

PROJECT DETAILS

Project Title:

Latency-Resilient Predictive Shared Autonomy for AI-Augmented Remote Vehicle Teleoperation.

Project Summary:

High communication latency significantly degrades safety and performance in remote vehicle teleoperation. This PhD will investigate whether predictive world modelling combined with adaptive shared autonomy can measurably improve operator performance under variable latency conditions. This project will develop a next-generation AI-augmented teleoperation framework that integrates long-horizon video prediction, digital twin-based state estimation, and human-in-the-loop adaptive shared autonomy to overcome high-latency (1000-2000ms delays) communication in remote vehicle operation.

Building on prior work in future frame prediction and predictive display systems, the research will combine multimodal sensing (vision, LiDAR, ego-state estimation), transformer-based predictive models, and real-time adaptive control to enhance situational awareness and safety. The outcomes will significantly improve remote operations for mining, disaster response, defence, and autonomous vehicle supervision, directly aligning with Australia's remote operations and robotics priorities.

Preferred Applicant Skillset:

Applicants should possess strong foundations in robotics, computer vision, machine learning, or control systems. Experience with deep learning (PyTorch, TensorFlow), reinforcement learning, state estimation (Kalman filtering, SLAM), ROS, and simulation environments (Gazebo, CARLA, Unity) is desirable. Knowledge of generative video models (GANs, transformers), multimodal sensor fusion, or digital twin frameworks will be advantageous. Candidates should demonstrate strong mathematical capability and programming proficiency in Python and C++. An interest in human-robot interaction and remote and autonomous vehicle systems is highly desirable.

Internship Opportunity:

Yes. There will be opportunity available for potential internship with Defence Science & Technology Group (DSTG), mining automation companies in WA, autonomous vehicle industry partners and robotics startups focused on remote operation. The internship would involve deployment and evaluation of predictive shared autonomy systems in real-world remote vehicle environments.

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