Speaker	Shih-Chii Liu
Talk Title	Event-based sensors, processing algorithms, and networks
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1. Abstract

Recent progress in the development of higher-performance, more usable neuromorphic spike-event-based visual ((DVS/ATIS/DAVIS) and auditory sensors (AER-EAR) along with versatile hardware such as FPGAs have stimulated exploration of real-time sensor processing, both in software and on hardware platforms. These sensors enable low-latency system-level response time at lower power than conventional sampled sensors. They could enable always-on sensing that beats the classical tradeoff between latency and power that has been a consequence of Nyquist-based sampling. This talk describes the state-of-art of event-based visual sensors, the types of event-driven algorithms that process the data, and the real-time implementations of event-based deep neural networks on the vision sensor outputs.

2. Brief Biography

Shih-Chii Liu runs the Sensors group together with Tobi Delbruck at the Institute of Neuroinformatics, Univ of Zurich and ETH Zurich. She studied electrical engineering as an undergraduate and received the Ph.D. degree in the Computation and Neural Systems program from the California Institute of Technology.

She worked at various companies including Gould American Microsystems, LSI Logic, and Rockwell International Research Labs. She is a group leader at the Institute of Neuroinformatics, University of Zurich and ETH Zurich, Switzerland. Her research interests include neuromorphic visual and auditory sensors, cortical processing circuits, and event-driven circuits, networks, and algorithms.

Dr. Liu is past Chair of the IEEE CAS Sensory Systems and Neural

Systems and Applications Technical Committees. She is current Chair of the IEEE Swiss CAS/ED Society and an associate editor of the IEEE Transactions of Biomedical Circuits and Systems and Neural Networks journal.

3. List of Representative Publications

1. **Liu, S-C., Yang, M-H., Steiner, A., Moeckel, R., and Delbruck, T. (2015), 1kHz 2D visual motion sensor using 20x20 silicon retina optical sensor and DSP microcontroller, Special Issue of ISCAS 2014: IEEE Transactions on Biomedical Circuits and Systems, doi:10.1109/TBCAS.2015.2414881.**
2. **Chien, C-H., Liu, S-C., and Steimer, A. (2015), A neuromorphic VLSI circuit for spike-based random sampling, IEEE Transactions on Emerging Topics in Computing: Special Issue on Advances in Neuromorphic and Analog VLSI Computing, To be published.**
3. D. P. Moeys, T. Delbruck, and S-C. Liu. "Current-mode automated quality control cochlear resonator for bird identity tagging", *2015 IEEE International Symposium on Circuits and Systems*, 2015
4. C. Braendli, R. Berner, M-H. Yang, S-C. Liu, and T. Delbruck, "A 240x180 130dB 3us latency global shutter spatiotemporal vision sensor", *IEEE Journal of Solid-State Circuits (JSSC)*, 49:(10) 2333-2341, 2014
5. S-C. Liu, A. van Schaik, B. Minch, and T. Delbruck, "Asynchronous binaural spatial audition sensor with 2x64x4 channel output", *IEEE Transactions on Biomedical Circuits and Systems*, 2014.
6. M-H. Yang, S-C. Liu, and T. Delbruck, "Comparison of spike encoding schemes in asynchronous vision sensors: Modeling and design", *2014 IEEE International Symposium on Circuits and Systems*, Melbourne, Australia 2014.
7. P. O'Connor, D. Neil, S-C. Liu, T. Delbruck, and M. Pfeiffer, "Real-time classification and sensor fusion with a spiking Deep Belief Network", *Frontiers in Neuromorphic Engineering,* vol. 7, 2013.
8. M. Slaney, T. Agus, S-C. Liu, M. Kaya, and M. Elhilali. "A model of attention-driven scene analysis", *Proceedings of the 2012 IEEE International Acoustics, Speech and Signal Processing*, 2012.