

UNITED NATIONS UNIVERSITY
VACANCY ANNOUNCEMENT
UNU-IIST

Positions are available at the United Nations University's International Institute for Software Technology¹ (UNU-IIST) in Macao for a post-doctoral researcher, PhD student and fellows. UNU-IIST is a Research and Training Centre of the United Nations University whose mission is to help developing countries strengthen their education and research in computer science and their ability to produce computer software. It thus provides a unique setting with a proven record in the application of mathematical methods to the production of useful theories for practical problems and for training young researchers in the application of rigorous methods of engineering information systems.

The positions are funded by UNU-IIST, the University of Macau² (UM) and the Macau Science and Technology Development Fund through "EAE — Engineering Accountable Ensembles". The project is run under the direction of Jeff Sanders (UNU-IIST) and Xu Qiwen (UM) who have established reputations for the theory and application of the rigorous development of information systems and between them considerable experience with graduate supervision (for a decade Sanders was the Oxford Computing Laboratory's Director of Graduate Studies).

The abstract of the EAE project is:

The extremely large software systems on which we rely daily, like the web and e-service systems, have mostly grown by accretion and not design. Built from autonomous components so numerous as to be constrained only statistically, as systems they nonetheless exhibit self-* behaviour (like adaptability and fault tolerance) in nondeterministic, open environments. In particular they exhibit emergence. Following the European InterLink programme, we call such systems *ensembles*.

The purpose of this project is to provide techniques for the deliberate, considered, top-down *engineering* of ensembles. Yet because ensembles are so important in commerce, science and everyday life, it is vital that as they are engineered, their functional properties be rigorously determined: their behaviour be

¹<http://www.iist.unu.edu>

²<http://www.umac.mo>

accountable. Our techniques are to be strong enough to *engineer accountable ensembles*. Important results include a formal account of emergence, meso-level designs for achieving emergence, the extension of state-based refinement criteria to include statistical behaviour, and a rigorous treatment of adaptability. They are applied to realistic multi-agent case studies.

Because they involve aspects of Formal Methods (specification, refinement, semantics and automation) these projects provide excellent training for Computer Scientists. Applicants are expected to have an active interest in the rigorous analysis of information systems and so to have an appropriate background.

The fellowship positions are intended for graduates from developing countries, typically already engaged in an MSc or PhD, but wishing to sharpen their research and develop skills to enable them to embark on an academic career. The primary requirement is that over a nine-month period the fellow write a research paper under supervision of Sanders or Xu.

The PhD and postdoctoral positions conform to international standards and are under the supervision of Drs Sanders and Xu. In the former case affiliation is with one of UNU-IIST's university contacts. In the latter case there are opportunities for supervision of fellows and teaching short courses; the position is viewed, like the others, as including a component of professional development and the successful applicant is expected to assist in running the project.

Salaries depend on experience and circumstances but are exempt from Macao tax. In US dollars per month, postdoctoral positions lie in the range 2,000–3,000, with PhD positions and fellowships 800. Accommodation is provided.

Further information about Macao can be found via Wikipedia, and about the positions, currently open, from

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