Welcome to the latest in our series on disruptive European-funded research. In this issue, we find out about three-dimensional (3D) stacked hardware layers for machine translation, discover how artificial intelligence (AI) is making cyber-physical systems (CPS) more efficient, and get up to date on the latest technologies powering data processing and analytics.

Innovation Europe

THE FVLLMONTI: TAKING TRANSISTORS TO THE NEXT DIMENSION, WITH CRISTELL MANEUX

FVLLMONTI is a FET ProActive project that seeks to provide an innovative solution for applications such as machine translation without relying on sending information to the cloud. Specifically, the project is creating ferroelectric vertical nanowire field-effect transistors (VNWFETs) to produce 3D stacked hardware layers of neural networks. We caught up with FVLLMONTI Coordinator Cristell Maneux to find out more.

How is FVLLMONTI disrupting nanoelectronics?

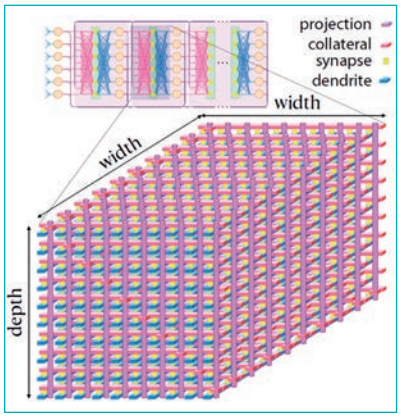
Currently, in the field of nanoelectronics, the method for producing computer processing units is to cut a wafer to create a die. Wafers are very thin, and the transistors on the hardware are actually two dimensional (2D), although the interconnects are 3D. In this project, we intend to fabricate and simulate model transistors that are really, naturally, 3D. This is important because it gives us access to a denser processing unit.

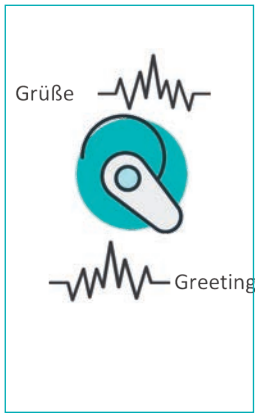
Why is it important to get more density on processing units?

More density allows us to have more processing power, which is a requirement for efficient neural networks. By creating 3D transistors, using nanowires, we have access to naturally 3D crossbars, which fit nicely to the neural network architecture, delivering superior performance for machine learning applications. Another thing which is really mandatory is to have memory port points embedded into this technology, and to do this we intend to use ferroelectric gate transistors.

What's the main application of this technology?

The one we're targeting is translation, but basically speaking it could be used in any application that needs to stay on the device, so we don't have to access the internet, for example, and so can save energy. This would mean that you could have one person speaking in French, for example, and the other person speaking in English, and a lightweight in-ear device could be used to translate in real time. This would avoid the somewhat ridiculous situation we have at the moment, where you have to send data to a translation machine in the cloud and retrieve it again, all while two people are standing in front of one another.





FURTHER INFORMATION:
fvllmonti.eu

FVLLMONTI (Ferroelectric Vertical Low energy Low latency low volume Modules fOr Neural network Transformers In 3D) has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no.101016776