

PhD opportunity – Robotics in off-site prefabrication of buildings

Applications are invited for a 3-year PhD within the Department of Civil Engineering at Monash University.

The PhD project

Prefabrication has the advantages of simplicity, speed and economy but has been inflexible to changes in design which is a primary reason behind its limited market share in the construction industry. To tackle this drawback, there is need for research to develop a Robotic Prefabrication System (RPS) which employs a new concept towards automatic construction of a prefabricated structure. The RPS will consist of a software module and a hardware module. First, the software employs the 3D model of a prefabricated structure as input, and returns motor control command output to the hardware. There are numerous underlying algorithms developed in the software module. For example, a novel algorithm will compute the optimal fabrication sequence to transform one model into another according to the differences identified. Meanwhile, the hardware module takes the motor control commands as input and executes the appropriate assembly/disassembly operations, and returns the desired structure in real-time.

Validation tests on lab-scaled prefabricated structures will demonstrate the ability of the system to successfully generate desired fabrication sequences and perform all assembly operations with acceptable placement precision.

This PhD will leverage the latest technologies, data science and AI in the development of new building processes and techniques. This will enable the application of robotics to optimise all phases of building delivery.

The opportunity

Scholarship covering tuition fees and providing a tax-free stipend (approximately \$29,000/year) for 3 years is potentially available for either local or international students. There is potential for successful applicants to earn around \$3,000 per annum through assisting in undergraduate teaching. Students are given financial support to attend an international conference during their PhD.

Selection criteria

The student will need to meet the following criteria:

- Masters or Bachelor (**H1** Honours) in Engineering (majoring in Civil, Mechanical, Electronics, or Aerospace Engineering, etc.);
- An excellent academic record (GPA>90%);
- Excellent English – Academic IELTS: minimum overall band score of 6.5 with no skill less than 6.0; and
- Proficiency in the Robot Operating System (ROS)

Application process

Applicants will be required to apply for a scholarship through Monash University. Applicants should express their interest by writing to Dr Mehrdad Arashpour (mehrdad.arashpour@monash.edu) with the following documents:

1. Academic transcripts
2. Publication list
3. Up-to-date CV
4. English proficiency evidence (Academic IELTS)
5. Names and contact details of three academic referees.