Research Assistant
(FPGA for Photonic Spectroscopy)
Photonics Systems and Sensing Lab
School of Electronic Engineering
Up to 9 Months Fixed Term

Introduction
Dublin City University (www.dcu.ie) is a research-intensive, globally-engaged, dynamic institution that is distinguished by both the quality and impact of its graduates and its focus on the translation of knowledge into societal and economic benefit. DCU prepares its students well for success in life, and in the workplace, by providing a high-quality, rounded education appropriate to the challenges and opportunities of the 21st century. As Ireland’s University of Enterprise and Transformation, DCU is characterised by a focus on innovation and entrepreneurship and a track-record of effective engagement with the enterprise sector, including commercial, social and cultural enterprises. Excellence in its education and research activities has led to DCU’s consistent position in the rankings of the world’s top young universities. DCU has a strong track record in attracting both Irish and European Union funding under FP7, Horizon 2020, Marie Curie Actions and Erasmus. We offer a dynamic and internationally focused environment in which to advance your academic career.

The Photonics Systems and Sensing Lab. (PSSL)
This is a research group that focuses on the simulation and demonstration of novel technologies for future photonic systems. The research carried out in this group encompasses a wide array of domains, including optical communications systems, a wide array of high-speed semiconductor devices, optical transmitters and receivers, optical pulse and frequency comb sources, high speed detection, photonic sensing as well as optical and digital signal processing. PSSL has strong linkages with academic and industrial partners in Ireland and abroad and works on a mix of fundamental and applied research topics in the domains of radio and optical systems.
The Project - Intelligent Photonic Sensor System (InPhoSS)

This research project is in the area of photonic sensor/interrogator technology for the development of a high-resolution real-time sensing solution. The InPhoSS project is funded by Enterprise Ireland (EI) through a Commercialisation Fund (CF).

Photonic based sensing technology has garnered a lot of attention recently as an effective tool for a wide range of applications such as monitoring low-level gas emissions, LIDAR and assessing and monitoring of civil infrastructures, etc. Taking gas sensing as a typical use case, individual gases possess absorption coefficients at unique frequencies and when a light source is passed through a sample, it's possible to identify the gas by its absorption profile. In this project, an intelligent photonic sensor system is proposed. This system will consist of an interrogator based on a dual optical frequency comb approach developed in CF-2017-0683A “INDOTS” and an intelligent receiver based on artificial neural networks.

Role Profile

The successful candidate will play a substantial role in the design and development of an intelligent neural network receiver implemented on an FPGA which can investigate spectroscopic data emanating from a photonic interrogator. The characterization of the system for differentiating between various absorption levels will be a vital aspect to be explored in this project. The work will also examine how to benchmark the system utilising more conventional interrogator/receiver approaches and illustrate the performance of the prototype for use in real world scenarios. The role will provide access to competent technical, infrastructural and administrative assistance and the opportunity to evolve a multi-faceted skillset in an environment where you closely partner with world-class Irish and international companies and research organisations. One of the highlights of working on such a project is that there is a strong potential of the outcomes being commercialised, which may direct to exciting/rewarding career opportunities.

Duties and Responsibilities

The Research Assistant will:

- Conduct a specified programme of research within the InPhoSS Enterprise Ireland Commercialisation Fund Project under the supervision of the project Principal Investigator.
- Work closely with the Principal Investigator to develop a hardware based neural network for analysis of spectroscopic data.
- Attend and contribute to PSSL group meetings.
- Carry out administrative work associated with the programme as necessary.
- Engage in the dissemination of the results of the research in which they are engaged, as directed by, with the assistance of and under the supervision of the Principal Investigator.
- Participate in meetings with the interested parties (e.g. end-users, commercialisation consultants, external industry and academic partners) and assist in promoting the technology (e.g. conferences and tradeshows).

**Qualifications, Skills and Experience:**

Applicants must hold a primary degree (NFQ Level 8), MSc or Bachelor’s Degree in Electronic, Mechanical or Mechatronic Engineering or a cognate discipline.

**Candidates will possess:**

- A passion for on-the-job learning and a willingness to contribute to multi-disciplinary aspects of the project such as working with a photonic interrogator for spectroscopy and contributing to the assembly and testing of an FPGA based prototype receiver.
- Excellent written and verbal communication and social skills.
- Proven ability to prioritise workload and work to strict deadlines.
- Ability to work in a team and to take responsibility to contribute to the overall success of the team.
- Strong problem solving abilities.
- Experience in FPGA programming and electronic hardware such as analog-to-digital convertors, electrical spectrum analysers, and FPGAs along with microcontroller programming is desirable.
- An aptitude for hands-on work and comfortability in a laboratory environment.
- A commitment to gaining practical experience working on a commercialisation fund.

**Desirable**

- Digital signal processing
- Neural networks
- Spectroscopy

**Mandatory Training**

The post holder will be required to undertake the following mandatory compliance training: Orientation, Health and Safety and Intellectual Property and Data Protection training. Other training may need to be undertaken when required.