



## **School of Computing, Engineering, and the Built Environment Edinburgh Napier University**

### **MRes Student Project**

#### **Application instructions:**

Detailed instructions are available at :

<https://www.napier.ac.uk/research-and-innovation/doctoral-college/how-to-apply>

*Prospective candidates are encouraged to contact the Director of Studies (see details below) to discuss the project and their suitability for it.*

### **Project details**

#### **Supervisory Team:**

- DIRECTOR OF STUDY: Dr Gokula Vasantha (Email [g.vasantha@napier.ac.uk](mailto:g.vasantha@napier.ac.uk))
- 2<sup>ND</sup> SUPERVISOR: Dr Simon Smith

**Subject Group:** Engineering & Mathematics

**Funding status:** Self funded

**Project Title:** Net-Zero Digital-Twin System Modelling of an Integrated Robotics and Flexible Manufacturing Systems

#### **Project description:**

The Engineering and Mathematics Group within the School of Computing, Engineering and the Built Environment is inviting applications for a Master of Research (MRes) in developing Net-Zero Digital-Twin System Model of an Integrated Robotics and Flexible Manufacturing Systems.

Many manufacturing parameters, such as the movement of input raw materials to machine performance, impact the productivity of a manufacturing factory. Therefore, manufacturers are interested in developing data-driven tools and techniques to monitor manufacturing units in real-time and develop smart, proactive strategies to improve performances. This Master of Research (MRes) project aims to develop intelligent real-time system modelling techniques that assesses manufacturing factory performance, develops improvement strategies, and evaluates the impact of proposed improvements.

The project focuses on the following research objectives: (i) develop an integrated assembly task involving mobile robot, Flexible manufacturing system and an operator, (ii) automate collecting and analysing real-time assembly process data, (iii) assess net-zero implications in the developed assembly task (e.g. energy consumption), and (iv) develop options to improve net-zero manufacturing targets. Since improving manufacturing factory environmental performance is the core objective, this research requires an excellent understanding of manufacturing systems, system engineering principles, data analytics, and machine learning (i.e., predictive modelling) techniques. Furthermore, the research involves a complete data processing cycle, such as multi-modal manufacturing data collection with appropriate sensors (e.g. worker's movement, machine temperature and vibration), data integration, data cleaning and data transformation. Therefore, it would be ideal if the candidate has some experience either in big data analytics or system simulation modelling software such as Siemens Plant Simulation and advanced programming skills.

The research work will initiate within the Flexible Manufacturing Laboratory at Edinburgh Napier University. The researcher joining this project will develop and train in the appropriate technical areas. The researcher will be actively encouraged to present the work at leading international conference. The researcher should have an appetite for undertaking an enquiring and rigorous approach to research together with a keen intellect and disciplined work habits. The researcher will benefit from collaborating with Professors at the University of Edinburgh and Strathclyde through an ongoing EPSRC (The Engineering and Physical Sciences Research Council, UK) funded research project ([EP/V051113](#)).

Perspective applicants are encouraged to contact the Supervisor before submitting their applications. Applications should make it clear the project you are applying for and the name of the supervisors.

## **Candidate characteristics**

### **Education:**

A first degree (at least a 2.1) ideally in Mechanical or Electrical or Electronics or Data Science or Operation Research with a good fundamental knowledge of data analytics and manufacturing systems and performance analysis.

### **English language requirement**

IELTS score must be at least 6.5 (with not less than 6.0 in each of the four components). Other, equivalent qualifications will be accepted. [Full details of the University's policy](#) are available online.

### **Essential Attributes:**

- Experience of fundamental manufacturing systems and processes
- Competent in data analytics and statistical techniques
- Knowledge of simulation processes and prediction approaches
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills relevant to the project
- Good time management

**Application checklist:**

- Statement no longer than 1 page describing your motivations and fit with the project
- Recent and complete curriculum vitae. The curriculum must include a declaration regarding the English language qualifications of the candidate.
- Supporting documents will have to be submitted by successful candidates.
- 2 academic references, using the [Postgraduate Educational Reference Form](#) (download)