

PhD Scholarship at the School of Surveying and Spatial Information Systems

Required Background:	Bachelor/Masters Degree in Surveying/Geomatics, Atmosphere Sciences, Computing, Maths, Statistics
Keywords:	Ionosphere, GPS/GNSS, Precise Positioning
Application Deadline:	31 March 2012 (Open until the position is filled)
Supervisors:	A/Professor Jinling Wang (plus external co-supervisors)
Contact:	A/Professor Jinling Wang (email: jinling.wang@unsw.edu.au)

GNSS Ionospheric Delay Variance Modelling

Background

This PhD research will be part of the *Cooperative Research Centre for Spatial Information (CRCSI)* Project 1.01 “New carrier phase processing strategies for achieving precise and reliable multi-satellite, multi-frequency GNSS/RNSS positioning in Australia” under the leadership of Prof Peter Teunissen. This project addresses two important research challenges that emerge in the context of processing multi-constellation, multi-frequency GNSS/RNSS data and that underpin the *CRCSI* program objectives of ‘instantaneous GNSS/RNSS positioning, anywhere, anytime, with the highest possible accuracy and the highest possible integrity’.

PhD Research Topic Description

The desire to increase the operational distance between the user and a RTK reference station has led to the necessity of estimating the residual ionosphere delay. The estimation of the residual ionosphere delay is only optimal if a correct variance model is chosen for this parameter. This is a major challenge as it is well-known that the ionosphere changes significantly on a geographical scale as well as on a time scale, both short and long. The fact that a differential ionosphere delay is to be modelled complicates the issue as the baseline dependency has to be included next to the geographical and time dependency. This issue is of significant importance for the robustness of RTK applications when approaching the solar activity maximum: a too optimistic variance model will most likely result in an incorrect estimation of the carrier phase ambiguities and thus incorrect position while a too pessimistic variance model will lower the availability of a position solution due to the inability to estimate the carrier phase ambiguities. It is proposed to study whether a low complexity model of the ionosphere variance can be derived from data-set spanning the whole solar activity cycle. The aim of this model is not to give a theoretically accurate description of the variance but to provide an adequate model to avoid that the algorithm falls into either the too pessimistic or too optimistic trap.

Specific work may include literature review, development of resolvers and methodological comparison, implementation, numerical comparison and test results.

Cooperative Research Centre for Spatial Information (CRCSI) will be funding a **generous** 3-year PhD scholarship for living expenses (A\$30,000/year). All prospective local and international students are encouraged to apply:

- For **local students**: Australian/New Zealand citizens or Australian permanent residents, your tuition fees for PhD studies are waived;
- For **international students**: you are encouraged to apply the Tuition Fee Scholarship (TFS) from the Graduate Research School at UNSW to cover your tuition fees. Suitability for the TFS will be assessed in the same way as applicants for IPRS. For more information about these scholarships, please go to <http://research.unsw.edu.au/international-research-candidate-scholarships>

For information on enrolment in the PhD program, see <http://research.unsw.edu.au/units/graduate-research-school>, including English language requirements <http://www.unsw.edu.au/english-requirements-policy#ENGLISHLANGUAGETESTS>

Information on the Supervisor’s research activities, see <http://www.gmat.unsw.edu.au/wang>