FET FLAGSHIPS

FET Flagship Pilot session

The Human Brain Project

For over two thousand years, humans have tried to understand what it means to perceive, to feel, to remember, to reason and to know. In the last century, this enquiry, once purely philosophical, has become a major scientific enterprise, lent new urgency by longer lifespans and the increasing prevalence of brain disease. Today, the quest has an additional motivation. We can use knowledge of the brain to design new information and communication technologies.

The last fifty years have seen a rapidly expanding effort to develop brain-inspired computing architectures and to emulate brain circuitry in microelectronic devices. Some of these attempts, such as Artificial Neural Networks and neuromorphic devices have demonstrated impressive functionality. To date, however, such technologies have had little impact on mainstream ICT. Only today has our knowledge and computing power reached the critical mass necessary to build and simulate biologically detailed models of the brain and to systematically derive brain-like technologies. This is the strategic goal of the Human Brain Project (HBP).

The aim of the HBP is to create the informatics, modeling and supercomputing technologies required to build biologically detailed models of the complete human brain. Such models could serve as the basis for new diagnostic tools and treatments for brain disease, new interfaces to the brain, a new class of low energy technologies with brain-like intelligence, and a new generation of brain-enabled robots. To turn these goals into reality, the HBP will: (i) implement a customizable exascale supercomputing infrastructure, with capabilities for real-time interactive model-building, simulation, analytics, visualization, data access and online scientific collaboration; (ii) build a global multidisciplinary program that brings together huge volumes of neuroscience and clinical data, derives basic organizing principles for brain structure and function, builds computer models, runs simulations of the brain, couples brain simulations to robots, and derives new insights into behaviour and cognition; (iii) use the results to develop new diagnostics and treatments for brain diseases, and to design novel neuromorphic devices, brain interfaces and intelligent robots; (iv) create 8 large-scale research facilities servicing this program.

In this session of FET11, the HBP team will present the project's goals, rationale and strategy and explore its potential impact.

Speakers:
Henry Markram, EPFL: Introducing the HBP
Sten Grillner, Karolinska Institutet: Brain simulation for a new kind of neuroscience
Thomas Lippert, Jülich Supercomputing Centre: Brain simulation and the future of supercomputing
Richard Frackowiak, CHUV: Brain simulation for the diagnosis and treatment of brain disease
Kris Verstreken, IMEC: New interfaces to the brain
Karl Heinz Meier, University of Heidelberg: Brain simulation as a source of neuromorphic technology
Alois Knoll, Technical University Munich: Brain simulation and robotics

Contact:
to be announced