

Design and development of a non-contact respiration rate monitor

Lead supervisor: [Professor Reza Saatchi](#)

Co-supervisor(s): [Dr Alan Holloway](#)

School/Institute: [Engineering and Built Environment](#)

Contact for applicant queries: Professor Reza Saatchi r.saatchi@shu.ac.uk

Project summary

Respiration rate (RR) is the average number of breaths per minute. It is an important vital sign for early detection of deterioration in critically unwell patients. Its measurement is subjective, relying on visual counting of chest movements. The design of a new RR measurement device utilizing a self-heating thermistor as its sensing element is being developed.

The thermistor is situated in a hand-held air chamber attached to a funnel that detects respiratory airflow up to 30 cm from the face. The exhaled respiratory airflow reduces the temperature of the thermistor and recovers during inhalation. A microcontroller provides signal processing while an LCD screen shows the respiratory signal and RR.

An initial prototype of the device has been developed and has undergone clinical evaluation in hospital environment on patients. The clinical trial and other evaluations indicated the efficacy of the device. However, the device is currently bulky and does not store any information. It also currently takes too long (50 seconds) to carry out the measurement. This needs to be reduced to 15 seconds to make it more viable on young children.

This summer training will work on the prototype to overcome its limitations and explore a commercial partner interested in manufacturing and commercializing it. There is also a possibility of a high impact journal paper.

The skill and knowledge of the intern developed in this internship include ability to design electronic devices for medical application, researching and applying innovative solutions to challenging engineering problems, industrial and market research, communication skill, research data analysis and interpretation writing scientific report.

Specific skills and experience required for this project

Please also refer to the advert on our jobs pages for the person specification for these internships

The intern needs to be motivated to engage in a research oriented electronic design problem. Previous knowledge and experience of embedding microcontrollers, signal processing and programming in C for STM32 based system would be valuable. The person is expected to work on their own initiative and as part of a research team. They should be able to explore market and identify companies that could take the device to market and clinical use.

The person needs to have a good ability to document information carefully, analyse and interpret data. And learn to write scientific report.

Project location

City Campus

Project delivery

This project can be delivered on a full-time or part-time basis