TOYOTA TSUSHO NEXTY ELECTRONICS (THAILAND) CO., LTD.

TOYOTA TSUSHO DENSO ELECTRONICS (THAILAND) Co., Ltd.

TESA

University Collaboration and Technology Promotion on Digital Twins Trend in Automotive Industry

CARLA CONTEST 2023

Background & Purpose

Currently, the automotive industry is moving toward the mobility innovation of the future which can refer to "CASE" framework (Connected, Autonomous, Sharing, Electric). The Digital Twins technology is one of the keys technology for this innovation.

Thus, the automotive requirement is more complex as well as testing scenario. In order to fulfill these requirements, the system & software development method has to be evolved and "Digital Twins" is one the key technology for this evolution in automotive industry.

We aim to promote digital twins trend of automotive software development industry and encourage university student to build career in automotive software development industry in Thailand.

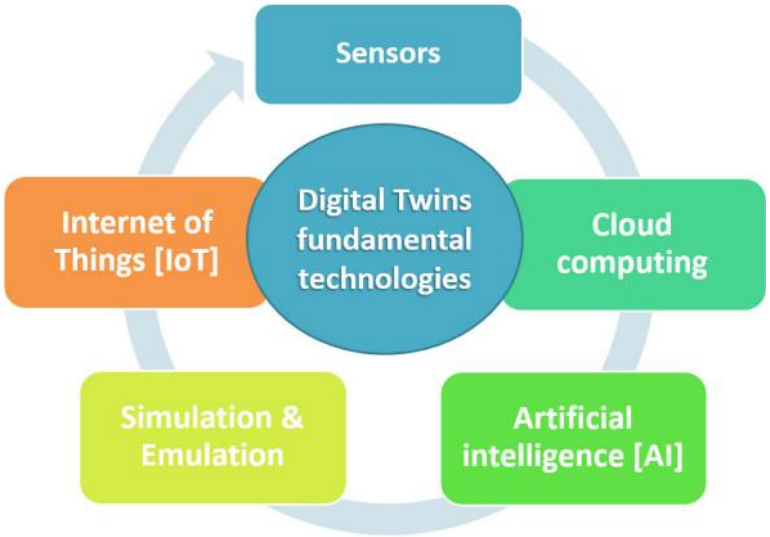

Figure 1. Digital twin fundamental technologies

Reference: https://www.mdpi.com/2571-5577/5/4/65/htm

What is CARLA?

CARLA is an open-source simulator for autonomous driving research that provides open digital assets, flexible specification of sensor suites and environmental conditions to support development, training, and validation of autonomous driving systems.

This virtual simulator is also part of digital twins concept. We are going to conduct the workshop in order to create own autonomous driving control software and run simulation on CARLA environment.

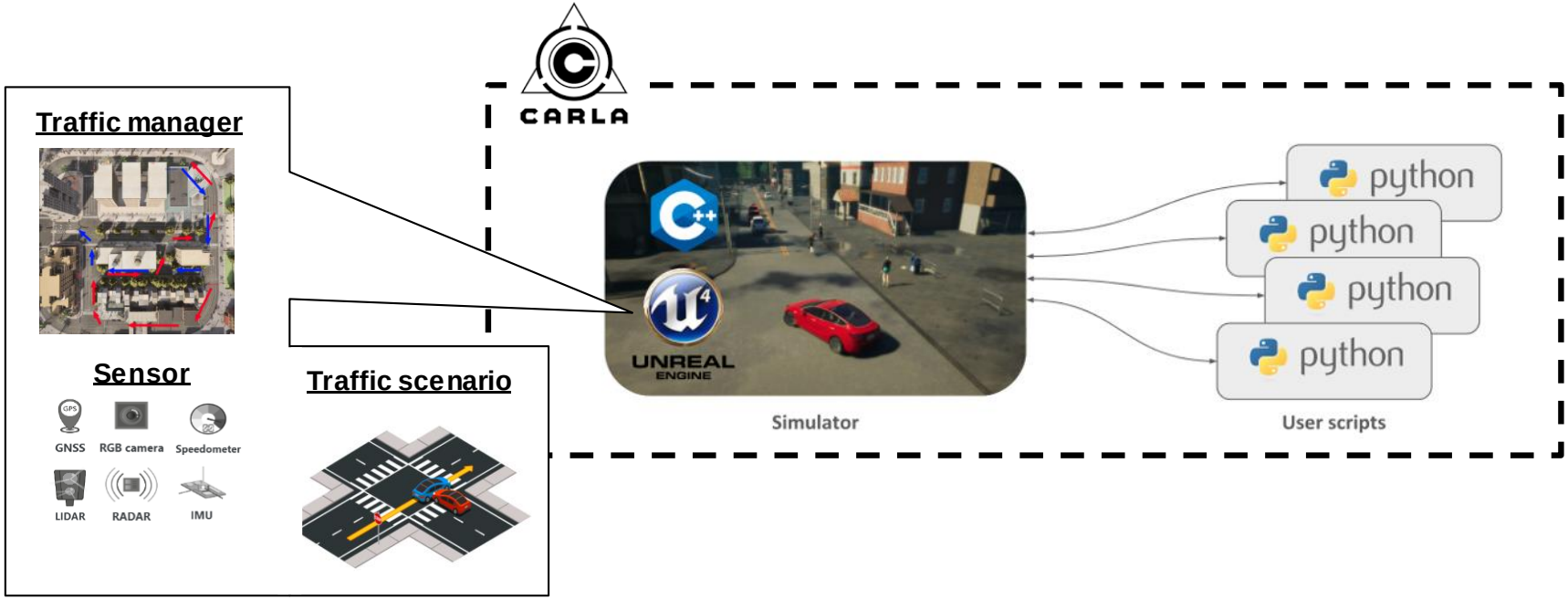

Figure 2. Overall CARLA simulator

Reference: https://carla.readthedocs.io/en/latest/start_introduction

Activity Concept

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❑ CARLA Workshop & Autonomous Driving Contest

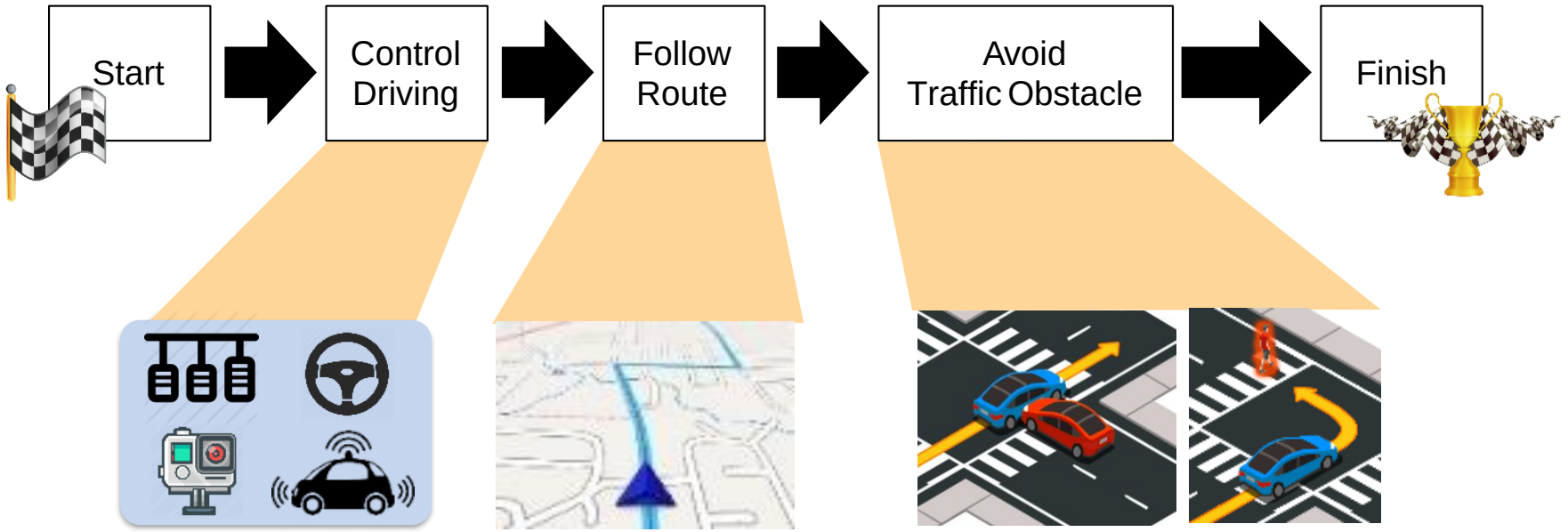

Figure 3. CARLA autonomous driving contest

- Control your car to drive follows the specified route to the finish line.
- Control your car to avoid traffic obstacle along the road.
- The fastest and safest driver will win the prize.

Activity Overview

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❑ Main Activities

① Registration

- Open online registration from today ~ 24th Feb
- Teams member not exceed 4 persons

② Event Introduction (Online session during 27th Feb ~ 5th Mar)

- Explained basic technology and concept related to contest event for student to prepare before joining the Event Day. (e.g. Digital Twins, autonomous driving concept and CARLA application)

③ Event Day (2 Days on-site during 11th ~ 12th Mar)

- **Lecture** - Learning session about sensors usage and autonomous driving control
- **Workshop** - Hand on session to apply knowledge of sensors usage and autonomous driving control by using CARLA simulator environment.
- **Contest** - Modify autonomous driving control software to overcome traffic situation and conduct simulation to find the best result as the winner of the event.

Lecture

Workshop

Contest

Prize

Items	Prize
Racing Winner	1st : 50,000 THB 2nd : 25,000 THB 3rd : 10,000 THB
Special Prize (Best Safety Result)	1 special prize: 10,000 THB

Registration

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https://forms.gle/MJKXrTsgDLw2Pive6

Q&A

https://line.me/ti/g2/aqfh0bv4EIGe6KGtk6rFnPuvhvHKQvX44wPzOw?utm_source=invitation&utm_medium=link_copy&utm_campaign=default

Appendix

“CASE” Framework

Connected – Vehicle communicate with other vehicle, people and infrastructure

Autonomous – Autonomous/automated self-driving vehicle

Sharing – Mobility sharing of transportation service and resources among users

Electric – Electric vehicle which is driven by electric motor

Contest Environment

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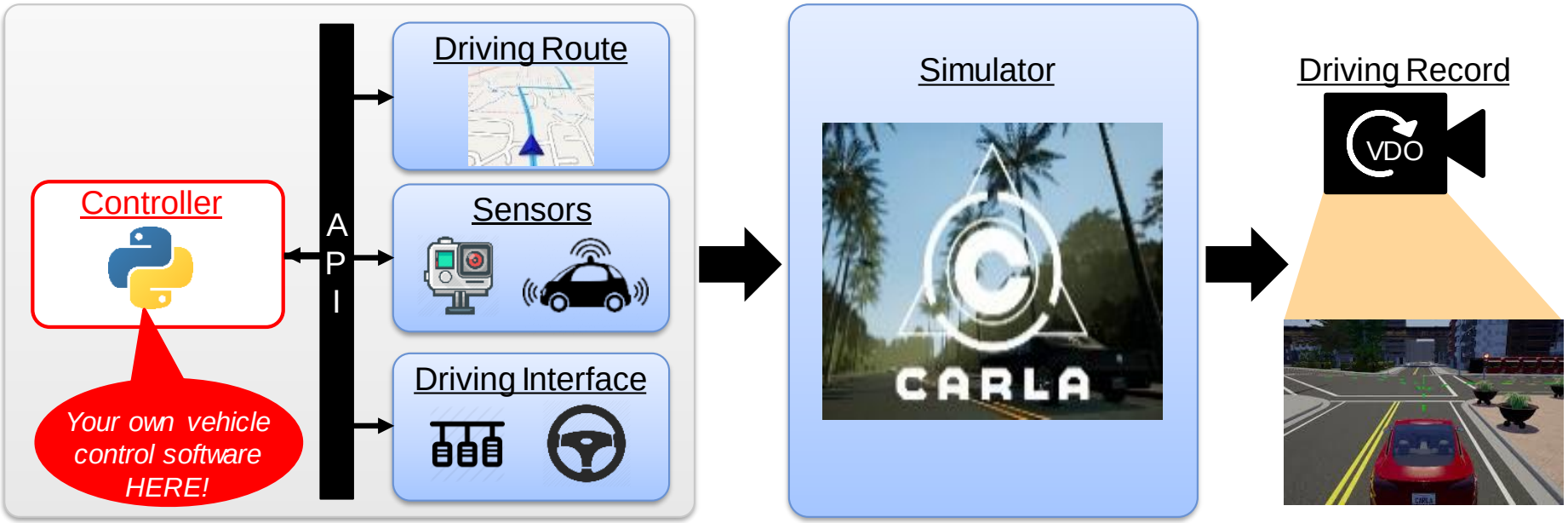
Develop by Contestant
Prepared by Contest Committee



Sample Route and Obstacle

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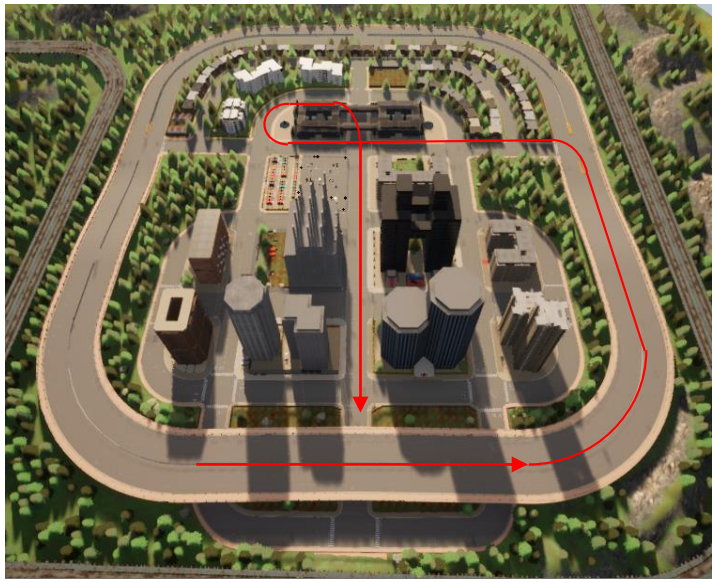
❑ Sample Driving Route



❑ Sample Traffic Obstacle

Situation 1: Lane changing to avoid blocking the road

Situation 2: Crossing negotiation at an unsignalize intersection.

Situation 3: Obstacle avoidance with prior action, perform an emergency brake or an avoidance.