UTA AIMS TO BUILD A BETTER MICROCHIP

Electrical engineer works to improve on-chip interconnect performance

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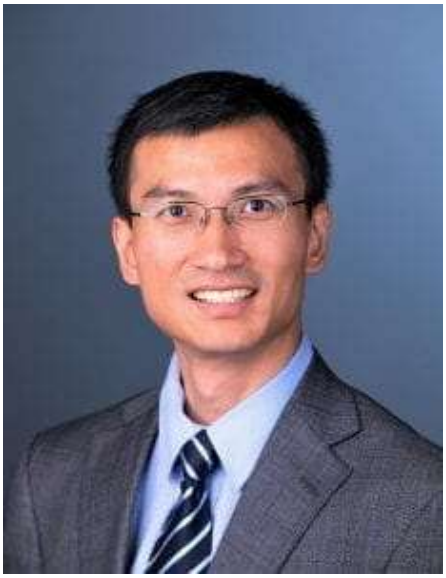

A University of Texas at Arlington electrical engineer is investigating how to improve intermediate interconnects on increasingly complex microchips that will lead to better performance of very large-scale integration (VLSI) circuits and systems.

Assistant Professor Chenyun Pan received a four-year, $230,000 grant from the Interuniversity Microelectronics Centre (IMEC) for the work.

VLSI is the process of creating an integrated circuit by fabricating billions of transistors on a single chip. It is at the core of semiconductor and telecommunication technologies. Interconnects are wires on chips used in generic microprocessors or integrated circuits, with lengths typically ranging from tens of nanometers to millimeters.

Pan hopes that his research will help determine how different materials and geometric structures used in intermediate-length interconnects can lead to greater efficiency as the semiconductor manufacturing process becomes smaller and smaller. He will explore new materials—including alternative metals, ballistic materials and optical or plasmonic materials—and investigate new interconnect structures and transmission lines.

“As chip technology continues to shrink, on-chip interconnects impose severe limitations on chip-level performance,” Pan said. “More than half of delays and power dissipation on chips are associated with interconnection networks.

“Traditionally, copper is used to make interconnects, but its large resistivity leads to significant lags in performance. We aim to find novel materials and transmission mechanisms that will alleviate the interconnect challenge and deliver improved chip speed.”

Pan’s connection to IMEC provides an important link between the University and industry, a necessary connection in the collaborative climate of research and development, said Diana Huffaker, chair of UTA’s Electrical Engineering Department.

“IMEC is the foremost research center and arguably the gold standard for basic research to industrial development in the world,” Huffaker said. “Dr. Pan’s continued collaboration with it is impressive and speaks to his ability and creativity as a researcher. I hope that this will lead to many more opportunities for him and for our department.”

Pan joined UTA in 2019. He was a researcher at IMEC’s headquarters in Leuven, Belgium, from 2014-15, focusing on emerging graphene interconnects and deeply scaled vertical field-effect transistors.

IMEC is a research and development hub for nano- and digital technologies. A trusted partner for companies, startups, and academia, IMEC offers a creative and stimulating environment with more than 4,000 researchers in 90 countries. IMEC works with many different partners, ranging from governmental agencies to universities to major semiconductor industrial partners, such as Intel, ARM, TSMC and Samsung.

- Written by Jeremy Agor, College of Engineering

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