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Faculty of Engineering
Summer Research Program 2023-2024

Project Title: AI Flow Control for Ground Based Vehicles (Sensing Systems)

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Objective

This project applies Deep Reinforcement Learning (DRL) using Neural Networks to connect the flow state of simplified ground vehicle geometries to an active flow controller. The aim is to regulate aerodynamic parameters such as vortex shedding, wake formation, and ultimately, the drag. Active flow control is an emerging method with the potential to reduce drag on vehicles by a larger margin than previously researched passive devices. This technique applies a local boundary, pressure or velocity change, subsequently manipulating the bulk surrounding flow. With the rapid development of AI and machine learning algorithms, an additional opportunity is presented with application to active flow control. Real-time monitoring of the flow can allow AI systems to continuously manipulate the flow, dynamically optimising performance. Through better understanding of active flow control around these simplified geometries, novel flow design features can reduce drag on ground transport vehicles helping create a more sustainable future.

Project Details

This team-based research project will be conducted within the Monash Wind Tunnel Research Platform. Further upgrades to our flow control systems are required to include a machine learning algorithm for simplified ground vehicle geometries. A combination of hands-on experimental work, engineering design, software development and data analysis will be essential to the project's completion. ***This project will particularly focus on the development of sensing systems and the related data analysis resultant from wind tunnel measurements of an AI based flow control system.***

Prerequisites

To be considered you must have completed at least 96 credit points of an undergraduate degree (usually 2 years) and have a weighted average mark of 80% or higher.