

# Scholarships

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## Global Software Development

Research projects under this theme address the many issues that arise in a global virtual team context. Themes and topics relate to the increasing globalisation of software development, where software is developed in a context of globally distributed individuals and teams.

The global dimension adds additional complexities to the inherently difficult process of software development, and gives rise to questions such as: what are the roles of time and space in global software projects; what technology environments (and in particular collaborative technologies) lend support to global software development; how is technology-use mediated in distributed projects; what additional dimensions and roles need to be considered and managed in a global project; what are the implications for software practices; what is the ecology of these projects; how do Open Source software projects evolve and become self sustaining; how do these teams communicate and coordinate their work; how are the complexities of intercultural communication navigated? Empirical studies of Global Software Teams including development practices and the use of Collaborative Technologies in Global Software Teams are areas of particular interest.

For more information, please contact [Dr. Tony Clear](#)

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## RFID in Healthcare

The applications of RFID in healthcare are potentially enormous. In the AURA laboratory we are particularly interested in using RFID and other technologies to understand and monitor human activities in critical situations and provide support for accurate clinical decision making, communication and efficient working in hospitals. At the moment, health systems are good at monitoring the clinical state of the patient, but bad at recording what happened to put the patient in that state. Using techniques from the semantic web and computational intelligence, projects will use data from advanced RFID devices and other sensors to represent and inform human activity - creating something like an airliner "black box" to reduce error and improve patient outcomes. Ultimately we would like to be able to warn doctors and nurses that an adverse event is about to happen and allow them to perform the correct actions to forestall this. We are particularly interested in the use of activity ontologies and fuzzy logic and the application to real clinical problems. The lab has excellent relationships with hospitals and community health organisations and practical developments and commercial exploitation are high priorities.

For more information, please contact [Dr. Dave Parry](#)

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## Modelling and Optimisation of Wireless Mesh Network MAC Protocols

As wireless mesh networks (WMNs) are becoming attractive solution for providing low-cost and high-speed Internet access citywide, performance analysis and optimisation of these networks are required for efficient design and deployment of such systems.

This research aims to develop a realistic analytical model to optimise the performance of 802.11-based medium access control (MAC) protocols for WMNs in both ideal and error-prone channels. Various factors such as the number of contending nodes, traffic load, contention window size, packet overhead and channel conditions, affecting the performance WMNs will be analysed. The analytical models will be validated using computer simulation.

The prospective student should have a strong background in Mathematics together with wireless communications and networking. A good working knowledge of MATLAB and network simulation packages (OPNET and ns-2) is required.

For more information, please contact [Dr. Nurul Sarkar](#)

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## RFID in Livestock

The use of RFID technology for tracking livestock can be dated back to the 1970s. Most of livestock tracking uses Low Frequency (125 – 134 KHZ). However a LF RFID system does not work very efficiently when there is a dense network of tags. Also it is affected by electrical disturbances and requires large antenna components which are difficult to set up. Hence in real life cases in the livestock, the animals are allowed to pass one by one through a race where antennas are set up so that the tags are picked up. Ideally, the livestock need to be detected in a much less ordered fashion.

For more information, please contact [Dr. Judith Symonds](#)

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## RFID in Serious Gaming

Serious gaming is where games are developed for purposes other than entertainment. This approach as a way to teach or for learning is becoming extremely popular in the educational sector. However industries have also started using serious gaming as a tool to teach their employees or to demonstrate complex issues. Applications of serious gaming include:

- To teach survival from fire in office building
- To teach driving ethics and driving skills
- To simulate a virtual hospital campus
- Games for virtual team building

For more information, please contact [Dr. Judith Symonds](#)

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## Semantic Analysis of Multimedia Information

### *Re-ranking of keyword search results based on content analysis*

Explore recurrent patterns / multimodal similarities in images/videos returned by search engines or meta search engines and use such information to re-rank the search results such that the results are presented to the user in descending order of relevance.

### *Multimodal analysis for scene modelling*

Develop a computational framework to model scenes as chunks of audio-visual data based on some consistency in terms of background a-v information. Where appropriate, also use other information such as a-v synchronization, textual cues and film-making conventions to enhance the model.

### *Content analysis for video summarization*

The purpose is to generate highly descriptive, condensed video clips of lengthy originals such as movies and TV programs. Methods include object detection and tracking, textual information analysis, scene modelling and analysis, etc. It is important to ensure that the end result is perceived as pleasing with smooth rendering of audiovisual information.

### *Machine understanding of video content*

Develop and compare supervised and unsupervised learning models to perform spatiotemporal analysis of video sequences in domain-specific applications e.g. surveillance, news, etc. Incorporate audio and textual information to enhance the analysis. Perform pattern mining to extract semantic events from the video sequences.

For more information, please contact [Professor Alvis Fong](#)

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## 1. Real-Time Data Streaming of Radio Astronomical Data

The objective of this project is to research and design a software architecture and implement a real-time data-streaming pipeline for correlation and image-synthesis of radio telescope data. A key feature of the pipeline will be its capability to run on hybrid hardware. It will investigate whether a real-time data-streaming pipeline can be effectively implemented in software and is be capable of handling the processing requirements of the Square Kilometre Array, as well as compare different architectures for executing stages of the pipeline, particularly homogeneous (x86, T2, PPC) versus heterogeneous (e.g. Cell BE) versus GPU (e.g. NVIDIA, Tesla) versus exotic architectures (e.g. FPGA).

## 2. Mobile Computer Vision

This research project is part of the larger Mobile Augmented Reality project currently underway within the School of Computing and Mathematical Sciences. The student will investigate the processing, segmentation, and recognition of images and video captured by mobile devices with the goal of realtime marker-free object recognition and pose estimation. The research will involve the development of new recognition algorithms suited for smart phone devices in outdoor environments. The candidate should have a thorough knowledge of current mobile technologies, data mining and computer vision/image processing techniques.

## 3. Computer Graphics Light and Shading Models

Light and shading models for realtime and photorealistic rendering of 3D computer graphics will be researched in this project. Particularly, new BRDF models and improved techniques for ambient occlusion will be investigated and implemented using programmable GPU pipelines. The aim will be to further evolve rendering effects that can be applied in the game and film industries using high performance architectures.

## 4. Topology Control and Routing in Heterogeneous Mobile Ad-Hoc Networks

Mobile ad-hoc networks (MANETs) provide many open and challenging research questions, particularly with regard to network topology control and the routing problem. This PhD research project will review existing solutions to the topology control problem and proactive/reactive routing algorithms for homogeneous MANETs, and then will attempt to extend those techniques to heterogeneous networks which have multiple modes of communication.

For more information, please contact [Dr. Andrew Ensor](#)

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## Other Research

There are many other research topics available. If you are interested in a research topic that is now listed above, please do not hesitate to contact our PhD Programme Leader, [Dr. Russel Pears](#) for discussion.