2025 RTP round - Empowering Artificial Intelligence in Smart Building and Construction 4.0

Status: **Open**
Applications open: 1/07/2024
Applications close: 18/08/2024

About this scholarship

Description/Applicant information

Project Overview

The current construction industry faces the problem of a low degree of digitization and productivity. The emergence of Artificial Intelligence (AI) can effectively alleviate these problems. This project aims to investigate the current state of AI in smart buildings and Construction 4.0 and explore future implementation roadmaps. By developing an integrated AI implementation framework, this project seeks to transform construction processes, improve efficiency, and advance sustainability. The project will explore AI-driven solutions for predictable maintenance, resource optimization, and real-time data analysis for construction projects. Emphasizing twin sustainable and digital transformation in construction and project management, the framework will integrated advanced Smart Building and Construction 4.0 technologies and analysis the drivers, motivations and barriers to their implementation in response to current challenges in construction. The expected outcomes of this project will contribute significantly to the advancement of smart and green construction practices, making a substantial impact on industry standards and sustainability efforts.

Aims

The project aims to explore the current state of AI implementation and develop an integrated framework for AI implementation in smart buildings and Construction 4.0 for predicting the future trends.

Objectives

The specific objectives are as follows:
(i) To develop and test an integrated conceptual and theoretical framework for AI implementation in smart buildings and Construction 4.0.
(ii) To identify the key areas of AI implementation in smart buildings and Construction 4.0.
(iii) To discern the key factors influencing the implementation of AI in smart buildings and Construction 4.0.
(iv) To examine the inter-relationships among these key influencing factors.
(v) To envisage a roadmap for construction firms, industry practitioners, and government authorities for sustainable building and urban development.

Significance

Theoretical Significance:
This study will contribute to the current body of knowledge of AI in the construction and project management field by examining current applications and future trends of AI technology in smart buildings and Construction 4.0. It will establish an integrated framework by mobilizing Institutional Theory and the Resource-Based View of the firm in the mainstream business context, testing their applicability to this topic. This integration will help comprehensively understand the multifaceted nature of AI implementation in a dynamic construction business environment. Furthermore, the project will identify the key factors affecting the implementation of AI in smart buildings and Construction 4.0, and examine the interrelationships among these factors, providing deeper insights into their collective impacts on the intention to use and practical implementation of AI in the smart buildings and Construction 4.0 era.

Practical Significance:
Practically, this study will offer valuable insights into future trends of AI in smart buildings and Construction 4.0. Construction companies will be able to leverage these insights to enhance their market competitiveness through effective AI strategies, considering both external drivers and internal organizational resource allocation practices at the project and corporate levels. The findings will also have significant implications for government departments, as understanding the interplay of different external institutional isomorphism processes will help government agencies adopt appropriate measures to facilitate AI implementation in the construction industry. This will lead to better regulatory frameworks and support systems that encourage innovation and sustainable practices.

Methodological Significance:
Methodologically, the study will demonstrate the application of advanced data analysis methods such as Structural Equation Modeling (SEM) techniques in exploring the multi-layered interrelationships among key factors influencing AI implementation. The use of SEM will showcase its potential advantages in handling complex, multi-dimensional data and providing robust analytical insights. This methodological approach will be a valuable reference for future research in similar domains, offering a reliable technique for examining intricate interactions within data sets.

This project will receive robust support from Curtin University, leveraging its state-of-the-art research facilities and strong focus on technological innovation and sustainable practices. The university's School of Design and Built Environment provides an ideal research environment, with interdisciplinary expertise in architecture, construction management, geography, and urban planning. Additionally, the internationally recognized Curtin Sustainability Policy Institute (CUSP) offers valuable resources and expertise in sustainability research and policy advice. The PhD candidate will benefit from collaborative opportunities with experienced researchers across the School, Faculty, and University. The significance of this project for Curtin University lies in its potential to enhance the institution's research profile, attract further funding, and strengthen academic and industry collaborations. By addressing critical industry challenges and contributing to the advancement of sustainable building practices, the project aligns with Curtin's strategic goals of fostering cutting-edge research and driving industry sustainability and digitalization transformation. A minimum of three high-quality academic papers will be published during PhD candidature and two more will be submitted.

Student type

- Future Students

Faculty

- Faculty of Humanities

Course type

- Higher Degree by Research

Citizenship

- Australian Citizen
- Australian Permanent Resident
- New Zealand Citizen
- Permanent Humanitarian Visa
- International Student

Scholarship base

- Merit Based

Value

The annual scholarship package, covering both stipend and tuition fees, amounts to approximately $70,000 per year.

In 2024, the RTP stipend scholarship offers $35,000 per annum for a duration of up to three years. Exceptional progress and adherence to timelines may qualify students for a six-month completion scholarship.

Selection for these scholarships involves a competitive process, with shortlisted applicants notified of outcomes by November 2024.

Scholarship Details

Maximum number awarded

1

Eligible courses

All applicable HDR courses.

Eligibility criteria

We are seeking a highly motivated HDR applicant with exceptional organizational, problem-solving, and project management skills. Proficiency in quantitative analysis, including familiarity with SEM, other advanced statistical methods, and Matlab, is highly desirable. Candidates should demonstrate a strong interest and understanding of smart building and Construction 4.0 concepts. Effective communication, teamwork, and independent research abilities are essential. Eligibility for enrollment in Curtin's PhD program is required, with preference given to candidates with a proven track record of academic publications.

Enrolment requirements

You must be enrolled in a Higher Degree by Research Course at Curtin University by March 2025.

How to apply

Application process

Please send your CV, academic transcripts and brief rationale why you want to join this research project via the HDR expression of interest form to the project lead researcher, listed below.

Need more information?

Enquiries

Project Lead: Dr Qian Zhang