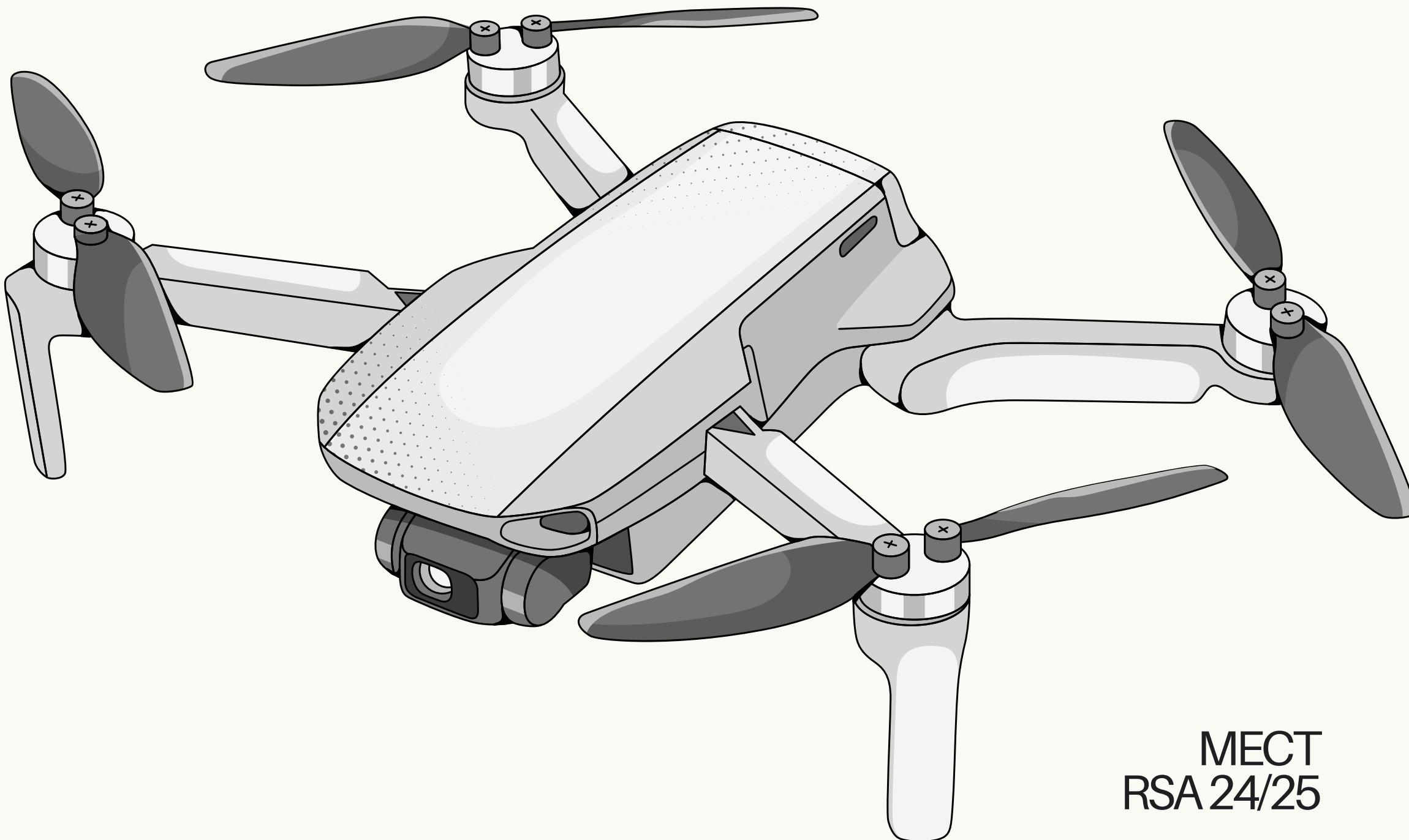


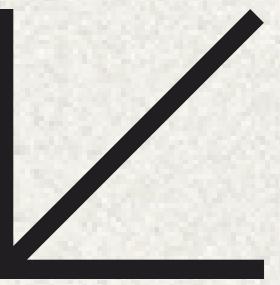
T.R.A.L.A.L.E.R.O

(TACTICAL RECON AND AERIAL LOGISTICS
FOR AUTONOMOUS LOCALIZATION ENGAGEMENT AND
ROUTING OPERATIONS)



Anderson Aoki &
António Almeida

MECT
RSA 24/25



Introduction

Autonomous vehicles face significant challenges in locating available parking in dynamic urban settings due to limited onboard sensor visibility, lack of elevated situational awareness, and absence of shared real-time perception data infrastructure.



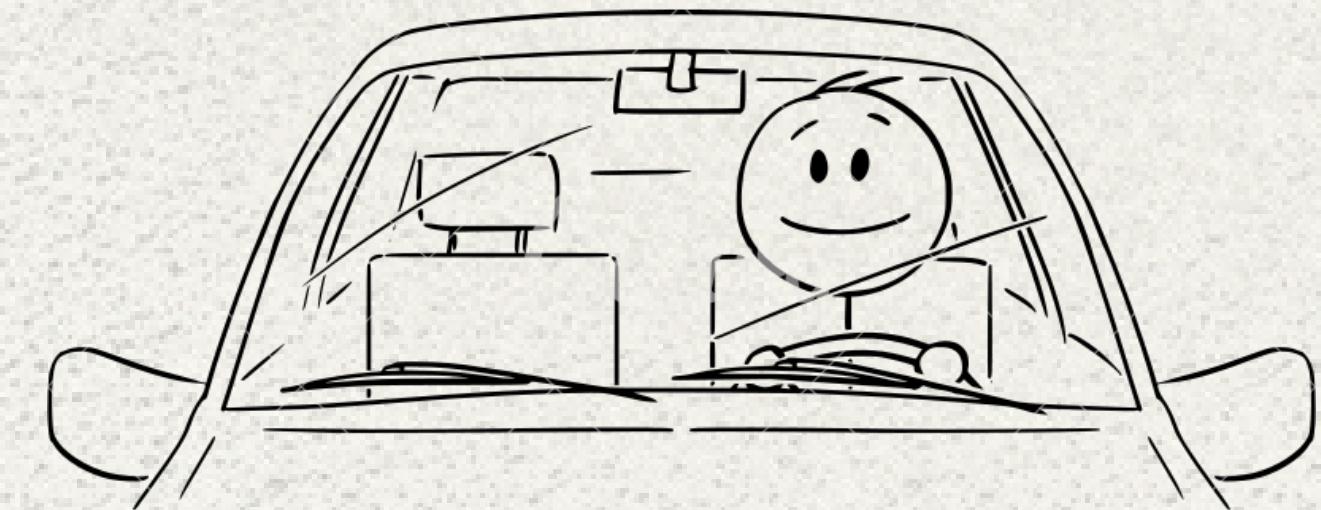
Use Case

In a smart city, an autonomous vehicle requires parking near a designated building. A drone is dispatched on-demand to survey the area due to the AV's limited visual access

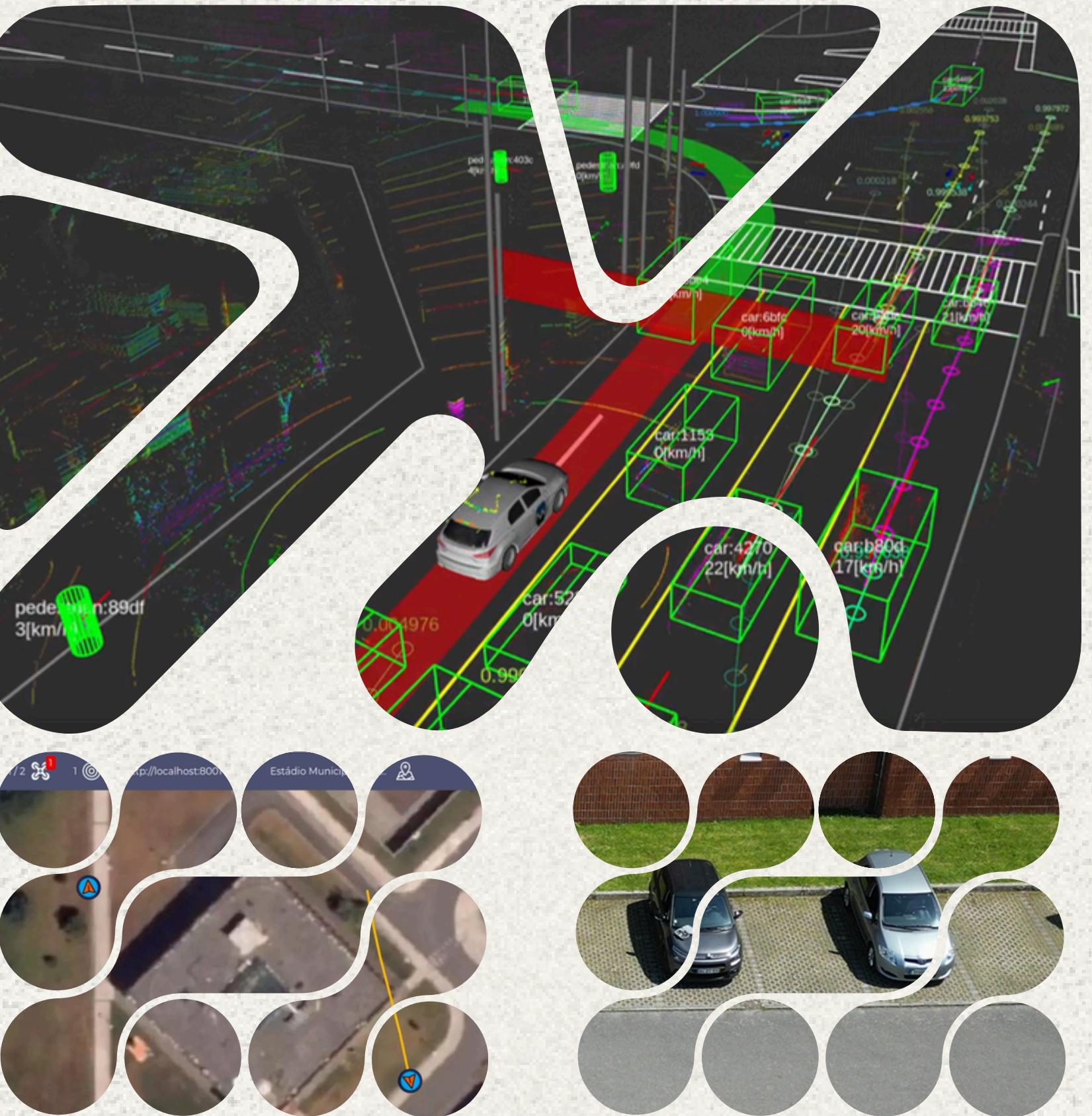
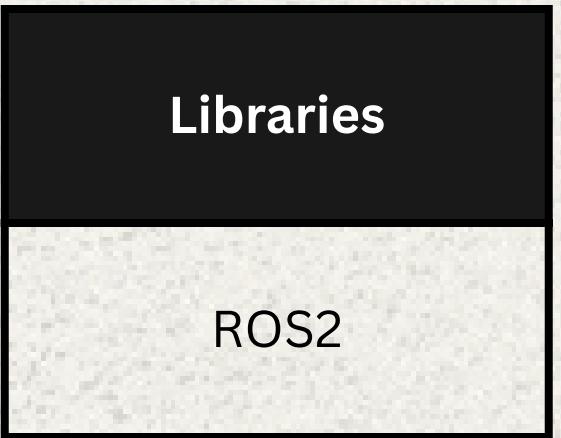
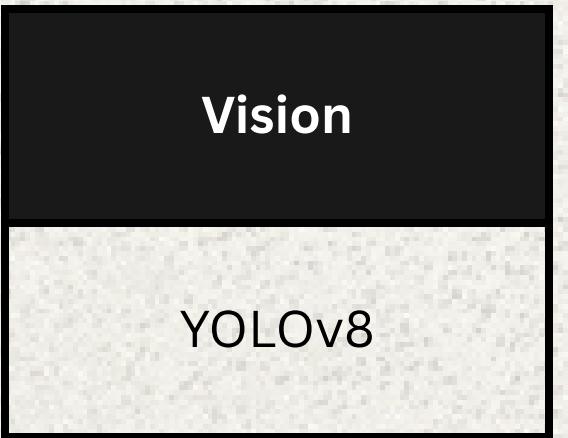
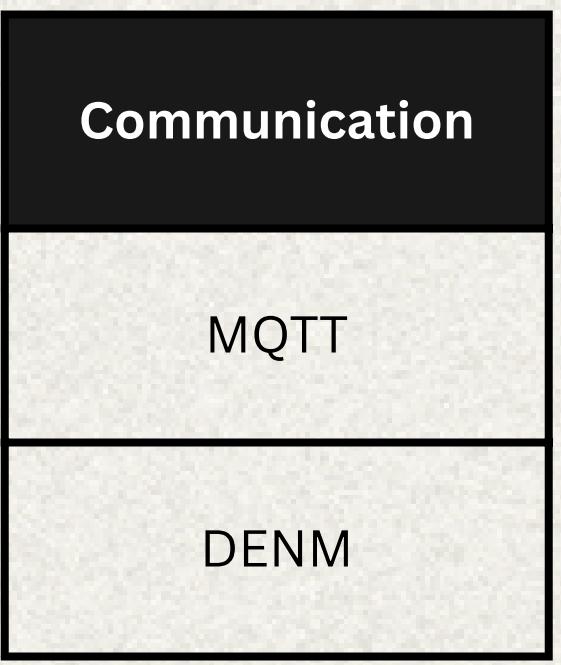
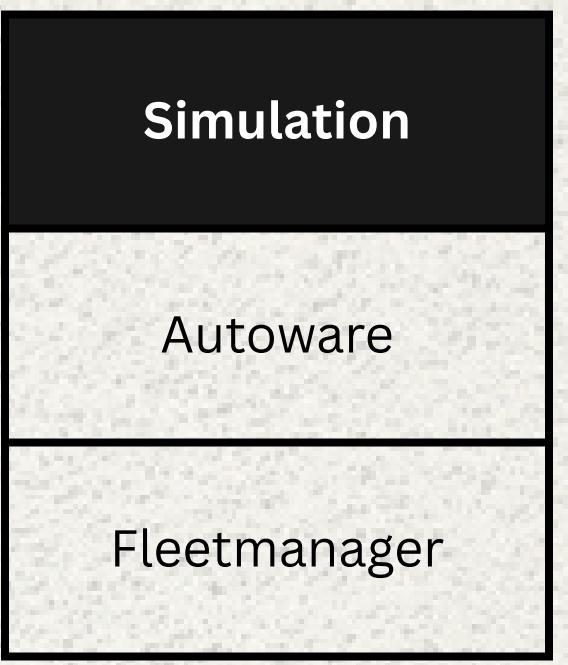


Objective

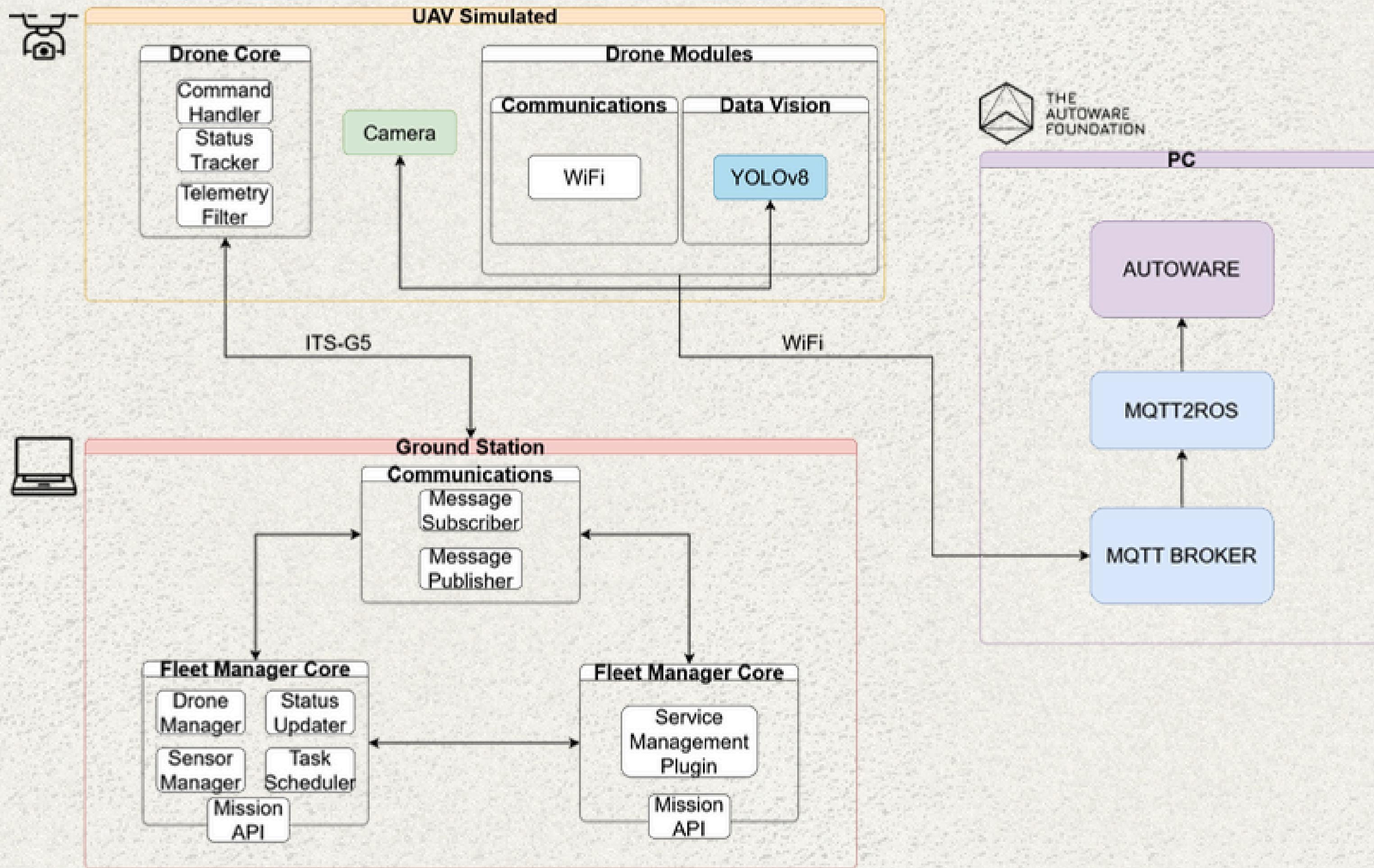
- Autonomous Drone Navigation
- Computer Vision-Based Parking Spot Detection
- Inter-System Communication via CPM
- Autonomous Vehicle Reaction and Navigation



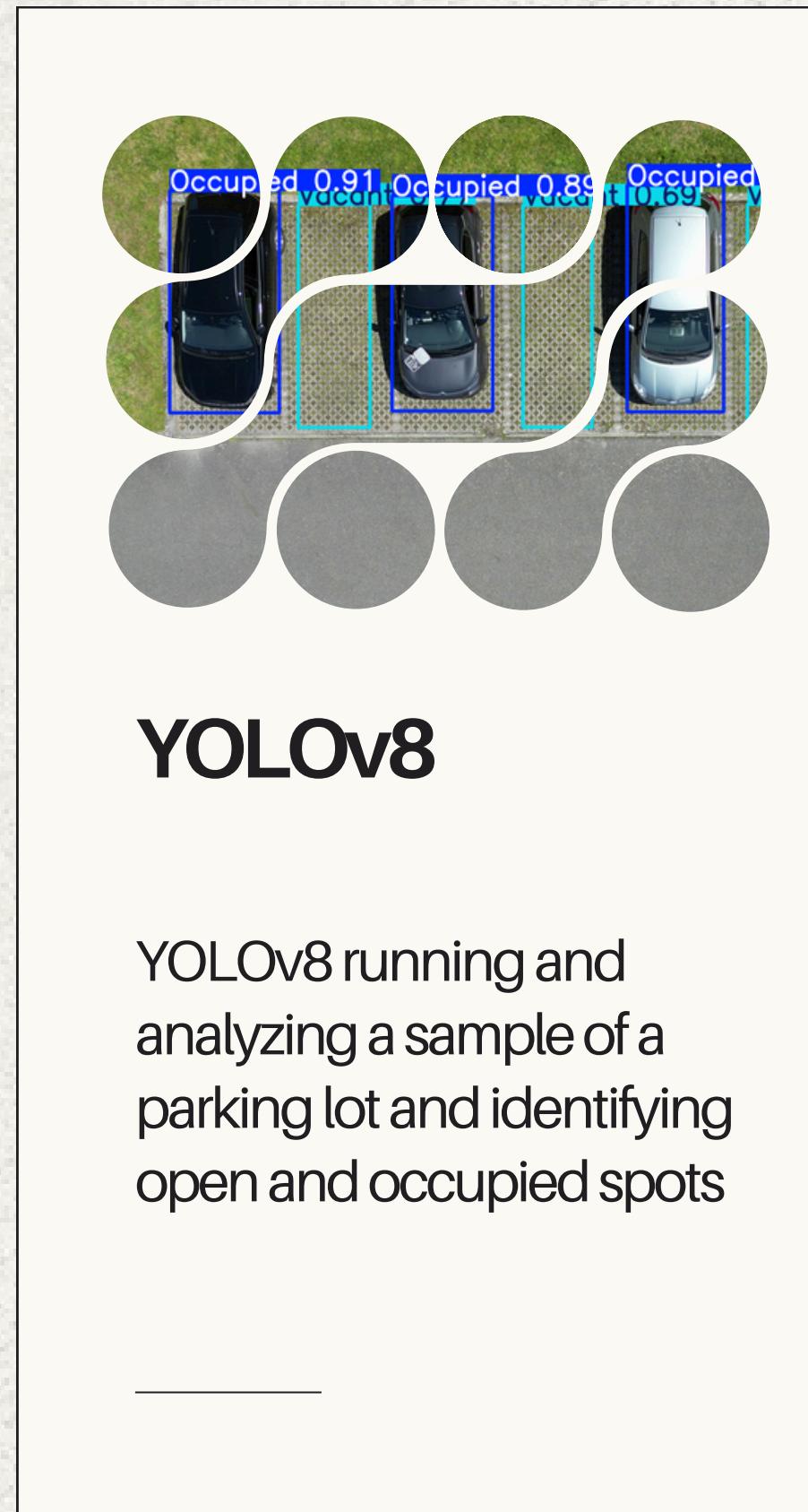
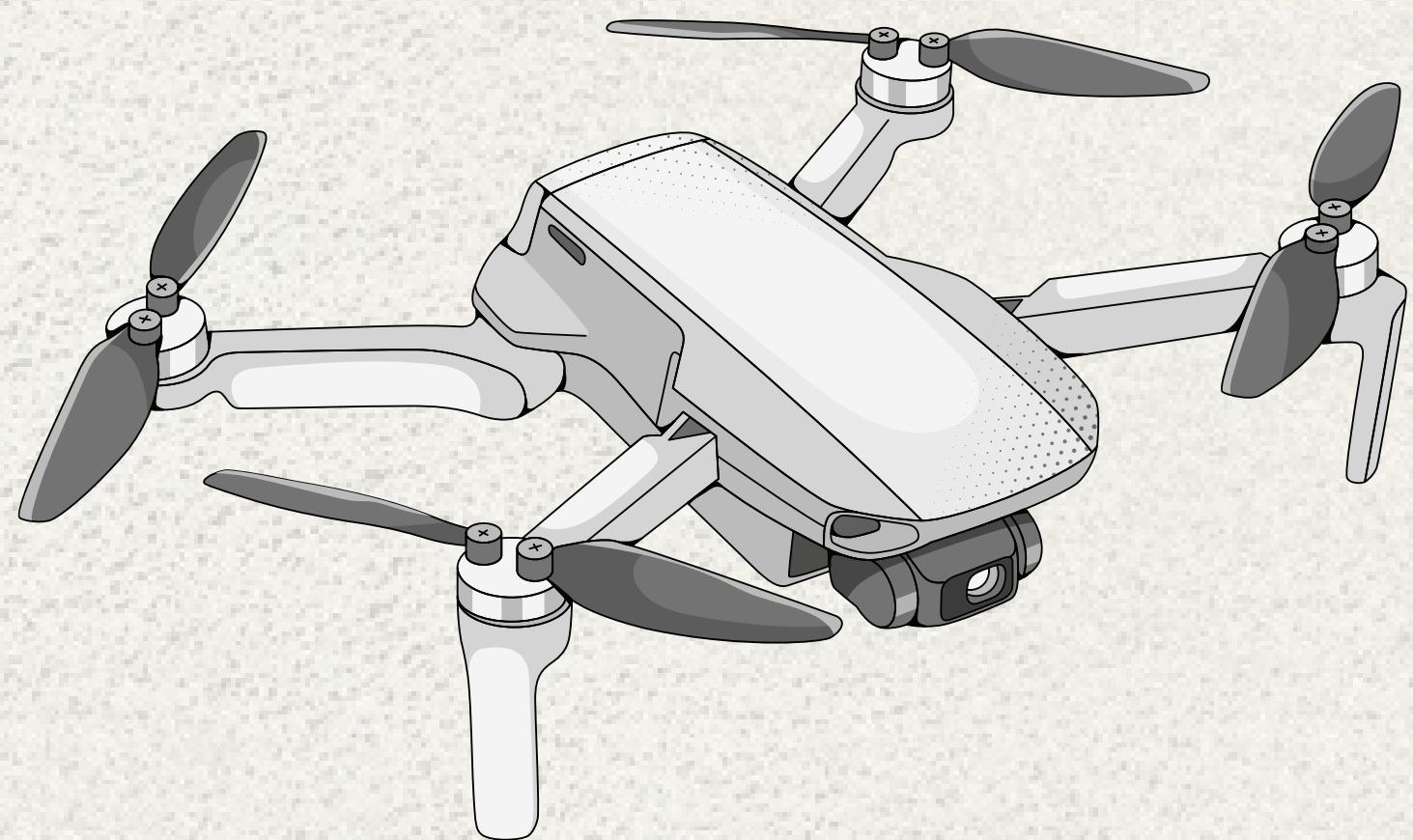
Tools



ARQUITECTURE



Current Implementation



YOLOv8

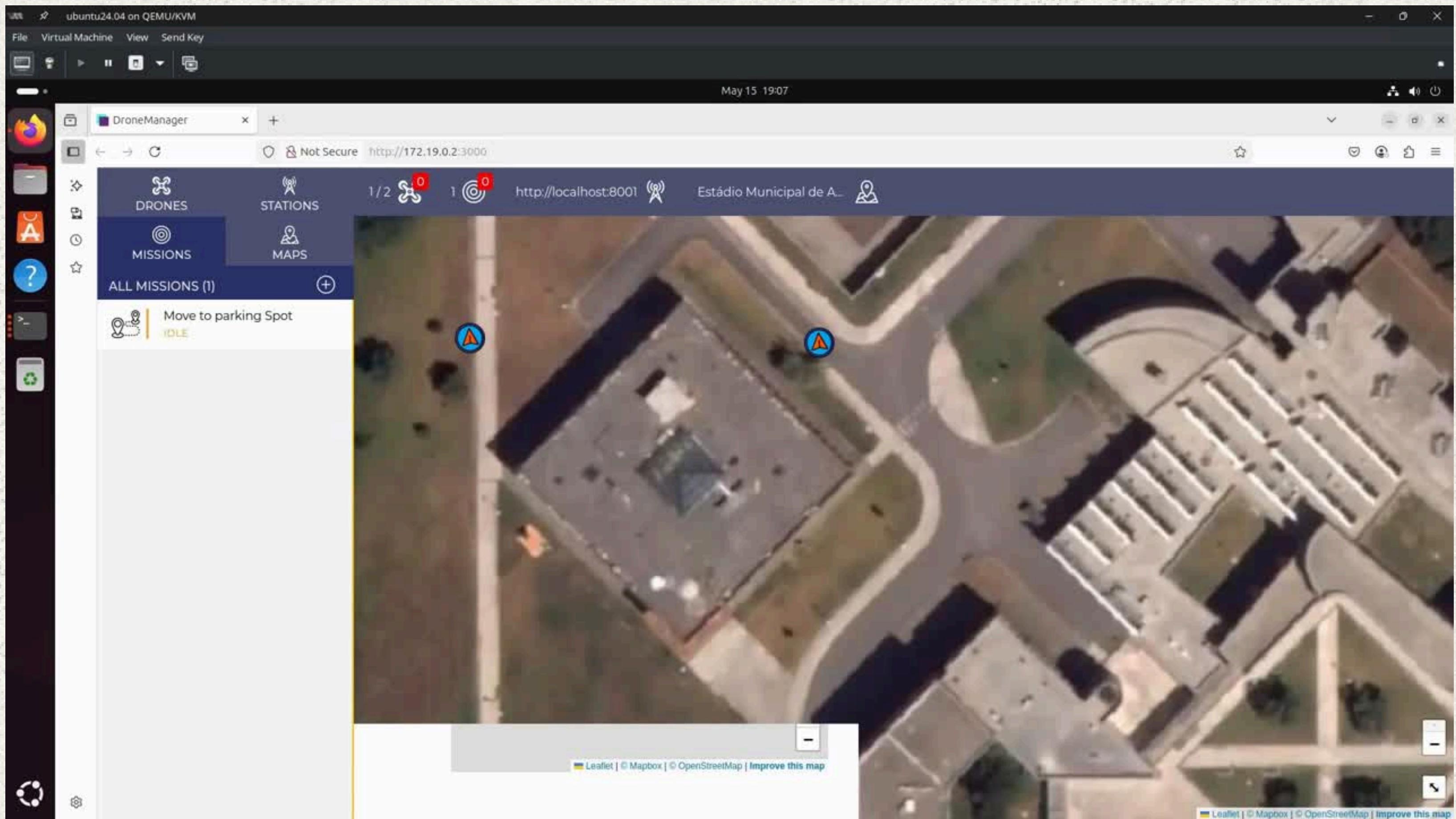
YOLOv8 running and analyzing a sample of a parking lot and identifying open and occupied spots



AUTOWARE PARKING

Autoware prepared with a custom Lanelet map containing a parking spot corresponding to the sample

Drone



Autoware



The image shows a terminal window titled "aoki@BlackBird: ~/autoware" running on a Linux system. The window displays the output of a command: "ros2 launch autoware_launch planning_simulator.launch.xml map_path:=\$HOME/mapa_rsa vehicle_model:=sample_vehicle sensor_model:=sample_sensor_kit". The output includes three lines of log information: "[INFO] [launch]: All log files can be found below /home/aoki/.ros/log/2025-05-15-17-52-55-534855-BlackBird-90" and "[INFO] [launch]: Default logging verbosity is set to INFO". The background of the slide features a dark, abstract, wavy pattern.

```
aoki@BlackBird:~/autoware$ ros2 launch autoware_launch planning_simulator.launch.xml map_path:=$HOME/mapa_rsa vehicle_model:=sample_vehicle sensor_model:=sample_sensor_kit
[INFO] [launch]: All log files can be found below /home/aoki/.ros/log/2025-05-15-17-52-55-534855-BlackBird-90
[INFO] [launch]: Default logging verbosity is set to INFO
```

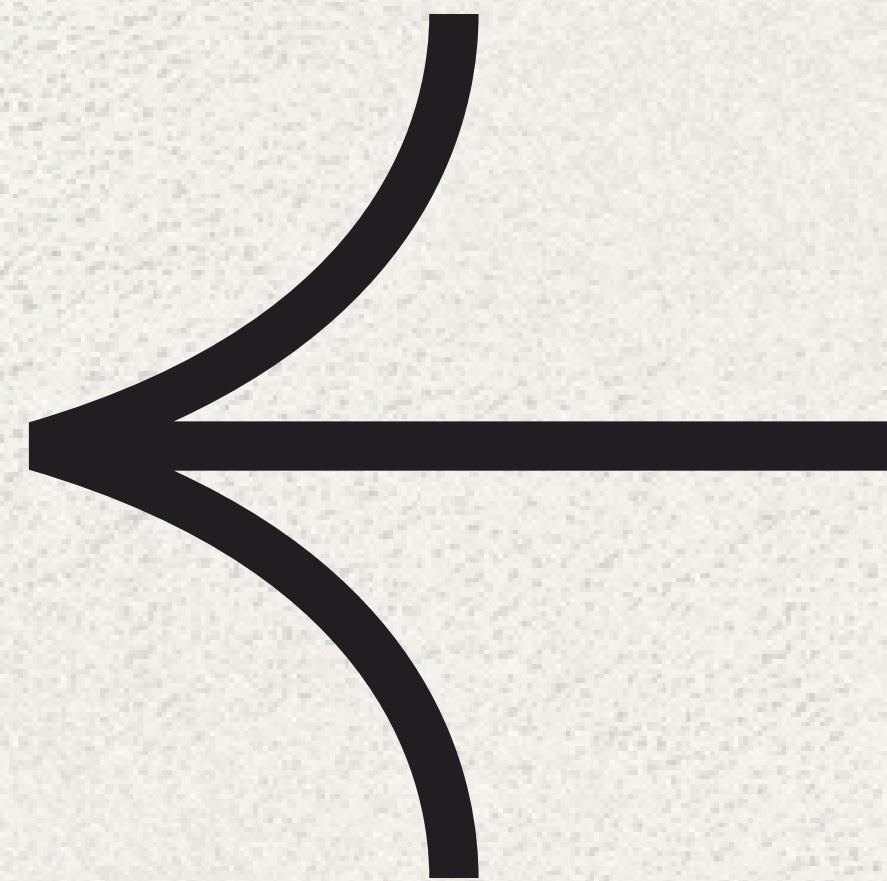
Future Work

YOLO on video

Sensor that uses the YOLO to find drone's next position

Communication between drone and Autoware

Autoware automatically setting the goal pose received by the drone



T.H.A.N.K Y.O.U

T.R.A.L.A.L.E.R.O Handles Aerial Navigation and Knowledge,
Yielding Operational Unification

Tactical Recon and Aerial Logistics for Autonomous Localization

Engagement and Routing Operations