination to another) integration, one can make this journey very easily and safely.

With a compact package and modern aesthetics, our project offers wide possibilities for future.

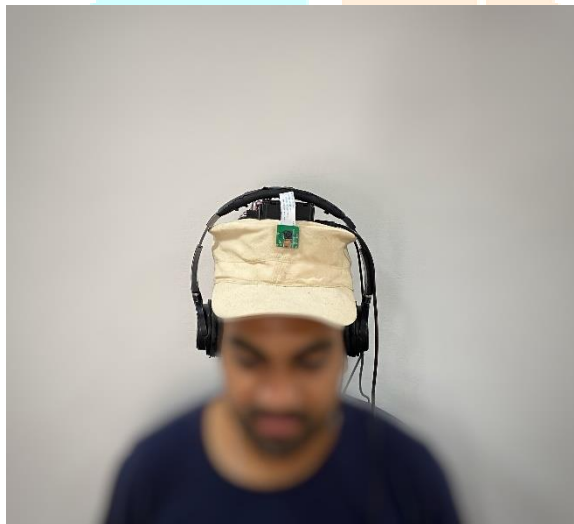
In our Project, the resultant is an AI based hardware which:

- Can detect the nearby obstacles.
- Can help user to avoid the obstacles.
- Can help user to navigate using google maps.





## Product Images:



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