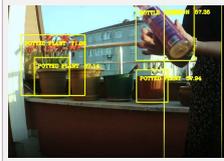


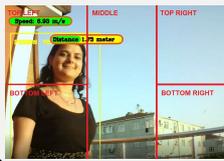
PROBLEM DESCRIPTION

- Problem:**
- Visually impaired people may encounter obstacles while walking.
 - They cannot detect what and where these obstacles are and how far they are.
 - They also cannot identify the direction of the obstacle.
- Solution:**
- We had designed a device that can detect objects, determine the distance and direction of objects for visually impaired people.

METHODOLOGY



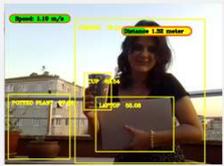
Object Detection
Detection of 80 different objects entering the camera angle with using COCO.



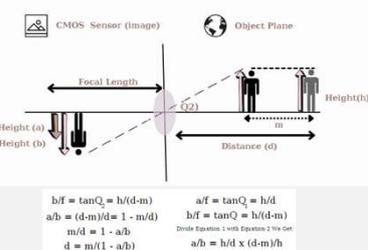
Direction Detection
Specifies the object as bottom right, bottom left, top right, top left, and middle.



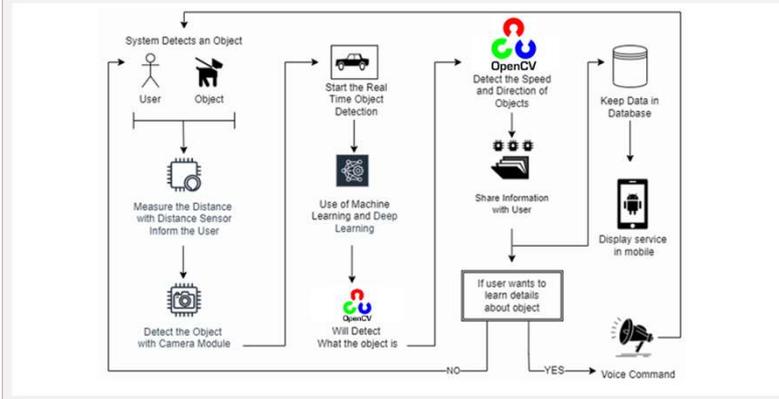
Speed Detection
Measuring the speed of people and cars.



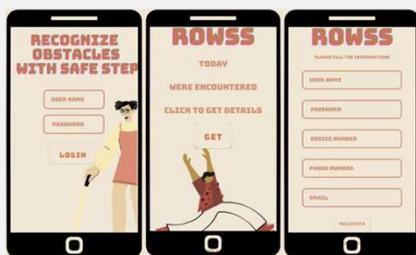
Distance Detection
Measuring the distance of objects entering the camera angle and warning the user..



PROCESS



USER INTERFACE OF MOBILE APPLICATION



User Interface Consists Of 3 Pages

- The Login Page of application
- The Register page
- The list page contains a list of objects encountered that day
- We were used AndroidStudio, XML and Java.

TECHNOLOGIES USED

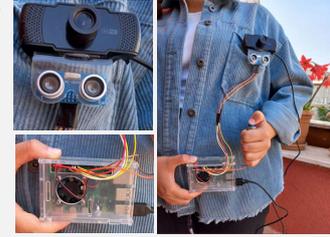


TECHNICAL APPROACHES

Modeling and Design:

The user will be warned by the camera in the brooch about obstacles while walking. When the user requests, the user will be notified about objects in the field by a sound module attached to the ear.

Hardware:



OBJECT DETECTION CLASSIFICATION

Haar-cascade Classifier

For training, a set of positive images and negative images without an object.

The pictures of the real object are recorded as positive pictures.

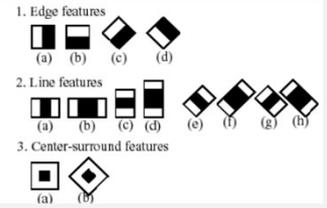
After the target object selection is made, the classifier then initiates scanning operations by placing Haar-like features into this quadrilateral field.[1]

The density of the feature:

$$f(x) = \sum_{BlackArea} (Density) - \sum_{WhiteArea} (Density)$$

This weak classifiers collected according to a particular formulation, and strong classifiers are obtained. $f_n(x) = \text{weak classifier } F(x) = \text{strong classifier.}$

$$F(x) = a_1 f_1(x) + a_2 f_2(x) + a_3 f_3(x) + \dots$$



DATABASE AND DATASET

Database:

Using Microsoft SQL Server Management Studio.

There are users and object detection tables in the database.

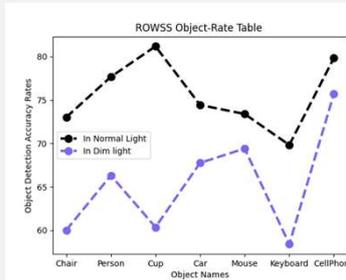
What is COCO?



COCO is a large-scale object detection, segmentation, and captioning dataset. COCO has several features:

- 330K images
- 1.5 million object instances
- 80 object categories
- 250,000 people with keypoints [2]

EXPERIMENTS & RESULTS



Seven randomly determined objects were detected 100 times in bright and dim light and their truth scores were recorded.

When we take the average of these results, the accuracy percentage different for the seven objects determined according to the ambient light is shown in the graph.

CONCLUSION

- In this project, we designed a device which can detect objects, speed, distance and direction. Then, it shares results with visually impaired people with a voice command in a real time.
- Real time object detection was performed with %70 truth score using machine learning, deep learning algorithms and libraries.
- In the future, we want to determine the color of the objects and if there is text on it, we want to be able to share it with the user.

REFERENCES

- K. K. AYTEN & O. KURNAZ, "Real-time Implementation of Image Based PLC Control for a Robotic Platform," in BALKAN JOURNAL OF ELECTRICAL & COMPUTER ENGINEERING, vol. 7, no. 1, p.65, Jan. 2019.
- COCO Common Objects in Context. "What is COCO?". Access: 29 May 2022. <https://cocodataset.org/#home>
- <https://www.direnc.net/> (Date of Access: 28/05/2022)
- <https://pyimagesearch.com/2015/01/19/find-distance-camera-objectmarker-using-python-opencv/>