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New vision of how the brain works

A research group led by Henrik Jörntell, professor of neurophysiology at Lund University, has made several discoveries that challenge the traditional view of the brain. The results of this innovative research have great implications in medicine but also for the next generation of virtual reality and AI.

The EU Future Emerging Technology Program has awarded SEK 32 million to an international research consortium with Swedish, British and French researchers and companies. The project (ph-coding) is led by researcher Henrik Jörntell from Lund and the contribution has enabled an innovative research on how the brain predicts the world around us.

-With our research we have two main goals, one goal is medical related – we have created a new understanding of how the brain manages information down at the cellular level. It is important to understand how neurological and psychiatric diseases occur, as these often relate to a disturbance in the transmission of information between nerve cells, says Henrik Jörntell and adds:

-The second objective is technologically related. Here the researchers are investigating new types of solutions for AI, and what happens in the brain when we touch things and how this helps the brain to predict the outside world. Through a two-way sensory interface, the researchers want to enable a human being to interact with a machine, which through nanotechnology senses the intentions of that person.

The consortium's research points to new principles that do not match the common perceptions of how the brain works. The great eye opener was when they studied how the brain's system of touch works.

– According to the prevailing perception of the brain, known as a functional localization, different parts of the brain have responsibility for different functions. When we measure the activities of individual neurons, we get a different picture suggesting that the functions are instead handled more comprehensively by the entire brain. This was partly because even the simplest touch engages a large number of sensors, says Henrik Jörntell.

By starting from the principles of the brain to extract and use a rich sense of sensory information from interactions with the outside world, researchers want to create different types of user interfaces that can be used for the next generation of virtual reality as well as the area of medicine.

– Our results open up a whole new world of promising treatment potential in a variety of medical conditions. Even at a more severe level of illness there is often a lot of brain capacity left and if you can learn brain cells to coordinate better internally, the recovery can also be greater than previously thought possible, concludes Henrik Jörntell.