AuE-8930

Computing & Simulation for Autonomy

Capstone Project

Project Title:

A Modular and Parallelizable Multi-Agent Reinforcement Learning Framework for Cooperative and Competitive Autonomous Vehicles

Team Members:

1. Chinmay Samak
2. Tanmay Samak

Objectives & Responsibilities:

- Set up high-fidelity 3D simulation platform based on real-world vehicle/environment representations (real2sim transfer) [Tanmay]
- Set up intelligent agent/environment parallelization framework for accelerating RL training [Tanmay]
- Formulate multi-agent reinforcement learning (MARL) problems for: [Tanmay]
    - Cooperative MARL (e.g., safe intersection traversal)
    - Competitive MARL (e.g., head-to-head autonomous racing)
- Implement the formulated deep reinforcement learning (DRL) pipeline and conduct parallelized training using local/cloud high-performance computing (HPC) resources [Chinmay]
- Deploy and analyze the trained policies and procedures to comment on the aspects of "computing and simulation for autonomy" [Chinmay]
- Potentially (if time permits) demonstrate simulation to reality (sim2real) transition of the trained policies in a digital-twin framework [Chinmay]

Note: *The name in square bracket indicates primary responsibility and NOT contribution. Both members will work together and contribute equally to this project.*