

Research Directions

Office of Research Services

Identification Methods for Nonlinear Systems

Professor Wei Xing Zheng from the School of Computing and Mathematics, along with researchers from the University of Iowa (USA) and the University of Melbourne, will develop systems identification methods for establishing mathematical models that can simulate or predict a system's behaviour in complex real-life situations, through and ARC Discovery project.



Systems identification is concerned with using mathematical tools and algorithms to build dynamical models from measured data. Such a dynamical model provides a mathematical description of the dynamical behaviour of a system or process. The obtained dynamical model can be used to predict or simulate the behaviour of a system in various situations to assist in controller design, supervision, or fault detection of a process. Hence, system identification is a critical part of systems analysis and control, with wide-spread practical applications.

'Typically', says Professor Zheng, 'control scientists and engineers have relied on the relatively simple method of linear dynamical systems. However, these tend to be limited because there are many practical and natural processes that cannot be described by linear dynamical models because their features and properties are too complicated. This project will conduct comprehensive research on the development of methods for nonlinear dynamical systems, which represent systems whose behaviour is not expressible as a linear function of its descriptors.'

Nonlinear dynamical systems cover a wide range of real-life situations, but their behaviour is extremely difficult to predict. The nonlinear systems identification algorithms that will be developed in this project will have applications areas such as telecommunication, manufacturing, and biomedical systems.

Project Title: *Development of identification methods for nonlinear dynamical systems*

Funding Amount: \$150,000 over three years
February 2007

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