

## Project Report: Real-Time Object Tracking with YOLOv8

 Role:

Developer

 Team Size:

Solo Project

 Technologies Used:

- Python
- OpenCV
- PyTorch
- Ultralytics YOLOv8
- collections, random, time (standard Python libraries)

 Project Type:

Real-Time Object Tracking System

 Duration:

5 hours

 Dates:

December 16 – December 22, 2024

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### Overview

In this solo project, I built a real-time object tracking system using the **YOLOv8** deep learning model. By integrating **OpenCV** and **YOLOv8**, the system processes live webcam footage, detects objects, assigns them unique IDs, and tracks their movement across frames. Each object's name, count, and track ID is displayed directly on the video.

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## 🎯 Objectives

- Understand the fundamentals of YOLOv8 and how it works in real-time.
  - Apply deep learning to track moving objects using Python.
  - Gain hands-on experience with object detection and unique ID assignment.
  - Develop a functional, real-time computer vision application.
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## 🔧 Tools & Libraries

- **OpenCV:** For capturing video and rendering visual overlays.
  - **Ultralytics YOLOv8:** For accurate object detection and tracking.
  - **PyTorch:** Backbone framework to run the YOLO model.
  - **collections, random, time:** For handling track IDs and timing logic.
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## ✨ Key Features

- Real-time object detection from webcam stream.
  - Unique ID tracking for each object across frames.
  - Dynamic display of object class labels and counts.
  - Efficient and lightweight Python implementation, even on CPUs.
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## ⚠️ Challenges Faced

- Maintaining consistent object IDs between frames without reassigning.
  - Balancing real-time performance with detection accuracy.
  - Properly integrating YOLOv8 and optimizing for minimal delay.
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## ✓ Conclusion

This project gave me a strong foundation in computer vision and object tracking using state-of-the-art deep learning tools. I learned how YOLOv8 functions in real-time applications and enhanced my skills in Python, video processing, and logic development. It's a foundational step toward more advanced vision projects like multi-object tracking and video analytics.