

Data-Driven Validation for Autonomous Vehicle



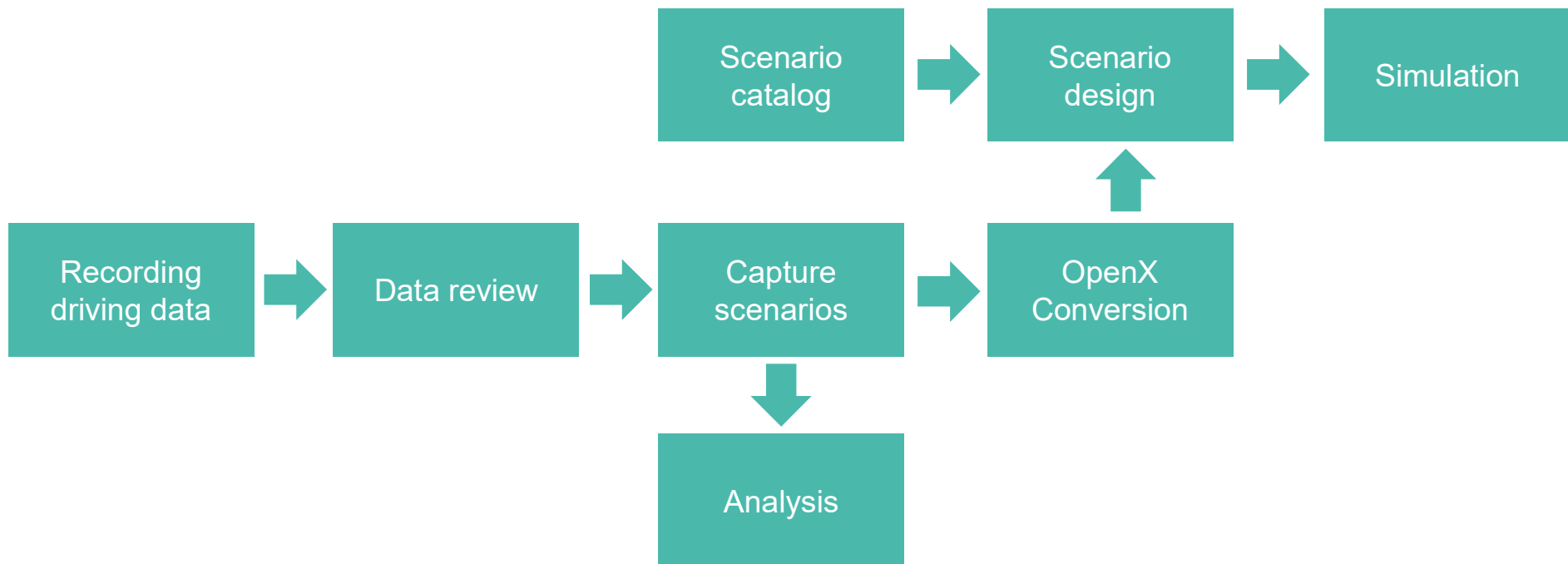
Hongseok Lee

2023/09/12



Association for Standardization of
Automation and Measuring Systems

Process

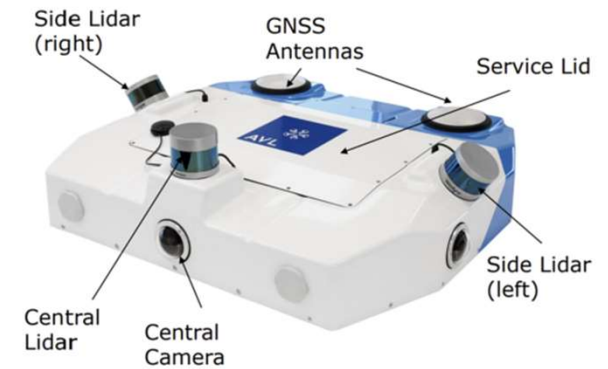


Recording driving data

Data collection: 1 Tera byte / hour



- Center LiDAR**
Velodyne Ultra Puck VLP-32c
- Side LiDAR (2x)**
Velodyne Ultra Puck VLP-16
- Front Camera**
Dalsa GENIE Nano-C4030
- Side & Rear Camera (3x)**
Dalsa GENIE Nano-C2020
- GNSS System**
OxTS RT3003 (GPS/IMU)
Novatel GNSS-802 (Antenna)



Recording driving data


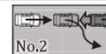



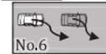
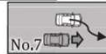

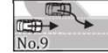



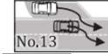
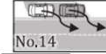

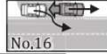

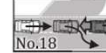

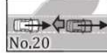

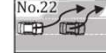


Status



Capture scenarios from the recordings

Why capture?

1) To analysis specific maneuvering behavior(UNECE R157)

			Surrounding traffic participants' location and motion			
	Road sector	Subject-vehicle behaviour	Cut in	Cut out	Acceleration	Deceleration (Stop)
Road sector and subject-vehicle behaviour	Main roadway	Lane keep	 No.1	 No.2	 No.3	 No.4
		Lane change	 No.5	 No.6	 No.7	 No.8
	Merge zone	Lane keep	 No.9	 No.10	 No.11	 No.12
		Lane change	 No.13	 No.14	 No.15	 No.16
	Departure zone	Lane keep	 No.17	 No.18	 No.19	 No.20
		Lane change	 No.21	 No.22	 No.23	 No.24

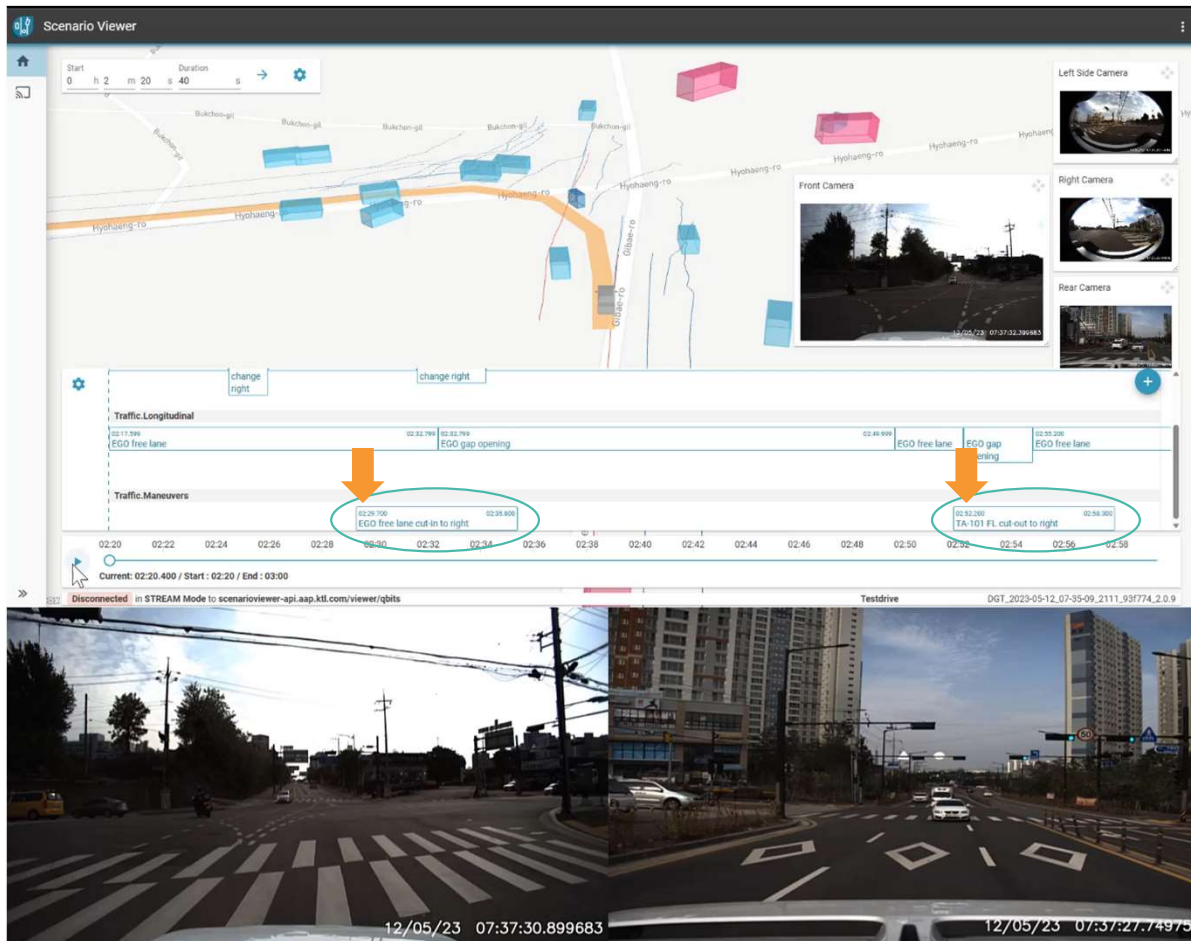
2) To transfer the actual driving situation to the simulator (by converting it into a scenario)

Problem

Capturing scenarios from the recording manually needs too much time.

It needs to be automated.

Capture scenarios



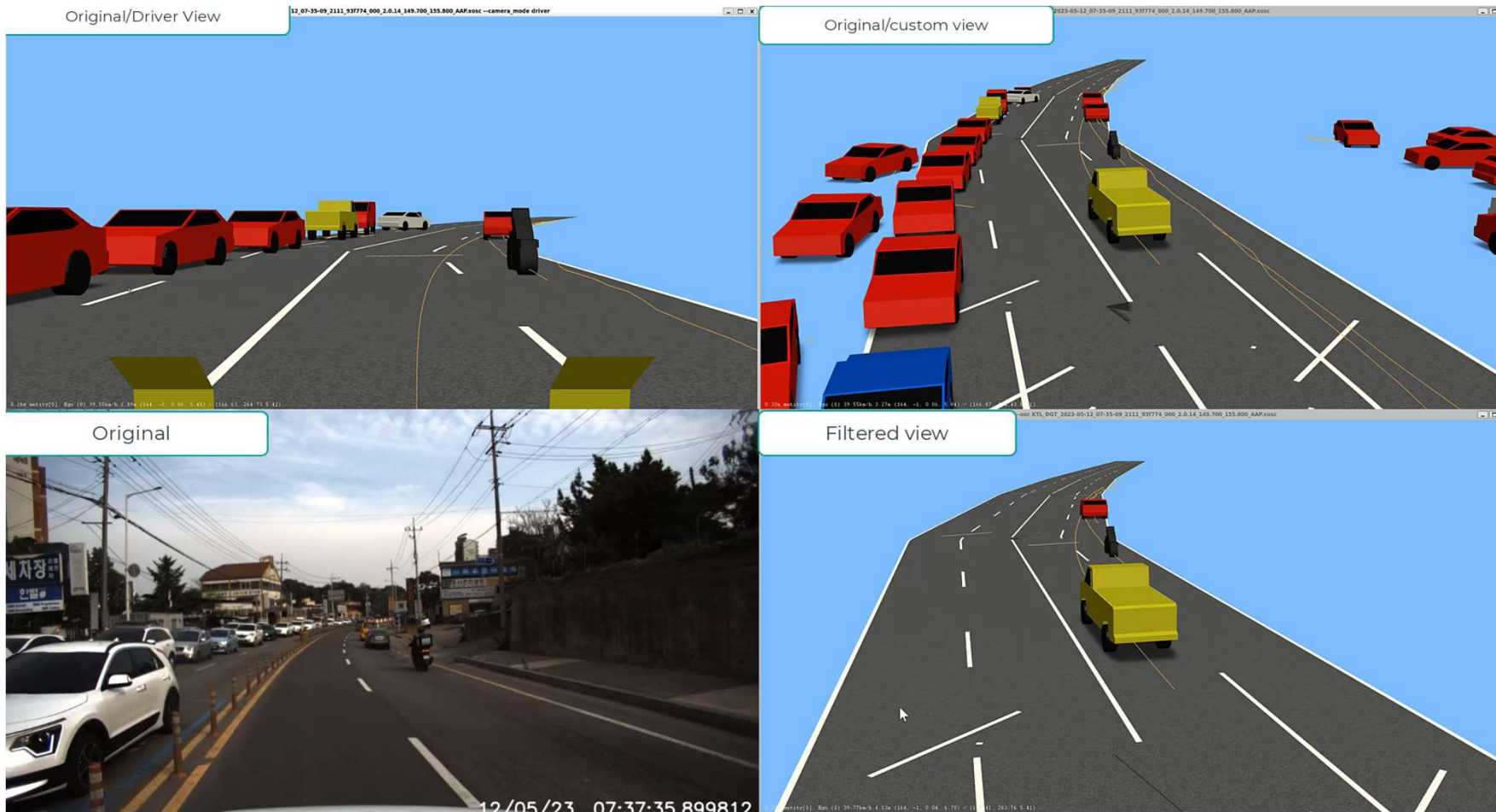
Captured scenarios

- 1) Ego free lane cut-in right
- 2) TA-101 FL cut-out to right



Simulation

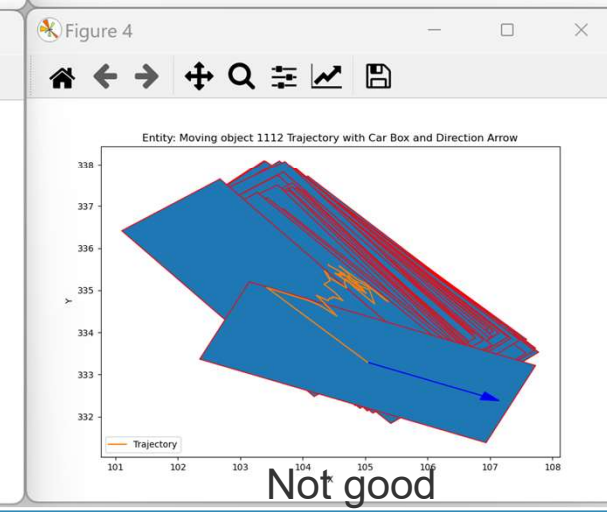
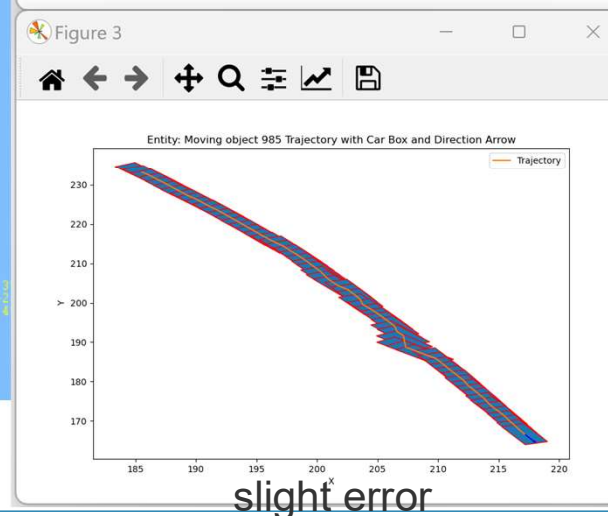
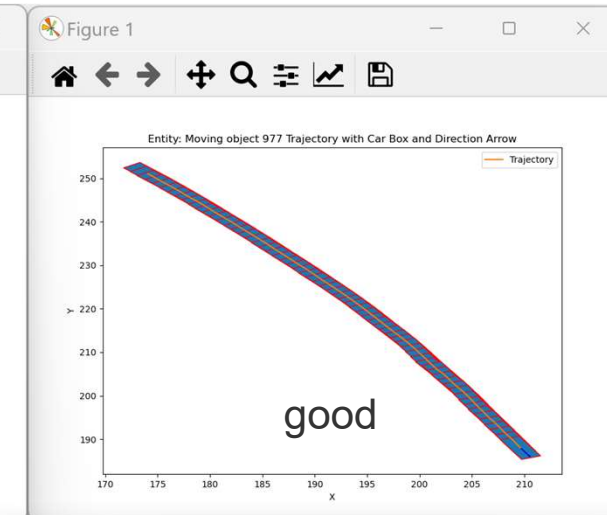
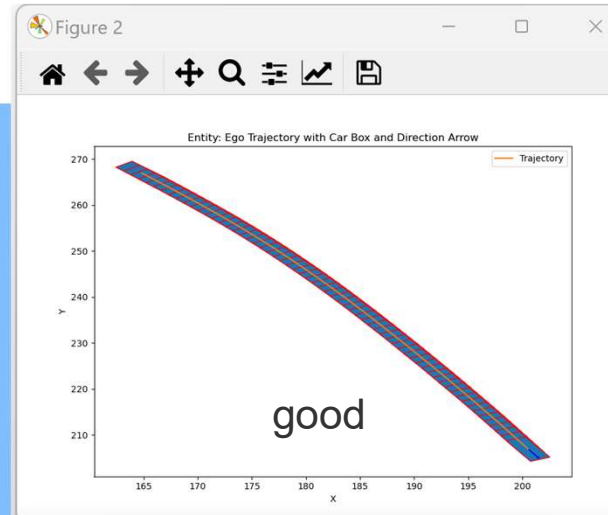
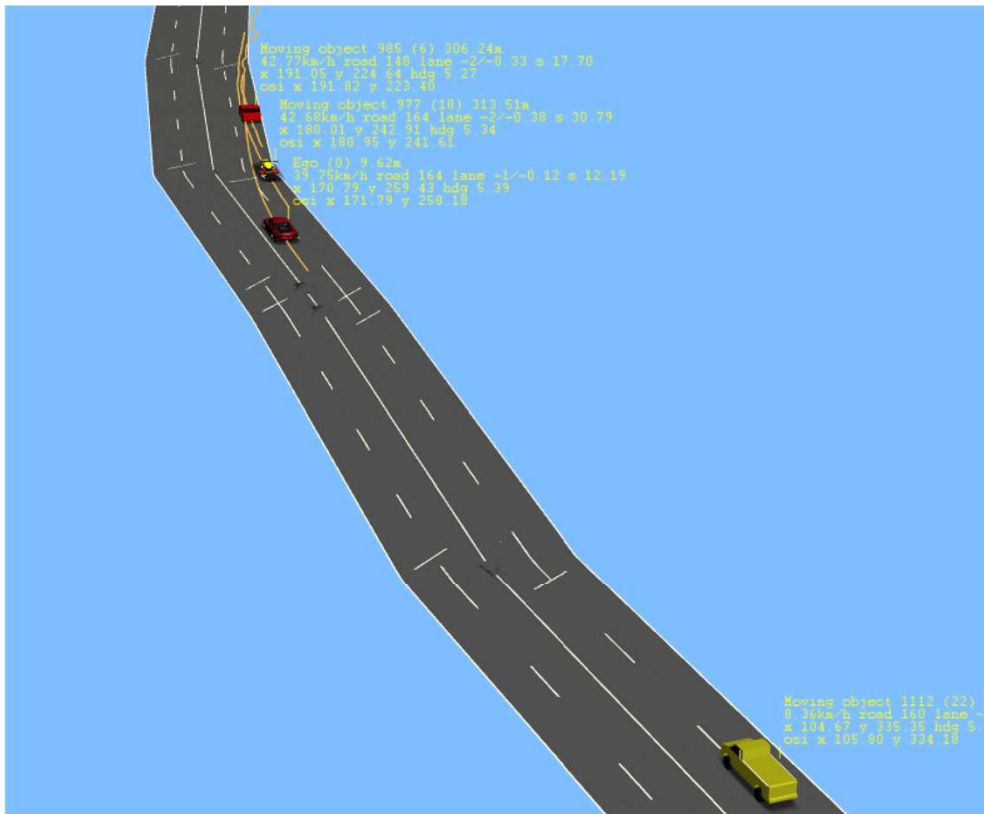
1) Ego free lane cut-in right



<https://youtu.be/LUk4rvxrBp0>

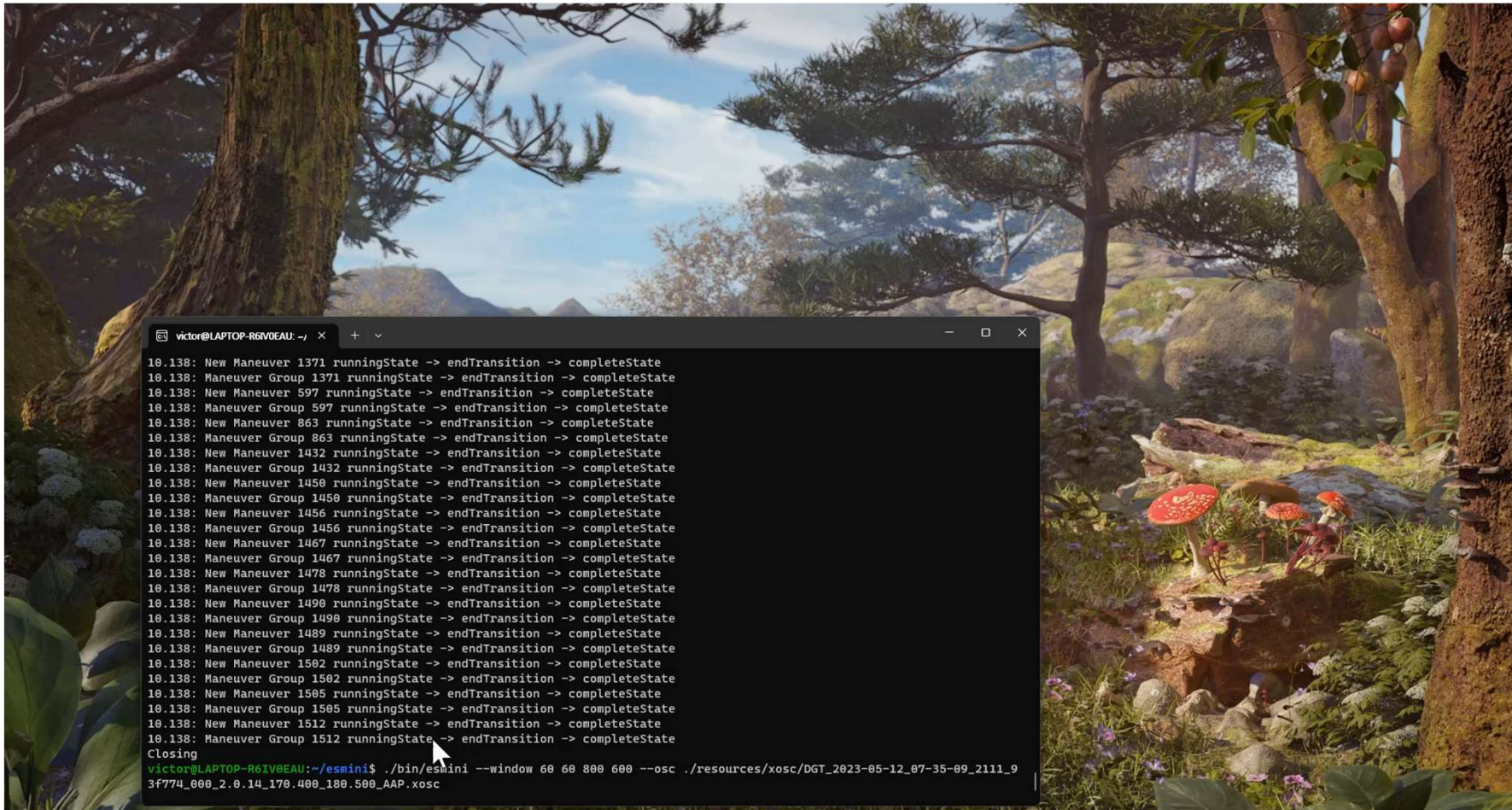
Simulation

1) Ego free lane cut-in right



Simulation



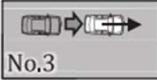
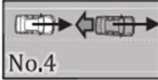
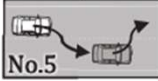
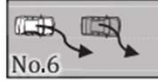
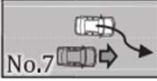
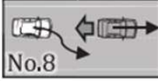
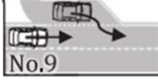






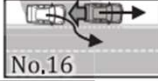





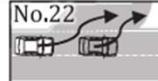
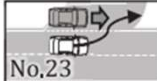

2) TA-101 FL cut-out to right



https://youtu.be/rNpDgUTt_Mc

Future work

Analysis specific maneuvering behavior

			Surrounding traffic participants' location and motion							
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