University of Western Sydney

Research Directions

Office of Research Services

Investigating Performance Limitation of Wireless Networked Feedback Systems

Spirit Rover Vehicle

Associate Professor Wei Xing Zheng, School of Computing and Mathematics, together with Professor Jie Chen, University of California is exploring feedback control over wireless networks. This ARC Discovery project aims to investigate the fundamental constraints, limitations and tradeoffs in the design of wireless networked control systems.

Networked control or control over networks is the setting in which control tasks are performed over wired or wireless communication links. These communication systems consist of electronic devices such as actuators, sensors and controllers that operate by carrying out information exchange and control signals via a communication network and typically over a long distance, for example, systems in robotic devices, sensor networks and the Mars-landing vehicles, *Spirit* and *Opportunity*.

'The systems under investigation all work via wireless control. Our principal focus will be studying the fundamental limitations of these systems, whether the wireless characteristics limit the performance achievable and what these limitations might be,' said Professor Zheng. 'We will also look at whether wireless systems degrade control performance, if a trade off exists or if improvement in performance is experienced between the wireless channel and that of the controller.'

To achieve this, the researchers plan to draw on concepts and ideas from different areas of communications, signal processing and control, using mathematical tools. Wireless systems and networks are exciting new areas of research that promise enormous scope in the future for applications such as manufacturing, telecommunications and defence.

Project Title: *An Investigation into Performance Limitation of Wireless Networked Feedback Systems*

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