

# Smart Traffic Management

## Vehicle Detection, Counting and Tracking

Department of Computer Science and Engineering,  
B V Raju Institute of Technology, Narsapur

**Guided by:**

Dr.Padmanabha Reddy Y C A

**Presented by:**

Sai Sathwik Kosuru-21211A05R6

Sai Kiran Pulella-21211A05Q0

# Context

- Traffic is a critical component of road infrastructural requirements for smart city considerations.
- Cities eligible for smart city handle huge traffic on a regular basis owing to infrastructural, economic, and lifestyle feasibility of development.
- Potential employers and Experts utilize and prefer complex network of transportation for preferring a city.
- Transportation facilities are crucial components required for efficient disbursal of goods and services thereby becoming a motivation for the current project.

# Problem Statement

- Obtained the CCTV Footage of Patny X Roads across all times and in various traffic conditions
- Analysis of traffic conditions required.
- Predictions of timings, counts and traced paths in relation to the obtained footage to be performed



Problem Statement: Analysis of Patny X Roads CCTV Footage

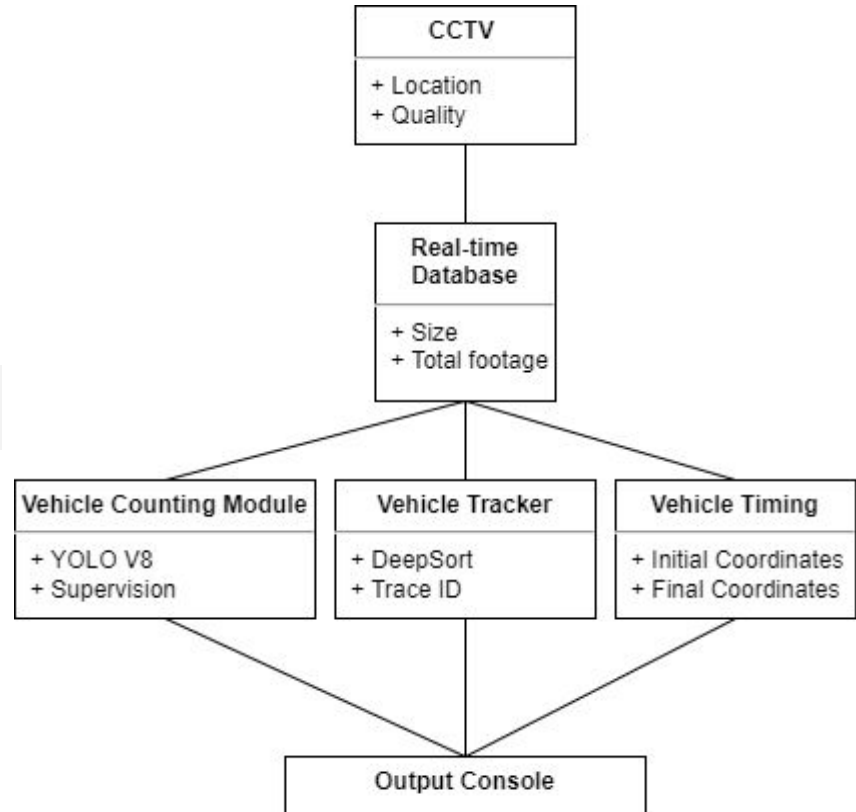
## Current progress

- Automated object detection of all the vehicles and the pedestrians on the roads
- Using axes of references, resolving the vehicle count by direction
- Identifying potential crowded places through direction-based segmentation of recorded CCTV footages

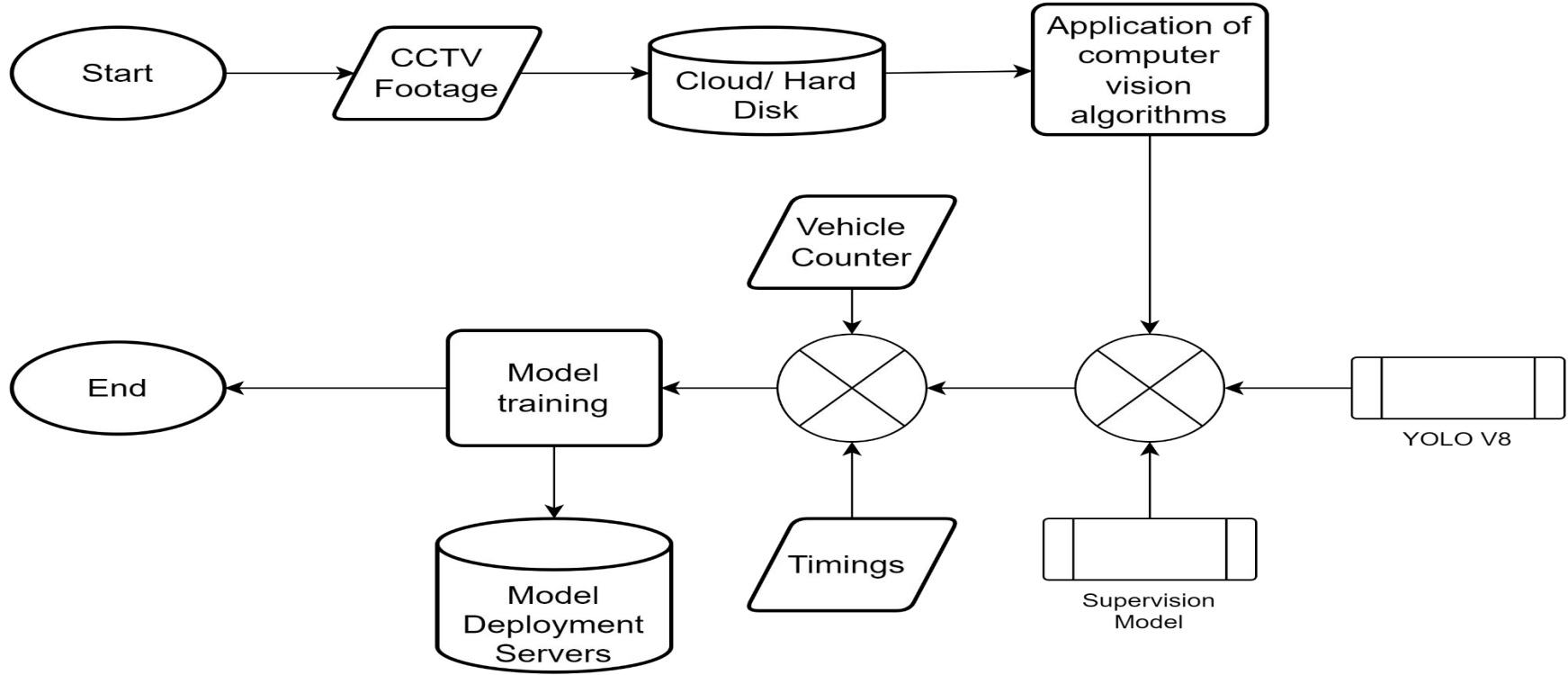
## Tech Stack Used

- Python
- YOLO NAS
- Deep Sort
- SAM

## Component Diagram



# Flowchart

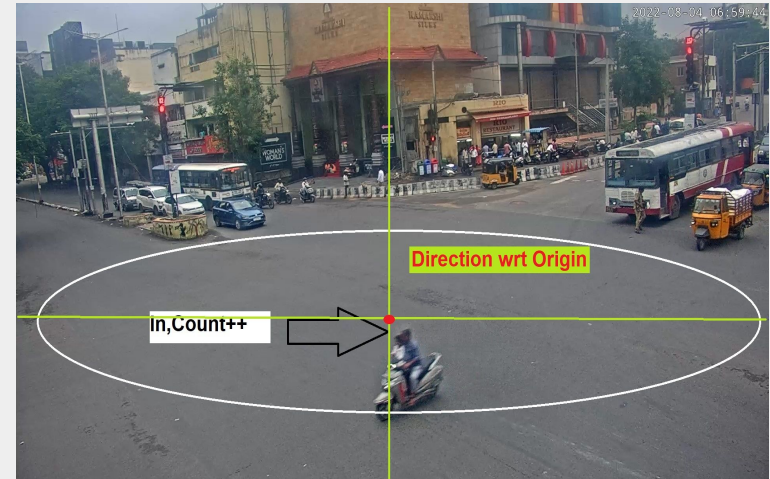


# Methodology

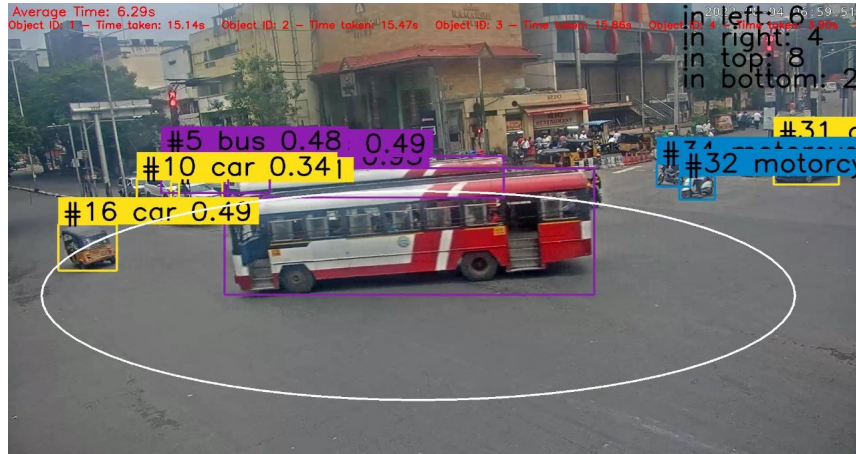
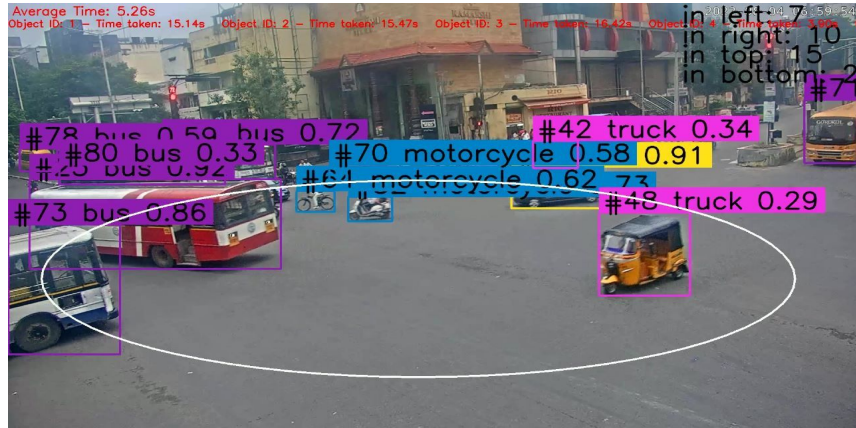


- The cartesian coordinate principle was used to detect the vehicle directions.
- Since the footage is based on a cross-roads at Patny, we have considered four axes of reference.
- The origin is situated at the center of the corresponding frame.
- Based on different directions, counter were configured and updated accordingly.

- The ellipse counter is configured to update the counter as the detected vehicle enters in
- This was the first stage where we have tested the ellipse counter of different vehicles in the footage.
- Ellipse shape found to be suitable for all the footages







# Results

- Polygon and Ellipse methods were investigated for their performance on the obtained CCTV footages
- Ellipse method found to be efficient
- Multi-directional vehicle counting and timings obtained efficiently.
- Timings were calculated based on the coordinates of the tracked objects

# Discussion of Result

Detected Vehicle Category	Count	Average Timing
Motorcycle	2+1(undetected)	4.32 Sec
Car	2	16.82 Sec
Bus	3	15.52 Sec
Truck	2	15.74 Sec
	10-9 Detected	13.1(passed junction)+5.71(average count of all detected vehicles)



# Conclusion and Future Scope

- Traffic conditions at Patny X Roads and Nearby locations can be estimated based on the vehicula count passing through the considered junction.
- Elliptical counter can show directions and timings, thereby providing the user with information about the average time taken for passing a location.
- Based on the obtained statistics and information, we can conclude about the average traffic in a time format, thus getting insights into smart traffic management implementation possibility at the concerned place
- Additional features like Crack detection, accident detection, wrong route detection, etc. may form part of the future work.

- Bui, K.-H.N.; Yi, H.; Cho, J. A Multi-Class Multi-Movement Vehicle Counting Framework for Traffic Analysis in Complex Areas Using CCTV Systems. *Energies* **2020**, *13*, 2036. <https://doi.org/10.3390/en13082036>



**Thank you**  
**Any Questions or**  
**Suggestions**