

NTU researchers develop world's smallest on-chip low-pass filter

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A research team from Nanyang Technological University (NTU, Singapore) has successfully designed the world's smallest on-chip low-pass filter which is 1,000 times smaller than existing off-chip filters.

A low-pass filter is a circuit that allows low-frequency signals to pass through while reducing unwanted high-frequency signals from passing through. Compared to existing off-chip [filters](#), which are discrete and bulky components, on-chip filters occupy a small area on integrated circuit chips, which can be found in portable devices such as mobile phones, laptops, vehicle-mounted radars, as well as speed guns used in traffic monitoring.

The successful completion of this research project was announced at the official opening of VIRTUS, the new Integrated Circuit Design Centre of Excellence, which was launched by NTU and the Economic Development Board just 10 months ago.

The man behind this invention is Professor Yeo Kiat Seng, Head of Circuits and Systems at NTU's School of Electrical and [Electronic Engineering](#). The breakthrough in design for this filter is set to revolutionise wireless communication.

"This new low-pass filter can lead to a significant improvement in signal quality as it removes nearly all unwanted interferences and noise in the environment," said Professor Yeo.

"This results in clearer reception and enhanced clarity for mobile phone users and users of wireless applications such as Bluetooth and other mobile devices. For example, if you are speaking to your friend on your mobile phone in a noisy food centre or in a train, you would still be able to hear him clearly."

"The filter also consumes less power and can be easily incorporated into existing integrated circuit chips at almost no cost. This means that in addition to better signal quality, consumers enjoy lower power consumption without any additional cost," he added.

The new filter will pave the way for further research and development of high-performance [integrated circuits](#) and [wireless communication](#) products. Integrated circuit chips incorporating the filter can result in new applications for transmitting uncompressed digital audio/video data, and high-speed wireless local area networks for instantaneous wireless file transfer.

Provided by Nanyang Technological University

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