



A multi-disciplinary research project involving the School of Psychology and the School of Information Technology and Electrical Engineering is seeking to develop computer systems and robots capable of intelligent thought, self-awareness, creativity, learning and emotion.

Dr Scott Bolland

THINKING INTELLIGENTLY

The program is being led by Dr Scott Bolland, who developed the Fluid Analogies Engine architecture for artificial intelligence programming during his PhD thesis at UQ, which was published in 2004.

The Fluid Analogies Engine research program will further Dr Bolland's PhD work. It is aimed at investigating and simulating the fundamental mechanisms of the mind, drawing on insights from psychology, biology and neuroscience, to develop computer systems and robots.

The approach that will be taken differs from traditional computer programming in that the systems will be primarily self-taught.

Dr Bolland said that "Fluid Analogies" referred to the process of being able to create and use analogies in multiple contexts to solve problems. This requires a process of learning to acquire sufficient information to create fluid analogies.

"To function in the real world requires vast amounts of knowledge, ranging from subtle fine motor commands needed to manipulate objects, through to knowing the consequences that various actions will have on the world," Dr Bolland said.

"It is unrealistic to assume that all this information can be programmed into or taught to a machine. Rather, machines of the future will be driven to actively seek new information and acquire new skills.

"This is similar to how children learn – they are not shown how to walk, but rather discover this and other skills and knowledge through self-guided action, experimentation and play," he said.

Central to the Fluid Analogies Engine research program will be the belief that for active exploration to occur, emotions are a necessary component.

"Emotions provide us with a useful signal that helps direct learning. For example, pain deters us from engaging in harmful activities, whereas pleasure motivates us to actively engage in activities from which new information can be learnt – such as reading magazines, playing sport or watching television," Dr Bolland said.

"Making learning fun, and boredom aversive, helps one to actively master skills and knowledge that may help us more effectively interact with the world."

Although initially experimental in nature, it is envisaged that the Fluid Analogies Engine program will have long-term implications in a wide range of fields, including the computer games industry, scientific discovery, computer aided design, and the development of autonomous robots and interactive toys.