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Major Project Presentation

On

Blind Assistant system

-Real-Time Object Detection with Distance and Voice Alerts

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Research objective

- Develop a real-time intelligent assistive system for visually impaired individuals to enhance environmental awareness and navigation.
- Combines advanced object detection, precise distance estimation, and intuitive audio feedback.
- Provide seamless, accurate, and user-friendly guidance to improve mobility, safety, and independence.
- Transforms visual data into meaningful real-time auditory insights using computer vision and distance estimation.
- Augment spatial awareness and empower users through an optimized blend of speed, accuracy, and user-centric innovation.

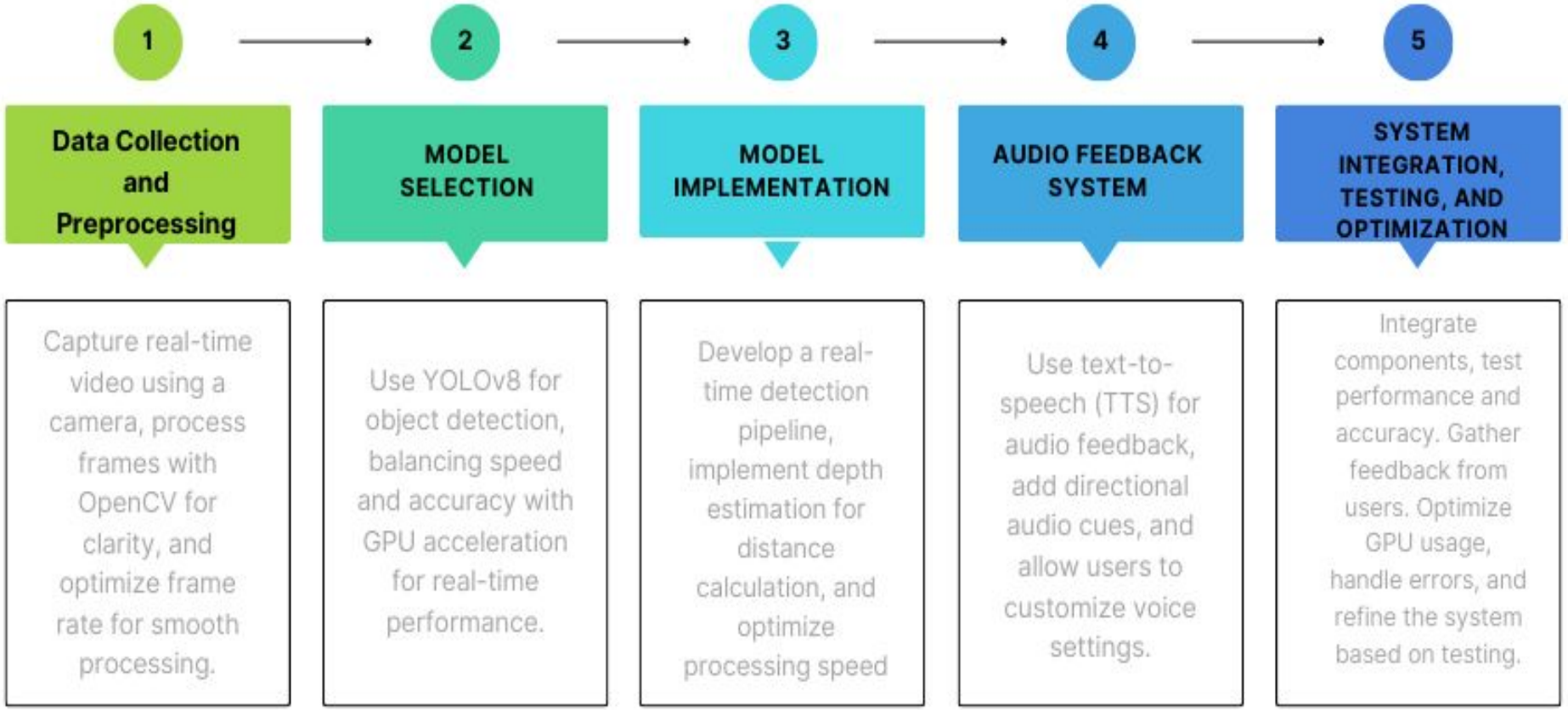
Problem Statement

- Real-Time Object Detection with Distance and Voice Alerts for blind people.
- We are focusing on developing a real-time object detection system with distance measurement and voice alerts to assist visually impaired individuals. The system utilizes deep learning and computer vision techniques, primarily based on YOLO (You Only Look Once) for object detection.

Literature Survey

AUTHOR	TITLE	PURPOSE	ALGORITHM	ACCURACY
Nethravathi B1, Srinivasa H P2, Hithesh Kumar P3, 2022	Visually Impaired Person Assistance Based on Tensor FlowLite Technology	To help visually impaired individuals navigate by detecting objects in real-time and providing audio descriptions.	Uses YOLO and YOLO-v3 for real-time object detection, with speech feedback provided through a Python library.	98%
Dr. M Y Babu, Akash Jatavath, G Yashwanth Kumar Reddy 2023	Object Detection System with Voice Alert for Blind	To help blind individuals navigate their environment independently by using deep learning for object detection and providing real-time speech feedback and warnings.	Employs a convolutional neural network (CNN) and the YOLO technique for quick and efficient object detection, using the COCO dataset for training. Text-to-Speech (TTS) is used to deliver audio alerts and warnings based on detected objects.	97%
N. V. N. Vaishnavi 1 , Tummala navya 2 , Velagapaodi Srilekha 3 2023	Blind Assistance in Object Detection and Generating Voice Alerts	To help visually impaired individuals navigate by identifying objects and providing audio feedback via a smartphone.	Uses machine learning to detect, classify objects, and calculate distance using a smartphone camera, providing real-time voice feedback.	95.8%
Millicent Mugwenhi Tawanda Mudawarima 2021	Blind Assistance in Object Detection and Generating Voice Alerts	To assist blind individuals in navigating their surroundings by using computer vision to detect objects and provide audio descriptions.	Uses computer vision and machine learning to analyze camera-captured images, detect indoor objects, and offer real-time audio feedback for improved navigation.	95%

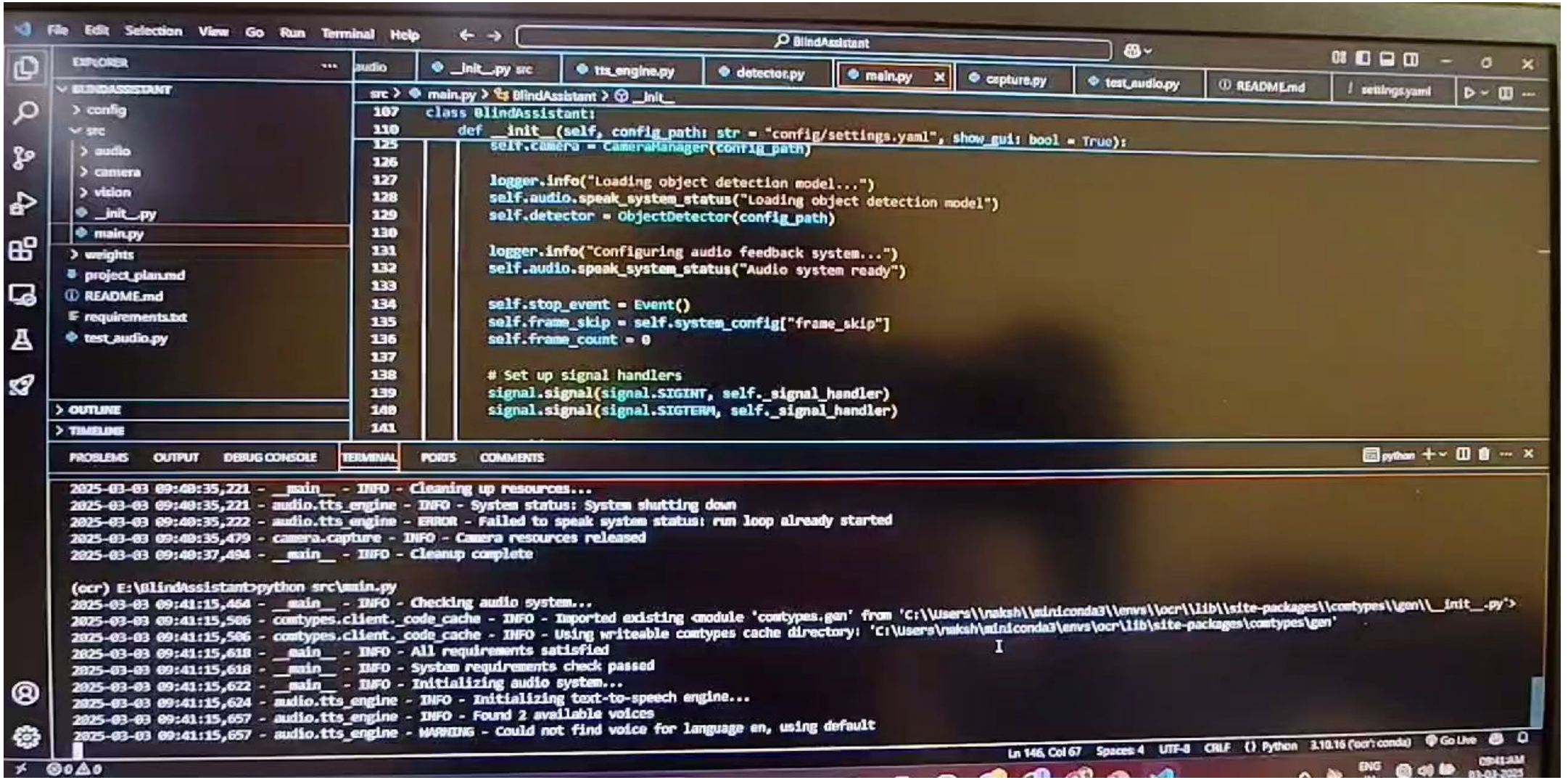
Research Methodology



Expected Outcome/Outcome

- **Expected Outcome of the Project**: Real-time Object Detection: The system will efficiently identify and classify objects in the user's environment using advanced deep learning models.
- **Accurate Distance Estimation:** The model will provide precise distance measurements, ensuring users can navigate obstacles safely.
- **Seamless Audio Feedback**: Objects and their distances will be conveyed via clear, real-time voice alerts, enabling intuitive interaction.
- **Enhanced Mobility and Safety:** Visually impaired individuals will experience improved independence and reduced risks in unfamiliar environments.
- **Optimized System Performance:** The solution will be lightweight, ensuring fast processing speeds and minimal latency for real-time assistance.
- **User-friendly Interface:** The system will be designed with accessibility in mind, making it easy to operate without requiring complex interactions.

Result/Discussions



Scope of Project

Future Enhancements

- AI-Powered Scene Understanding – Detects not just objects but entire scenes (e.g., roads, stairs, doors).
- Wearable Device Integration – Converts the system into smart glasses for hands-free use.
- Voice & Gesture Commands – Allows users to interact seamlessly with the system.
- Haptic Feedback – Uses vibrations for silent, intuitive alerts.
- GPS and Navigation Support – Helps users navigate outdoor environments with real-time directions.

Applications

- Assistive Technology for the Visually Impaired – Enhances mobility and independence.
- Smart Glasses for Enhanced Vision – Can be adapted into AR-based glasses.
- Autonomous Robots & Drones – Enables smart navigation in unknown environments.
- Elderly Care Assistance – Provides obstacle alerts for improved safety.
- Disaster & Rescue Operations – Assists in search-and-rescue missions by detecting obstacles and people.

Progress So far

Phase 1: Setup & Data Collection (completed)

- - Project setup and camera interfacing completed.

Phase 2: Object Detection & Distance Estimation(completed)

- - YOLOv8 integration is completed.
- - Depth estimation module developed.

References

- https://thesai.org/Downloads/Volume13No11/Paper_71-Visually_Impaired_Person_Assistance_Based_on_Tensor_FlowLite.pdf
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- https://medium.com/beingryaan/real-time-object-detection-along-with-distance-and-voice-alerts-for-blinds-a-blind-assistance-1708b97c3ecch ttps://ultralytics.com/yolov8
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Thank you