

RESEARCH DIRECTIONS

Opening your mind

Professor André van Schaik and Dr Runchun Wang from the Biomedical Engineering and Neuroscience Research Program in the MARCS Institute will develop a platform to replicate functions of the brain and share it with researchers across the world. This project is funded by the Australian Research Council through its Discovery Projects scheme.

'To understand how brains work, we need to simulate neural networks of a size similar to that of the human brain,' André explains. 'But the human brain is huge and complex: 100 billion neurons with 100 trillion connections.'

'Researchers in the UK and US – funded in part through the Defence Advanced Research Projects Agency or the European Union – are investing hundreds of millions of dollars building hardware to simulate the brain. While building hardware from the ground up has advantages, it means that the simulation platform can only be shared among a relatively small group of researchers.'

André's goal is to make brain simulation open access: 'We will build a system from commercial hardware that will cost only a few ten thousand dollars and we will make our design and software available for free.'

Using field programmable gate arrays – a flexible hardware platform that can be programmed directly using a hardware description language – André and his team will digitally model more and more complex functions of the brain. This modelling will be interoperable with the dedicated hardware platforms being developed more slowly and expensively elsewhere, accessible to other researchers through Python-based front-end software, and open to researchers world-wide.



André's research will increase the pace of international efforts to simulate the neural networks of the brain, leading to advances in robotics, neurological disorders and computing. The research will create a novel platform for simulating large-scale neural networks in real time in a cost effective package, and it will be available in a widely accessible format.

Project Title: Hardware Acceleration for Neural Systems

Funding has been set at: \$430,000

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