Developing and Testing a Vehicular AI Agent

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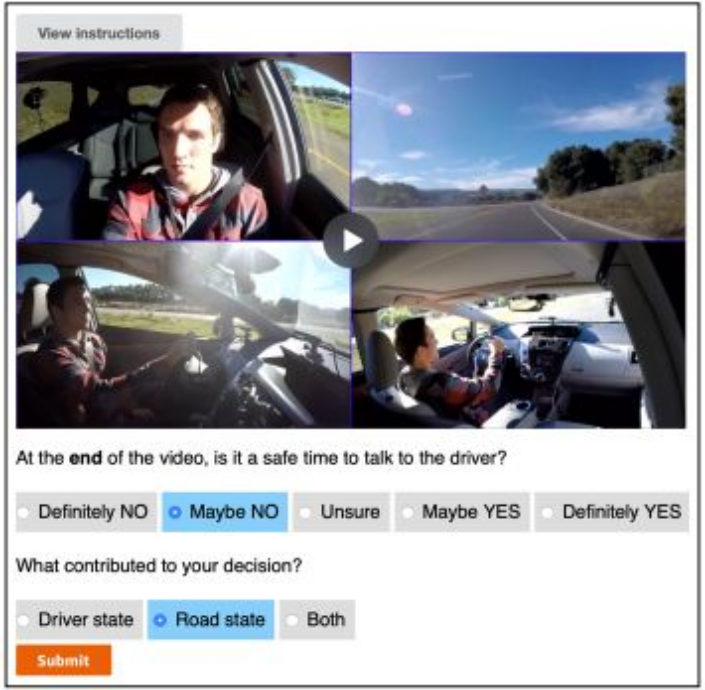
Motivation: Exploring Interactions

- **Develop** an AI agent that can interact and communicate with drivers in real-time
- **Test** AI Agent by creating realistic simulation environments using the CARLA Simulator to replicate **real-world traffic scenarios**

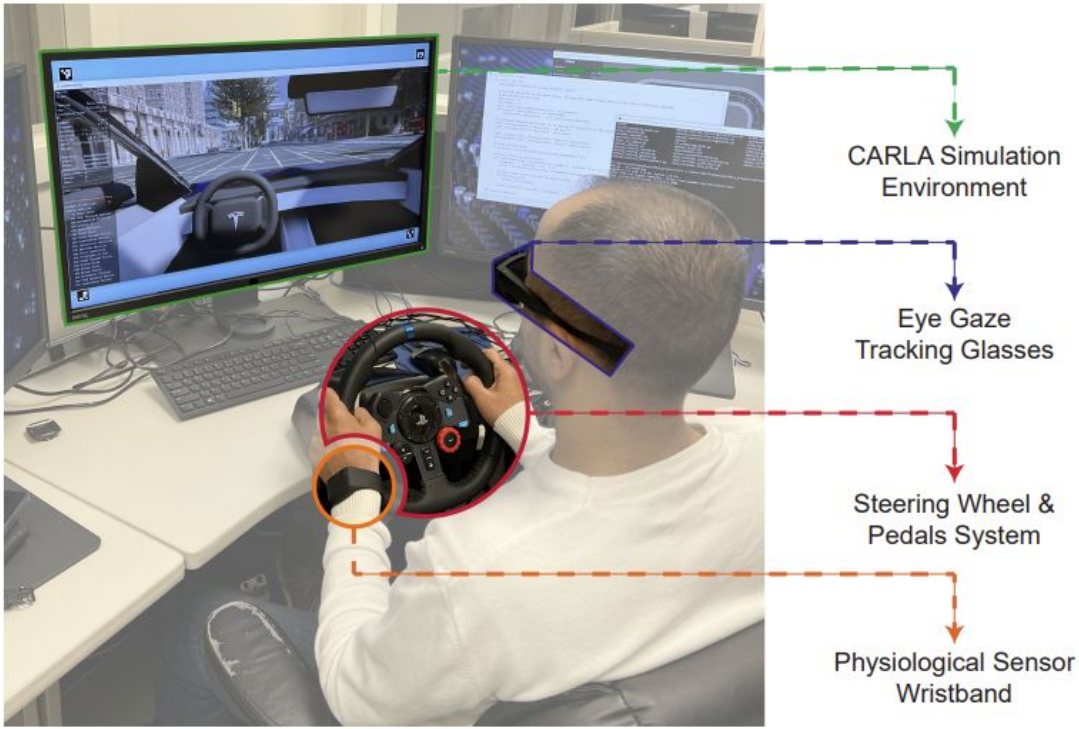


What is CARLA?

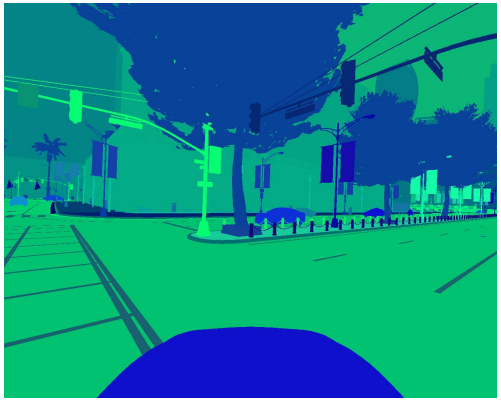
- An open-source platform for autonomous driving and research development that uses Python.

- Supports various sensors and enables interaction with the simulation programmatically.

Carla PazNet

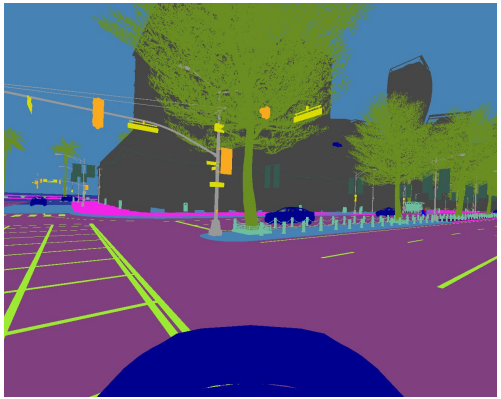


Depth



Instance Segmentation

RGB



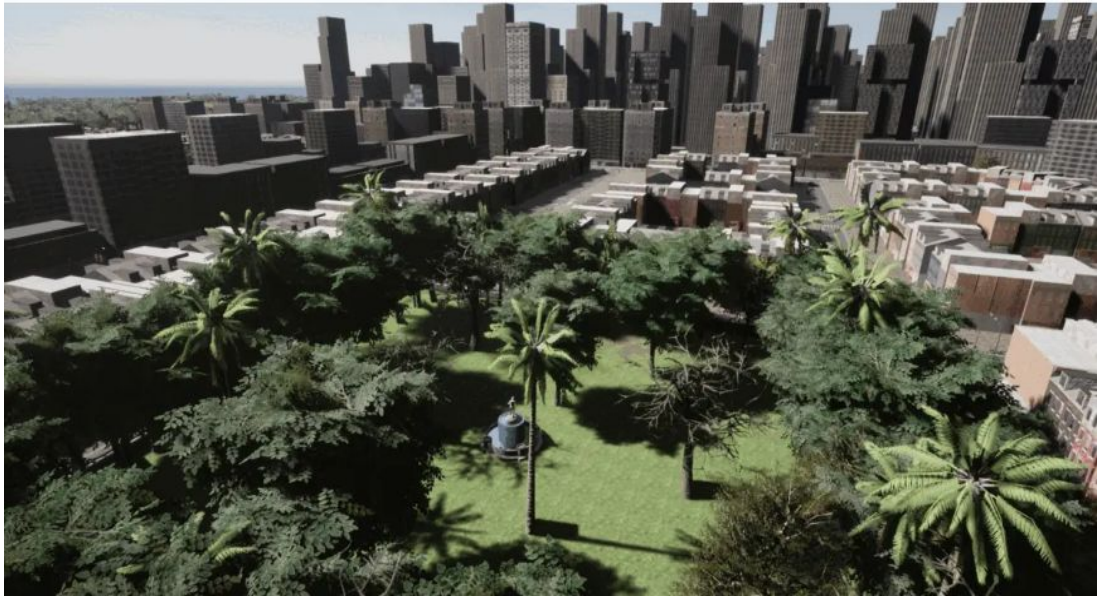
Semantic Segmentation

Sensor Data

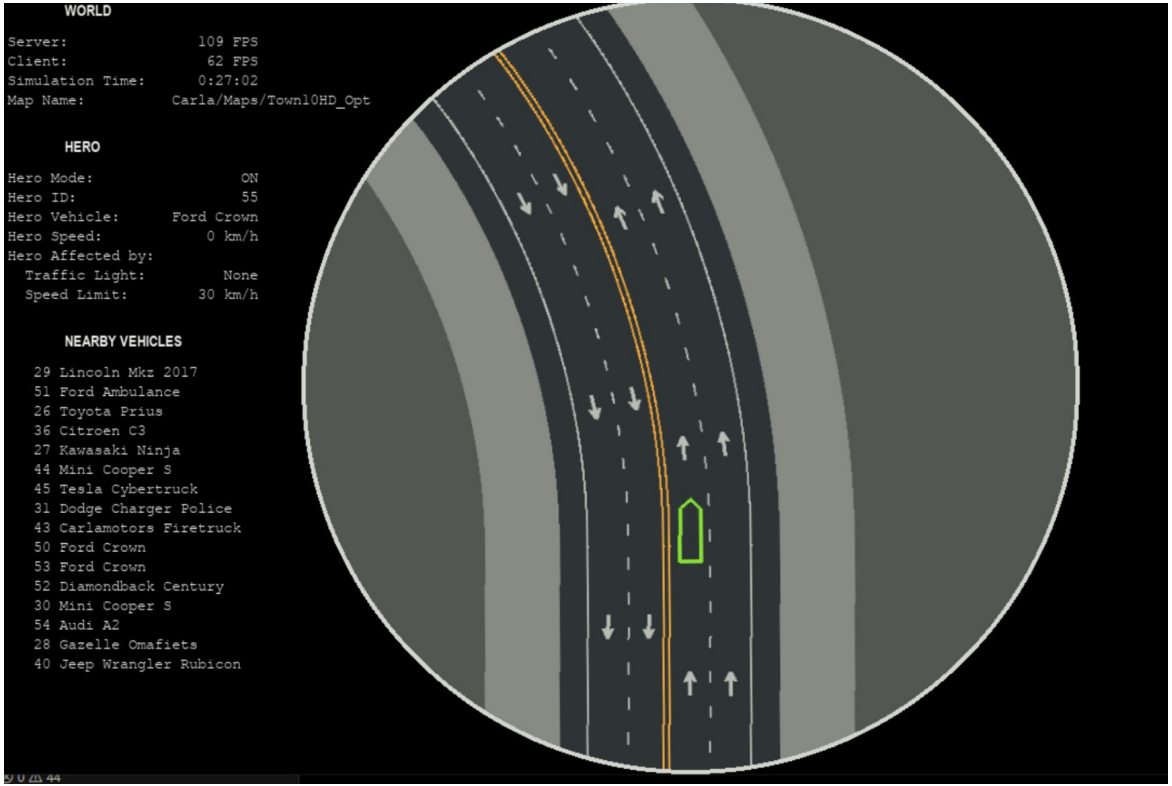
Scenario Runner

Town 12

- Vast map that spans 10x10 km² (compared to the standard map which was 1.2 km²).
- Consists of various sections such as a downtown area, farmland, woods, city, suburbs, and highways.
- Great to run larger experiments.
- Obstacles:
  - FPS
  - Storage



GPS Map


WORLD
Server: 109 FPS
Client: 62 FPS
Simulation Time: 0:27:02
Map Name: Carla/Maps/Town10HD_Opt
HERO
Hero Mode: ON
Hero ID: 55
Hero Vehicle: Ford Crown
Hero Speed: 0 km/h
Hero Affected by:
Traffic Light: None
Speed Limit: 30 km/h
NEARBY VEHICLES
29 Lincoln Mkz 2017
51 Ford Ambulance
26 Toyota Prius
36 Citroen C3
27 Kawasaki Ninja
44 Mini Cooper S
45 Tesla Cybertruck
31 Dodge Charger Police
43 Carlamotors Firetruck
50 Ford Crown
53 Ford Crown
52 Diamondback Century
30 Mini Cooper S
54 Audi A2
28 Gazelle Omafiets
40 Jeep Wrangler Rubicon

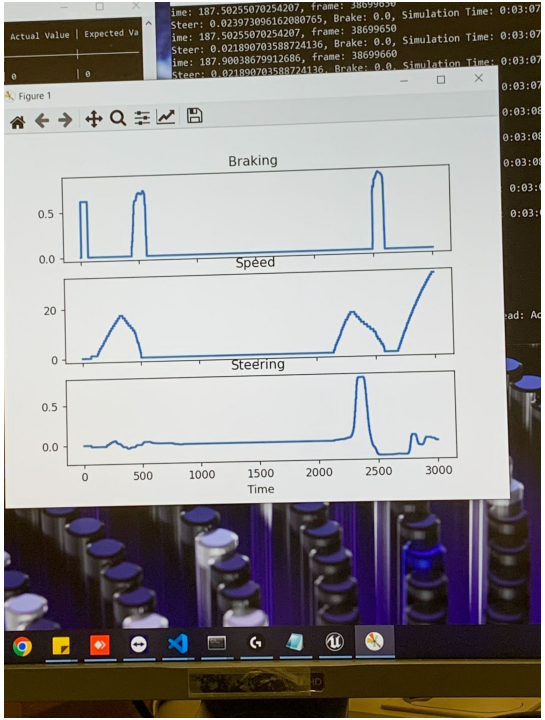
Map, Route, and Voice Agent Demonstration

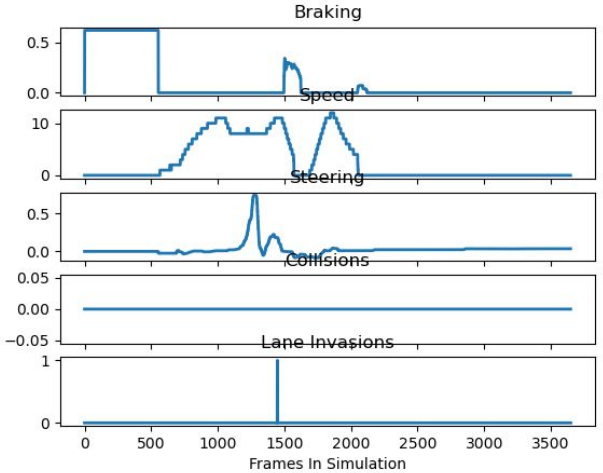
Data Collection

- Question: How do we decide what is a “good” run or not?

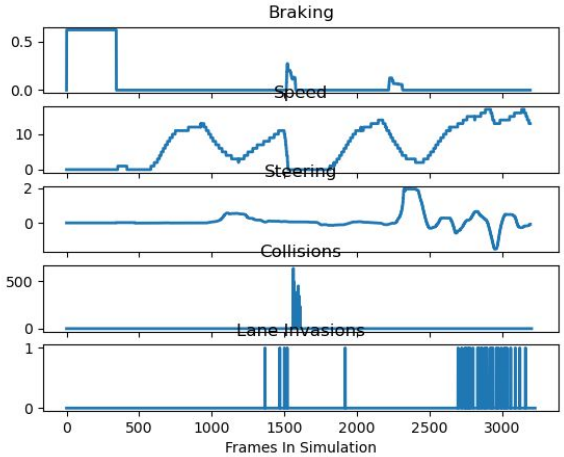
- Need to collect two types of data: Voice agent vs. no voice agent

Results





Without voice agent



With voice agent

Future Plans

- Loading the Town-12 and having more scenarios in it for large-scale testing with the help of better hardware support.

- Integrating the Carla PazNet model and training the model using the data collected from scenarios.

Acknowledgements

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Thank you :)