

# 3D Navigation Protocol for Grab Object and Object Detection Neural Network for a Vision Disability

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**Abstract**—this research mainly focused on the created interface between visions of an object around the environment for a vision disability. Created interface with true visionary capabilities used object detection workflow. Add also garbed object protocol added feature for this interface. Used two collaborated workflows, this interface crated a solution for real-time problems for the visual disability. Each part of the interface converted user-friendly feedback output. Each section of object detection identified used model was faster\_rcnn\_inception\_v2\_coccc\_2018\_01\_28 and it already trained a model by Microsoft. For defined object outside environment used text to speech convert program to coco model translated for 3D mono sound protocol and it generated frequency variable 3D sound selection for the user to understated object around the objects. To father understated this 3D mono sound waves converted digital format to analog format used Pulse with Modulation technique. Each signal validated by protocol digital variable generator for identified which side object detected on the system. In the signal collaborated as the measured depth of the object crated frequency high signal and low signal using frequency modulation concept. Used separate sensor modules were, MPU6050 accelerometer and gyroscope, APDS – 9960 RGB and Gesture Sensor, TOF 10120 Laser Range Finder and Raspberry Pi Camera for the generated separate 3D mono frequency sound to identified each hand gestor actioned identical for the object garbed. Used each sensor variable row data combined with suitable algorithmic formula generated each PWM signal for the hand space motion. Combined of math mythical functionality with separate algorithmic PWM signals each object can be identified and garbed true the space using a sound signal. Each speared sound signal identified according to the position of the signal.

**Index Terms**— Artificial Intelligence, Deep Learning Algorithms, Machine Learning Algorithms, Digital Image Processing, Depth Sensing Camera Algorithms, Microcontroller and Microprocessor, 3D Gesture Sensor, Time of Flight Sensor, Laser Range Finder Sensor.

## 1 INTRODUCTION

THIS was a final researched component for degree-level students in the computer science stream and the title was 3D Navigation protocol for grab object and Object Detection neural network for a vision disability. In research content mainly focused solution for interfacing identify the object and grab object vision disability persons or robotic modules. On that was a reason this research material for an only crated solution and not was for harmed practically, physical or mentally to people. This researched the only purpose was finding a solution for a vision disability. In this research, it was identical research conducted as two parts. One part was a grab object used electronically sensing technic and another part was an object detection system for the grab objects used as an identified object. So that was conducted research materials for the third party. Further, look at this content object detection part done in different ways for this research theme. When the first part was identified as an object using the already training coco or the Yolo models. Then the other part was trained suitable models for research-based. In this documentation, there were two separate models for the trained and classification done. Each separate two example models trained by the researched purposed and trained data added according to the content of researched objectives. Before this model part done this research also added open CV object tracked content for an identified objects within moved. And also there were hardware solutions for the captured image and the electronically given feedback. And the other section was implemented part for the grab objects and the identified depth of the object. This section separately done by research focused added parts. Because of

each part added separate sensor unite for identified Hand gestures and using algorithmic simulation in 3D depth sensed technology for given feedback to the user.

## 2 EVALUATION RESULT

### 2.1 REAL-TIME OBJECT DETECTION

In this solution, there are research-based object detection protocols tested. Using this type of experiment easily can identify an object. Because of this object detection model pre-training by another third party company. This model can easily detect objects around the environment normally if fast processing power in second. So that according to data gathering it can measure the improvement of the device.

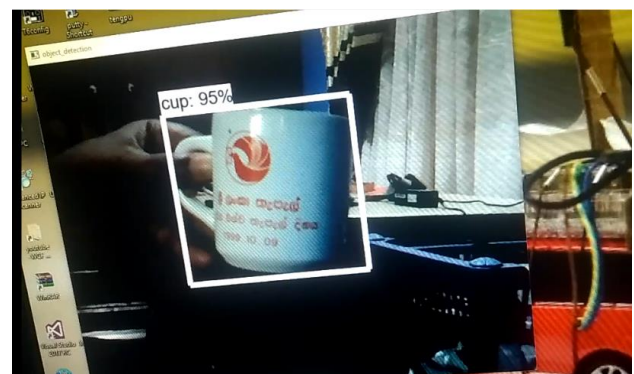


Figure 1.0

## 2.2 Custom Trained Neural Network for Object Detection

In this model use custom made dicey understand using computer vision object detection materials train. In this model trading using six hundred pictures at list four or five days us-



Figure 2.0

ing sixty housed time completion cycles. This model train using google neural network train framework tensor flow. At

very easy way. So this 3D sound pattern makes a prototype of object movement. That how the User can understand using past experience where the object located for the object. Then the user has an idea hoe the object grabs the object also using a fast experience.

## 3 DEVELOPMENT PROCESSED

According to the proposed method had two parts. One part of Object detection and the other part is the hand motion sensing part. Figure 7 - Development Process Each development process developed separately and the combination is done by using proper Algorithmic programs for the development tool provided. Then each part detection by the separately and sensor data gathering separately. Each section combination is done by the microcontroller for each section. Each sensor device connected using the I2C bus and SPI communication protocols.

Tensor flow object detection API was the most convenient way to identify an object. Because of using a predetermined object navigation system it can identify an object for a suitable environment. In the section, it uses phases for detection object. If it

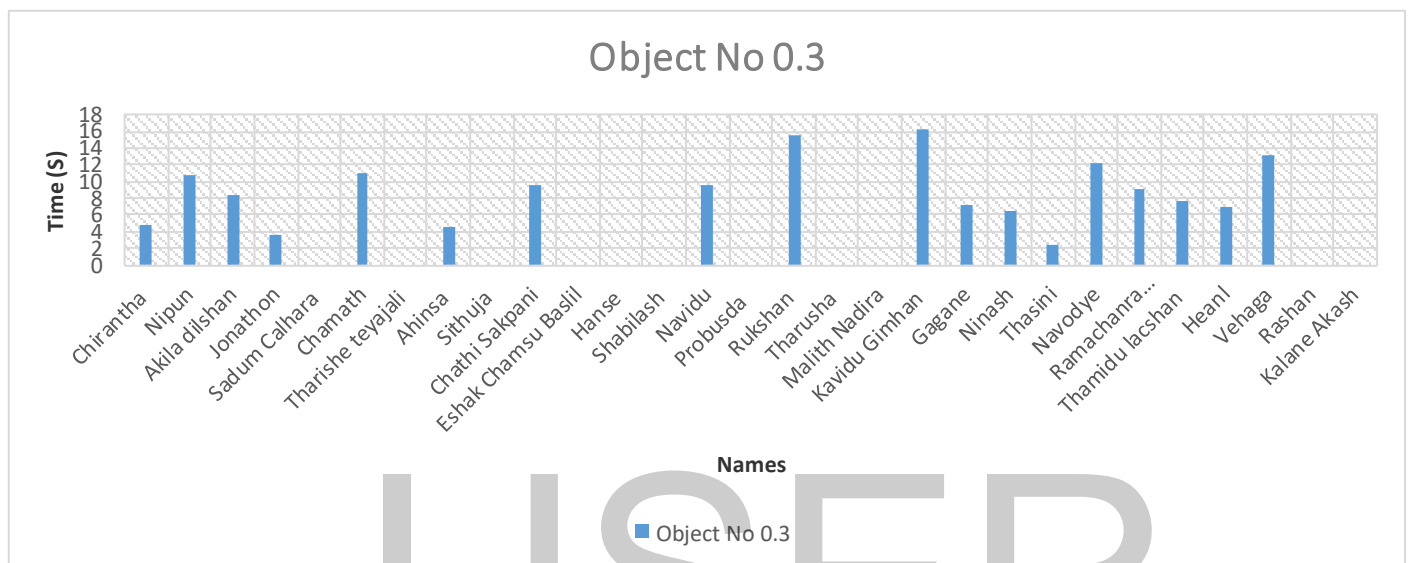


Figure 3.0

this train, the session model can understand what side dicey faces to the camera. Using understand this type of scenario there have can be practical difficulties. For using something like visualization it can be customized visualization for the specific section.

## 2.3 3D Mono Sound Generate

Using a 3D mono sound pattern user can identify each object side and the separate angle sound loudness. 3D Sound waves crate path of the object and collaborate hand movement user can grab the object

creates a more accuracy modeling technique it can detect a high level of objects. Figure 2 and 1 -Tensor Flow Object Detection API According to the object detection model, it can be a detection of seven-step implementation cycles for the object detection modeling process.

When this system second part is the hardware solution for the grab object using hand motion. Han motion is done by the separate selection with object detection. But there have simplified the algorithmic ways to detected image range finder using image size. It is a new concept and it can be detected and explained separately below. This concept using four sensors four detecting hand motion in the space and it generates a sound pattern for the object to identify the location of hand and object. This identity sensors work detection separate movement

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of the hand. APDS 9960 sensor identify gesture of hand identically. Each sensor can identify six gestures of hand and each gestur movement identify separate sound patron. Each sound pattern identifies the celebrate of object depth and hand movement. These things are can a just by the command given by the hand movement. MPU 6050 had content of accelerometer and gyroscope for the sensitive hand movement collected of the device. When this sensor adds hand long side as a rubber band or gloves it can generate a hand petition as a 3 axis variable in the space. So each value can transfer using i2c bus SDA SCL connection true to Arduino form sensor. This connection processed by the algorithmic call blue bulb and it has separately processed for calibrating with the gestur sensor. TOF 10120 Laser range finder was a LIDAR type laser used a range finder. Because it is low-cost equipment for processed and there has a disadvantage of it, not a 3D LIDAR sensor.

Figure 5.0

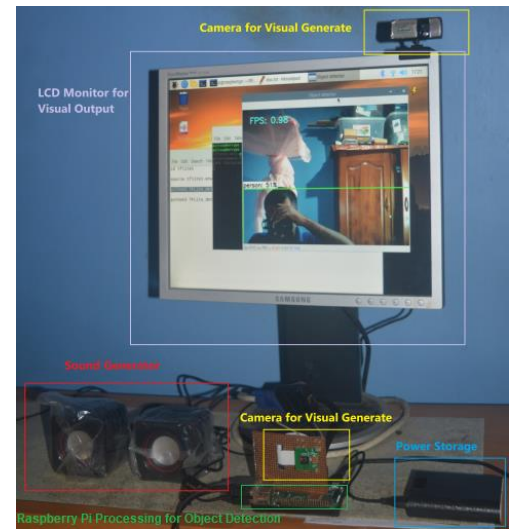
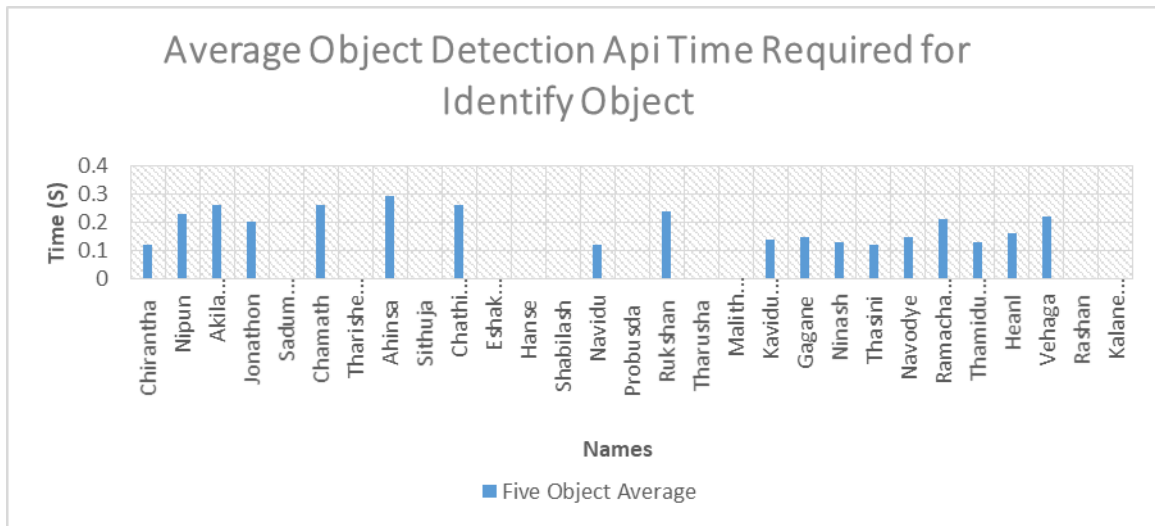


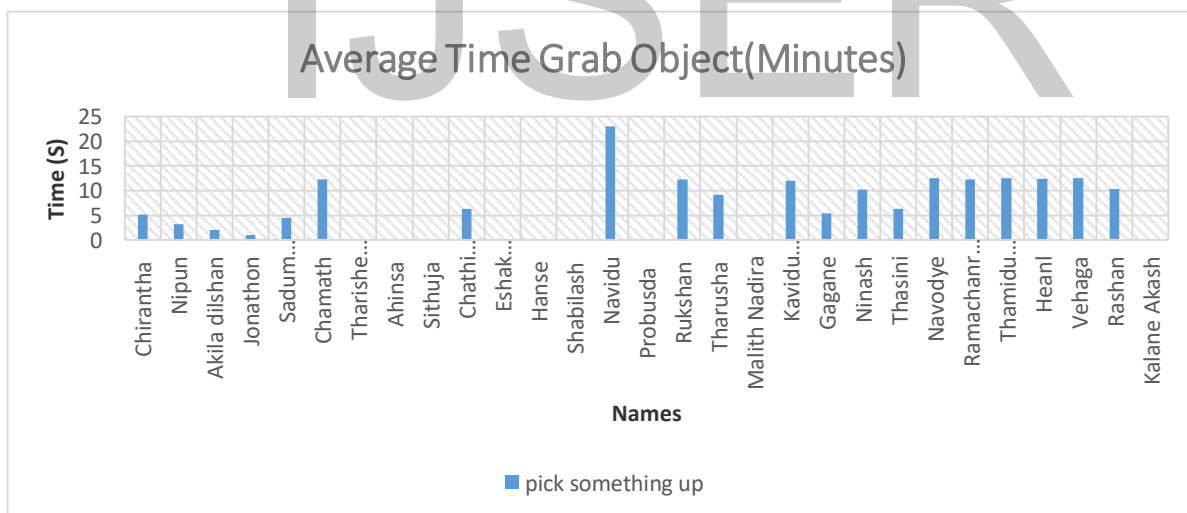
Figure 4.0



This prototype device is used as an entry device equipment and it calibrates with the raspberry pi camera module for the identify the depth of object beyond to device. (Figure 7)

#### 4 PROPOSED PROTOTYPE DEVICE RESULTS

Figure 6.0





This device generate many efficient outcome for the result.

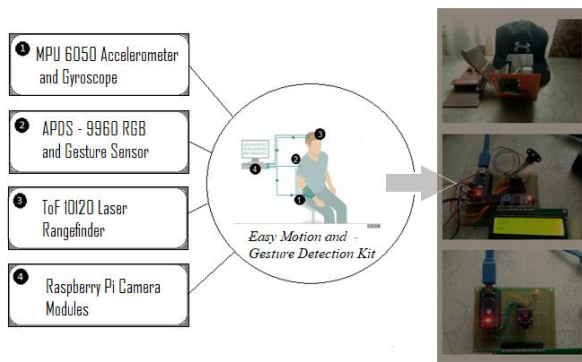


Figure 7.0

Figure 3 contribute one of the object identify time nearly twenty blind personal. And also Figure 4 and 5 generate evolutionary result that object identification. Reducing time and energy find object using this product. That why this research create more value.

## 5 EQUATIONS

In this research they have more assumption. Because of this devices implementation much more difficult when the practically. But this figures are more accurate because of equation results much more similar to practical outcome. Figure 5 and 6 are the result section and it generate by figure 8. Figure 8 compare each situation of object detection and grab object time. Comparison get much more similar result with practical situation and it can calculate productivity.

## 6 REFERENCES

The function supports multi-channel images. Each channel is processed independently." This functionality creates with three parameters. Then this used tensor flow object detection modeling [4]. Tensor flow helps truly develop a model for object detection. In real-time object detection using deep learning algorithms can detect the real-time object in real-time scenarios [5].this modeling is already trained by google and this

Figure 8.0

Formula for calculate the identity average grace time

Require time = Object pick up average time - (object identify time without device - object identify time with device)

$$X = y - (xt - yt)$$

model can detect more objects 41 in the real world. Object detection workflow is a principle that object detection done. But the functionality of object detection using a different algorithm. Tensor flow is an open-source machine learning framework developed by Google. A deep learning algorithm born because of machine learning algorithms has some unsort problems [6]. Because of if some prediction done by using a

machine learning algorithm can be unpredictable without some section data lost. As an example, if the smart home condition of detected by using some variables but without humidity data set it can't predict the home condition. That can end with error results and without any result. So on that rezone deep learning bore inside machine learning as a subset. This deep learning algorithm makes a result almost without a sample dataset but according to given pre-allocated principle. So that why these types of the algorithm used in object detection. In this section take bout real-time object detection functionalities [2, 3]. To archive stent task it must use stent tools for it. That means in this using several libbers for the identify object image pixel array for object detection. Because of object detection, we use several cameras to identify the object and as an object image, it can get the location of the image. Using real-time image capture ring and camera location combination identify image location and what kind of object. "Adrian Rosebrock", how is done this tutorial using python programming language for the detection of objects. This machine-learning algorithm or deep learning algorithm are can using a separate way. And it can pretrain data set using this pre crate algorithm using row data we can crate model for classification test data [7]. "Data Science Primer chapter six Model Training" added much more information, this using row data and add this data for separate clusters or classes and this data training and tested after data verification. And make a suitable model using train classification data then it can be model to use test data. The end result added by this model. Object detection is one of the deep learning algorithms for using identify an object around the environment. This type of exerciser technically has a principle to process [8]. Because it may be used very high accurate model pre-made and the model contends more verity class for object detection [10]. There have more verity model to choose and this model are specialized for stent object numbers. "Tensor flow object detection model zoo" there has a verity of object detection models they are performed by the time scale model provides. In this session, we can show how to train a model using row data [9]. Using row data added specific software called "Label image" can label each image for the make an object detection model. Unlike the other machine learning techniques object detection model taring using as a row data image capture y cameras. This imager must be a low pixel density because of when this image process using all pixels. Then the process must not be continued because of the density or size of the image file. When the raw data image label this test data training a model using tensor flow. That way model added to the test data to classify an object in the image.

## 7 CONCLUSION

The function supports multi-channel images. Each channel is processed independently." This functionality creates with three parameters. Then this used tensor flow object detection modeling [4]. Tensor flow helps truly develop a model for object detection. In real-time object detection using deep learning algorithms can detect the real-time object in real-time scenarios [5].this modeling is already trained by google and this model can detect more

objects 41 in the real world. Object detection workflow is a principle that object detection done. But the functionality of object detection using a different algorithm. Tensor flow is an open-source machine learning framework developed by Google. A deep learning algorithm born because of machine learning algorithms has some unsolved problems [6]. Because of if some prediction done by using a machine learning algorithm can be unpredictable without some section data lost. As an example, if the smart home condition of detected by using some variables but without humidity data set it can't predict the home condition. That can end with error results and without any result. So on that rezone deep learning bore inside machine learning as a subset. This deep learning algorithm makes a result almost without a sample dataset but according to given pre-allocated principle. So that why these types of the algorithm used in object detection. In this section take about real-time object detection functionalities [2, 3]. To archive stent task it must use stent tools for it. That means in this using several libraries for the identify object image pixel array for object detection. Because of object detection, we use several cameras to identify the object and as an object image, it can get the location of the image. Using real-time image capture ring and camera location combination identify image location and what kind of object. "Adrian Rosebrock", how is done this tutorial using python programming language for the detection of objects. This machine-learning algorithm or deep learning algorithm are can using a separate way. And it can pretrain data set using this pre crate algorithm using row data we can crate model for classification test data [7]. "Data Science Primer chapter six Model Training" added much more information, this using row data and add this data for separate clusters or classes and this data training and tested after data verification. And make a suitable model using train classification data then it can be model to use test data. The end result added by this model. Object detection is one of the deep learning algorithms for using identify an object around the environment. This type of exerciser technically has a principle to process [8]. Because it may be used very high accurate model pre-made and the model contends more verity class for object detection [10]. There have more verity model to choose and this model are specialized for stent object numbers. "Tensor flow object detection model zoo" there has a verity of object detection models they are performed by the time scale model provides. In this session, we can show how to train a model using row data [9]. Using row data added specific software called "Label image" can label each image for the make an object detection model. Unlike the other machine learning techniques object detection model taring using as a row data image capture y cameras. This imager must be a low pixel density because of when this image process using all pixels. Then the process must not be continued because of the density or size of the image file. When the raw data image label this test data training a model using tensor flow. That way model added to the test data to classify an object in the image.

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## REFERENCES

- [1] Py image search. 2019. Real-time object detection with deep learning and Open CV. [ONLINE] Available at: <https://www.pyimagesearch.com/2018/05/14/a-gentle-guide-to-deep-learning-objectdetection/>. [Accessed 28 August 2019].
- [2] Py image search. 2019. A gentle guide to deep learning object detection. [ONLINE] Available at: <https://www.pyimagesearch.com/2018/05/14/a-gentle-guide-to-deep-learning-object-detection/>. [Accessed 28 August 2019].
- [3] Open cv. 2019. Motion Analysis and Object Tracking. [ONLINE] Available at: [https://docs.opencv.org/4.1.1/d7/df3/group\\_\\_imgproc\\_\\_motion.html](https://docs.opencv.org/4.1.1/d7/df3/group__imgproc__motion.html). [Accessed 28 August 2019].
- [4] Tensor flow. 2019. Object detection. [ONLINE] Available at: [https://www.tensorflow.org/lite/models/object\\_detection/overview](https://www.tensorflow.org/lite/models/object_detection/overview). [Accessed 28 August 2019].
- [5] Edureka. 2019. Object Detection Tutorial in Tensor Flow: Real-Time Object Detection. [ONLINE] Available at: <https://www.edureka.co/blog/tensorflow-object-detection-tutorial/>. [Accessed 28 August 2019].
- [6] Elitedatascience. 2019. model-training. [ONLINE] Available at: <https://elitedatascience.com/model-training>. [Accessed 28 August 2019].
- [7] GitHub. 2019. Tensor Flow Object Detection API tutorial. [ONLINE] Available at: <https://tensorflow-object-detection-api-tutorial.readthedocs.io/en/latest/training.html>. [Accessed 28 August 2019].
- [8] Towardsdatascience. 2019. Creating your own object detector. [ONLINE] Available at: <https://towardsdatascience.com/creating-your-own-object-detector-ad69dda69c85>. [Accessed 28 August 2019].
- [9] GitHub. 2019. Tensor flow detection model zoo. [ONLINE] Available at: [https://github.com/tensorflow/models/blob/master/research/object\\_detection/g3doc/detection\\_model\\_zoo.md](https://github.com/tensorflow/models/blob/master/research/object_detection/g3doc/detection_model_zoo.md). [Accessed 28 August 2019].
- [10] Medium. 2019. Object Detection using Tensor Flow and COCO Pre-Trained Models. [ONLINE] Available at: <https://medium.com/object-detection-using-tensorflow-and-coco-pre/object-detectionusing-tensorflow-and-coco-pre-trained-models-5d8386019a8>. [Accessed 28 August 2019].