# General Proposal

General steps to implement the visualization tasks:

## I. Visualization for car information

Key idea:

1. call the carla.DebugHelper, use the method **draw_string**

API: https://carla.readthedocs.io/en/latest/python_api/#carla.DebugHelper

- **draw_string**(**self**, **location**, **text**, **draw_shadow**=False, **color**=(255,0,0), **life_time**=-1.0)snippet →

  Draws a string in a given location of the simulation which can only be seen server-side.

  - **Parameters:**
    - `location` (*carla.Location* - *meters*) - Spot in the simulation where the text will be centered.
    - `text` (*str*) - Text intended to be shown in the world.
    - `draw_shadow` (*bool*) - Casts a shadow for the string that could help in visualization. It is disabled by default.
    - `color` (*carla.Color*) - RGB code to color the string. Red by default.
    - `life_time` (*float* - *seconds*) - Shape's lifespan. By default it only lasts one frame. Set this to `0` for permanent shapes.

2. Then edit the **automatic_control.py**, the general framework should be like this:
   a. In the main function, we iterate through all the cars first:

```
offset = 1 # the string locates 1 meter next to the car
for vehicle in world.world.get_actors().filter('vehicle.*'):
      loc = actor_i.get_location()
      vel = actor_i.get_velocity()
      acc = actor_i.get_acceleration()
      text = "loc: {}, vel: {}, acc: {}".format((loc.x + offset, loc.y,
loc.z), vel, acc)
```

```
world.world.debug.draw_string(location, text)
```

# II. Visualization for traffic lights information panel

Two methods to implement it:

1. **Let the traffic light information being showed at the top of each traffic light**
2. **Create a separate traffic panel to record all the traffic light's information**

**For method 1:**

The overall implementation is similar to the car information one, we add the string information to the traffic light just like before.

For here, we use the actor **carla.TrafficLight** to get the information.

Useful methods:get_green_time, get_red_time, get_state

API: https://carla.readthedocs.io/en/latest/python_api/#carla.TrafficLight

**For method 2:**

We may assign each traffic light an individual name, and gather them into a separate panel to show the information. We may build a data frame and plot it for the user.