POSITION DESCRIPTION

Postdoctoral Research Fellow

POSITION DETAILS

Position Title	Postdoctoral Research Fellow – Data Science and AI
Classification	Academic Level A
Position Number	NEW
School/Office	Faculty of ECS
Division	Provost

POSITION PURPOSE

This role contributes to Western Sydney University's research excellence by delivering data-driven components of the SmartCrete CRC's Intelligent Rail Infrastructure System (IRIS). The position undertakes research focused on machine learning, signal processing and digital monitoring technologies to improve defect detection, predictive maintenance and infrastructure reliability across the railway network.

KEY ACCOUNTABILITIES

1. **Conduct and synthesise** comprehensive literature reviews to evaluate current monitoring technologies, identify capability gaps and define future opportunities in structural health monitoring.
2. **Design and optimise** instrumentation strategies and sensor configurations to support robust, high-quality monitoring data.
3. **Develop and refine** signal processing, data interpretation and damage-detection frameworks using advanced machine learning and deep learning techniques.
4. **Generate and validate** algorithms and analytical models that support defect detection, localisation and reporting within the IRIS Digital Twin environment.
5. **Prepare and disseminate** research outputs including manuscripts, conference papers, progress reports and final project deliverables.
6. **Engage and collaborate** with academic teams, industry partners and SmartCrete CRC stakeholders to ensure alignment with project milestones and research objectives.
7. **Support the supervision** of HDR, Honours and Master of Engineering students where appropriate.
8. **Maintain accurate research records** in accordance with University governance, ethics and compliance requirements.

QUALIFICATIONS, EXPERIENCE AND SKILLS

Essential

- Doctoral qualification in Mechanical, Materials or Civil Engineering, or an equivalent discipline with strong research expertise in experimental or analytical studies.
- Demonstrated research capability evidenced by high-quality peer-reviewed journal publications.
- Proven motivation and capacity to progress scientific and technological advances related to the project.
- Experience in railway track or structural health monitoring (desirable but beneficial).
- Excellent interpersonal, written and verbal communication skills, with the ability to work collegially in a research team environment.
- Ability to contribute to the supervision of Higher Degree Research and Honours students.

KEY RELATIONSHIPS

- **This position reports to**: Associate Professor in Infrastructure Health Monitoring
- **This position has no supervisory responsibilities**
- **Key internal relationships**:
    - Lead Investigator – Associate Professor in Infrastructure Health Monitoring
    - Teaching and Research Technical Services
    - Associate Dean (Research)
    - Students
    - Dean and School Manager
    - Research team members
- **Key external relationships**:
    - Industry partners (including rail authorities)
    - SmartCrete CRC collaborators

CHALLENGES

- Integrating machine-learning-based defect-detection models with real-world, variable-quality railway monitoring data.
- Balancing research innovation with industry expectations, project timelines and the operational constraints of railway environments.
- Ensuring analytical models remain accurate, scalable and robust when applied across diverse track conditions, materials and system configurations.

UNIVERSITY EXPECTATIONS

The University expects that all employees are aware of, and comply with legislation and Western's policies and procedures relevant to the position, including but not limited to:

→ Code of Conduct
→ Work Health and Safety and Wellbeing Management System
→ Enterprise Agreement or Award
→ Anti-discrimination principles, Equal Employment Opportunity and staff and student equity.

Approved by:
Date: