MIE498H1: Research Thesis 2023-2024

Supervisor	Birsen Donmez
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Number of Positions	1
Open to	Undergraduate Mechanical and Industrial Engineering Students
Term Offered	Winter (S)
Research Area	Human Factors
Research Topic	Building Driver Drowsiness Detection and Intervention Systems

Project Description

Drowsiness while driving can lead to crashes with serious injuries and fatalities. With the advancement of sensor and computational technology, driver monitoring systems (DMS) are becoming a popular method of tracking driver sleepiness levels and alerting them. DMS studies have shown that driver drowsiness can be detected using physiological signals (e.g., heart rate, respiration rate), behavioural data (e.g., eye closure, yawning), and driving data (e.g., speed, lane deviation). However, there is limited research on the effectiveness of driver drowsiness interventions that use such DMS. The objective of this research is to design and evaluate an intervention system for driver drowsiness in a driving simulator experiment. The designed intervention will first detect drowsiness using eye-trackers and observer ratings, then will initiate an intervention to alert the driver through warnings, cognitive tasks, and driving automation. Participants will be invited to this driving simulator experiment, and their physiological (e.g., heart rate), behavioural (e.g., eye-tracking), and driving data (e.g., speed) will be collected. The participants will evaluate their interactions with the intervention system. The findings of this study will contribute to the advancement of driving safety research and inform the design of DMS and intervention systems in real cars. The student is expected to assist with pilot testing of the designed system and data collection with human participants and to assist with data cleaning and analysis. The student is also expected to contribute to a journal paper submission as the final deliverable and will give a lab presentation at the end of the term. The due dates are the last day of lectures. The anticipated time commitment of this project will be 8-9 hours/week.

Additional Information	N/A
Application Instructions	Send an email indicating your interest together with your CV and your latest transcript to donmez@mie.utoronto.ca and sayas@mie.utoronto.ca

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