

## PhD Scholarship at Australian Centre for Space Engineering Research

|                       |                                                                                |
|-----------------------|--------------------------------------------------------------------------------|
| Required Background:  | Bachelor/Master's Degree in Electronics/Communications/Computer Engineering    |
| Keywords:             | Interference, Localisation, Signal Processing, GPS                             |
| Preferred Experience: | Signal Processing, Wireless Communications                                     |
| Application Deadline: | 31/03/2012                                                                     |
| Supervisors:          | Dr Ediz Cetin, Prof Andrew Dempster                                            |
| Contact:              | Dr Ediz Cetin ( <a href="mailto:e.cetin@unsw.edu.au">e.cetin@unsw.edu.au</a> ) |

---

### Enhanced Interference Detection and Localization

Due to their low-power levels, GPS signals are very susceptible to interference from either intentional or unintentional sources. With ever increasing reliance on GPS for the everyday operation of the modern infrastructure, detection, localisation and elimination of interference to the GPS system has become of paramount importance. GNSS Environmental Monitoring System (GEMS) Phase II provides the capability to detect and geo-locate interferers in real-time in a given area. GEMS Phase II consists of a number of distributed sensor stations connected to a central processing unit, to achieve real-time interference localisation. Geo-localization is achieved by hybrid Angle-of-Arrival (AOA) and Time Difference of Arrival (TDOA) techniques. In order to calculate the TDOA, data collected at different sensor stations must be cross-correlated. This however limits the level at which actual interferers can be detected since the cross-correlation of the collected sets of data not only contains peaks due to the interferers but also contains peaks due to the GPS satellites themselves. These unwanted peaks could be mistaken for weak interferers hence degrading the interference detection and geo-localization performance. This problem is expected to be further exacerbated by the current and proposed deployment of a number of new Global Navigation Satellite Systems (GNSS) and regional augmentations.

This research work is concerned with enhancing the capability of interference detection and geo-localization by devising and utilising novel signal processing algorithms as well as their eventual low-cost digital realization. Research work will concentrate on issues associated with the presence of cross-correlation peaks due to portfolio of GNSS signals and their influence on the interference detection and localization and propose novel algorithms to remove these unwanted peaks on-the-fly given dynamically changing conditions. It is anticipated that the outcomes of this research will result in enhanced interference detection and localization capability.

---

ACSER will be providing scholarships for some students. All prospective students should, however, apply for:

- Australian Postgraduate Award (APA; for Australian citizens) OR an
- International Postgraduate Research Scholarship (IPRS; International students).

Suitability for the ACSER and Garada scholarships will be assessed in the same way as applicants for APA and IPRS. For more information about these scholarships please go to

<http://research.unsw.edu.au/postgraduate-research-scholarships>.

Further Information on the project may be obtained from Dr Ediz Cetin ([e.cetin@unsw.edu.au](mailto:e.cetin@unsw.edu.au))