UNIVERSITY OF ALBERTA

FACULTY OF ENGINEERING

Networked Optimization, Diagnosis, and Estimation (NODE) Lab

NODE Laboratory

RESEARCH TOPICS

The current research programs aim to advance safe decision-making and motion planning for cyber-physical systems and shared human-autonomy controls, with a focus on collaborative robotics, intelligent mobility, and autonomous manufacturing systems, and include **fundamental research**, **knowledge development**, and **technology transfer** to International/Canadian robotic, manufacturing, and intelligent transportation industries. The NODE lab has developed solutions built on:

- Autonomous navigation
- Networked control systems (NCS) interacting with human
- AI-enabled augmented perception for exploration and motion planning under uncertainty

ON-GOING RESEARCH ACTIVITIES

- Resilient motion planning in unstructured environments
- Augmented perception for intelligent systems (for mobility and manufacturing)
- Distributed sensor networks for state estimation and monitoring
- Human-autonomy shared control
- Learning-aided controls and robot learning

APPLICATIONS

- Intelligent mobility and logistics
- Healthcare and living labs
- Natural resources and fabrication
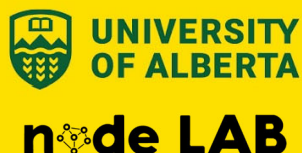
EMERGING RESEARCH PRIORITIES

- Exploration and surveillance
- Physics-informed learning for NCS
- Learning-aided decision making

PRINCIPAL INVE STIGATOR

Ehsan Hashemi, PhD, PEng, SMIEEE, is currently an Associate Professor of Mechanical Engineering at the University of Alberta. He is an expert in autonomous navigation, networked robotics, and human-autonomy interaction, and has large-scale projects with Canadian and International industry partners on automated driving system, networked control systems, robot perception, and explainable AI with several technology transfers.

PARTNERS

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