**PhD Project Proposal**

School of Electronics, Electrical Engineering and Computer Science

|  |
| --- |
| **Proposed Project Title: Cloud & IoT System Architecture for Digital Manufacturing** |
| **Principal Supervisor: Prof DImitrios Nikolopoulos Second Supervisor: Dr Declan Nolan (School of MAE)** |
| **Project Description:** With the advancement of information and communication technology, manufacturing industries are moving towards a new era where physical and virtual worlds are merging together through cyber-physical systems. This introduces the fourth stage of industrial revolution termed as Industry 4.0, and fosters smart manufacturing which can improve the quality of the product and reduce the product delivery time through performing smart actions such as forecasting, proactive maintenance, automation, etc. Smart manufacturing leverages emergent technologies, such as cloud computing, Internet of Things (IoT), machine learning (ML), artificial intelligence (AI), etc. to achieve its goal. Importantly, IoT devices can capture critical events (e.g. unexpected temperature rise in the production, unavailability of resources, etc.) in digital form and communicate with the cloud services to provide smart manufacturing solutions. This requires developing a platform for Cloud-IoT communication designed for manufacturing, and proposing new ML/AI algorithms to take smart manufacturing decisions. This PhD project will develop such a platform after exploring and addressing the key challenges in deploying cloud services and IoT devices for manufacturing. Specifically, the project will have the following key objectives: * Creating a common platform for Cloud-IoT communication which can monitor valuable data from production such as machine utilisation, product quality, material availability, etc.
* Proposing novel ML/AI algorithms which can analyse the monitored data to identify anomalous behaviour in the manufacturing process.

The PhD student will have the opportunity to work with a multi-disciplinary team of researchers from Computer Science and Mechanical Engineering under an EPSRC project named biohaviour (http://biohaviour.com - Bio-inspired rules for Innovative Engineering design). Biohaviour aims to deliver an improved and efficient manufacturing system through biologically inspired algorithms and cloud services. The biohaviour team is currently developing a cloud-based manufacturing framework which can be integrated with IoT devices for smart manufacturing, this is an added advantage for the PhD student. Moreover, during this PhD project the student will develop his skills and knowledge in:* Deployment of cloud computing services
* Deployment and monitoring of IoT devices
* Data analysis through Machine Learning and Artificial Intelligence
* Digital Manufacturing through cloud and IoT
* Programming in Java and Python
 |
| **Contact details**Supervisor Name: Prof D Nikolopoulos Tel: +44 (0)28 9097 1800QUB Address: ECIT Institute Queen’s Road BT3 9DT Email: d.nikolopoulos@qub.ac.uk |