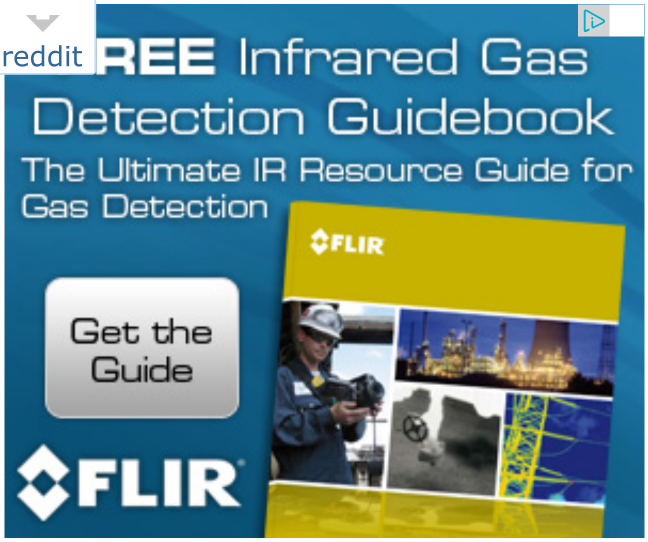
Startup Seamless Devices launches from professor Peter Kinget's lab

2014

Innovative technology developed in Electrical Engineering Professor Peter Kinget's lab is at the core of Seamless Devices, a startup co-founded by Kinget and his former student Jayanth Kuppambatti PhD'14. Seamless Devices aims to address critical limitations faced by semiconductor technologies striving to meet the demands of performance and power efficiency required by the next-generation of electronic devices and s.



"The idea behind Seamless Devices is to simplify the design of high-performance electronic systems even as transistors are scaled down deep into the nanoscale," says Kinget. "We are building patented switched-mode analog signal processing techniques and extending their capability to serve a broad range of applications across industries."

These applications could include consumer electronics—wearable sensors, for instance; embedded and connected devices such as thermostats; telecommunications and wireless communications including mobile phones; and health care, as in EKG or EEG signals, and heart monitors.

The design of high-performance analog interfaces is becoming progressively harder as silicon semiconductor technologies keep scaling and circuits can only operate with smaller supply voltages. At the same time, demands on circuit performance and power efficiency keep increasing. And as transistors on chips become smaller in size, the voltages available become lower, presenting difficulties in analog and mixed-signal integrated circuits. These issues can lead to reduced performance or additional design complexity.

Analog circuits perform the critical function of interfacing the physical, analog world we live in to the digital, cyber world of computers and consumer electronics. The ever-increasing performance of digital systems in nanoscale technologies needs to be matched with analog interfaces with equally high performance in fully integrated systems-on-a-chip.

The switched-mode signal processing technology was developed in Kinget's lab to translate seamlessly from analog to digital. "We are using our technique to take advantage of the fact that the timing resolution in nanoscale integrated circuits is becoming more accurate, by transforming analog signals into a time-based form that preserves a high degree of signal fidelity," Kuppambatti notes.

Silicon Valley-based Seamless Devices was co-founded with Allied Minds, a science and technology development company specializing in the commercialization of early stage research spinning out of university and federal labs. Kuppambatti joined Seamless Devices as its first employee in November 2014.

"We are excited by the opportunity to work with Columbia University on the commercialization of this new technology," says Chris Silva, chief executive officer at Allied Minds. "Analog signals—music, speech, images, biomedical signals, and radio waves, to name a few—are ubiquitous and touch every aspect of our daily lives. This new processing technique will enable the development of innovative devices with higher performance, lower power consumption, and smaller size."

Initially, Seamless Devices will be working on solutions for the semiconductor intellectual property (IP) market, which involves developing and licensing circuit designs that are incorporated into system-on-chip integrated circuits. Within this analog IP market, the company expects to be able to offer analog-to-digital converters (ADC) for telecom applications, meeting an accelerating demand for ADCs that can operate at high bandwidth and high resolution with low power consumption.

"The evolution of our idea, from brainstorm to a professional company has been very exciting for us," Kinget adds, "And we could not have reached this point without the support of the Columbia ecosystem. Just a year or so ago, we were incubating in the Columbia Startup Lab and supported with an Ignition Grant from Columbia Engineering and a small business innovation research award from the National Science Foundation. Columbia Technology Ventures was also marketing our research to the marketplace and connected us with Allied Minds. We are so grateful for all the support—it was key in taking our venture to this next step."

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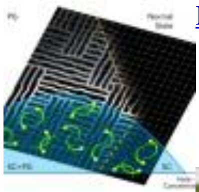

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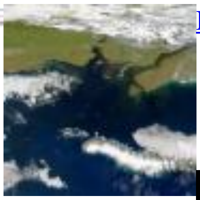

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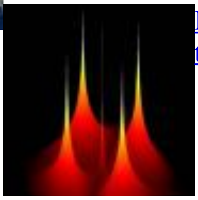

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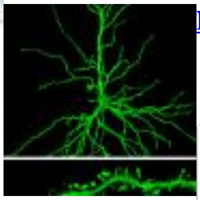

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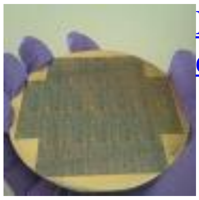

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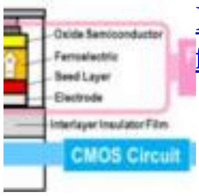

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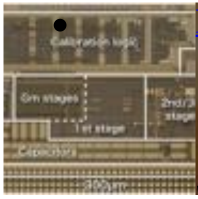

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