Research project and supervisory team

Supervisory Team	Dr. Jing Wang, Dr. Richard Smith, Dr. Sen Yang
Short introduction & description of research project	For patients with severe diseases, e.g. elderly people or new-born babies, the real-time monitoring of multiple physiological indices during MRI scanning is essential. Due to the strong electromagnetic field in MRI Scanner room, the traditional electronic sensors for monitoring health status will be damaged. This project proposes an MRI compatible wearable sensor based on Fiber Bragg Grating (FBG) technology with the advantages of immunity to EM fields, high sensitivity, light-weight, high flexibility, high stability, low cost and small size. This wearable sensor is able to monitor the following parameters in real time: 1. Human physiological indices: body temperature, heart rate, blood oxygen level, breathing, volume of perspiration; 2. Environmental parameters, i.e. room temperature, humidity and audio level. Besides real-time monitoring, machine learning will be adopted in data analysis, in order to analyse the patient's emotion and to identify any dangerous circumstances, e.g. sudden apnoea, abnormal heart rate. For example, the audio signal will be separated into environmental audio and human audio, and based on the signal of human audio, breathing, heart rate, and body temperature, dangerous circumstances can be diagnosed and a warning message will be sent to the doctors immediately. The proposed system, with only minor modification to the system setup, can also be used as daily or long-term physiological monitoring within normal environment where there is a need. The objectives of this proposed research in Phase I are to: 1. Design and setup a sensing system for the real-time detection of human physiological indices (body temperature, heart rate, blood oxygen level, breathing, volume of perspiration) and environmental parameters (room temperature, humidity and audio level), which is mainly designed for simultaneous monitoring of patients during MRI scanning. 2. Develop the diagnosing and warning system using signal processing techniques and machine learning algorithm. 3. Investigate the relationship between physiological indices (especially PWV) with hypertension and angiocardiopathy.
Contact points	Jing Wang, Jing.Wang@nottingham.edu.cn