PhD Studentships in Remote Sensing

Two PhD positions are available to work on the analysis of spatial, multivariate data from open-pit iron ore mines. The research will complement and build upon existing work in the Rio Tinto Centre for Mine Automation (RTCMA) in the Australian Centre for Field Robotics (ACFR).

Essential requirements:

- A Bachelor Degree with First Class Honours or equivalent results;
- Excellent mathematical skills;
- Open to learning new techniques and approaches including machine learning and multivariate analyses;
- Practical experience using Matlab;
- A willingness to work in the field, including at working mine sites.

Desirable requirements:

- Knowledge of Gaussian process for machine learning;
- Some knowledge of geology;
- Practical experience in C++.

**Position 1** (Primary supervisor: Dr Richard Murphy, Associate Supervisor: Dr Arman Melkumyan).

The student will work on the analysis of remotely sensed data to quantify, classify and map of minerology and lithology. The work will involve the development of new techniques for the analysis of multispectral and hyperspectral imagery acquired from open pit iron-ore mines. Data will be acquired from sensors mounted on field-based platforms. A primary focus of the studentship will be to develop algorithms which are insensitive to variations in incident illumination and geometry of the mine wall. Particular emphasis will be given to the development and optimisation of methods for spectral unmixing of hyperspectral imagery to derive estimates of mineral abundances at sub-pixel scales.

**Position 2** (Primary supervisor: Dr Arman Melkumyan, Associate Supervisor: Dr Richard Murphy)

The student will work on incorporation of field-based remotely sensed data into a unified geological model. The studentship will focus on two primary aspects: mine face modelling and fusion of mine face models with three dimensional geological models. The work will involve theoretical and applied research on development of new probabilistic modelling and fusion techniques for mine geology. The fusion aspect of the work will include multispectral and hyperspectral cameras as well as a variety of other geological sensors. Familiarity with probabilistic machine learning and fusion techniques particularly Gaussian processes is highly desirable for this position.

For both positions the student will be required to do fieldwork in Western Australia, acquiring data using field spectrometers and hyperspectral imagers.

For further information on these projects please contact arman.melkumyan@sydney.edu.au or Richard.murphy@sydney.edu.au
To be eligible to apply students must be an Australian citizen, a New Zealand citizen or an Australian permanent resident. Rio Tinto Centre for Mine Automation scholarships are potentially available to exceptional students.

Expressions of interest should be sent to Ms Lisa Hunter-Smith, Australian Centre for Field Robotics, The Rose Street Building (J04), The University of Sydney NSW 2006. Tel: (02) 9351 8143, Fax: (02) 9351 7474, email: lisa.huntersmith@sydney.edu.au and should include a CV and academic transcripts.

Closing date 31 July 2012.