Building Brains

Prof. Stephen Furber

School of Computer Science, The University of Manchester, United Kingdom

Just two years after the world's first stored program computer ran its first program at Manchester in 1948, Alan Turing published his seminal paper on "Computing Machinery and Intelligence". The paper opens with the words: I propose to consider the question, "Can machines think?". Turing then goes on to explore this question through what he calls "The Imitation Game", but which subsequent generations simply call "The Turing Test". Despite spectacular progress in the performance and efficiency of machines since Turing's time, we have yet to see any convincing demonstration of a machine that can pass his test. This would have surprised Turing - he believed that all that would be required was more memory. Although cognitive systems are beginning to display impressive environmental awareness, they do not come close to the sort of "thinking" that Turing had in mind.

My take on the problems with true artificial intelligence are that we still really haven't worked out what natural intelligence is. Until we do, all discussion of machine intelligence and "the singularity" are specious. Based on this view, we need to return to the source of natural intelligence, the human brain.

The SpiNNaker project has been 15 years in conception and 8 years in construction, but is now ready to contribute to the growing global community (exemplified by the EU Human Brain Project) that is aiming to deploy the vast computing resources now available to us to accelerate our understanding of the brain, with the ultimate goal of understanding the information processing principles at work in natural intelligence. SpiNNaker is a massively-parallel computer system, ultimately to incorporate a million ARM processor cores with an innovative lightweight packet-switched communications fabric capable of supporting typical biological connectivity patterns in biological real time.