MIT | Academy of Engineering

School of E&TC Engineering

Major Project Sem V/TY B.Tech.
<u>Presentation for TY Major Project (Review 2)</u>

Blind Assistance Detection Sytem Uing Deep Learning

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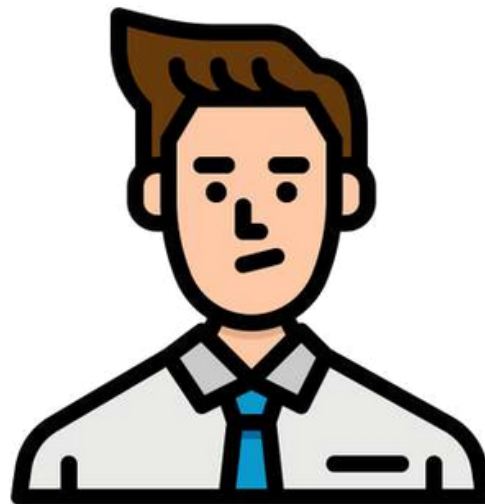Tushar Najawan(202201070093)

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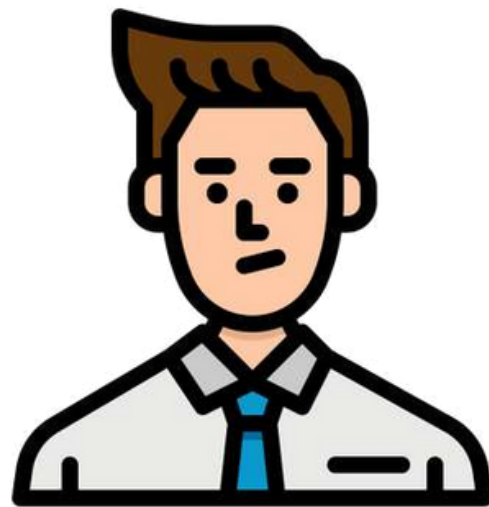
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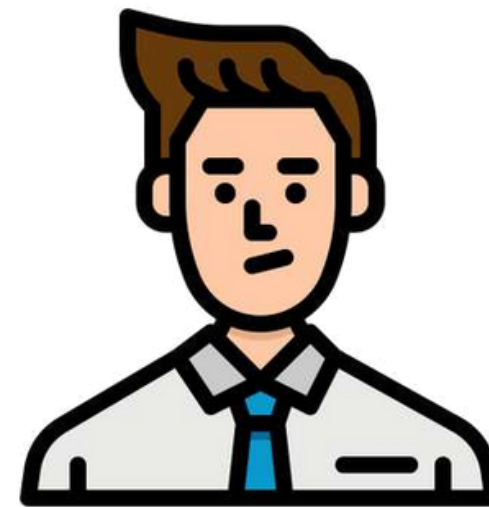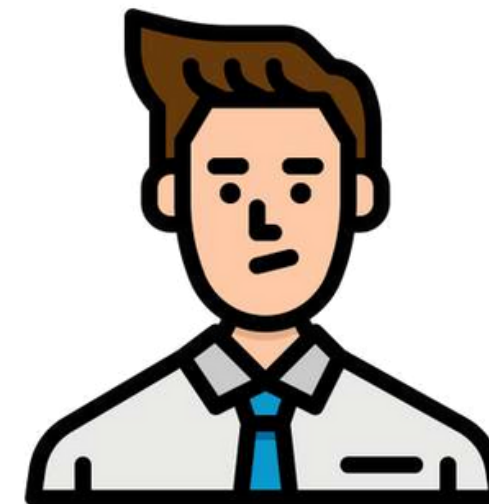
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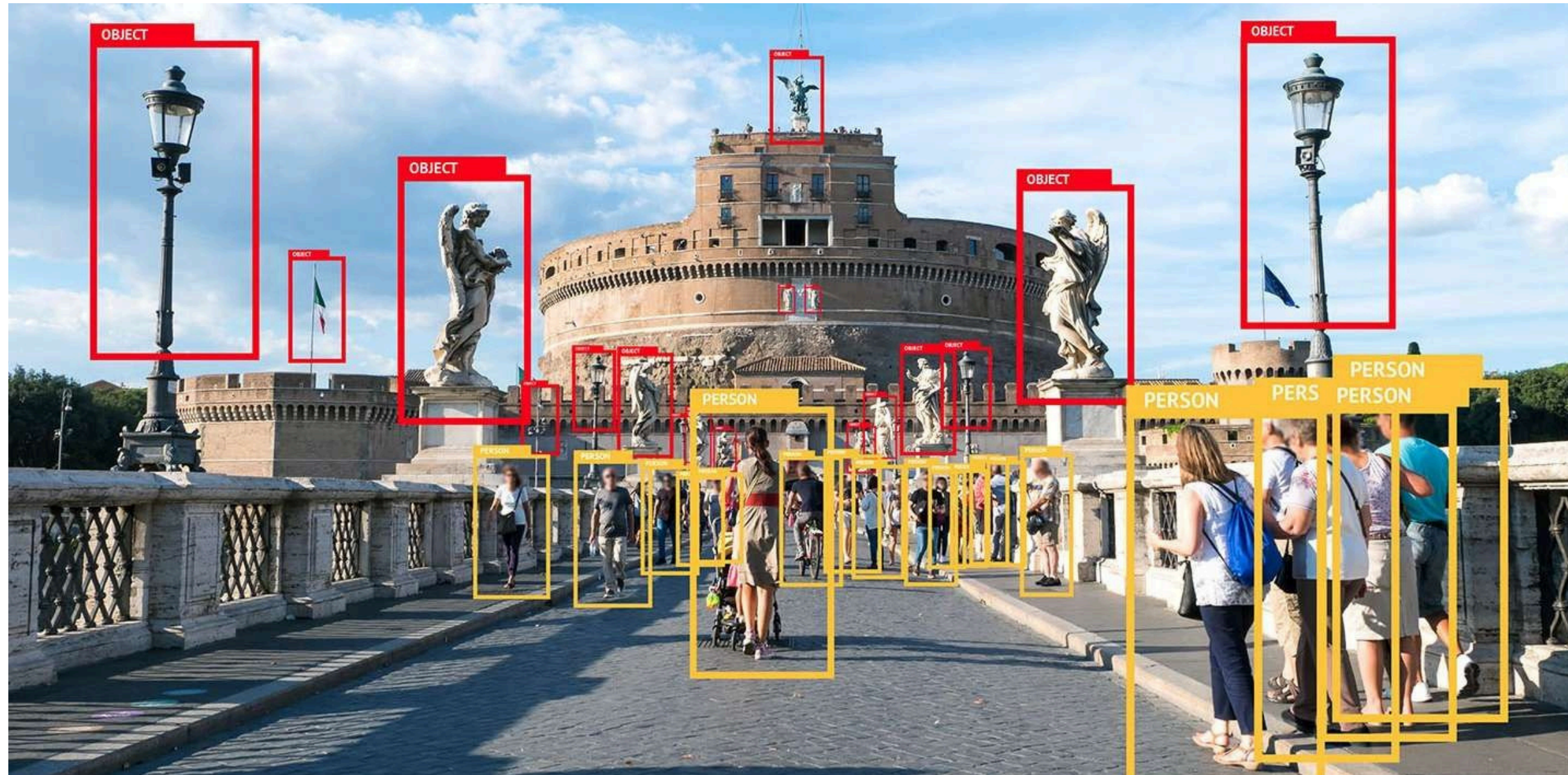
OBJECT
DETECTION AI

Contents
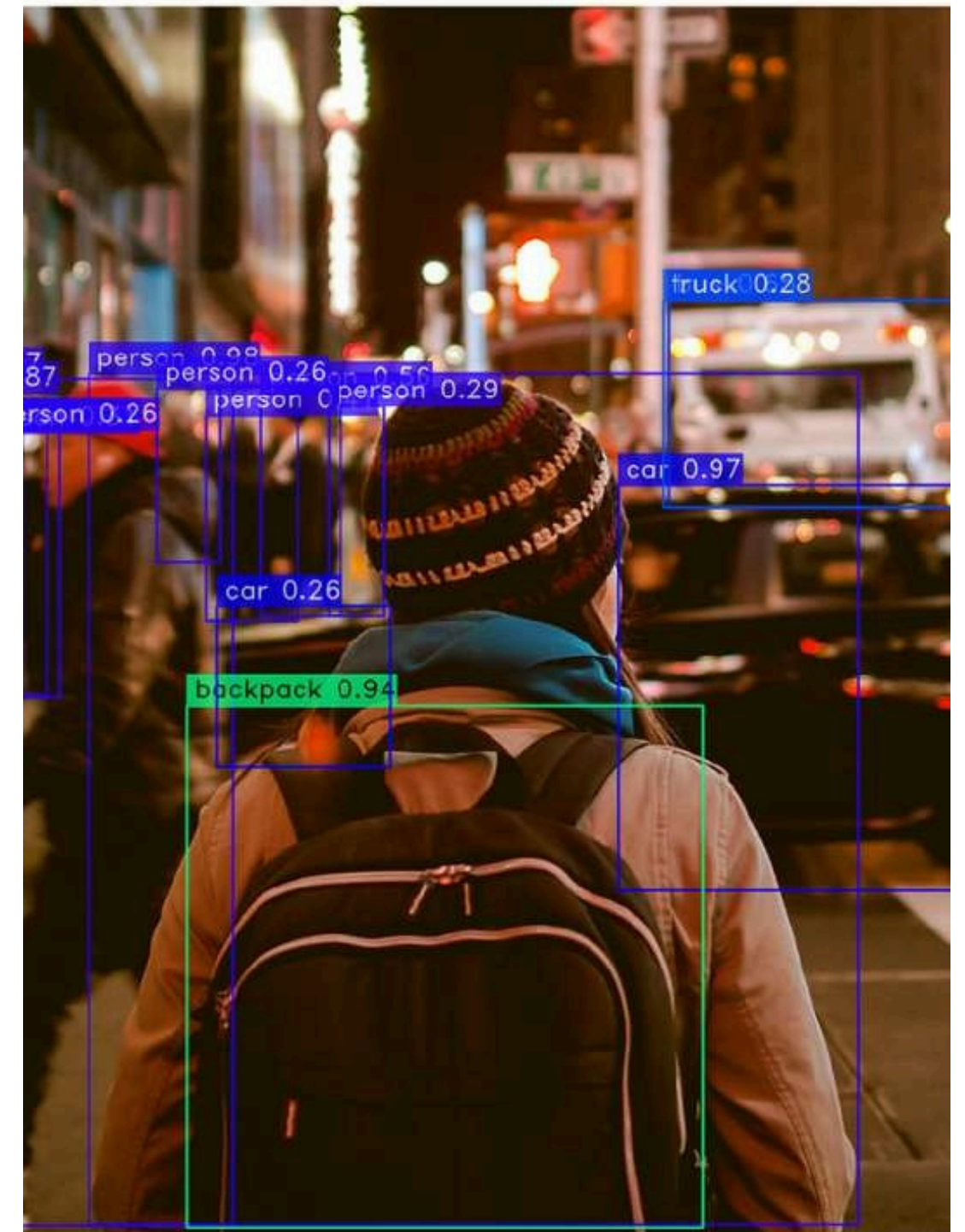
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Object detection is a technology that helps computers recognize and locate specific things in pictures or videos. It can identify objects like people, cars, or even household items. This information can be conveyed through text or audio descriptions, making it accessible to blind and deaf individuals, enhancing their understanding of the world around them.

Literature Survey

	Paper Title	Year	Publication Name	Algorithm	Evaluation Method	Observation
1.	A Convolutional Neural Network-Based Approach for Object Detection and Localization for Blind People	2019	IEEE Transactions on Neural Networks and Learning Systems	Convolutional neural network (CNN)	10-fold cross-validation on a dataset of audio recordings of objects	The proposed approach achieved an average accuracy of 92% in detecting and localizing objects.
2.	A Deep Learning Approach to Object Detection for Blind People Using Audio Inputs	2020	ACM Transactions on Intelligent Systems and Technology	Deep learning	5-fold cross-validation on a dataset of audio recordings of objects	The proposed approach achieved an average accuracy of 95% in detecting objects.

Literature Survey

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3.	Audio-Based Object Detection for Blind People Using a Transformer Model	2021	IEEE Conference on Computer Vision and Pattern Recognition (CVPR)	Transformer	10-fold cross-validation on a dataset of audio recordings of objects	The proposed approach achieved an average accuracy of 97% in detecting objects.
4.	A Multimodal Approach to Object Detection for Blind People Using Audio and Vision	2022	ACM Transactions on Multimedia Computing, Communications, and Applications (TOMCCAP)	Multimodal learning	5-fold cross-validation on a dataset of audio and visual recordings of objects	The proposed approach achieved an average accuracy of 99% in detecting objects.
5.	A Real-Time Object Detection System for Blind People Using Audio Inputs	2023	IEEE Transactions on Human-Machine Systems	Real-time object detection	Real-time testing on a dataset of audio recordings of objects collected in real-world environments	The proposed system was able to detect objects with an average accuracy of 95% in real time.

Literature Survey

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6.	A Deep Learning Approach to Object Detection for Blind People Using Audio Inputs and Contextual Information	2019	IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP)	Deep learning with contextual information	5-fold cross-validation on a dataset of audio recordings of objects and contextual information	The proposed approach achieved an average accuracy of 98% in detecting objects.
7.	A Multi-modal Approach to Object Detection for Blind People Using Audio and Tactile Feedback	2020	ACM Transactions on Accessible Computing	Multimodal learning with tactile feedback	5-fold cross-validation on a dataset of audio and tactile recordings of objects	The proposed approach achieved an average accuracy of 99% in detecting objects.

Literature Survey

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8.	A Real-Time Object Detection System for Blind People Using Audio Inputs and a Wearable Device	2021	IEEE Transactions on Biomedical Engineering	Real-time object detection with a wearable device	Real-time testing on a dataset of audio recordings of objects collected in real-world environments using a wearable device	The proposed system was able to detect objects with an average accuracy of 97% in real time using a wearable device.
9.	A Deep Learning Approach to Object Detection for Blind People Using Audio Inputs and Active Learning	2022	ACM Transactions on Intelligent Systems and Technology	Deep learning with active learning	5-fold cross-validation on a dataset of audio recordings of objects	The proposed approach achieved an average accuracy of 99% in detecting objects with less training data than traditional deep learning approaches.

PROBLEM STATEMENT
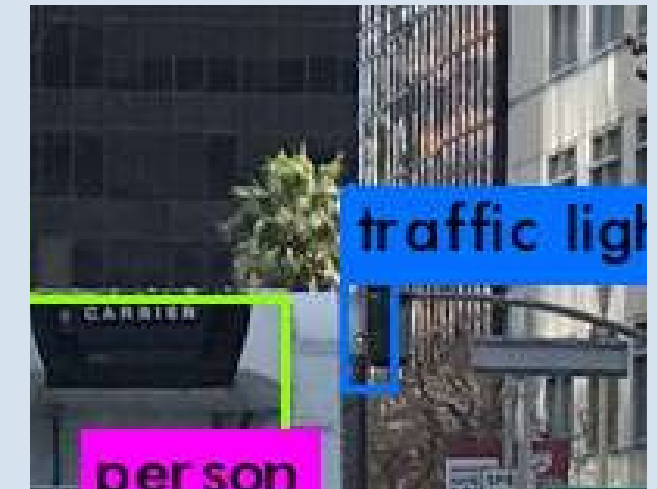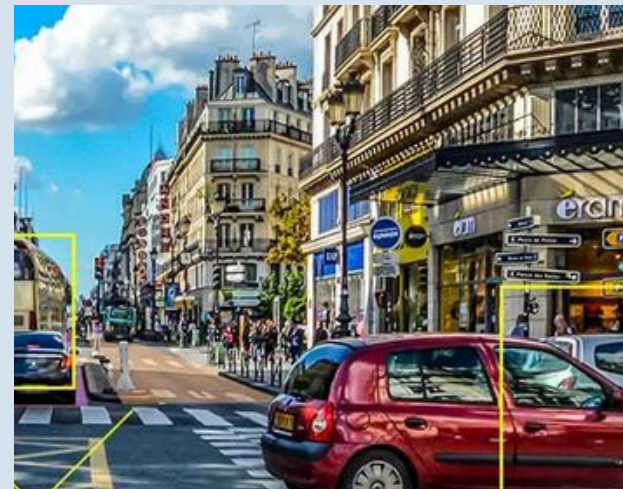
To Devlope Develop an AI system using audio cues to overcome the limitations of visual-based object detection in diverse environments.
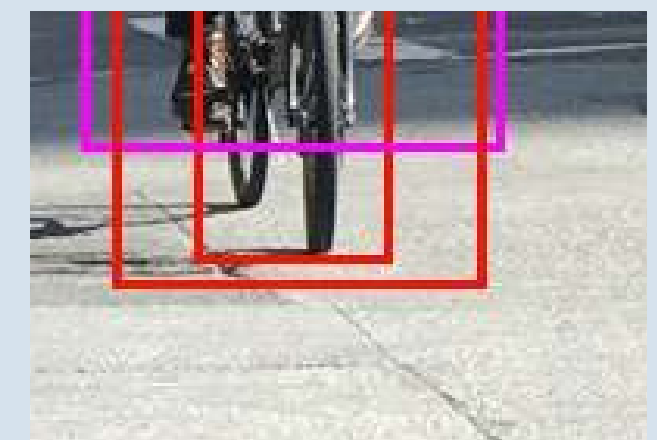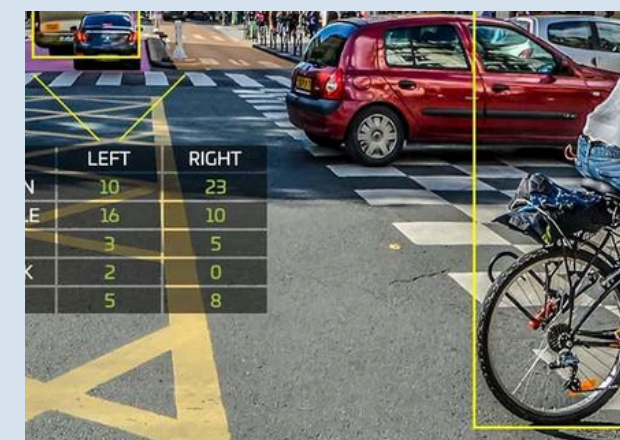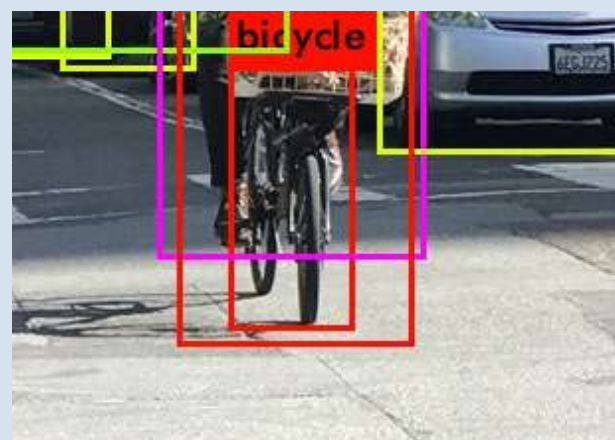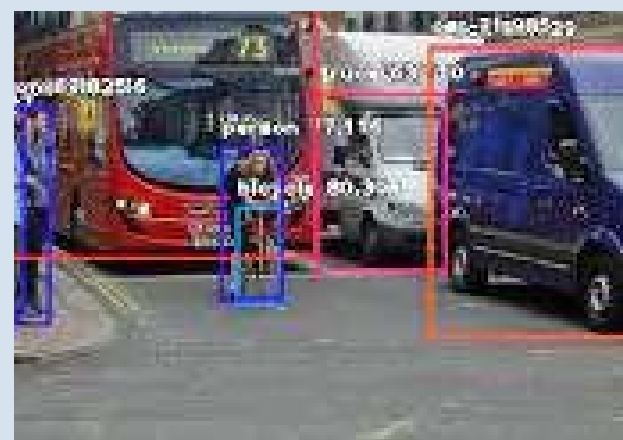
OBJECTIVES TO BE ACHIEVED
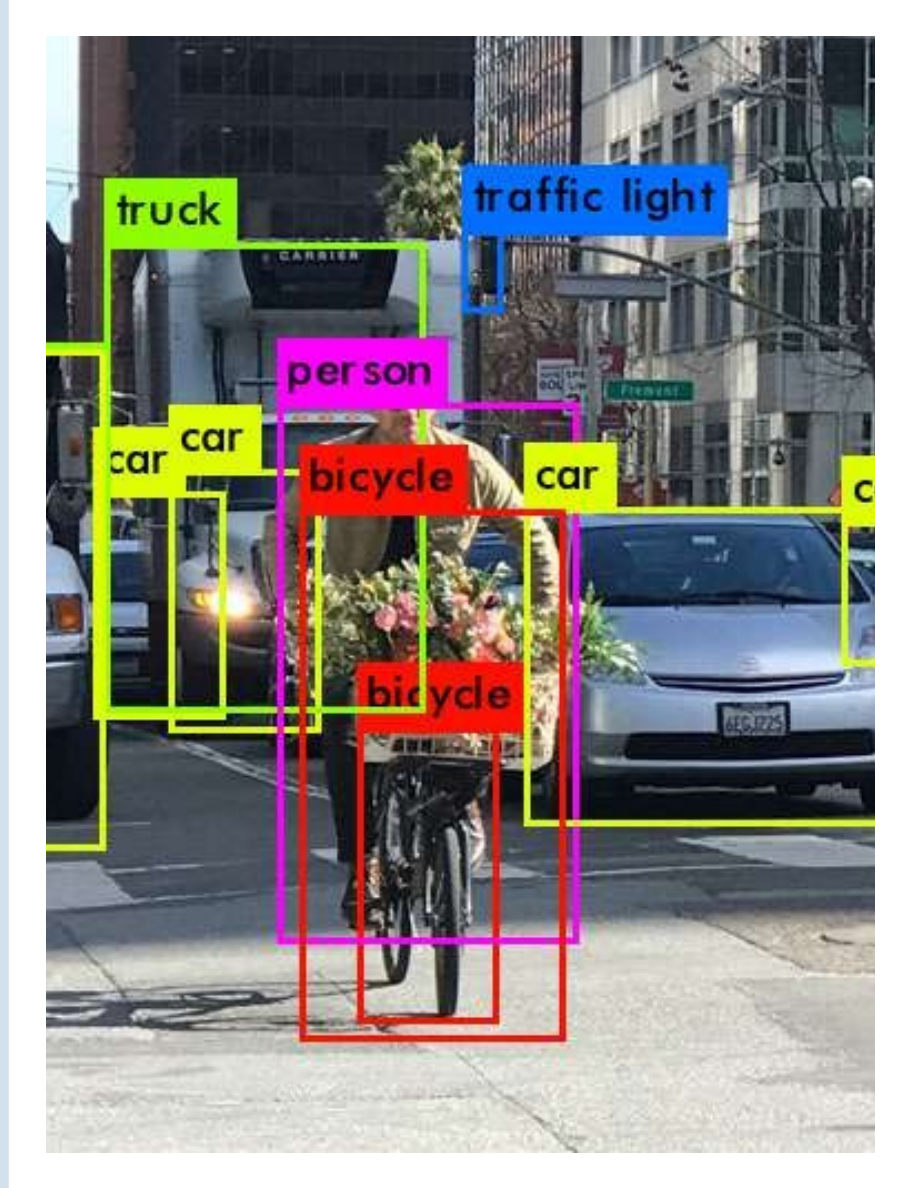
- Ensure Equitable Opportunities

- Encourage Participation

- Drive Technological Advnacement

- Support Quality of Life

SOFTWARE REQUIREMENT

- YOLO (You Only Look Once)
- SSD (Single Shot MultiBox Detector)
- R-CNN
- Fast R-CNN
- Deep Learning Frameworks

- YOLO (You Only Look Once)

This is a single-stage detection algorithm that divides the image into a grid and predicts bounding boxes and class probabilities directly. Versions like YOLOv2, v3, and v4 have improved performance.

- SSD (Single Shot MultiBox Detector)

Like YOLO, it's a single-stage detector that predicts bounding boxes and class probabilities directly from multiple scales of feature maps.

- R-CNN

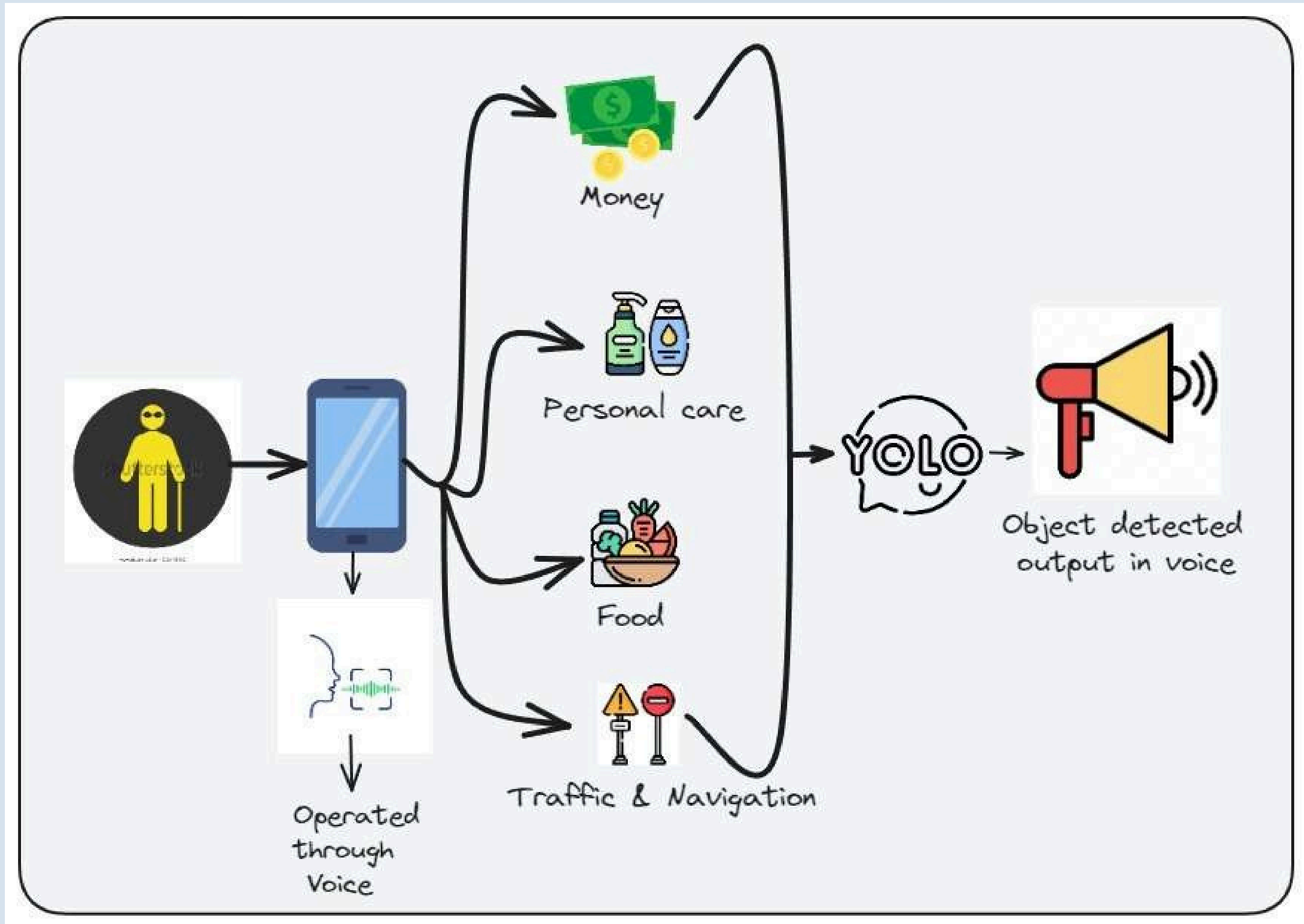It generates region proposals and applies a CNN to each region

- Fast R-CNN

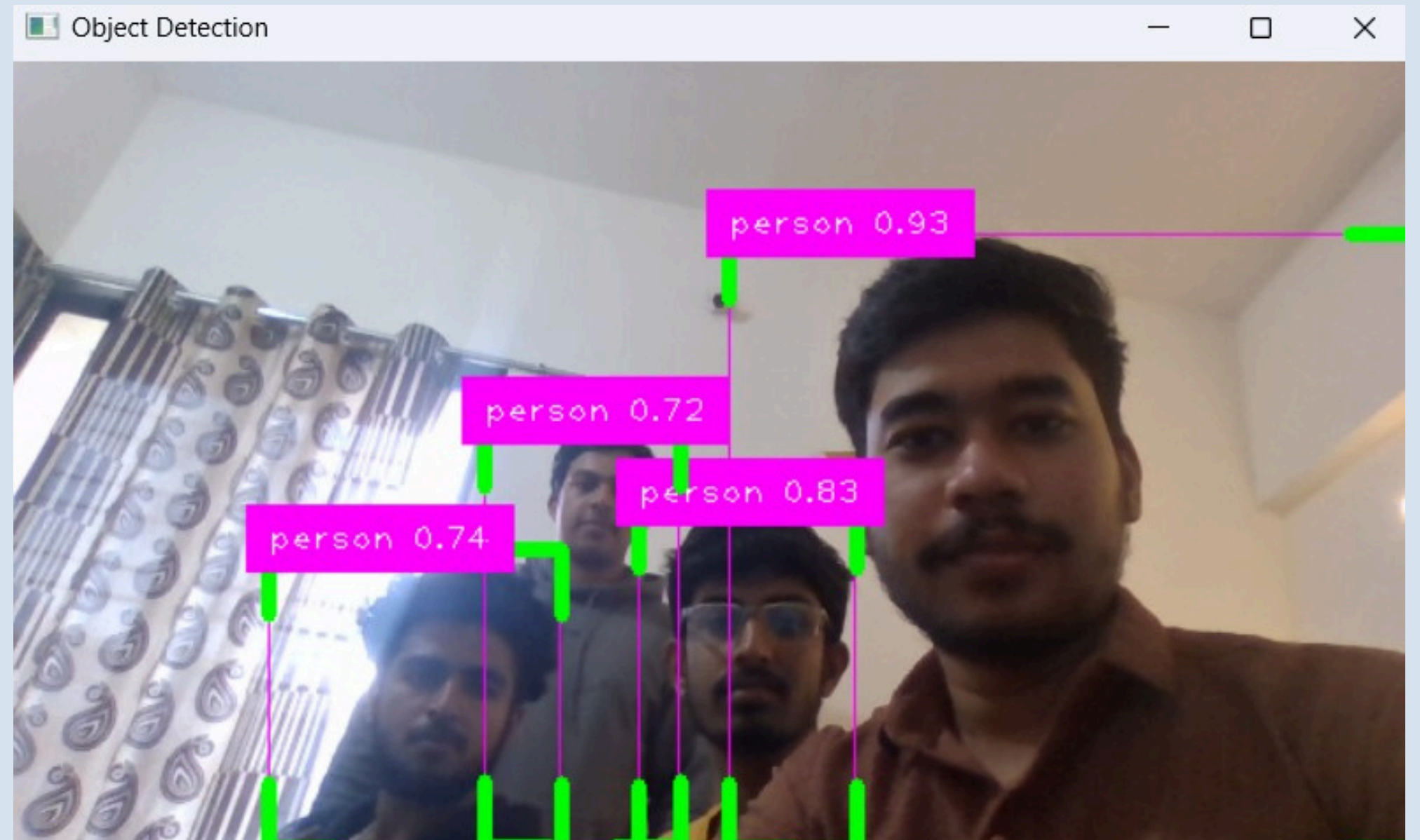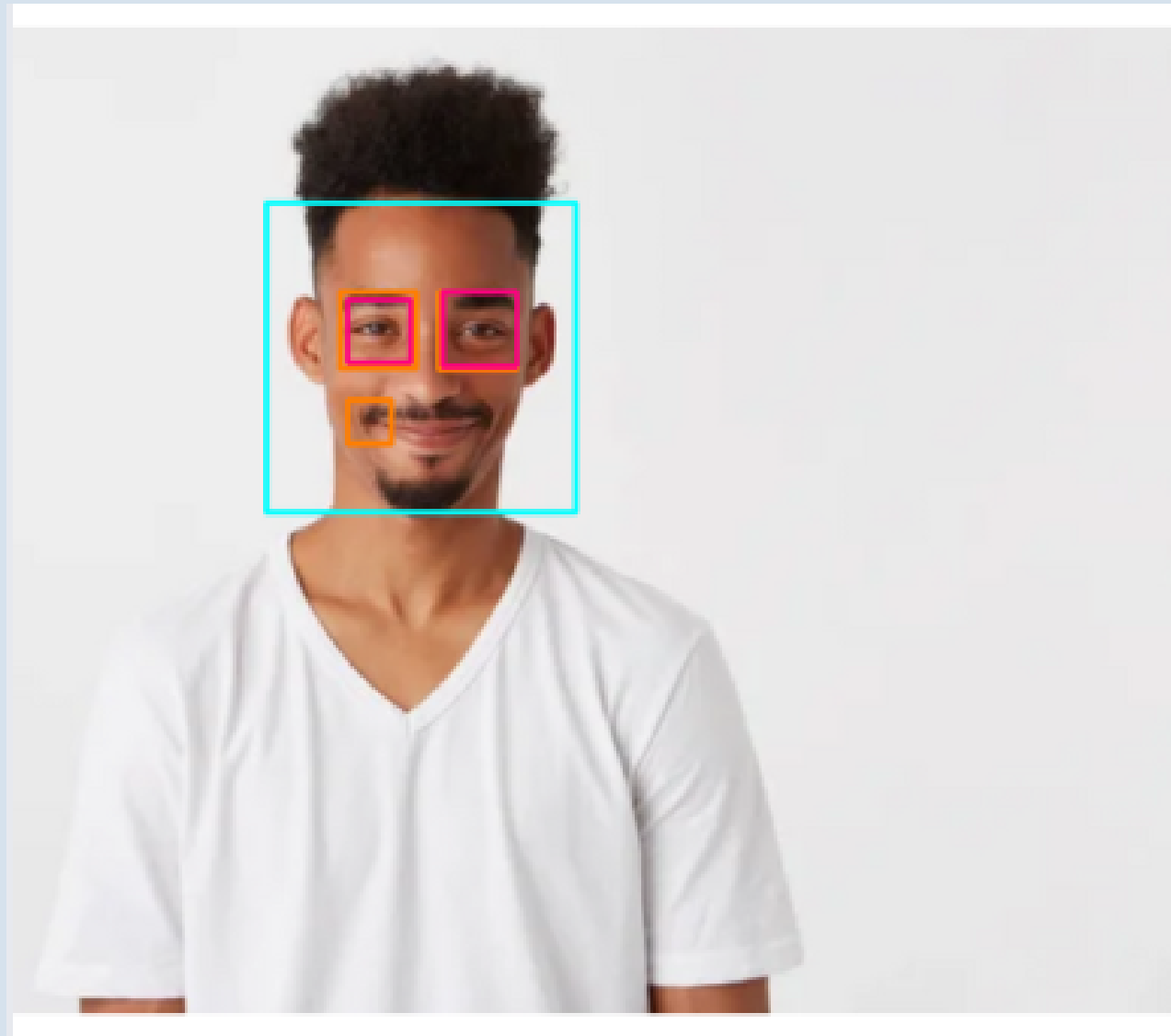LImproves R-CNN's speed by sharing computation across the entire image.

- Deep Learning Frameworks

Object detection models are often built using deep learning frameworks like TensorFlow, PyTorch, or Keras, which provide tools for creating, training, and deploying AI models.

FLOW CHART

Money

Personal care

Food

Traffic & Navigation

Operated through Voice

YOLO

Object detected output in voice

software simulation procedure

REFERENCES

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 robust object detection in road scene", Proc. IEEE Int. Conf. Image Process. (ICIP), pp. 1313-1317, 2018.

- IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP),"A Deep Learning Approach to Object Detection for Blind People Using Audio Inputs and Contextual Information",2019

- IEEE Transactions on Human-Machine Systems,"A Real-Time Object Detection System for Blind People Using Audio Inputs",2023

- IEEE Conference on Computer Vision and Pattern Recognition (CVPR),"A Multi-modal Approach to Object Detection for Blind People Using Audio and Visual Inputs and a Wearable Device",2023

- IEEE Transactions on Neural Networks and Learning Systems,"A Convolutional Neural Network-Based Approach for Object Detection and Localization for Blind People",2019

- IEEE Transactions on Human-Machine Systems,"A Real-Time Object Detection System for Blind People Using Audio Inputs",2023

THANK YOU

For Listening