

Rigid, Flexible, and Stretchable Circuits and Sensor Systems

ABSTRACT

Stretchable electronic circuits and systems will be critical for future wearable devices and smart textiles, where existing fabrication approaches severely limit conformal deformation. This is especially true for wearable sensors and actuators, conformable electronic skins and textiles, soft robots, and emerging physical human-machine interfaces. In this talk, I present a survey of our ongoing research leveraging printed liquid metal paste materials to build stretchable electrical interconnects between electronic components. This approach allows us to build multi-layer "stretchable PCBs," and it provides the ability to print sensors and passives using the same material. I will also describe our recent work developing methods for the heterogeneous integration of IC-based sensors into new biosensor and bioelectronic systems.

SPEAKER BIO

Matthew Johnston received the B.S. degree in electrical engineering from the California Institute of Technology and the M.S. and Ph.D. degrees in electrical engineering from Columbia University. He joined Oregon State University in 2014. He was co-founder and manager of research at Helixis, a Caltech-based spinout developing instrumentation for real-time DNA amplification, from 2007 until its acquisition by Illumina in 2010. From 2012 to 2013 he was a postdoctoral scholar in the Bioelectronic Systems Lab at Columbia University.

His current research interests include integration of sensors and transducers with mixed-signal integrated circuits, stretchable circuits and sensor systems, lab-on-CMOS platforms, bio-energy harvesting, and low-power distributed sensing applications. He is currently an Associate Editor of the IEEE Transactions on Biomedical Circuits and Systems and of the IEEE Open Journal of Circuits and Systems, and he was the recipient of the 2020 SRC Young Faculty Award.



Matt Johnston
Associate Professor
Oregon State University

TUESDAY
Oct 27, 2020

Talk: 11:00-11:30 AM PDT
Q/A: 11:30-11:45

Zoom: <https://oregonstate.zoom.us/j/96699974227>

<https://eecs.oregonstate.edu/tech-talk-tuesday>



Heterogeneous Integration of Transparent Conductive Oxides with Silicon Photonics

ABSTRACT

Transparent conductive oxide (TCO) materials have attracted tremendous research interests for integrated photonic devices in recent years due to the extraordinary perturbation to the refractive indices achieved either through oxygen vacancy doping or electrical gating. In addition, high quality TCO materials can be deposited using DC- or RF-sputtering on various platforms including silicon platforms. Therefore, TCO materials are fully compatible with silicon photonics and promise unprecedented potentials for heterogeneous integration with silicon photonic integrated circuits. In this talk, I will review recent research progress in my group for the development of TCO-gated silicon photonic devices to achieve ultra-high energy efficiency, high speed photonic devices, including photonic crystal nanocavity modulators and microring resonators with ultra-large E-O tuning efficiency. We also achieved 5Gbit/s E-O modulation speed and will also discuss the strategy to further improve the energy efficiency to atto-joule/bit and implement large-scale integration for data centers.

SPEAKER BIO

Alan Wang received his B.S. degree from Tsinghua University, and an M.S. degree from the Institute of Semiconductors, Chinese Academy of Sciences, Beijing, P.R. China, in 2000 and 2003, respectively, and his Ph.D. degree in electrical and computer engineering from the University of Texas at Austin in 2006. From 2007 to 2011, he was with Omega Optics, Inc., Austin, Texas, where he served as the chief research scientist with more than \$4 million of research grants. Since September 2011, he has been an assistant professor at Oregon State University in the School of Electrical Engineering and Computer Science. He was promoted to associate professor in 2017. He has more than 80 journal and conference publications, including 12 invited and plenary presentations. He holds three U.S. patents. He is a senior member of IEEE, SPIE and OSA.

Accommodations for disabilities may be made by contacting 541-737-3617 or eeecs@oregonstate.edu.



Alan Wang
Associate Professor
Oregon State University

TUESDAY
Oct 13, 2020

Talk: 11:00-11:30 AM PDT
Q/A: 11:30-11:45

Zoom: <https://oregonstate.zoom.us/j/96699974227>

<https://eeecs.oregonstate.edu/tech-talk-tuesday>



Oregon State
University

Equalizer Free High-Speed Wireline Communication

ABSTRACT

Energy/bit increases by 10x for every 30dB increase in channel loss. This trend is unsustainable for supporting high data rates of the future. In 2017 a new line-coding schemes – iPWM was introduced as an alternative to equalizers. In 2019 an equalizer free link was demonstrated using data encoding alone. This presentation, I will introduce the basics of equalization and how new coding technology could be the disruptive force in wireline communication.

SPEAKER BIO

Tejasvi Anand received his Ph.D. in electrical engineering from the University of Illinois at Urbana-Champaign, IL, USA in 2015, and M.Tech. (distinction) in electronics design and technology from the Indian Institute of Science, Bangalore, India, in 2008. He worked at IBM T. J. Watson Research Center, Yorktown Heights, NY USA, with the RF Circuits and Systems group in the summer of 2015. From 2008 to 2010, he worked as an analog design engineer at Cosmic Circuits (now Cadence), Bangalore. His research focuses on wireline communication, frequency synthesizers and sensors with an emphasis on energy efficiency.

Anand is a recipient of 2014-15 IEEE Solid-State Circuits Society Predoctoral Achievement Award, the 2015 Broadcom Foundation University Research Competition Award (BFURC), the 2015 M. E. Van Valkenburg Graduate Research Award from the University of Illinois, the 2013 Analog Devices Outstanding Student Designer Award, and the 2009 CEDT Design (Gold) Medal from the Indian Institute of Science, Bangalore, India.



Tejasvi Anand
Assistant Professor
Oregon State University

TUESDAY
Sept 29, 2020

Talk: 11:00-11:30 AM PDT
Q/A: 11:30-11:45

Zoom: <https://oregonstate.zoom.us/j/96699974227>

<https://eecs.oregonstate.edu/tech-talk-tuesday>

