Information about the Applicant

Henry Leung is the Schulich Industrial Chair Professor of the Department of Electrical and Software Engineering of the University of Calgary. Before joining the University of Calgary, he was with the Department of National Defence (DND) of Canada as a defence scientist. His current research interests include information fusion, machine learning, IoT, data analytics, robotics, signal, and image processing. He has published more than 400 journal papers and 300 conference papers. He is an associate editor of various journals such as Scientific Reports, IEEE Emerging Topics on Circuits and Systems, IEEE System, Man, Cybernetic Letters, and Journal of Sensors. He is the editor of the Springer book series on "Information Fusion and Data Science". He is a Fellow of IEEE, SPIE, Engineering Institute of Canada (EIC), Canadian Academy of Engineering (CAE) and Royal Society of Canada (RSC)

Tutorials Given by the Applicant (Last 5 Years)

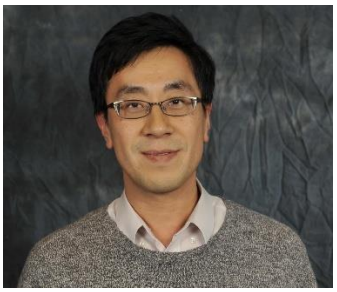
1. Henry Leung and Hongqi Zhang, "Sensor Transform Using Deep Learning: From Technologies to Applications," IEEE Sensors Conference, Vancouver, Canada 2025
2. Henry Leung, "Low Power IoT and Edge AI," IEEE Instrumentation and Measurement Conference (I2MTC), Chemnitz, Germany 2025
3. Henry Leung, "Predictive 3D Perception Using Deep Learning," IEEE Sensors Conference 2024, Kobe, Japan
4. Henry Leung and Gayan Brahmanage. "Predictive 3D Perception for Intelligent Vehicles," IEEE Intelligent Transportation Systems Conference (ITSC), Edmonton, Canada 2024
5. Henry Leung and Nan Xie, "Machine Learning for Low Power IoT Sensors," IEEE System, Man and Cybernetics, Maui, Hawaii, USA 2023
6. Henry Leung, "Deep Learning in Remote Sensing: Algorithms and Applications," ISPRS Geospatial Week, Cairo, Egypt 2023.
7. Henry Leung and Nan Xie, "Low Power Sensors and Machine Learning for Industrial IoT," IEEE Sensors Conference, Dallas, USA 2022

Keynotes Given by the Applicant (Last 5 Years)

1. RGBD and RGB predictive depth (RGB-PD) simultaneous localization and mapping for autonomous vehicles, Keynote Speaker, 11th International Conference on Systems and Informatics, Shanghai, China Dec 2025
2. 3D Perception for Autonomous Vehicles, Keynote Speaker, CAU International Metaverse Festival, Nov 2025
3. RGBD and RGB predictive depth (RGB-PD) simultaneous localization and mapping for autonomous vehicles, Keynote Speaker, 2nd International Conference on Computing, Machine Learning and Data Science, Xiamen, China April 2025
4. 3D computer vison with applications to autonomous vehicles, Keynote Speaker, IEEE Smart World Congress 2024, Fiji 2024/12 – 2024/12
5. RGBD and RGB predictive depth (PD) simultaneous localization and mapping for autonomous vehicles, Keynote Speaker, 16th International Conference on Signal Processing Systems (ICSPS 2024), Kunming, China 2024/11 – 2024/11

6. Predictive 3D perception using deep learning, Tutorial Speaker, IEEE Sensors Conference 2024, Kobe, Japan 2024/10 – 2024/10
7. Predictive 3D perception for intelligent vehicles, Tutorial Speaker, IEEE Intelligent Transportation Systems Conference (ITSC), Edmonton, Canada 2024/9 – 2024/9
8. 3D Computer vision with applications to autonomous vehicles, Keynote Speaker, 8th International Conference on Digital Signal Processing (ICDSP 2024), Hangzhou, China, 2024/2 – 2024/2
9. An uncertainty aware processing framework for HMI Systems, Keynote Speaker, 15th International Conference on Intelligent Human Machine Interaction, Daegu, Korea 2023/11- 2023/11
10. Machine learning for low power IoT sensors, Tutorial Speaker, IEEE Conference on Systems, Man, and Cybernetics, Maui, Hawaii, USA, 2023/10-2023/10
11. Deep learning in remote sensing: algorithms and applications, Tutorial Speaker, ISPRS Geospatial Week 2023, Cairo, Egypt, 2023/9-2023/9
12. UAV object detection and tracking using deep learning, 10th International Conference on Control, Dynamic Systems and Robotics (CDSR23), Keynote Speaker, Ottawa, Canada 2023/6 – 2023/6
13. 3D perception for autonomous vehicles, 2nd International Conference on Mechatronics and Mechanical Engineering (ICMME2023), Keynote Speaker, Kaifeng, China 2023/5-2023/5
14. 3D computer vision with applications to autonomous vehicles, The 7th International Conference on Digital Signal Processing (ICDSP2023), Keynote Speaker, Chengdu, China 2023/2-2023/2
15. 3D video analytic for autonomous driving, 14th International Conference on Signal Processing Systems, Keynote Speaker, Zhenjiang, China Nov 2022
16. Low power sensors and machine learning for industrial IoT, Tutorial Speaker, IEEE Sensors 2022, Dallas, Texas, USA 2022/10-2022/10
17. RGB-D image processing for autonomous driving, The 6th International Conference on Computer Graphics and Digital Image Processing (CGDIP), Keynote Speaker, Shanghai, China, July 2022
18. Deep learning-based signal processing for video analytics, The 6th International Conference on Communication, Image, and Signal Processing (CCISP2021), Chengdu, China, Keynote Speaker, Nov 2021
19. Information fusion and decision support for autonomous systems, IEEE International Conference on Autonomous Systems, Montreal, Canada, Keynote Speaker, Aug 2021
20. Information fusion for autonomous systems and IoT, Huawei Workshop on Data Fusion and IoT, Toronto, Canada, Keynote Speaker, July 2021
21. Integrated information fusion and data analytics, International on Workshop on Intelligent Navigation and Advanced Information Fusion Technology, Harbin, China, Keynote Speaker, 2020 (online)
22. Localization, navigation and tracking for autonomous vehicles, International Conference on Aerospace Systems Science and Engineering, Shanghai, China, Keynote Speaker, 2020 (online)

Picture



Lecture 1

Title
Low Power IoT Sensors and Machine Learning

Abstract
The Internet of Things (IoT) paradigm enables smart objects to communicate, this allows us to interact with our environment in a smart way. It is predicted that low power and ultra-low power sensors will make up the majority of IoT devices by 2030. To leverage the full potential of IoT applications, machine learning (ML) techniques are required to analyze sensor measurements on the edge for real-time analytics, lower latency, and less privacy concern. In this tutorial, we will first give a comprehensive overview of low power sensors and compare various IoT communication protocols. We will cover the end-to-end data integration steps from sensors to the loud data platform using real life award-winning smart cities examples. This tutorial will review various methods for applying ML and deep learning to resource-limited low power sensors. Different hardware and software options will be discussed including bio-inspired chipsets, traditional centralized learning, federated ML, pruning and TinyML for edge computing. We will demonstrate the latest design of our acoustic sensor with edge ML capability for real time sound classification. Development trend and future research opportunities for edge AI and IoT will also be presented.

Lecture 2

Title
Predictive 3D Vision with Applications to Intelligent Vehicles

Abstract

3D perception, the ability to perceive depth and spatial relationships in the world, is fundamental to human cognition and holds immense potential across various sensing domains including robots and intelligent vehicles. The emergence of deep learning-based techniques offers a compelling alternative, potentially enabling 3D vision from monocular camera inputs without additional hardware modifications.

This tutorial will delve into the principles and applications of traditional 3D sensing and computer vision methods. Subsequently, we will introduce predictive 3D sensing based on 2D cameras that use machine learning to generate 3D sensing, covering fundamental concepts, common architectures, and training data requirements. We will use intelligent vehicles to illustrate the predictive 3D vision concept including simultaneous localization and mapping (SLAM) and obstacle detection for illustrations. Issues such as compatibility with monocular cameras and seamless integration into existing sensor systems without requiring additional hardware modifications will also be discussed in this tutorial.

Statement about availability for delivering lectures.

My university has provided substantial and sustained support for my research activities, particularly my engagement with international organizations through invited lectures and collaborations. I was awarded a research chair that formally reduced my teaching responsibilities to one course per year, enabling a stronger focus on research. To further support my extensive international travel, a co-instructor has been continuously assigned to my course teaching over the past five years. In addition, my administrative duties have been intentionally kept to a minimum, allowing me to dedicate the majority of my time to research, international collaboration, and scholarly leadership.