RM1 – AI Racer

Autonomous Cars using Neural Networks and Computer Vision

Industry Partner: Robotics Masters Limited
Location of Partner: North Sydney & Online/Remote
URL for Partner: https://roboticsmasters.co
Contact Person:
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General field/discipline: AI, Computer Vision, Image Processing, Simulation, Autonomous Cars.

Specific requirements/skills:

This project is for students who want a serious real-world industry experience. They will need to be self-motivated and goal focused, with a strong Python background and an interest in AI. Experience working with AI, deep neural networks, image processing or big data is preferred but not required.

TensorFlow/Keras, Python, Unity

Project Outline:

Autonomous Vehicle Tech involves many different aspects of Software, Computer Vision, AI, Hardware, Electrical, VR, AR, IoT, and embedded computing.

If you are interested in being prepared for industry jobs the best place to learn the methods is to get involved and start experimenting with the technologies by seeking out where the most community support and development is happening.

The goal of this project is for students to walk away with a serious understanding of Artificial Intelligence (AI) technologies associated with autonomous vehicles, so they can develop and apply them to real-world roles post university.

For this project we will be asking students to implement both a real world and simulated world traffic sign detection algorithms using TensorFlow 2.

The Project – Implement Sign Detection using TensorFlow and Computer Vision

This is a continuation of work completed by Capstone Students last year.

We are moving closer to autonomous cars and drones every day and finding new ways of using AI in the real world in other applications (fighting pandemics, object classification).

Students will be looking at existing techniques and creating new software solutions to detect several pre-defined traffic signs using a combination of Neural Networks (TensorFlow) and Computer Vision (OpenCV). Teams will look at different technologies and come up with a solution that is reliable and efficient.   This will involve data collection and cleaning. TensorFlow 2 is recognised as one of the preferred libraries for completing AI tasks.

Teams will be using the Donkey Car Platform to test their algorithms and solutions on Jetson Nanos. The Donkey Car Platform includes both a physical hardware stack and a simulator built using Unity. Students are expected to initially test solutions in Unity, adding new parts as needed and later on the physical hardware.

At the end of the project, the teams will compete in a challenge course and prove that their algorithms are effective.

Students will work directly with the industry partner and be able to gain valuable industry knowledge. Clients have more than 10 years of Capstone Project experience working with Sydney University.

Teams: 2+

Reference Material/Links

- **Donkey Car:** https://github.com/autorope/DonkeyCar
- **Simulator**: https://github.com/tawnkramer/gym-donkeycar
- **Simulator (Unity):** https://github.com/tawnkramer/sdsandbox
- **TensorFlow Classification:** https://www.tensorflow.org/tutorials/keras/classification
- **OpenCV**: https://opencv.org/