Title: Bioimage Analysis of Background Fluorescence in Cells

Type of award: PhD Research Studentship

Department: Electrical and Electronic Engineering

Scholarship Details: Scholarship covers full UK/EU (EU applicants who have been resident in the UK for 3 years prior to 1st September 2018) PhD tuition fees and a tax-free stipend of £14,777 p.a. subject to eligibility criteria. EU national’s resident in the EU may also apply but will only qualify for PhD tuition fees.

Duration: 4 years

Eligibility: Home/EU applicants only

Starting Date: 1 October 2018

PhD Topic Background/Description

The Schools of Computer Science, Electrical and Electronic Engineering, and Engineering Maths (SCEEM) and Biochemistry at the University of Bristol, UK are looking for a PhD student interested in bioimage analysis of background fluorescence in cells.

All cells display some degree of autofluorescence. Although the molecular structures that display autofluorescence are characterised, a quantitative link between autofluorescence and cell state is not currently known [1]. By combining high-end microscopy techniques to detect the fluorescence pattern and intensity in cells with advanced image processing and machine learning tools [3,4,5], we aim to make precisely that correlation between the autofluorescence pattern and the physiological state of that cell.

This project will provide a novel image analysis tool for monitoring cell state. Whereas biosensors measure chemical biomarkers indicative, for example, of apoptosis (cell death), optical/imaging methods can better assess cell integrity and activity of individual cells (e.g., via morphology and autofluorescence) and detect “special” cells. In addition, by quickly measuring and analysing many cells, a statistically representative indication of the cell population in real time can be obtained.

We are looking for a person that thrives in an interdisciplinary environment. Either someone with a cell biological training but with a strong interest and expertise in image analysis or a person with a computational imaging / image processing background with exposure to life sciences research would fit the role profile. To highlight the interdisciplinary nature of the project the aims of the research project are as follows:

1. To detect the spectra, intensities, and localisation of the autofluorescence in cells over time and during at different (induced) physiological states (e.g. oxygen stress, temperature).
2. To develop automated analysis tools for the detection changes in fluorescence pattern, signature, and/or intensities and classification into categories.
3. To register the autofluorescence categories with known cellular markers.
4. To correlate the classification groups identified in goal 2 with the physiological state as described above.
5. To design an imaging patch that could be used on cell culture bags

The successful candidate will be based either in SCEEM or Biochemistry, depending on the background of the student. Part of the studies will be conducted at University College London (UCL) and the student will be part of the EPSRC funded CDT for Innovative Manufacturing at UCL.

References:

Further Particulars

Candidate Requirements
We are looking for an enthusiastic student with either a 1st or 2:1 honours degree equivalent at master level in electrical & electronic engineering, computer science, maths or biomedical related subject. Familiarity with scientific programming in Matlab/Python is also required.

Informal enquiries
For informal enquiries please contact Prof Alin Achim (alin.achim@bristol.ac.uk) or Prof Paul Verkade (p.verkade@bristol.ac.uk)

For general enquiries, please email sceem-pgr@bristol.ac.uk

Application Details
To apply for this studentship submit a PhD application using our online application system [www.bristol.ac.uk/pg-howtoapply]

Please ensure that in the Funding section you tick “I would like to be considered for a funding award from the Electrical Engineering Department” and specify the title of the scholarship in the “other” box below with the name of the supervisor, Prof Alin Achim.

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