**PROJECT DETAILS**

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<th><strong>Project Title</strong></th>
<th>Adaptive filtering of noisy speech signals</th>
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**Project Summary**

Biomedical signals provide useful metrics in a wide range of health care scenarios. However, these signals are often affected by noise and require extensive signal processing to extract useful clinical diagnostic metrics. Current signal processing techniques are either fixed by design or adaptive to variations known a priori. However, because of normal physiological variation, the characteristics of these signals are often non-stationary and more robust adaptive signal processing techniques are required to track many types of biomedical signals. As a clinical example, complications of the diabetic foot result in 20 lower limb amputations per day in the UK. The problem is exacerbated by the vascular and neurological damage that occurs in the diabetic foot, and the consequent loss of feeling results in trauma being unnoticed. Previous work by the principal investigator has demonstrated the efficacy of detecting the pre-cursors of ulceration through non-invasive measurement of blood flow using optical and ultrasonic techniques. However, extensive signal processing is required to convert the signals into a clinically interpretable form and lengthy analysis and clinical expertise was required to make the clinical diagnosis. If clinical diagnostics can be made to operate reliably in real-time preventative measures could be taken before ulceration occurs.

Recent advances in machine learning offer potential for artificially intelligent adaptive signal processing algorithms to track time varying biomedical signals and provide real-time detection of physiological abnormalities in at risk patients. This will allow for more rapid detection of physiological abnormalities allowing preventative measures to be applied early reducing the risk of more serious complications.

**Proposed Research Outcomes:**
- Develop and evaluate novel adaptive machine learning algorithms for biomedical signal processing.
- Demonstrate the viability of the approach within a specific clinical modality.

**Academic Impact**

This work has potential for academic impact in relation to two BU research themes (i) Health and Wellbeing & (ii) Digital Technologies. A primary objective will be to publish in peer reviewed journals to produce REF quality outputs. Secondly, the work will provide a foundation for a research bid to EPSRC refer to [https://www.epsrc.ac.uk/research/ourportfolio/researchareas/dsp/](https://www.epsrc.ac.uk/research/ourportfolio/researchareas/dsp/). The MRes student will gain useful experience in DSP algorithm development and Machine Learning which is a rapidly expanding technology used in a wide range of sate of the art industrial contexts.

**Societal Impact**

The main societal impacts are (i) Improve the quality of life of patients by providing early detection of physiological conditions (ii) Reducing NHS costs arising from treatment of complications caused by delayed prognosis. The algorithms are also likely to have wider application in other sectors where signals with non-stationary characteristics are buried in noise, such as, robotics, manufacturing, aerospace, security, communications, broadcasting and home entertainment, biology and environmental sciences, and the creative industries. A viable solution in this respect would provide excellent opportunities for commercialisation with strong potential for economic benefits to industry.
Training Opportunities

The project student will gain experiential opportunities from working with state of the art signal processing and machine learning technologies both in theoretical and practical contexts. This will enhance existing skills in computer science and provide a strong basis for future employment opportunities. The main practical experience will be gained through use of the industry standard Matlab tool set providing excellent skills that are in demand by the scientific industries.

SUPERVISORY TEAM

First Supervisor
Dr Jon Cobb

Additional Supervisors
Dr Glyn Hadley

Recent publications by supervisors relevant to this project


INFORMAL ENQUIRIES

To discuss this opportunity further, please contact Jon Cobb on JCobb@bournemouth.ac.uk

ELIGIBILITY CRITERIA

The MRes Fee Waive Scholarships are open to UK & EU candidates, who must demonstrate outstanding qualities and be motivated to complete an MRes in 12 months full-time.

The successful applicants must have a proven previous academic excellence (first class honours or equivalent). An IELTS (Academic) score of 6.5 minimum (or equivalent) is essential for candidates for whom English is not their first language.

In addition to satisfying the basic entry criteria, BU will look closely at the qualities, skills and background of each candidate and what they can bring to their chosen research project in order to ensure successful completion.

Additional Eligibility Criteria:
Essential C/C++ programming skills; Desirable Matlab/Simulink

HOW TO APPLY

Please complete the online application form by 24 July 2017.