Department	**School of Computing**
Supervisors	Shufan Yang
Project Title	Real-time fNIRS imaging

PROJECT DESCRIPTION

In the last decade, functional Near-Infrared Spectroscopy (fNIRS) technology, an emerging photonic modality of functional brain imaging, has provided an alternative means of achieving a wearable, lightweight, low-cost neuroimaging technology. This technology has been widely utilised in broad applications, including neuroscience, clinical neurology, and personalized healthcare. However, conventionally all the processing pipelines are offline, not in the real-time; this significantly limits the wider applications of fNIRS technologies. In this project, the Phd candicated will work on a FPGA-based real-time accelerator to implement principal component analysis, spline interpolation, wavelet analysis, kalman filtering and reinforcement learning approaches on Xilinx ZYNQ chips and compare their performance on the accuracy of the recovered, simulated hemodynamic response function (HRF).

The Phd candidate will gain knowledge in fields such as photonic devices, near-infrared spectroscopy, and wearable photonic imaging, and will learn various useful skills such as machine learning. Prospective 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 supervisor(s).

Academic qualifications

A first degree (at least a 2.1) ideally in Computer Science or related disciplin. with a good fundamental knowledge of computer programming, signal processing, algorithms.

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 python programming
- Competent in signal processing
- Knowledge of software programming.
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills relevant to the project
- Good time management

Desirable attributes:

Enthusiastic on digital healthcare

Indicative Bibliography	Zhao, H., Frijia, E. M., Vidal Rosas, E., Collins-Jones, L., Smith, G., Nixon-Hill, R., . . . Cooper, R. J. (2021). **Design and validation of a mechanically flexible and ultra-lightweight high-density diffuse optical tomography system for functional neuroimaging of newborns**. *Neurophotonics, 8 (1)*, 015011. doi:10.1117/1.NPh.8.1.015011
Enquiries	For informal enquiries about this PhD project, please contact s.yang@napier.ac.uk
Web page	https://www.napier.ac.uk/research-and-innovation/research-degrees/application-process