Final Presentation: EGR 598
Connected and Automated Vehicles

Supporting the AV-TEP Mission, Scenario-Based Testing Pillar, Scenarios team

Project Sponsor: Shujauddin Rahimi, ACA

Project Engineer: Aravind Siddharth

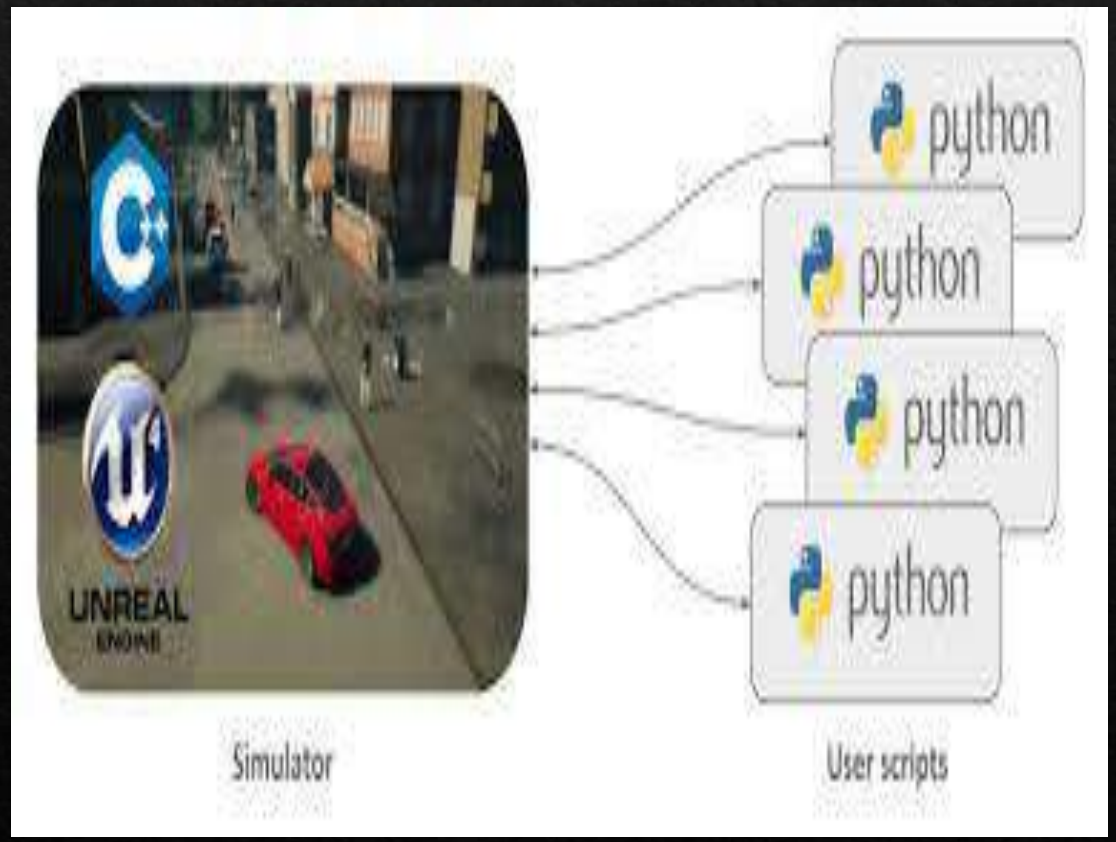
Project Objectives

- Objective: Mimic NHTSA’s 37 pre-crash scenarios within the CARLA simulator to emulate real-world driving conditions.
- There are already 13/37 scenarios which are already developed.
- Description: Contributing to AV-TEP's goal of safe ADS deployment.
- Data: Analyzing accident data from GES 2004.
- Requirements: Python, CARLA, Linux OS expertise.

Table 1: 37 Pre-Crash Scenario Typology

1	Vehicle Failure	21	Vehicle Not Making a Maneuver – Opposite Direction
2	Control Loss with Prior Vehicle Action	22	Following Vehicle Making a Maneuver
3	Control Loss without Prior Vehicle Action	23	Lead Vehicle Accelerating
4	Running Red Light	24	Lead Vehicle Moving at Lower Constant Speed
5	Running Stop Sign	25	Lead Vehicle Decelerating
6	Road Edge Departure with Prior Vehicle Maneuver	26	Lead Vehicle Stopped
7	Road Edge Departure without Prior Vehicle Maneuver	27	Left Turn Across Path from Opposite Directions at Signalized Junctions
8	Road Edge Departure While Backing Up	28	Vehicle Turning Right at Signalized Junctions
9	Animal Crash with Prior Vehicle Maneuver	29	Left Turn Across Path from Opposite Directions at Non-Signalized Junctions
10	Animal Crash without Prior Vehicle Maneuver	30	Straight Crossing Paths at Non-Signalized Junctions
11	Pedestrian Crash with Prior Vehicle Maneuver	31	Vehicle Turning at Non-Signalized Junctions
12	Pedestrian Crash without Prior Vehicle Maneuver	32	Evasive Action with Prior Vehicle Maneuver
13	Pedalcyclist Crash with Prior Vehicle Maneuver	33	Evasive Action without Prior Vehicle Maneuver
14	Pedalcyclist Crash without Prior Vehicle Maneuver	34	Non-Collision Incident
15	Backing Up into Another Vehicle	35	Object Crash with Prior Vehicle Maneuver
16	Vehicle Turning – Same Direction	36	Object Crash without Prior Vehicle Maneuver
17	Vehicle Parking – Same Direction	37	Other
18	Vehicle Changing Lanes – Same Direction		
19	Vehicle Drifting – Same Direction		
20	Vehicle Making a Maneuver – Opposite Direction		

CARLA Simulator(Car Learning to Act)

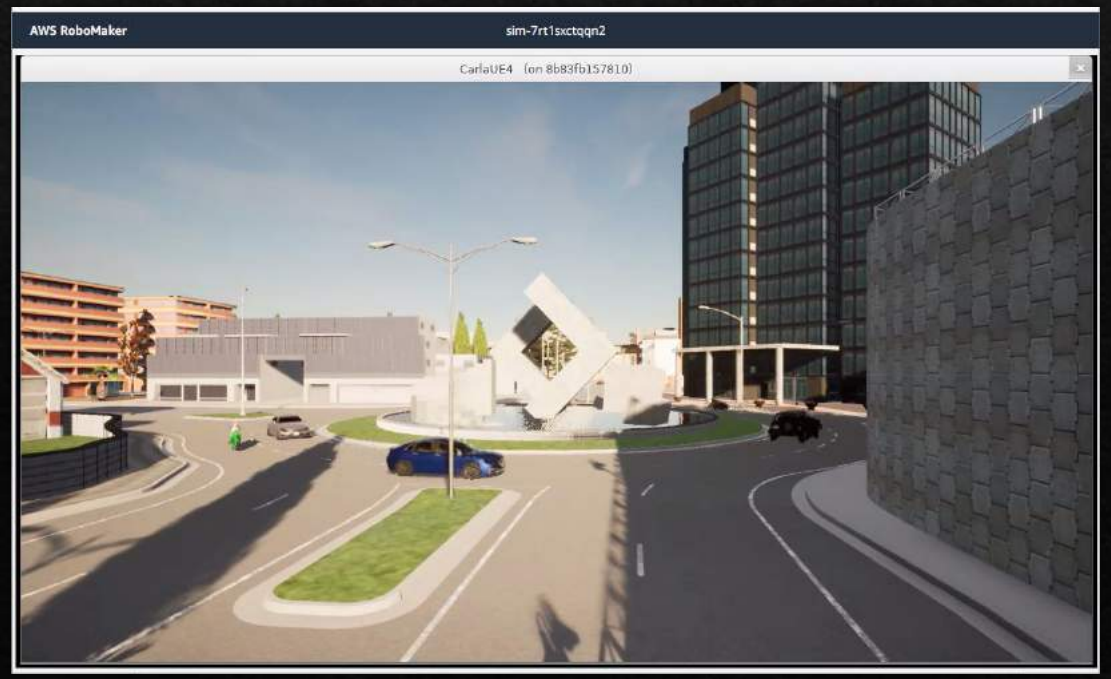


- CARLA IS AN OPEN-SOURCE SIMULATOR FOR AUTONOMOUS VEHICLES.
- SUPPORTS TRAINING, DEVELOPMENT, AND VALIDATION OF AUTOMATED DRIVING SYSTEMS(ADS).
- CARLA PROVIDES OPEN DIGITAL ASSETS (URBAN LAYOUTS, BUILDINGS, VEHICLES) THAT WERE CREATED FOR THIS PURPOSE AND CAN BE USED FREELY.
- THE SIMULATION PLATFORM SUPPORTS FLEXIBLE SPECIFICATION OF SENSOR SUITES AND ENVIRONMENTAL CONDITIONS.

Scenario Runner

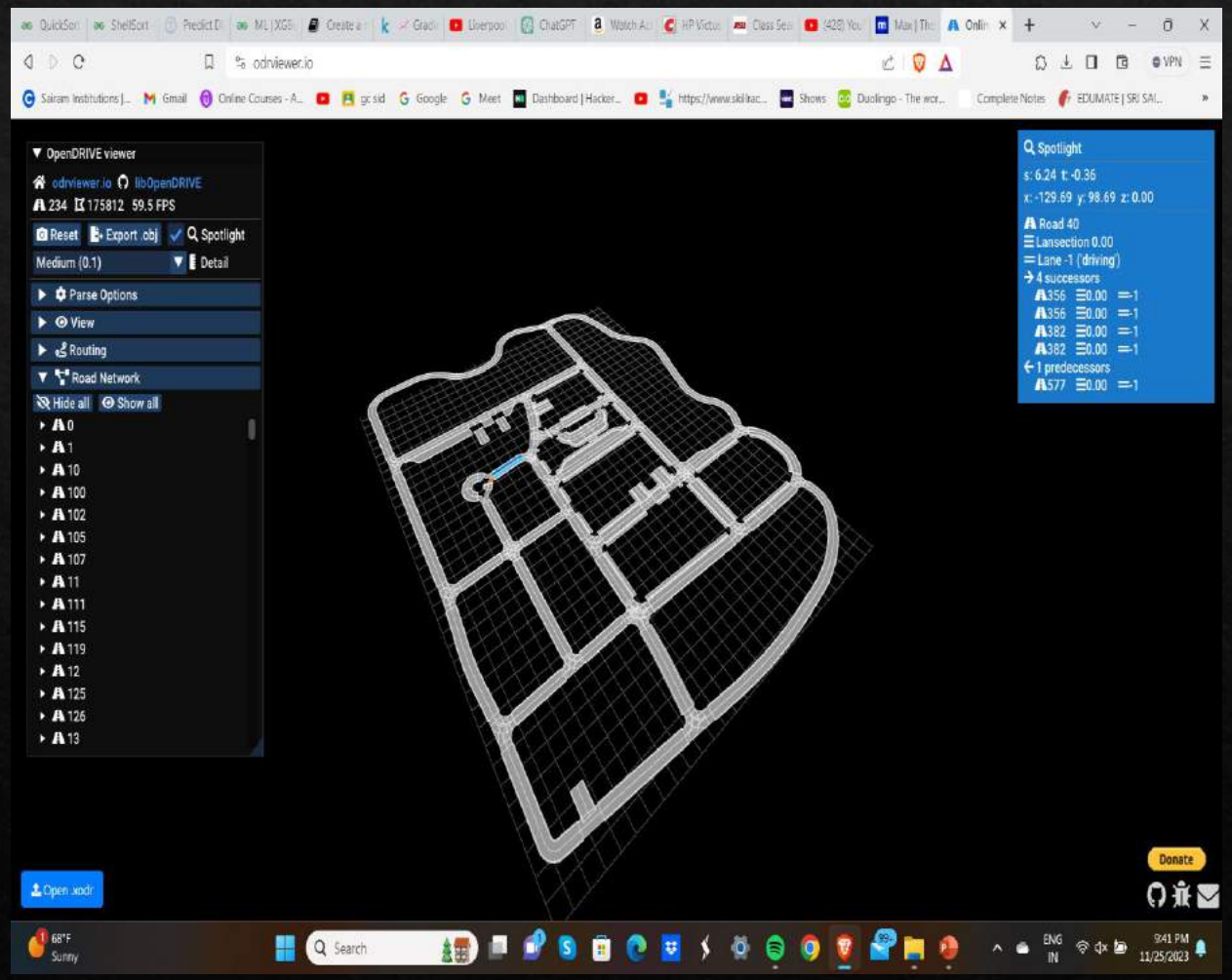
- ScenarioRunner is a module that allows traffic scenario definition and execution for the CARLA simulator. The scenarios can be defined through a Python interface or using the OpenSCENARIO standard.

- ScenarioRunner can also be used to prepare AD agents for their evaluation, by easily creating complex traffic scenarios and routes for the agents to navigate through.



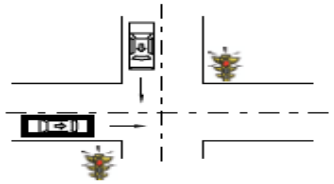
XODR Viewer

- Online tool to get a high overview of the maps of the towns we are going to use in Carla.
- Provides specifics such as the world map coordinates, road ID, turnings, intersections, road signs, and road coordinates helping us understand the nature of roads, lanes, and signals, etc.
- Very essential for spawning the vehicles.



Scenario 1

Running Red Light



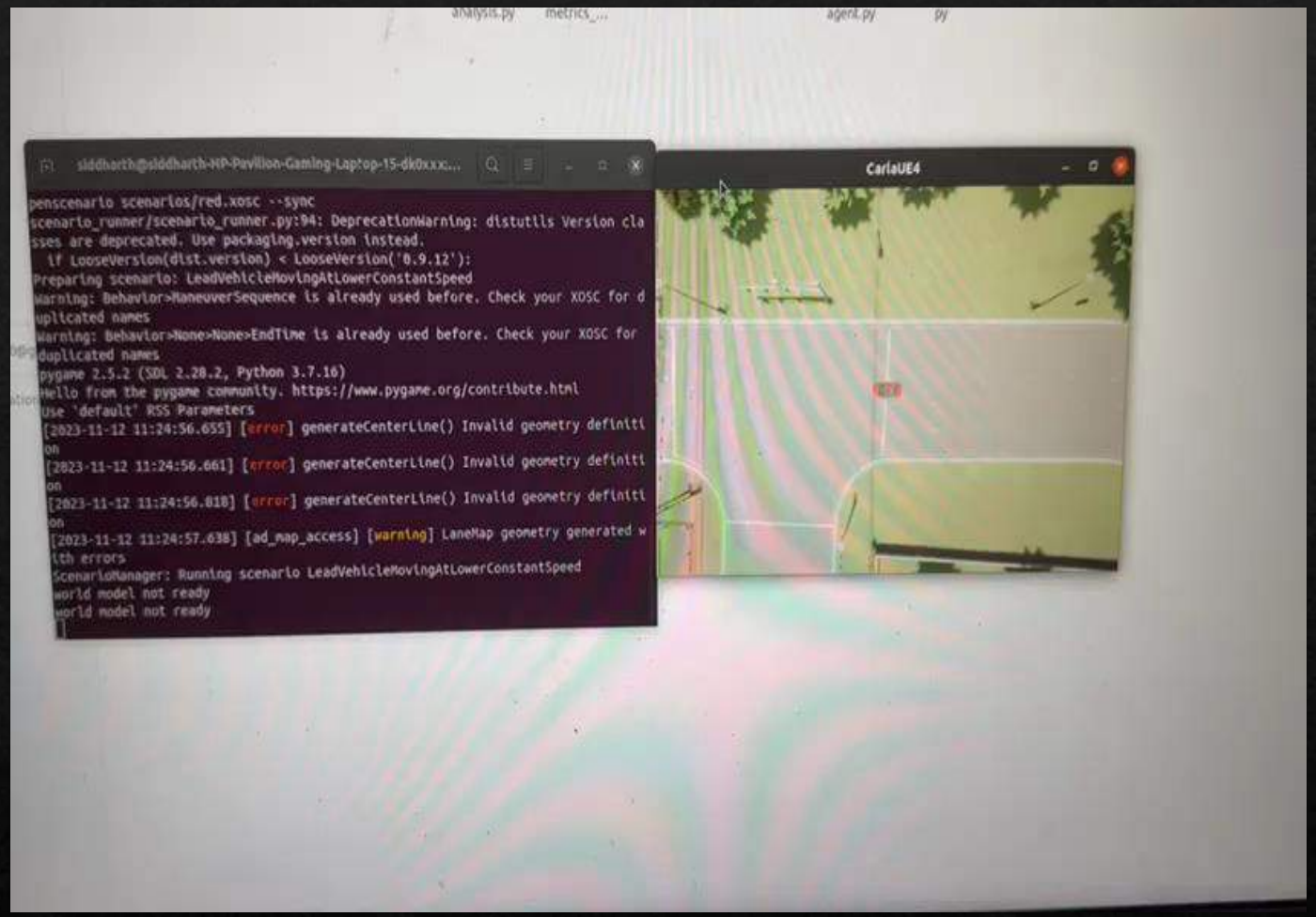
Typical Scenario: Vehicle is going straight in an urban area, in daylight, under clear weather conditions, with a posted speed limit of 35 mph; vehicle then runs a red light, crossing an intersection and colliding with another vehicle crossing the intersection from a lateral direction.

Factor Over-Representation: Urban area, inattention, female driver, and younger and older drivers are over-represented (based on a simple comparison of percentages).

Dynamic Variations: Vehicle runs a red light while turning left and collides with another straight crossing vehicle from a lateral direction.

Scenario Severity: Table below quantifies the annual severity of this crash scenario in terms of five different metrics based on 2004 GES statistics. This table also provides the ratios of people involved by maximum injury severity using the KABCO and AIS injury scales. About 1.18 percent of all people involved in this crash scenario suffered high-level MAIS 3+ injuries (serious, severe, critical, or fatal).

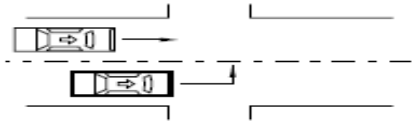
Crash Severity		Scenario	Scenario/All
No. of crashes		254,000	4.27%
No. of vehicles involved		528,000	4.94%
No. of people involved		740,000	4.92%
Societal Cost	Economic cost	$6,627,000,000	5.53%
	Functional years lost	135,000	4.87%
KABCO Injury Scale	None	0.726	0.888
	Possible	0.169	1.546
	Non-incapacitating	0.073	1.522
	Incapacitating	0.025	1.283
	Fatal	0.001	0.457
	Unknown	0.006	1.666
	Died prior	-	-
AIS Injury Scale	None	0.709	0.909
	Minor	0.249	1.320
	Moderate	0.030	1.422
	Serious	0.009	1.393
	Severe	0.001	1.366
	Critical	0.001	1.319
	Fatal	0.001	0.453
	Injured people per crash	0.848	1.528


siddharth@siddharth-HP-Pavilion-Gaming-Laptop-15-dk0xxx...
CarlaUE4
penscenario scenarios/red.xosc --sync
scenario_runner/scenario_runner.py:94: DeprecationWarning: distutils Version cla
sses are deprecated. Use packaging.version instead.
if LooseVersion(dist.version) < LooseVersion('0.9.12'):
Preparing scenario: LeadVehicleMovingAtLowerConstantSpeed
Warning: Behavior>ManeuverSequence is already used before. Check your XOSC for d
uplicated names
Warning: Behavior>None>None>EndTime is already used before. Check your XOSC for
duplicated names
pygame 2.5.2 (SDL 2.28.2, Python 3.7.16)
Hello from the pygame community. https://www.pygame.org/contribute.html
Use 'default' RSS Parameters
[2023-11-12 11:24:56.655] [error] generateCenterLine() Invalid geometry definiti
on
[2023-11-12 11:24:56.661] [error] generateCenterLine() Invalid geometry definiti
on
[2023-11-12 11:24:56.818] [error] generateCenterLine() Invalid geometry definiti
on
[2023-11-12 11:24:57.638] [ad_map_access] [warning] LaneMap geometry generated w
ith errors
ScenarioManager: Running scenario LeadVehicleMovingAtLowerConstantSpeed
world model not ready
world model not ready

Scenario 2

Vehicle(s) Turning – Vehicles Traveling in Same Direction

Typical Scenario: Vehicle is turning left at an intersection in an urban area, in daylight, under clear weather conditions, with a posted speed limit of 35 mph; and then cuts across the path of another vehicle initially traveling in the same direction.

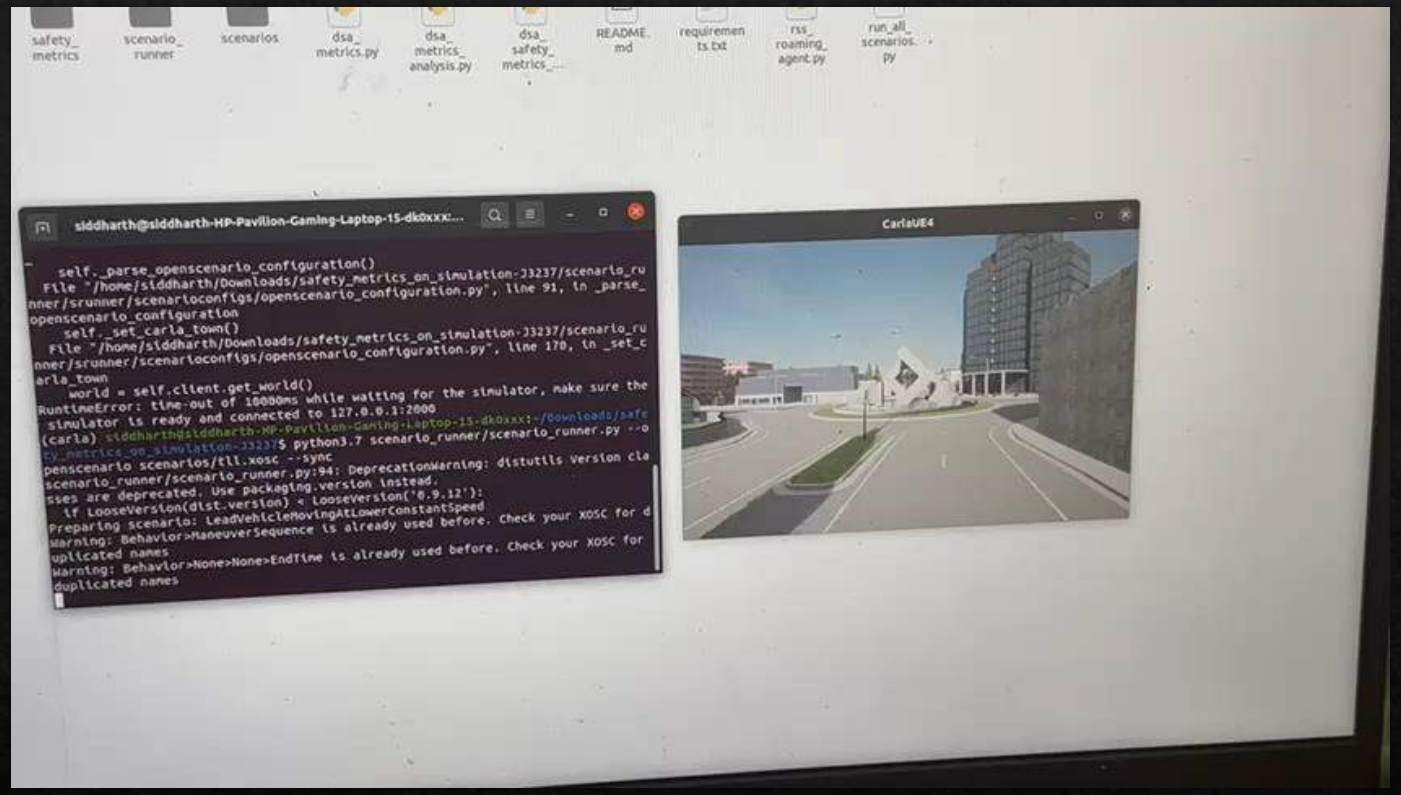


Factor Over-Representation: Clear weather, dry road, low-speed road, and younger driver are over-represented (based on a simple comparison of percentages).

Dynamic Variations: Vehicle is turning right and cuts across the path of another vehicle initially traveling in the same direction.

Scenario Severity: Table below quantifies the annual severity of this crash scenario in terms of five different metrics based on 2004 GES statistics. This table also provides the ratios of people involved by maximum injury severity using the KABCO and AIS injury scales. About 0.44 percent of all people involved in this crash scenario suffered high-level MAIS 3+ injuries (serious, severe, critical, or fatal).

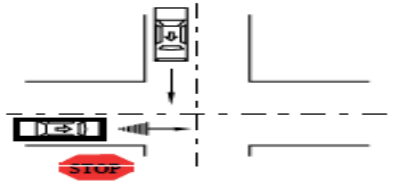
Crash Severity		Scenario	Scenario/All
No. of crashes		222,000	3.73%
No. of vehicles involved		446,000	4.17%
No. of people involved		641,000	4.26%
Societal Cost	Economic cost	$2,810,000,000	2.34%
	Functional years lost	47,000	1.68%
KABCO Injury Scale	None	0.900	1.100
	Possible	0.066	0.608
	Non-incapacitating	0.023	0.470
	Incapacitating	0.009	0.455
	Fatal	0.0003	0.190
	Unknown	0.002	0.574
	Died prior	-	-
AIS Injury Scale	None	0.846	1.084
	Minor	0.137	0.728
	Moderate	0.012	0.568
	Serious	0.003	0.521
	Severe	0.0004	0.485
	Critical	0.0002	0.465
	Fatal	0.0003	0.189
	Injured people per crash	0.444	0.801


safety_metrics
scenario_runner
scenarios
dsa_metrics.py
dsa_metrics_analysis.py
dsa_safety_metrics_...
README.md
requirements.txt
rss_roaming_agent.py
run_all_scenarios.py
siddharth@siddharth-HP-Pavilion-Gaming-Laptop-15-dk0xxx:...
self._parse_openscenario_configuration()
File "/home/siddharth/Downloads/safety_metrics_on_simulation-J3237/scenario_runner/srunner/scenarioconfigs/openscenario_configuration.py", line 91, in _parse_openscenario_configuration
self._set_carla_town()
File "/home/siddharth/Downloads/safety_metrics_on_simulation-J3237/scenario_runner/srunner/scenarioconfigs/openscenario_configuration.py", line 170, in _set_carla_town
world = self.client.get_world()
RuntimeError: time-out of 10000ms while waiting for the simulator, make sure the simulator is ready and connected to 127.0.0.1:2000
(carla) siddharth@siddharth-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~/Downloads/safety_metrics_on_simulation-J3237$ python3.7 scenario_runner/scenario_runner.py --openscenario scenarios/tll.xosc --sync
scenario_runner/scenario_runner.py:94: DeprecationWarning: distutils Version classes are deprecated. Use packaging.version instead.
if LooseVersion(dist.version) < LooseVersion('0.9.12'):
Preparing scenario: LeadVehicleMovingAtLowerConstantSpeed
Warning: Behavior>ManeuverSequence is already used before. Check your XOSC for duplicated names
Warning: Behavior>None>None>EndTime is already used before. Check your XOSC for duplicated names
CarlaUE4

Scenario 3

Straight Crossing Paths at Non-Signalized Junctions

Typical Scenario: Vehicle stops at a stop sign in an urban area, in daylight, under clear weather conditions, at an intersection with a posted speed limit of 25 mph; and then proceeds against lateral crossing traffic.

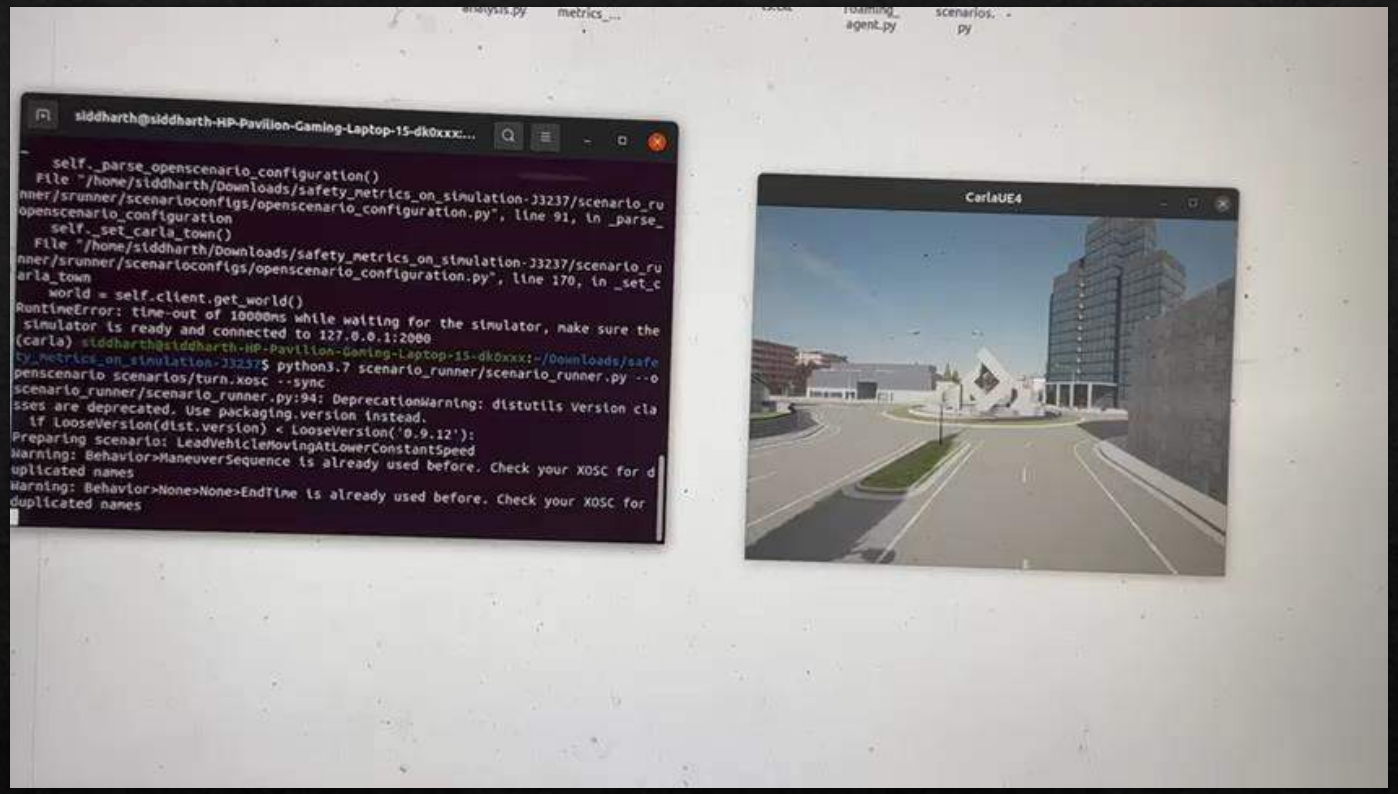


Factor Over-Representation: Rural area, low-speed road, vision obscured, female, and younger and older drivers are over-represented (based on a simple comparison of percentages).

Dynamic Variations: Vehicle is going straight through an uncontrolled intersection and then cuts across the path of another straight crossing vehicle from lateral direction. Another scenario involves both vehicles first stopping and then proceeding on straight crossing paths.

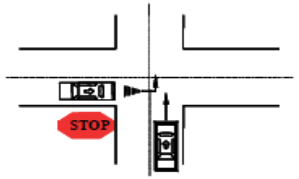
Scenario Severity: Table below quantifies the annual severity of this crash scenario in terms of five different metrics based on 2004 GES statistics. This table also provides the ratios of people involved by maximum injury severity using the KABCO and AIS injury scales. About 1.21 percent of all people involved in this crash scenario suffered high-level MAIS 3+ injuries (serious, severe, critical, or fatal).

Crash Severity		Scenario	Scenario/All
No. of crashes		264,000	4.44%
No. of vehicles involved		535,000	5.00%
No. of people involved		765,000	5.09%
Societal Cost	Economic cost	$7,290,000,000	6.08%
	Functional years lost	174,000	6.29%
KABCO Injury Scale	None	0.769	0.940
	Possible	0.139	1.276
	Non-incapacitating	0.062	1.279
	Incapacitating	0.024	1.245
	Fatal	0.002	1.252
	Unknown	0.004	1.103
	Died prior	-	-
AIS Injury Scale	None	0.742	0.951
	Minor	0.220	1.166
	Moderate	0.026	1.237
	Serious	0.008	1.245
	Severe	0.001	1.238
	Critical	0.0005	1.246
	Fatal	0.002	1.241
	Injured people per crash	0.748	1.348


siddharth@siddharth-HP-Pavilion-Gaming-Laptop-15-dk0xxx:...
self._parse_openscenario_configuration()
File "/home/siddharth/Downloads/safety_metrics_on_simulation-J3237/scenario_runner/srunner/scenarioconfigs/openscenario_configuration.py", line 91, in _parse_openscenario_configuration
self._set_carla_town()
File "/home/siddharth/Downloads/safety_metrics_on_simulation-J3237/scenario_runner/srunner/scenarioconfigs/openscenario_configuration.py", line 170, in _set_carla_town
world = self.client.get_world()
RuntimeError: time-out of 10000ms while waiting for the simulator, make sure the simulator is ready and connected to 127.0.0.1:2000
(carla) siddharth@siddharth-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~/Downloads/safety_metrics_on_simulation-J3237$ python3.7 scenario_runner/scenario_runner.py --openscenario scenarios/turn.xosc --sync
scenario_runner/scenario_runner.py:94: DeprecationWarning: distutils Version classes are deprecated. Use packaging.version instead.
if LooseVersion(dist.version) < LooseVersion('0.9.12'):
Preparing scenario: LeadVehicleMovingAtLowerConstantSpeed
Warning: Behavior>ManeuverSequence is already used before. Check your XOSC for duplicated names
Warning: Behavior>None>None>EndTime is already used before. Check your XOSC for duplicated names
CarlaUE4

Scenario 4

Vehicle(s) Turning at Non-Signalized Junctions



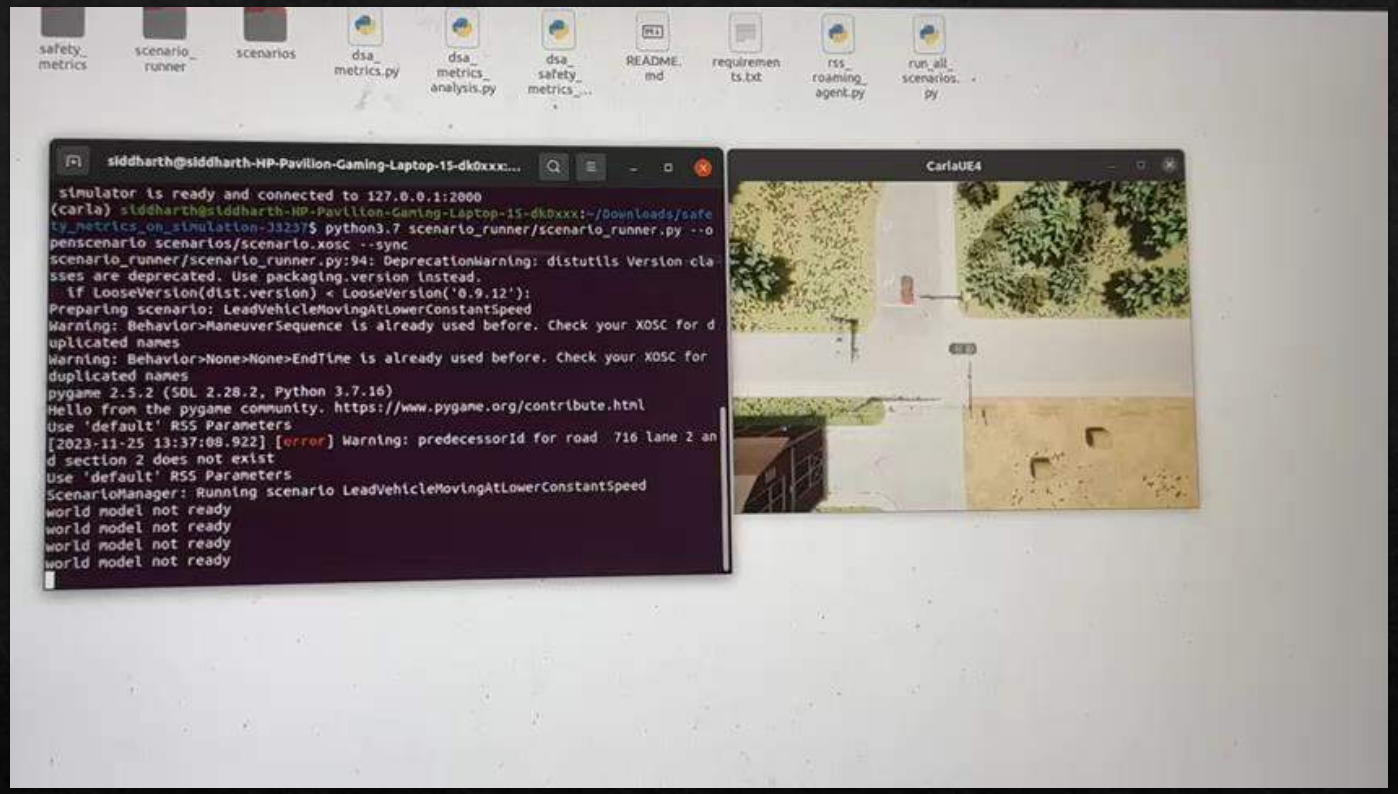
Typical Scenario: Vehicle stops at a stop sign in a rural area, in daylight, under clear weather conditions, at an intersection with a posted speed limit of 35 mph; and proceeds to turn left against lateral crossing traffic.

Factor Over-Representation: Rural area, intersection and driveway/alley locations, low-speed road, vision obscured, inattention, female, and younger and older drivers are over-represented (based on a simple comparison of percentages).

Dynamic Variations: Vehicle stops at a stop sign and then proceeds to turn right against lateral crossing traffic.

Scenario Severity: Table below quantifies the annual severity of this crash scenario in terms of five different metrics based on 2004 GES statistics. This table also provides the ratios of people involved by maximum injury severity using the KABCO and AIS injury scales. About 0.71 percent of all people involved in this crash scenario suffered high-level MAIS 3+ injuries (serious, severe, critical, or fatal).

Crash Severity		Scenario	Scenario/All
No. of crashes		435,000	7.32%
No. of vehicles involved		872,000	8.15%
No. of people involved		1,212,000	8.07%
Societal Cost	Economic cost	$7,343,000,000	6.13%
	Functional years lost	138,000	5.00%
KABCO Injury Scale	None	0.843	1.030
	Possible	0.101	0.925
	Non-incapacitating	0.038	0.788
	Incapacitating	0.015	0.778
	Fatal	0.001	0.331
	Unknown	0.003	0.736
	Died prior	-	-
AIS Injury Scale	None	0.801	1.027
	Minor	0.174	0.921
	Moderate	0.018	0.851
	Serious	0.006	0.823
	Severe	0.001	0.790
	Critical	0.0003	0.784
	Fatal	0.001	0.328
	Injured people per crash	0.554	0.998


safety_metrics
scenario_runner
scenarios
dsa_metrics.py
dsa_metrics_analysis.py
dsa_safety_metrics_...
README.md
requirements.txt
rss_roaming_agent.py
run_all_scenarios.py
siddharth@siddharth-HP-Pavilion-Gaming-Laptop-15-dk0xxx:...
simulator is ready and connected to 127.0.0.1:2000
(carla) siddharth@siddharth-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~/Downloads/safety_metrics_on_simulation-J3237$ python3.7 scenario_runner/scenario_runner.py --openscenario scenarios/scenario.xosc --sync
scenario_runner/scenario_runner.py:94: DeprecationWarning: distutils Version classes are deprecated. Use packaging.version instead.
if LooseVersion(dist.version) < LooseVersion('0.9.12'):
Preparing scenario: LeadVehicleMovingAtLowerConstantSpeed
Warning: Behavior>ManeuverSequence is already used before. Check your XOSC for duplicated names
Warning: Behavior>None>None>EndTime is already used before. Check your XOSC for duplicated names
pygame 2.5.2 (SDL 2.28.2, Python 3.7.16)
Hello from the pygame community. https://www.pygame.org/contribute.html
Use 'default' RSS Parameters
[2023-11-25 13:37:08.922] [error] Warning: predecessorId for road 716 lane 2 and section 2 does not exist
Use 'default' RSS Parameters
ScenarioManager: Running scenario LeadVehicleMovingAtLowerConstantSpeed
world model not ready
world model not ready
world model not ready
world model not ready
CarlaUE4

Issues and Challenges

```
_metrics_on_simulation-J3237$ ^C
: command not found
danielesp145@daniel-linuxbox:~/Carla/safety_metrics_on_simulation-J3237_1/safety
_metrics_on_simulation-J3237$ export CARLA_ROOT=/Home/Carla/CARLA_0.9.13_RSS
export SCENARIO_RUNNER_ROOT=/Home/Carla/safety_metrics_on_simulation-J3237_1/saf
ety_metrics_on_simulation-J3237/scenario_runner
export PYTHONPATH=${CARLA_ROOT}/PythonAPI/carla/dist/carla-0.9.13-py3.7-linux-x8
6_64.egg
export PYTHONPATH=$PYTHONPATH:${CARLA_ROOT}/PythonAPI/carla/agents
export PYTHONPATH=$PYTHONPATH:${CARLA_ROOT}/PythonAPI/carla
export PYTHONPATH=$PYTHONPATH:${CARLA_ROOT}/PythonAPI
export PYTHONPATH=$PYTHONPATH:${CARLA_ROOT}/PythonAPI/examples
export PYTHONPATH=$PYTHONPATH:${CARLA_ROOT}/PythonAPI/examples/rss
export PYTHONPATH=$PYTHONPATH:${SCENARIO_RUNNER_ROOT}/srunner
danielesp145@daniel-linuxbox:~/Carla/safety_metrics_on_simulation-J3237_1/safety
_metrics_on_simulation-J3237$ python3.7 scenario_runner/scenario_runner-0.9.13/s
cenario_runner.py --openscenario scenarios/LVA_10.xosc --sync
Traceback (most recent call last):
  File "scenario_runner/scenario_runner-0.9.13/scenario_runner.py", line 33, in
<module>
    import carla
ModuleNotFoundError: No module named 'carla'
```

```
File "/home/criscruz/Downloads/safety_metrics_on_simulation-J3237/scenario_runner/srunner/sc
  from agents.navigation.basic_agent import BasicAgent, LocalPlanner
File "/home/criscruz/.local/lib/python3.7/site-packages/agents/__init__.py", line 22, in <mo
  from . import scripts
File "/home/criscruz/.local/lib/python3.7/site-packages/agents/scripts/__init__.py", line 21
  from . import train
File "/home/criscruz/.local/lib/python3.7/site-packages/agents/scripts/train.py", line 33, i
  from agents.scripts import configs
File "/home/criscruz/.local/lib/python3.7/site-packages/agents/scripts/configs.py", line 26,
  from agents.scripts import networks
File "/home/criscruz/.local/lib/python3.7/site-packages/agents/scripts/networks.py", line 30,
  tfd = tf.contrib.distributions
AttributeError: module 'tensorflow' has no attribute 'contrib'
criscruz@criscruz-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~/Downloads/safety_metrics_on_simulation
```

```
//github.com/tensorflow/probability). You should update all references to use `t
fp.distributions` instead of `tf.distributions`.
Traceback (most recent call last):
  File "scenario_runner/scenario_runner-0.9.13/scenario_runner.py", line 35, in
<module>
    from srunner.scenarioconfigs.openscenario_configuration import OpenScenarioC
onfiguration
  File "/home/danielesp145/Carla/safety_metrics_on_simulation-J3237_1/safety_met
rics_on_simulation-J3237/scenario_runner/scenario_runner-0.9.13/srunner/scenario
configs/openscenario_configuration.py", line 24, in <module>
    from srunner.tools.openscenario_parser import OpenScenarioParser, ParameterR
ef
  File "/home/danielesp145/Carla/safety_metrics_on_simulation-J3237_1/safety_met
rics_on_simulation-J3237/scenario_runner/scenario_runner-0.9.13/srunner/tools/op
enscenario_parser.py", line 26, in <module>
    from srunner.scenariomanager.scenarioatomics.atomic_behaviors import (Traffi
cLightStateSetter,
  File "/home/danielesp145/Carla/safety_metrics_on_simulation-J3237_1/safety_met
rics_on_simulation-J3237/scenario_runner/scenario_runner-0.9.13/srunner/scenario
manager/scenarioatomics/atomic_behaviors.py", line 32, in <module>
    from agents.navigation.basic_agent import BasicAgent, LocalPlanner
ModuleNotFoundError: No module named 'agents.navigation'
```

```
  Installing build dependencies ... done
  Getting requirements to build wheel ... done
  Preparing metadata (pyproject.toml) ... done
Requirement already satisfied: more-itertools in /usr/lib/python3/dist-packages
(from -r requirements.txt (line 16)) (8.10.0)
Requirement already satisfied: requests in /usr/lib/python3/dist-packages (from
-r requirements.txt (line 17)) (2.25.1)
ERROR: Could not find a version that satisfies the requirement json (from versio
ns: none)
ERROR: No matching distribution found for json
paritosh@paritosh-ASUS-TUF-Gaming-F15-FX506LH-FX566LH:~/EGR 598 (CAV)/safety_met
rics_on_simulation-J3237$ py-trees=0.8.3
Traceback (most recent call last):
  File "/usr/lib/command-not-found", line 28, in <module>
    from CommandNotFound import CommandNotFound
  File "/usr/lib/python3/dist-packages/CommandNotFound/CommandNotFound.py", line
 19, in <module>
    from CommandNotFound.db.db import SqliteDatabase
  File "/usr/lib/python3/dist-packages/CommandNotFound/db/db.py", line 5, in <mo
dule>
    import apt_pkg
ModuleNotFoundError: No module named 'apt_pkg'
paritosh@paritosh-ASUS-TUF-Gaming-F15-FX506LH-FX566LH:~/EGR 598 (CAV)/safety_met
rics_on_simulation-J3237$
```

```
aravind@aravind-HP-Pavilion-Gaming-Laptop-15-dk0xxx: ~/D...
scenarios/LVA_10.xosc --sync
Traceback (most recent call last):
  File "scenario_runner/scenario_runner.py", line 607, in main
    result = scenario_runner.run()
  File "scenario_runner/scenario_runner.py", line 507, in run
    result = self._run_openscenario()
  File "scenario_runner/scenario_runner.py", line 495, in _run_openscenario
    config = OpenScenarioConfiguration(self._args.openscenario, self.client, ope
nscenario_params)
  File "/home/aravind/Downloads/safety_metrics_on_simulation-J3237/scenario_runn
er/srunner/scenarioconfigs/openscenario_configuration.py", line 60, in __init__
    self._parse_openscenario_configuration()
  File "/home/aravind/Downloads/safety_metrics_on_simulation-J3237/scenario_runn
er/srunner/scenarioconfigs/openscenario_configuration.py", line 91, in _parse_op
enscenario_configuration
    self._set_carla_town()
  File "/home/aravind/Downloads/safety_metrics_on_simulation-J3237/scenario_runn
er/srunner/scenarioconfigs/openscenario_configuration.py", line 170, in _set_car
la_town
    world = self.client.get_world()
RuntimeError: time-out of 10000ms while waiting for the simulator, make sure the
 simulator is ready and connected to 127.0.0.1:2000
aravind@aravind-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~/Downloads/safety_metrics_o
n_simulation-J3237$
```


```
aravind@aravind-HP-Pavilion-Gaming-Laptop-15-dk0xxx: ~/D...
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la_town
    world = self.client.get_world()
RuntimeError: time-out of 10000ms while waiting for the simulator, make sure the
 simulator is ready and connected to 127.0.0.1:2000
aravind@aravind-HP-Pavilion-Gaming-Laptop-15-dk0xxx:~/Downloads/safety_metrics_o
n_simulation-J3237$
```

Issues and Challenges (Contd..)

- Installation and setting up of CARLA and Scenario Runner took more time than expected as our onboarding document missed some key controller files such as agent.py and misc.py.
- Setting up paths of CARLA and Scenario Runner folders in bashrc file.
- Locating the coordinates of vehicles posed a great challenge as the Xodr viewer doesn't exactly give you the proper annotation of the coordinates.
- Ubuntu crashes(in my case) can be tedious.
- Working with the rss_roaming_agent.py file is also difficult if you are not familiar with understanding the contents.
- Graphic drivers can give you some errors if you don't update them regularly.
- Carla crashes when the scenario is run multiple times.

Steps to overcome these issues and challenges

- Make sure you properly install your Ubuntu (either version 20 or 22) properly.
- Graphic drivers are updated regularly.
- You need to have Python version 3.7.
- Carla and Scenario Runner are of the same version.
- Carla and Scenario Runner path mentioned in bashrc file should be correct.
- Installation of all .py, xosc, and other files must be ensured before working with the scenario development.

Deliverables

- A 20-page report on the project.
- Documentation of scenarios created.
- Final Presentation.

Vote of Thanks

- Dr. Jeffrey Wishart
- Mr. Varun Jammula
- Shujauddin Rahimi (Project Sponsor)
- Pranav
- Paritosh

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- Video courtesy (my phone).
- Error images from discord.

Thank You

Q & A