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Imec demonstrates self-learning neuromorphic chip that composes music

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Antwerp (Belgium) – May 16, 2017 – Today, at the imec technology forum (ITF2017), imec, the world-leading research and innovation hub in nano-electronics and digital technologies, demonstrated the world's first self-learning neuromorphic chip. The brain-inspired chip, based on OxRAM technology, has the capability of self-learning and has been demonstrated to have the ability to compose music.

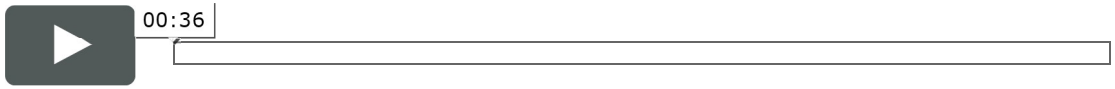
The human brain is a dream for computer scientists: it has a huge computing power while consuming only a few tens of Watts. Imec researchers are combining state-of-the-art

hardware and software to design chips that feature these desirable characteristics of a self-learning system. Imec's ultimate goal is to design the process technology and building blocks to make artificial intelligence to be energy efficient so that that it can be integrated into sensors. Such intelligent sensors will drive the internet of things forward. This would not only allow machine learning to be present in all sensors but also allow on-field learning capability to further improve the learning.

By co-optimizing the hardware and the software, the chip features machine learning and intelligence characteristics on a small area, while consuming only very little power. The chip is self-learning, meaning that is makes associations between what it has experienced and what it experiences. The more it experiences, the stronger the connections will be. The chip presented today has learned to compose new music and the rules for the composition are learnt on the fly.

Imec maakt zelflerende chip geïnspireerd op het menselijk brein

de imec



It is imec's ultimate goal to further advance both hardware and software to achieve very low-power, high-performance, low-cost and highly miniaturized neuromorphic chips that can be applied in many domains ranging for personal health, energy, traffic management etc. For example, neuromorphic chips integrated into sensors for health monitoring would enable to identify a particular heartrate change that could lead to heart abnormalities, and would learn to recognize slightly different ECG patterns that vary between individuals. Such neuromorphic chips would thus enable more customized and patient-centric monitoring.

“Because we have hardware, system design and software expertise under one roof, imec is ideally positioned to drive neuromorphic computing forward,” says Praveen Raghavan, distinguished member of the technical Staff at imec. “Our chip has evolved from co-optimizing logic, memory, algorithms and system in a holistic way. This way, we succeeded in developing the building blocks for such a self-learning system.”

About ITF

The Imec Technology Forum (ITF) is imec’s series of internationally acclaimed events with a clear focus on the technologies that will drive groundbreaking innovation in healthcare, smart cities and mobility, ICT, logistics and manufacturing, and energy.

At ITF, some of the world’s greatest minds in technology take the stage. Their talks cover a wide range of domains – such as advanced chip scaling, smart imaging, sensor and communication systems, the IoT, supercomputing, sustainable energy and battery technology, and much more. As leading innovators in their fields, they also present early insights in market trends, evolutions, and breakthroughs in nanoelectronics and digital technology: What will be successful and what not, in five or even ten years from now? How will technology evolve, and how fast? And who can help you implement your technology roadmaps?

About imec

Imec is the world-leading research and innovation hub in nano-electronics and digital technologies. The combination of our widely-acclaimed leadership in microchip technology

and profound software and ICT expertise is what makes us unique. By leveraging our world-class infrastructure and local and global ecosystem of partners across a multitude of industries, we create groundbreaking innovation in application domains such as healthcare, smart cities and mobility, logistics and manufacturing, and energy.

As a trusted partner for companies, start-ups and universities we bring together close to 3,500 brilliant minds from over 75 nationalities. Imec is headquartered in Leuven, Belgium and also has distributed R&D groups at a number of Flemish universities, in the Netherlands, Taiwan, USA, China, and offices in India and Japan. In 2016, imec's revenue (P&L) totaled 496 million euro. Further information on imec can be found at www.imec.be.

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