University of California, Riverside

Lab 0 Report

EE 267 Section 001

Name: Chi Wong & Leela Praneeth Puli

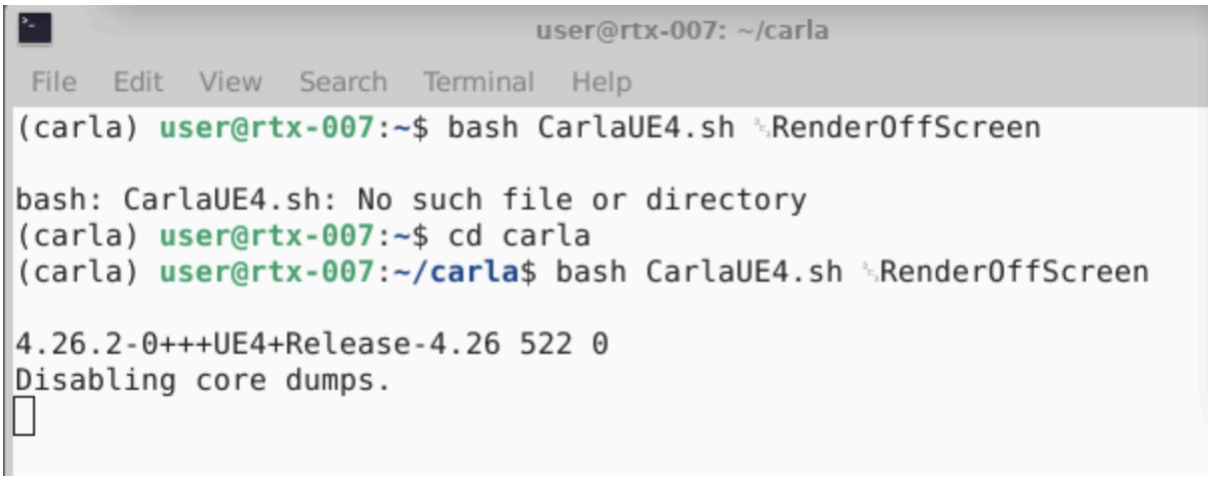
Team 8

Date: 10/11/2025

Professor: Dr. Hang Qiu

Part 1: Running Carla server

Using Option 2 BCOE GPU machine

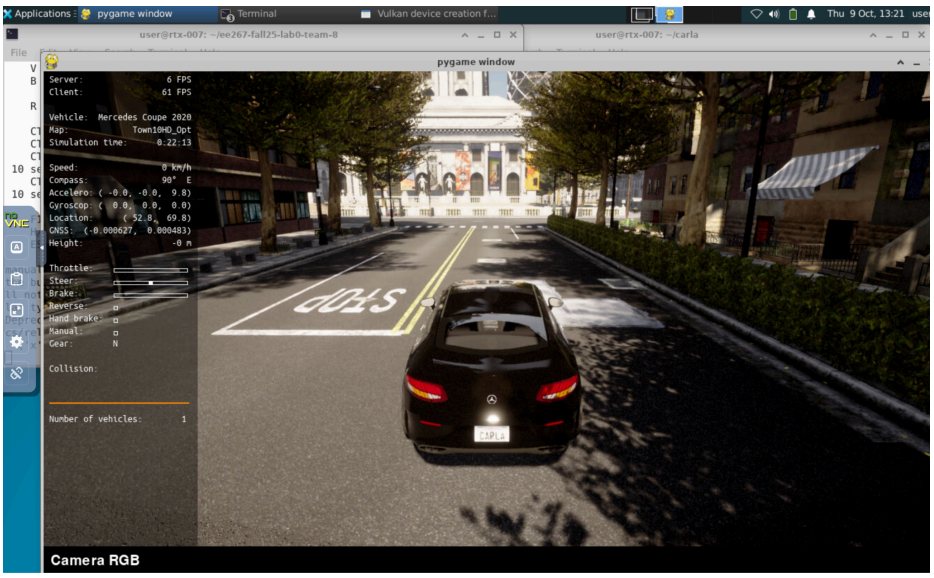


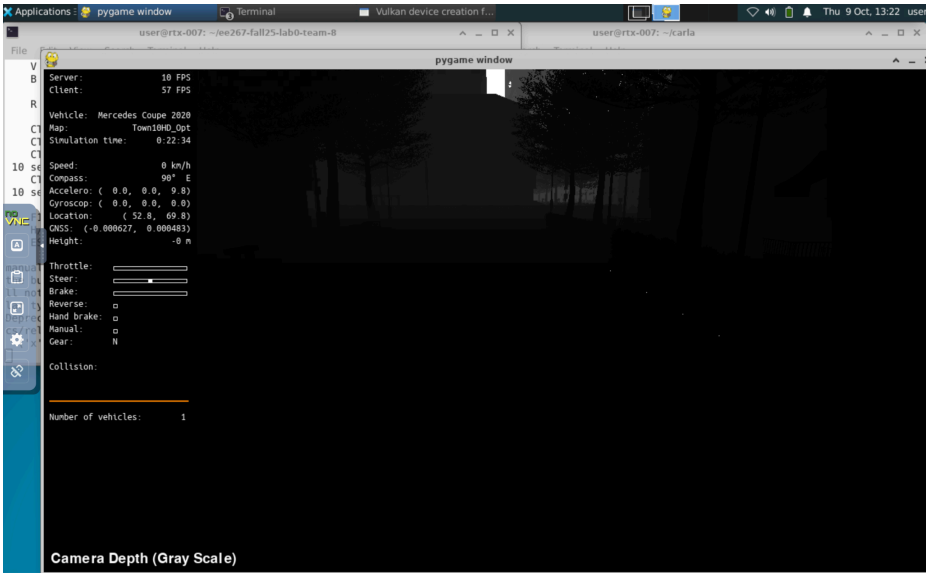
Reflection:

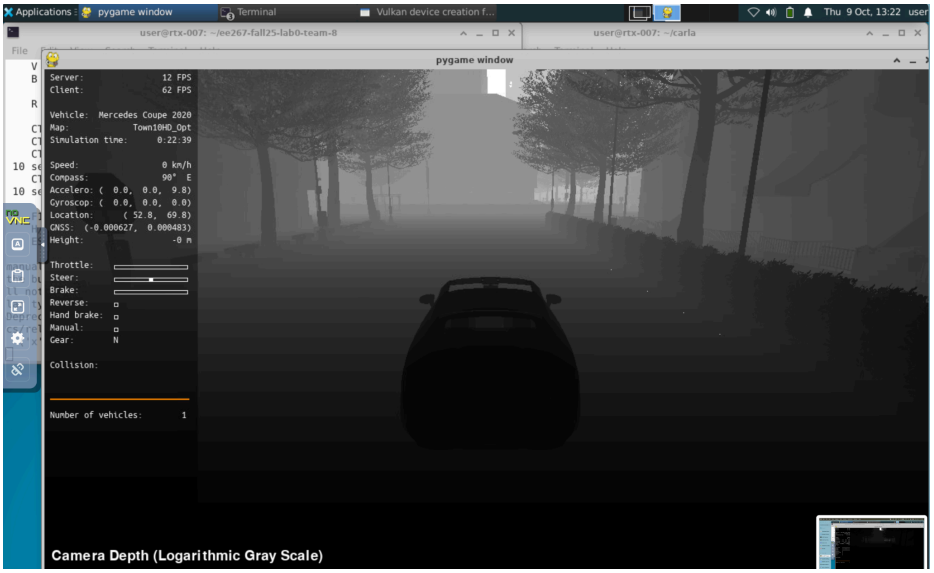
We were able to successfully run Carla using the BCOE GPU virtual machine.

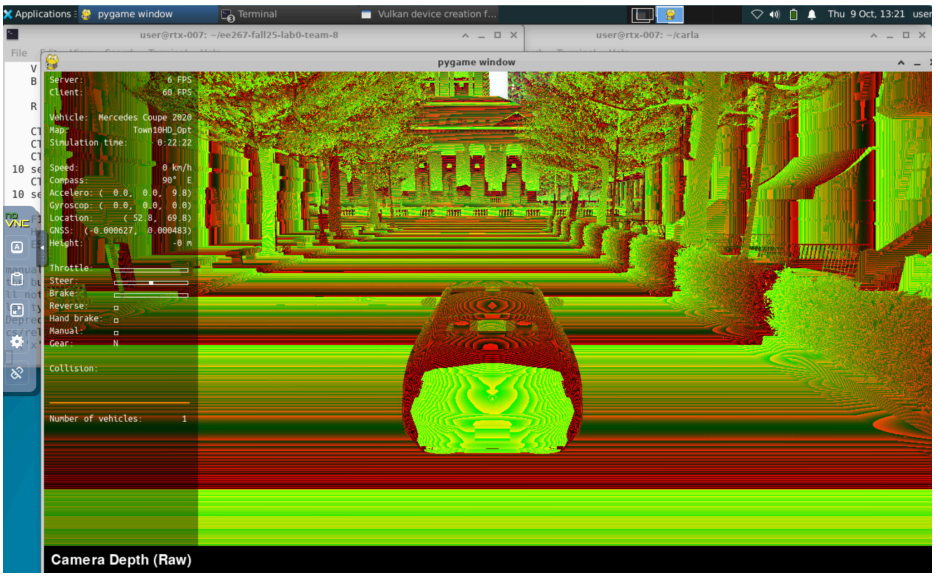
Part 2: Drive a Car Using Carla Client

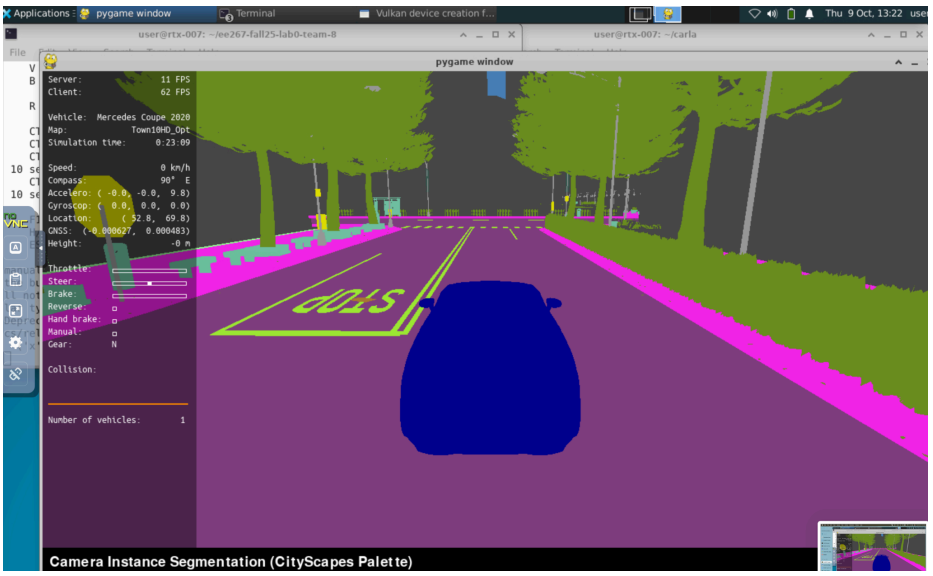
Screenshots of different sensor rendering:

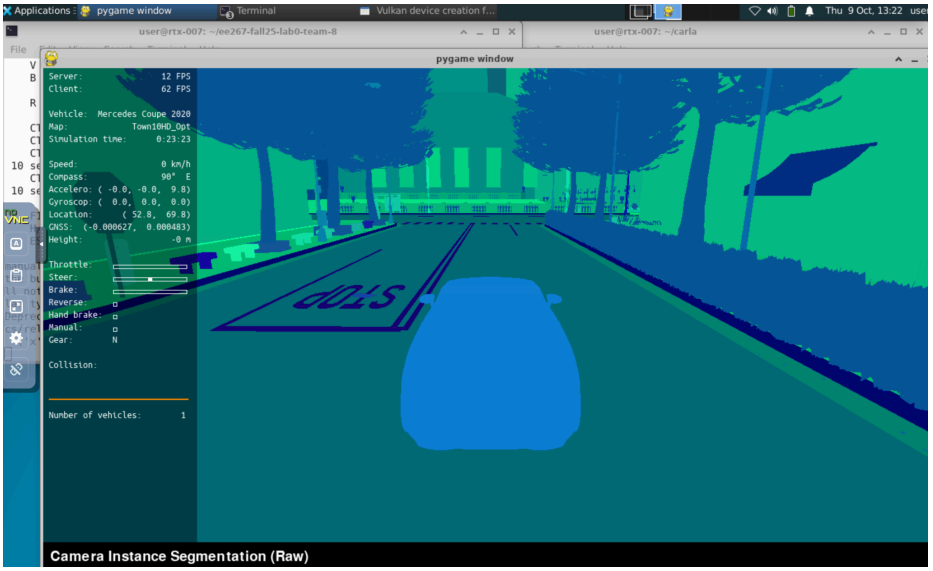


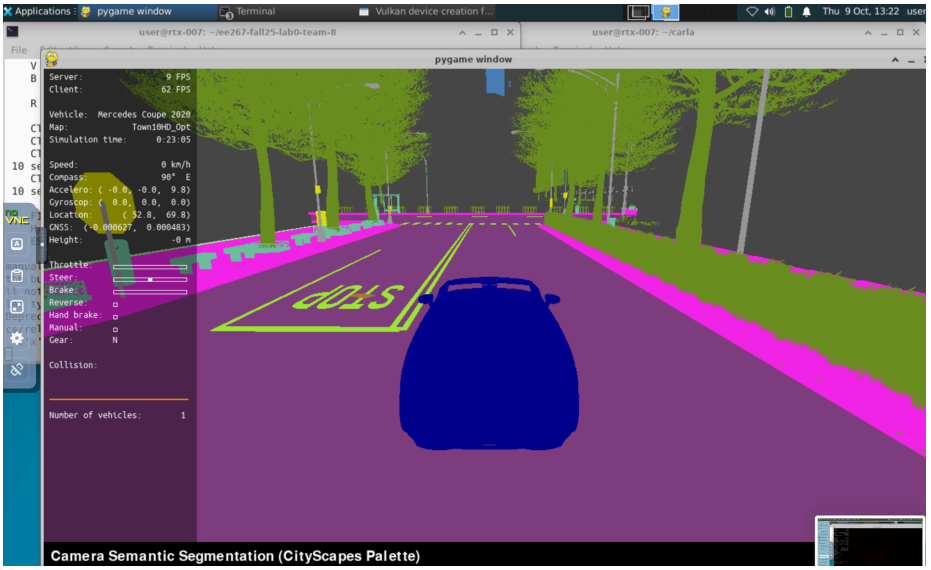

Applications
pygame window
Terminal
Vulkan device creation f...
Thu 9 Oct, 13:22
user@rtx-007: ~/ee267-fall25-lab0-team-8
user@rtx-007: ~/carla
pygame window
Server: 10 FPS
Client: 57 FPS
Vehicle: Mercedes Coupe 2020
Map: Town10HD_Opt
Simulation time: 0:22:34
Speed: 0 km/h
Compass: 90° E
Accelero: (0.0, 0.0, 9.8)
Gyroscop: (0.0, 0.0, 0.0)
Location: (52.8, 69.8)
GNSS: (-0.000627, 0.000483)
Height: -0 m
Throttle:
Steer:
Brake:
Reverse:
Hand brake:
Manual:
Gear: N
Collision:
Number of vehicles: 1
Camera Depth (Gray Scale)

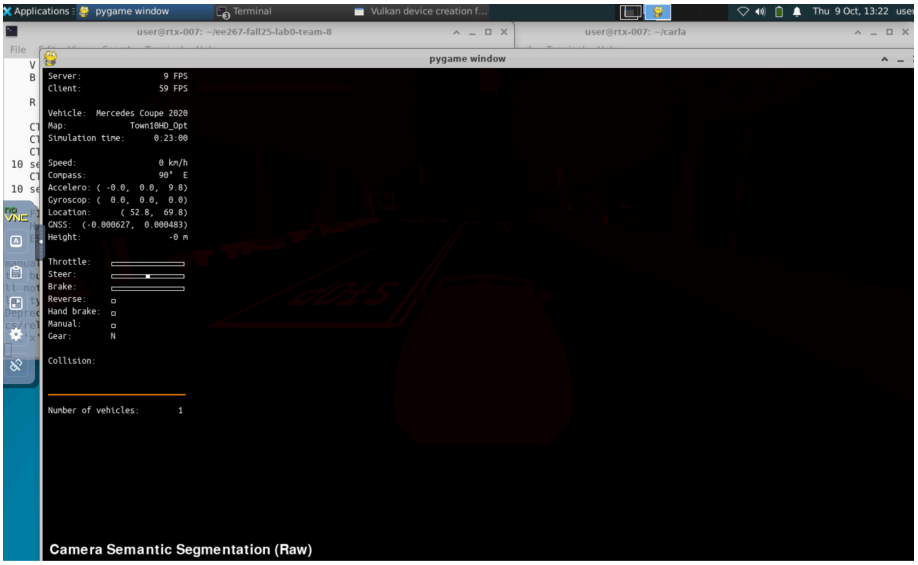

Applications
pygame window
Terminal
Vulkan device creation f...
Thu 9 Oct, 13:22
user@rtx-007: ~/ee267-fall25-lab0-team-8
user@rtx-007: ~/carla
pygame window
Server: 12 FPS
Client: 62 FPS
Vehicle: Mercedes Coupe 2020
Map: Town10HD_Opt
Simulation time: 0:22:39
Speed: 0 km/h
Compass: 90° E
Accelero: (0.0, 0.0, 9.8)
Gyroscop: (0.0, 0.0, 0.0)
Location: (52.8, 69.8)
GNSS: (-0.000627, 0.000483)
Height: -0 m
Throttle:
Steer:
Brake:
Reverse:
Hand brake:
Manual:
Gear: N
Collision:
Number of vehicles: 1
Camera Depth (Logarithmic Gray Scale)

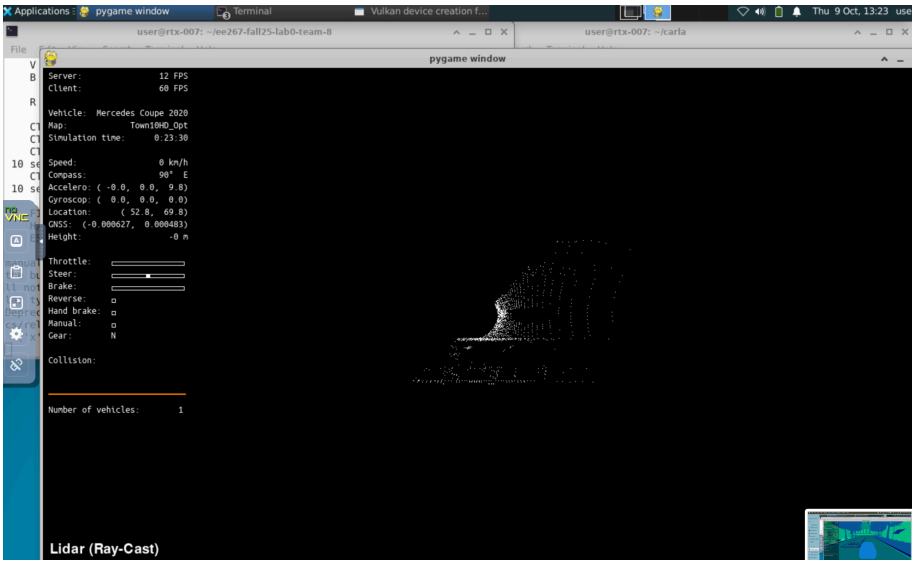

Applications
pygame window
Terminal
Vulkan device creation f...
Thu 9 Oct, 13:21
user@rtx-007: ~/ee267-fall25-lab0-team-8
user@rtx-007: ~/carla
pygame window
Server: 0 FPS
Client: 60 FPS
Vehicle: Mercedes Coupe 2020
Map: Town10HD_Opt
Simulation time: 0:22:22
Speed: 0 km/h
Compass: 90° E
Accelero: (0.0, 0.0, 9.8)
Gyroscop: (0.0, 0.0, 0.0)
Location: (52.8, 69.8)
GNSS: (-0.000627, 0.000483)
Height: -0 m
Throttle:
Steer:
Brake:
Reverse:
Hand brake:
Manual:
Gear: N
Collision:
Number of vehicles: 1
Camera Depth (Raw)


Applications
pygame window
Terminal
Vulkan device creation f...
Thu 9 Oct, 13:22
user@rtx-007: ~/ee267-fall25-lab0-team-8
user@rtx-007: ~/carla
pygame window
Server: 11 FPS
Client: 62 FPS
Vehicle: Mercedes Coupe 2020
Map: Town10HD_Opt
Simulation time: 0:23:09
Speed: 0 km/h
Compass: 90° E
Accelero: (-0.0, -0.0, 9.8)
Gyroscop: (0.0, 0.0, 0.0)
Location: (52.8, 69.8)
GNSS: (-0.000627, 0.000483)
Height: -0 m
Throttle:
Steer:
Brake:
Reverse:
Hand brake:
Manual:
Gear: N
Collision:
Number of vehicles: 1
STOP
Camera Instance Segmentation (CityScapes Palette)


Applications
pygame window
Terminal
Vulkan device creation f...
Thu 9 Oct, 13:22
user@rtx-007: ~/ee267-fall25-lab0-team-8
user@rtx-007: ~/carla
pygame window
Server: 12 FPS
Client: 62 FPS
Vehicle: Mercedes Coupe 2020
Map: Town10HD_Opt
Simulation time: 0:23:23
Speed: 0 km/h
Compass: 90° E
Accelero: (-0.0, -0.0, 9.8)
Gyroscop: (0.0, 0.0, 0.0)
Location: (52.8, 69.8)
GNSS: (-0.000627, 0.000483)
Height: -0 m
Throttle:
Steer:
Brake:
Reverse:
Hand brake:
Manual:
Gear: N
Collision:
Number of vehicles: 1
STOP
Camera Instance Segmentation (Raw)


Applications
pygame window
Terminal
Vulkan device creation f...
Thu 9 Oct, 13:22
user@rtx-007: ~/ee267-fall25-lab0-team-8
user@rtx-007: ~/carla
pygame window
Server: 9 FPS
Client: 62 FPS
Vehicle: Mercedes Coupe 2020
Map: Town10HD_Opt
Simulation time: 0:23:05
Speed: 0 km/h
Compass: 90° E
Accelero: (-0.0, -0.0, 9.8)
Gyroscop: (0.0, 0.0, 0.0)
Location: (52.8, 69.8)
GNSS: (-0.000627, 0.000483)
Height: -0 m
Throttle:
Steer:
Brake:
Reverse:
Hand brake:
Manual:
Gear: N
Collision:
Number of vehicles: 1
STOP
Camera Semantic Segmentation (CityScapes Palette)

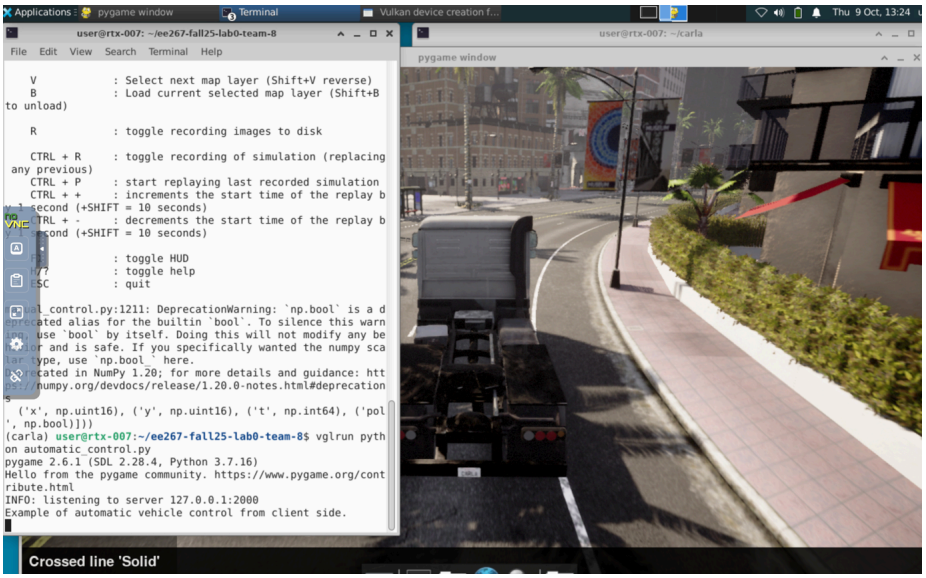




Reflection:

By driving a car with the Carla client, we were able to capture and visualize data from various on-board sensors. We saw renderings from the Camera RGB, different forms of depth imaging (Gray Scale, Logarithmic Gray Scale, Raw), Instance Segmentation (Cityscapes Palette, Raw), Semantic Segmentation (Cityscapes Palette, Raw), and Lidar (Ray-Cast). Finally, we were also able to run the automatic_control.py script.

Screenshot of running automatic_control.py:



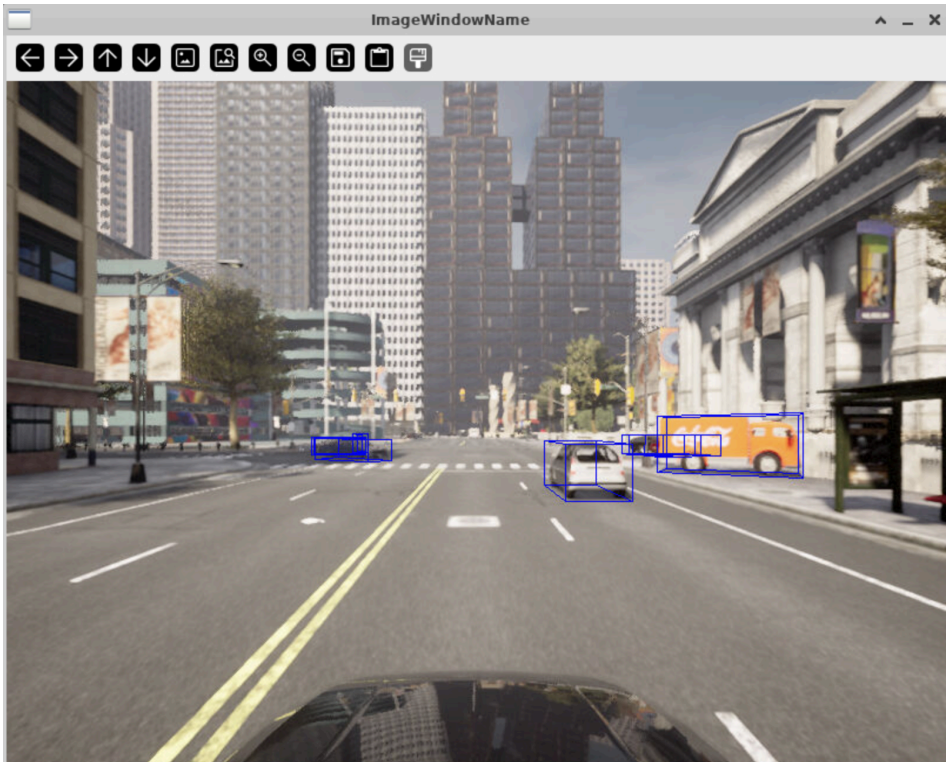
Part 3: Using Carla API

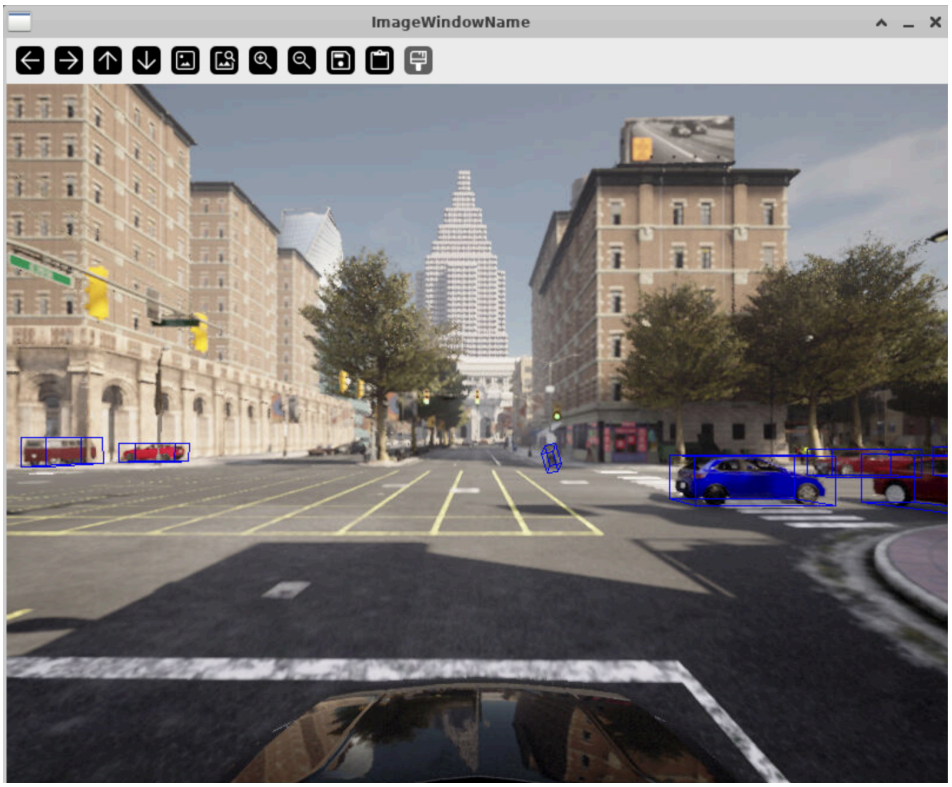
Spawn random vehicles and pedestrians:

Reflection:

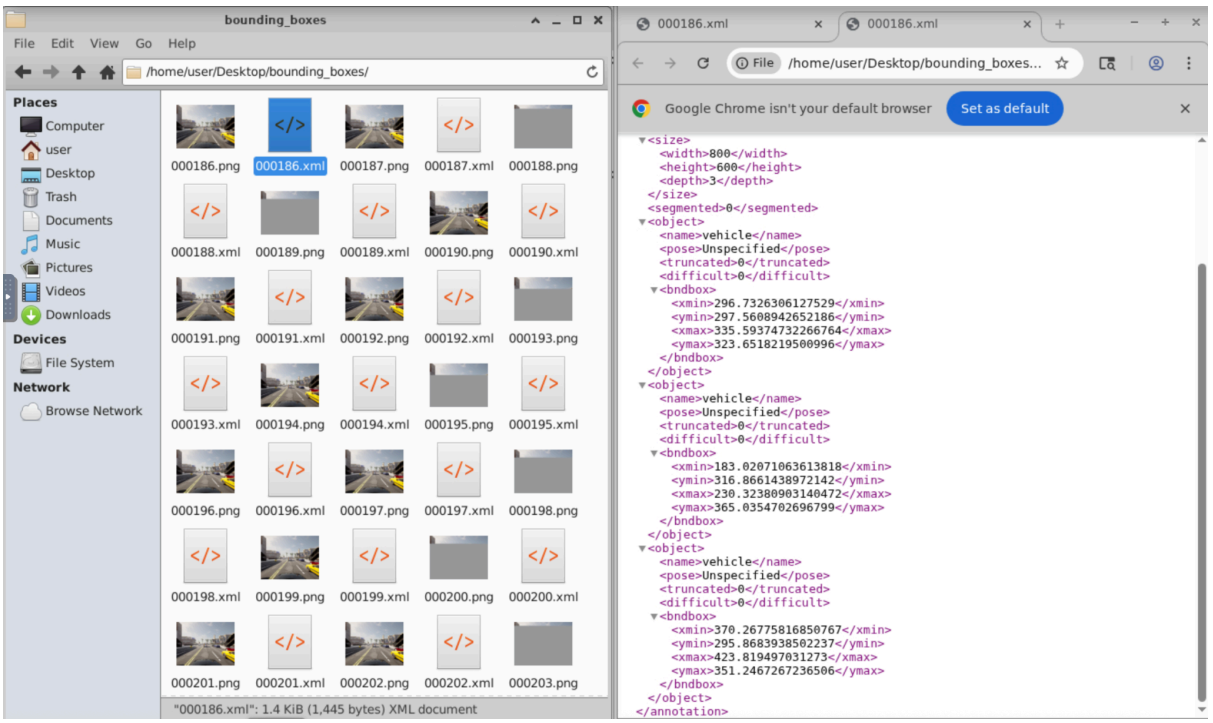
We used the Carla API to populate the simulated environment by successfully spawning random vehicles and pedestrians into the scene.

Part 4: Bounding Boxes





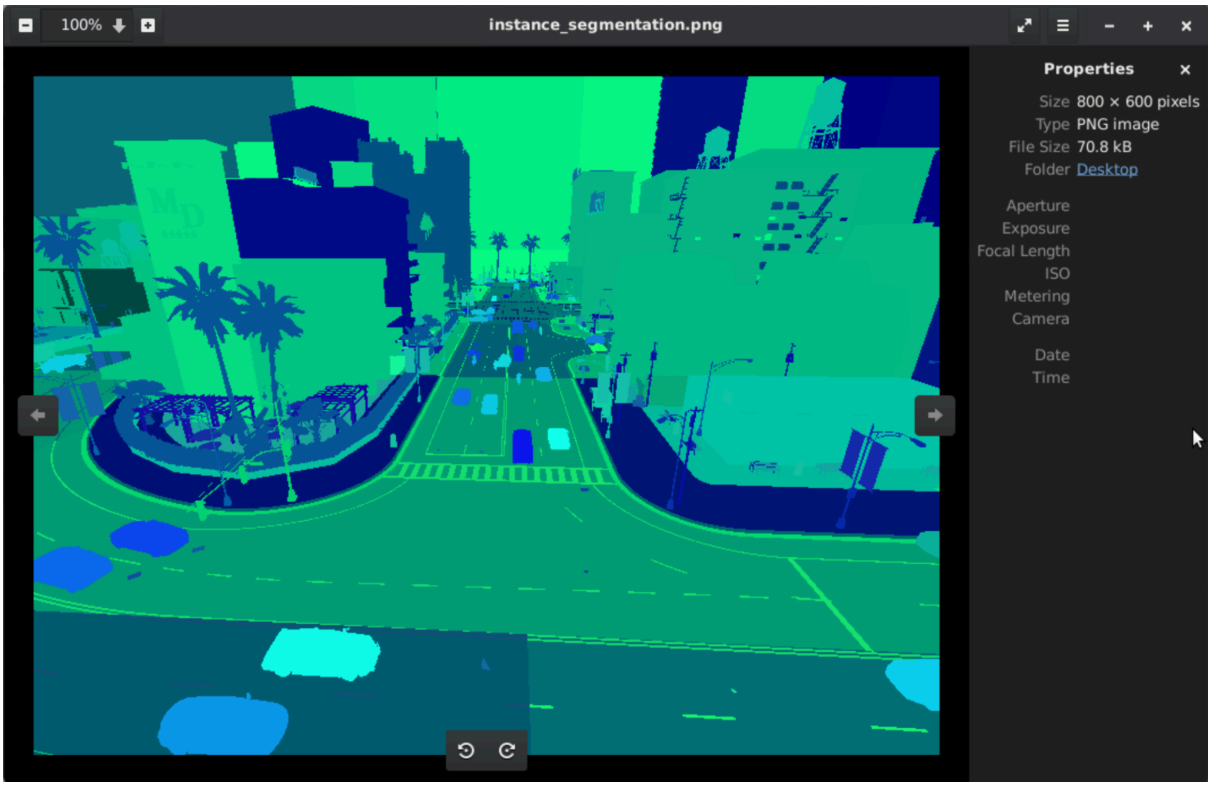
Export bounding boxes:

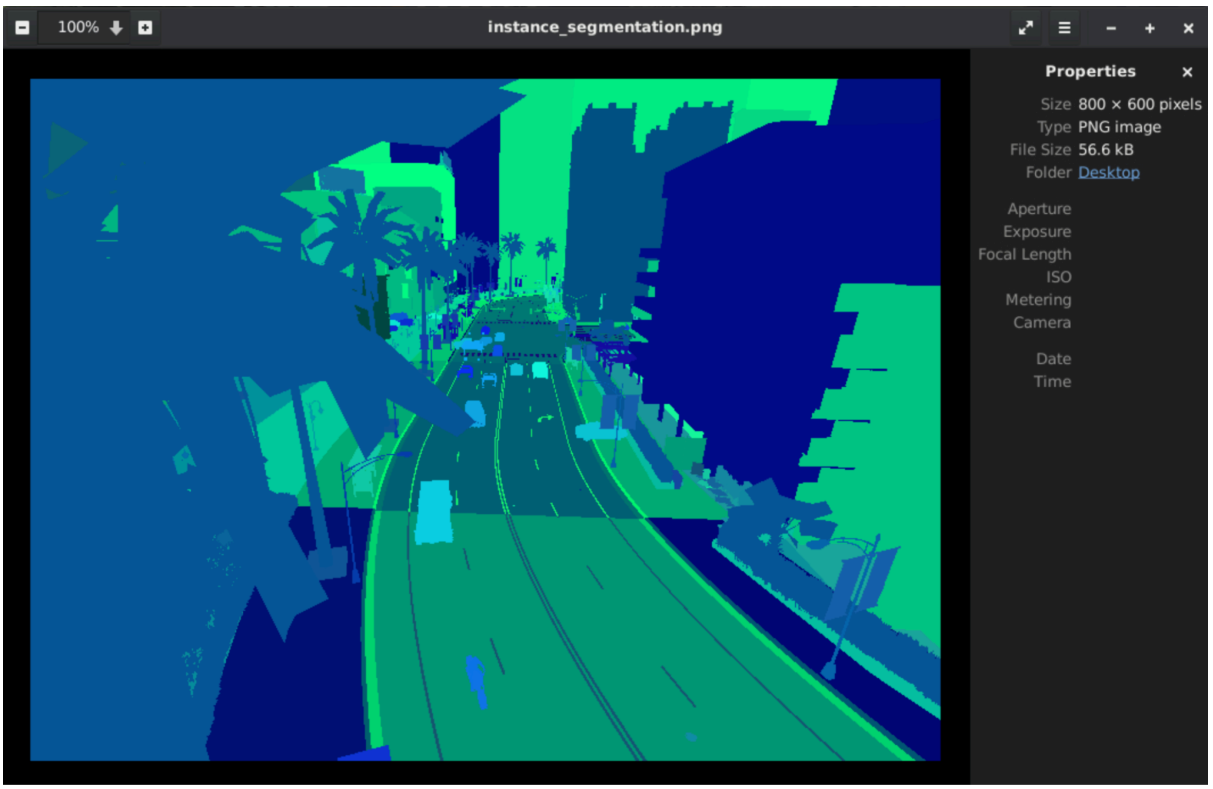


Reflection:

We successfully demonstrated the ability to draw bounding boxes around vehicles in the scene. Crucially, we also exported the bounding box data, confirming that we can save the corresponding image files and XML documents in PASCAL VOC format.

Part 5: Instance Segmentation





Reflection:

For this section, we generated and captured instance segmentation images for the default coordinates and our own manually selected coordinates.

- In the instance segmentation images, the instance IDs are encoded in the G and B channels of the RGB image file. The R channel contains the standard semantic ID. Each pixel value represents a unique instance ID. Similar objects are represented in the same color.
- Instance segmentation has a unique pixel value for each object whereas Semantic segmentation has the same ID for objects belonging to a class.
- Instance segmentation is more precise in detecting objects. It is helpful to track moving objects like vehicles and pedestrians in real time.