EDITH COWAN UNIVERSITY

PROJECT DETAILS

Project Title:

Cyber-Physical Digital Twin for Secure and Resilient EV Charging Infrastructure.

Project Summary:

Electric vehicle charging infrastructure is becoming an essential component of Australia's electricity system. These charging systems rely heavily on digital communication, remote coordination, and automated control, making them sensitive to cyber and operational failures that may affect safety and reliability. Current research largely prioritises energy optimisation, with limited focus on cyber-physical safety validation. This project will develop a cyber-physical Digital Twin integrating co-simulation, Knowledge graph-based modelling, and temporal logic to enable anomaly and threat detection. The innovation combines data-driven digital twin with safety checks that can be formally verified, leading to more secure and reliable EV charging infrastructure.

Preferred Applicant Skillset:

The preferred HDR applicant should have a strong background in Computer Science, Cybersecurity, or closely related disciplines. Experience in cyber-physical systems, distributed architectures, or Digital Twin development is desirable. Knowledge of graph-based modelling, formal methods, temporal logic, or model checking will be advantageous. Strong programming skills and familiarity with event-driven systems and communication protocols are beneficial. The candidate should demonstrate strong analytical reasoning, mathematical capability, and experimental design skills, with the ability to conduct rigorous simulation-based research and produce high-quality scientific publications.

Internship Opportunity:

The HDR candidate will have the opportunity to work closely with industry collaborators engaged in EV charging infrastructure platforms. The project aligns with an established research pipeline within the supervisory team focused on energy systems cybersecurity and cyber-physical resilience at ECU. The candidate will be mentored through structured supervision meetings, collaborative research workshops, and joint industry engagement activities. They will contribute by developing simulation models, conducting cyber-physical validation studies, and translating findings into industry-relevant outcomes. This engagement supports joint publications, technology transfer, and potential co-funded research aligned with national energy resilience priorities.

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