Computers like Brains

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Did you ever think of your own brain as a computer? In many aspects, it is not a very good one. It is bad at math and we can never remember all those phone numbers. But, this is why we invented real computers!

On the other hand, our brain has amazing capabilities. We can drive cars and make reasonable decisions in very demanding situations. We have fears and emotions and possibly a free will. We have a sense of our own, called consciousness. All this is located in a one-litre volume in our head and consumes just 20 Watts of power. More amazing facts : We lose about 1 brain cell each second without noticeable effect, we dont need software updates, we just learn continuously.

Building artificial systems with such capabilities would be a game changer for information science and technology. The European Human Brain Flagship Project (HBP) has this research and development on the agenda, it is developing what is called neuromorphic computers.

We know that the brain is a complex network of cells, called neurons. The neuromorphic groups in the HBP follow two different pathways to mimic this structure : A machine made of 500.000 telephone processors and another machine connecting 4 Million neurons with up to 1 Billion connections realized mostly in analog circuits like in the real brain. The first system is located in Manchester (UK), the second in Heidelberg (Germany).

What is it good for? We plan to help neuroscientist to understand the functioning of the real brain, in particular the process of learning. We also want to develop a new approach to machine learning and artificial intelligence (AI), a field that is looking for more brain inspired technologies.

The HBP is an ideal environment to pursue this kind of research. It brings together different disciplines needed to build these new and fascination machines, which may well, have a fundamental impact on the way we humans live in the future.

The keynote lecture will introduce the concepts of neuromorphic computing, describe the achievements and provide an outlook to the future.