exploring

By David Adams

parallel universes to help industry

It's been the subject of movies for years—a person can virtually enter another world where the experience is so real they find it hard to distinguish between what's real and what's not. Think of *The Matrix*.

Yet to Professor Saeid Nahavandi, Chair in Engineering within Deakin University's School of Engineering and Technology and research leader in intelligent systems, those movies are not as far-fetched as they might seem.

Saeid's team is involved in a number of projects employing virtual reality to improve the efficiency of processing and manufacturing systems within a range of different industries.

'The client can be immersed in a virtual plant which represents a real plant,' Saeid says. He added that this could make a significant contribution to a person's understanding of the process.

'And if you want to do maintenance, for example, sometimes you need to be closer to the process and be immersed in the environment to see (properly) from a safety perspective. Or if you're planning an assembly routine, sometimes immersion provides a better and greater understanding of the process.'

Technologies developed within the intelligent systems lab allow users to immerse themselves in the 3D world to see how a particular system works and, through the use of what is known as haptics, they also allow the user to feel aspects of their virtual environment.

'Whatever the robot arm can feel, it can come from the virtual world through the haptic device into the hand of the remote operator,' Saeid says. 'Robotics is nothing new—they've been operating tele-robotics since the 1960s in the nuclear industry, but to be able to put feedback in so the user can actually feel it is (new).'

Saeid says such technologies—which can also be combined with robotics to allow people to use machines remotely while 'feeling' what the robot does—could significantly reduce production times by allowing machine operators to learn how to use equipment before the production line has to be physically altered.

Haptics and robotics could also be used in the medical sector and in industries involving hazardous materials, such as the nuclear industry.

As well as working with robotics—and these include autonomous, moving robots capable of carrying more than 100 kilograms—the intelligent systems research lab is also involved in the development of computer simulation and modelling technologies to increase industry efficiency.

Deakin has already worked on an extensive list of projects using simulation technologies developed in the laboratory. Its industry partners include Ajax, Pacifica, Bosch and Air International—for whom it is using simulation models to maximise efficiency at an automotive seat manufacturing plant.

It is also working on a major Australian Research Council project aimed at improving security at major international airports, with a focus on baggage handling systems.

'Our role is to develop new technology which allows software houses to be able to develop models of complex systems such as airports rapidly,' Saeid says. 'We are developing tools, techniques and new methodology to achieve that.'

About 70 staff, postgraduate and undergraduate students regularly work in the lab and the research conducted there permeates through to undergraduates undertaking engineering, robotics and mechatronics and electronics degrees—many of whom spend time in the lab during units on robotics-related subjects.

'They physically experience and learn and program those systems and identify their capabilities and their use,' Saeid says.

This is part of a process to prepare students for work in industry.

'We try to prepare students to be ready for industry by the time they leave Deakin so they can appreciate the complexity and nature of real industry problems and go about solving them,' Saeid says.