Installation Guide and Basic Instructions for CARLA

For any detail about using CARLA, please read the official documentation: https://carla.readthedocs.io/en/latest/.

Part 1: Download and Extract the CARLA Simulator

1. Prerequisites:

- **Recommended system**:
  - Intel i7 gen 9th - 11th / Intel i9 gen 9th - 11th / AMD ryzen 7 / AMD ryzen 9
  - +16 GB RAM memory
  - NVIDIA RTX 2070 / NVIDIA RTX 2080 / NVIDIA RTX 3070, NVIDIA RTX 3080
  - Ubuntu 18.04

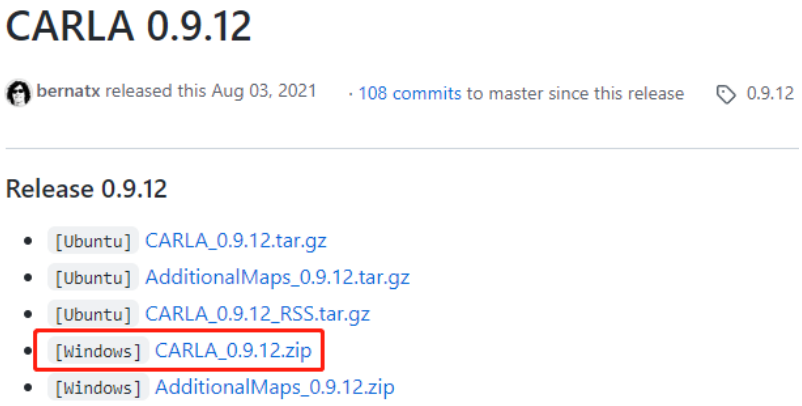
  The configuration of your computer is not necessarily to be as good as the recommended system, as long as you can run the CARLA server and the client fluently on your computer.

- **Python:**
  For recent versions, CARLA is only compatible with **Python 3.7**. If you are using other versions of Python, please download version 3.7x. (https://www.python.org/downloads/windows/)

  Here are some required or recommended Python libraries:
  - pygame
  - numpy
  - opencv-python

2. Installation steps:

1) Download CARLA from https://github.com/carla-simulator/carla/blob/master/Docs/download.md . Click on **CARLA 0.9.12** and then click on *CARLA_0.9.12.zip* for windows. Currently, version 0.9.12 is recommended. You can also try to install a higher version.



2) Extract the content of *CARLA_0.9.12.zip* to any working directory. The extraction will create a folder named *WindowsNoEditor* in the directory. You may change the name of the folder, for instance, *CarlaSimulator*.

Part 2: Testing the CARLA Simulator

1. Load the CARLA server

Assuming the directory of CARLA you installed is *C:/{Your_Directory}/CarlaSimulator*. You can directly run *CarlaUE4.exe* in the folder, but we recommend using CMD commands so that we can easily change the parameters.

Open the Command Prompt window, type or copy and paste the two commands and press Enter:

```
>> cd C:/{Your_Directory}/CarlaSimulator
>> CarlaUE4.exe
```

The CARLA window will pop up. You can press and hold the left mouse button and use the *W, S, A, D, Q, E* keys to navigate the world.

CARLA provides 5 maps for the users. The default map is Town03. To switch to other maps, type the following commands in the **same** CMD window:

```
>> cd C:/{Your_Directory}/CarlaSimulator/PythonAPI/util
>> python config.py --map Town05
```

You can choose any number between Town01 and Town06.

You can also add vehicles and pedestrian into the world. In the **same** CMD window, type the following commands:

```
>> cd C:/{Your_Directory}/CarlaSimulator/PythonAPI/examples
>> python generate_traffic.py -n 200 -w 50 --safe
```

200 vehicles and 50 pedestrians will be created. You can change the number of the vehicles and pedestrians, as long as the software runs fluently on your computer. If the spawn points of a vehicle or a pedestrian has a conflict with other objects, it will be deleted.

2. Load the client

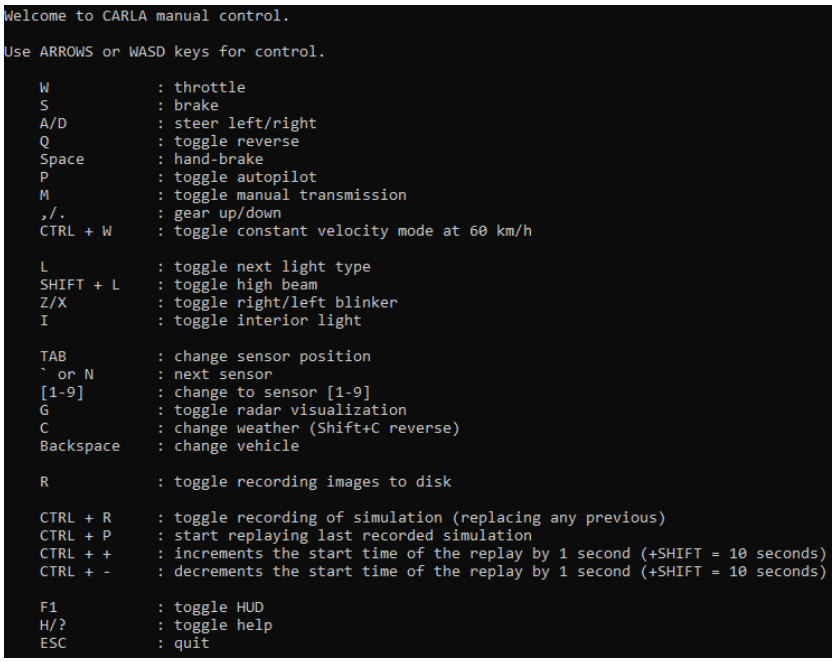
Open a **new** CMD window, type the following commands to run the example Python client:

```
>> cd C:/{Your_Directory}/PythonAPI/examples
>> python manual_control.py
```

A client window will pop up.

The panel on the left shows all the parameters of the client vehicle. The parameters will which change dynamically as the vehicle moves.

You can use *W, S, A, D* keys to manually control the vehicle. The detailed keyboard control functions are shown in the CMD window. You can check and try to use these functions of the vehicle.



If you press *P*, the autopilot mode will be turned on. The vehicle will randomly choose to make a turn or to go straight at every intersection. Other vehicles in the world are using the same auto mode.

You can also run more than one client at the same time. Just open a new CMD window and type the same manual control command. All the clients will be created in the same server.

In the future, we are going to write our own Python scripts to use the sensors on the vehicle and automatically control the vehicle.