

# SEMS: RESEARCH PROJECT DESCRIPTION

## 1. Project Background and Description

### *Mobile Robot Manipulators with Integrated Continuum Arm*

#### **Project description:**

Modular construction using offsite pre-engineered building units to be assembled on site is touted as a key technology for the building industry. The use of modular and other lightweight forms of building construction is increasing rapidly and is proving the module-based methodology can ensure faster delivery and build times and minimized budgets, as well as alleviate construction's impact on vicinity of the construction site and the environment. To leverage advanced robotics in manufacturing and address distinct scientific questions and engineering challenges thus enable automation in modern building construction, this project aims to develop a complementary and novel cooperative mobile robot manipulator with flexible continuum arm to be deployed in industry factories for human-robot co-operative fabrication tasks. The project will directly benefit from outstanding facilities in the multidisciplinary robotics lab (<https://www.qmul.ac.uk/robotics/facilities/>) and a variety of world-class equipment in the labs and workshop at the School of Engineering and Materials Science.

## 2. Project Scope

- a) Investigating cross-disciplinary approach in continuum robotic arm design for the mobile manipulator thus enabling dexterous manipulation
- b) Exploring novel mechatronic solutions for the continuum robotic manipulator with inherent compliance
- c) Developing a control and navigation system of the mobile platform to implement complex tasks with advanced sensing capability.

## 3. Desired Skills from the Student

- a) Solid understanding of engineering principles needed to design, fabricate, and validate work (Essential)
- b) Strong background in complex assembly design (Essential)
- c) Demonstrated computer modeling/computer aided design experience, e.g. Solidworks experience (Essential)
- d) Basic knowledge and capability in manufacturing processes, both traditional (lathe, mill, casting, etc.) and modern (laser cutter, 3D printing, etc.) (Essential)
- e) Experience with Matlab, Python, or similar computational environment (Essential)
- f) The minimum requirement for this studentship opportunity is a good Honours degree or MSc/MRes in mechanical or electronic engineering, or a field closely related to robotics.
- g) If English is not your first language then you will require a valid English certificate equivalent to IELTS 6.5+ overall with a minimum score of 6 in Writing (Reading, Listening, Speaking).

## 4. Supervisory Team

Primary: **Dr Ketao Zhang**

*Additional: (Name (inc title)/ department or company if outside SEMS).*