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# MULTI OBJECT TRACKING ON LOW COST EMBEDDED PLATFORMS

INSTITUTION'S INNOVATION COUNCIL
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Department Research Day
Inspiring Minds, Advancing Frontiers

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## Abstract

Design and implement an MOT system for an autonomous vehicle using Raspberry Pi. The system shall be able to determine with accuracy the location of multiple objects in real time, such as pedestrians, vehicles, or other obstacles, to guarantee safety and informed decision-making when navigating any setting that concerns dynamic environments of driving.

## Background

Multi-object tracking (MOT) has become an essential task in computer vision, widely applied in areas such as autonomous driving, traffic management, and surveillance systems. The primary objective of MOT is to track multiple objects across video frames by identifying their trajectories. While the tracking of pedestrians in controlled environments has shown significant improvements, tracking vehicles presents unique challenges, especially in real-world traffic scenarios.
Vehicles move at higher speeds than pedestrians and exhibit nonlinear motion patterns, making their trajectories harder to predict. Moreover, traffic environments are often cluttered, with numerous occlusions caused by other vehicles, infrastructure, or environmental factors

## Methods

**Object Detection with YOLO (You Only Look Once):**

- Use a state-of-the-art object detection algorithm like YOLO to detect vehicles in each frame of the video. YOLO's real-time detection capabilities make it suitable for complex and fast-moving traffic environments. YOLO divides the image into a grid and predicts bounding boxes and class probabilities for each grid cell, allowing for the detection of multiple objects, such as different types of vehicles

**DeepSORT (Simple Online and Realtime Tracking):**

- Implement the DeepSORT algorithm, which combines a deep learning-based appearance model with the traditional SORT algorithm (which uses Kalman Filters ). DeepSORT improves tracking in cluttered environments and during occlusions by associating objects with high appearance similarity, even if their motion patterns are nonlinear or erratic.

## Expected Outcome


## Conclusion

In this study, we explored the complexities of multi-object tracking (MOT) for vehicles in dynamic traffic environments, emphasizing the challenges posed by nonlinear motion, occlusions, and cluttered backgrounds

## Future Perspectives

The project's subsequent stages will then concentrate more on the Raspberry Pi's deeper hardware integration and improvements. To continue the software work where we are stuck and increase the effectiveness of object identification and tracking, future research would look into hardware like the Rasberypi.

## Impact on Society

**Reduction in Traffic Accidents:**

- By providing real-time tracking of vehicles and better predictions of their trajectories, MOT systems can help prevent collisions in high-risk situations. For example, intelligent transportation systems can use this data to alert drivers or autonomous systems to potential dangers, such as speeding vehicles or unsafe lane changes, thus reducing the number of accidents and fatalities on the road.