

Demo Project – CARLA (open source vehicle and traffic simulation software)

**Goal** – A demo project of the vehicle simulation is made in CARLA simulator. This demo trial is intended for the display of my interest toward the work opportunity at AVL Software and Functions GmbH in the field of vehicle and traffic simulation.

Carla Documentation is solely used as a reference for this trial demo, along with the help of the Carla forum and Coursera [1] [2][3].

This part of demo project is summarized into two parts.

- 1) Part 1 – Here the basic function and example for the Python API are tried. The main focus of this part is to be able to understand the Client server function, Creation and Deletion of the Objects (Such as Vehicle, Walkers, Traffic, Dynamic weather, etc.), To try all the Python API example files available and to understand the functions. This part also covers the section for loading different maps available. Along with he about activities this section all the required python libraries are included for the functioning of the simulation in Carla.

**File Name** – first.py

**Type** – Python

Maps : In fig 1 shown are the some of available blueprint maps in Carla.



a



b



c

Fig 1 – Different Maps in Carla a) Town-1, b) Town-2, c) Town-3

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### Dynamic Weather Functions :

Here shown two different weather simulation of the same map blueprint. Such simulation not just for pictorial these weather changes also is used for the sensors simulation during various weather conditions.

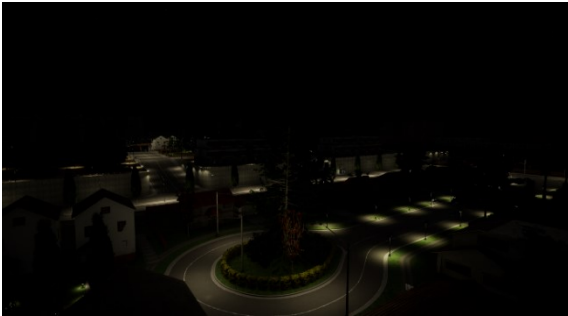


Fig 2 – Two different weather scenario of the same map.

### Object Creation and Traffic simulation :

The object created is the model of the tesla Cybertruck where the entire dynamics of the vehicle can be interpreted and used for the autonomous simulations. In the second figure shown is the creation of the traffic simulation in a city blueprint.



Fig 3 – Cybertruck Object creation and City traffic simulation

- 2) Part 2 – In this part two of the demo trial, the entire study from part 1 is used for generating of a Autonomous Lane tracking simulation. This a quick made simulation where a simple PID control logic is used where the gains of the PID controller are tuned using test and trial method.

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This part covers the lane detection using the way points obtained using functions like (world, get.waypoints, etc.). The lane navigation done in this part where the throttle and the steering for the vehicle object created ('cybertruck') is obtained by using a simple and classic PID controller. The Spawning of the object here is also made manually using trial and test method.

**File Name** – second.py

**Type** – Python



Fig 4 – Lane Navigation using PID control logic.

## Reference –

- [1] CARLA Simulator. (Viewed 2021, March 25). *CARLA Documentation*. Retrieved from <https://carla.readthedocs.io/en/latest/>
- [2] CARLA Simulator. (Viewed 2021, March 25). *CARLA forum*. Retrieved from <https://forum.carla.org/c/using-carla>
- [3] Coursera. (Viewed 2021, March 25). *Carla Overview - Self-Driving Car Simulation*. Retrieved from <https://www.coursera.org/lecture/intro-self-driving-cars/lesson-1-carla-overview-self-driving-car-simulation-w7uE2>

## Appendix –

Libraries used in python for Carla-

- glob
- os
- sys
- cv2
- random
- matplotlib.pyplot
- time
- numpy
- argparse