Mechanical & Industrial Engineering
UNIVERSITY OF TORONTO

MIE498H1: Research Thesis 2025-2026

Supervisor	Andreas Mandelis
Supervisor email	mandelis@mie.utoronto.ca
Number of Positions	2
Open to	Mechanical and Industrial Engineering Students
Term Offered	Full-year
Research Area	Applied Machine Learning Thermal sciences and imaging
Research Topic	Thermal emission waveform filtering using Autoencoders and Neural Networks

Project Description

This project aims to develop and optimize advanced signal processing techniques for denoising and enhancing thermal emission waveforms using deep learning models, particularly autoencoders and neural networks. (photo) thermal signals captured from infrared cameras often suffer from noise and signal degradation, especially at longer depths. The goal is to explore neural architectures that can clean the thermal waveform while preserving important thermal features. In this study you will 1. Learn the fundamentals of thermal infrared imaging and signal processing 2. Implement and train deep learning methods in Python 3. Evaluate results using quantitative metrics such as SNR, PSNR, etc.

Additional Information	Requirements: Basic programming in Python, familiarity with machine learning and an interest in imaging or signal processing.
Application Instructions	Submit unofficial transcript to Professor Andreas Mandelis (mandelis@mie.utoronto.ca)