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## **Ultra-miniaturization, Integration of Communications, Computing & Neural Interfaces Creates Remote Control “Cyborg Insects,” with IoT Implications**

*Luncheon presentation at 2016 Symposium on VLSI Technology & Circuits to explore the IoT potential of neural interfaces between synthetic computing and multicellular organisms...*

HONOLULU, HI (JUNE 1, 2016) – The radical miniaturization of both computational and communications circuits has lowered the barriers to introducing synthetic neural interfaces into organic, multicellular organisms (“cyborg insects”), with significant implications for the emerging Internet of Things (IoT). The integration potential of these types of neural interfaces, and their impact on our increasingly connected society is the subject of the luncheon presentation at the 2016 Symposia on VLSI Technology & Circuits, a premiere international conference on semiconductor technology that defines the pace, progress and evolution of microelectronics, scheduled from June 13-17, 2016 in Honolulu, Hawaii.

The luncheon presentation, entitled **“Cyborg Insects & Other Things; Building Interfaces Between the Synthetic & the Multicellular,”** by Michel Maharbiz, associate professor of Electrical Engineering & Computer Sciences at UC Berkeley, reflects the overall Symposia theme, **“Inflections for a Smart Society.”** The luncheon presentation is scheduled for Thursday, June 16, and is part of the Symposia program that showcases thought-provoking, leading edge research from an industry expert on a subject related to VLSI technology and circuits.

Both size and power requirements for communications and computing circuits have seen dramatic reductions – a wireless transceiver powered at 1pJ is capable of delivering signals to a thinned CMOS digital engine with a sensor front-end as small as  $500\mu\text{m}^2$ . With this radical miniaturization comes the ability to introduce a synthetic neural interface into a complex, multicellular organism, as exemplified by the creation of a “cyborg insect.”

“The rapid pace of computation and communication miniaturization is swiftly blurring the line between technological base we’ve created and the technological base that created us,” explained Dr. Maharbiz. “These combined trends of extreme miniaturization and advanced neural interfaces have enabled us to explore the remote control of insects in free flight via implantable radio-equipped miniature neural stimulating systems.”

As part of his luncheon presentation, Dr. Maharbiz will also discuss his recent progress in constructing extremely small neural interfaces, or “neural dust,” in collaboration with colleagues at UC-Berkeley.

More information about the Symposia luncheon presentation is available here:  
<http://vlsisymposium.org/plenary-rump-sessions/#1460130601278-714ef35f-ed28>

The annual Symposia on VLSI Technology & Circuits will be held at the Hilton Hawaiian Village, Honolulu, Hawaii from June 13-16, 2016 (Technology) and June 14-17, 2016 (Circuits). Held together since 1987, the Symposia provide a unique opportunity for the world's top device technologists, circuit and system designers to exchange leading edge research on microelectronics technology, with alternating venues between Hawaii and Japan.

### **Sponsoring Organizations**

The Symposium on VLSI Technology is sponsored by the IEEE Electron Devices Society and the Japan Society of Applied Physics, in cooperation with the IEEE Solid State Circuits Society.

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### **Further Information, Registration and Program Details**

Visit: <http://www.vlsisymposium.org>.

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