Area: Integrated Circuits and Embedded Systems (ICES)

Host: Prof Massimo Bruno Alioto
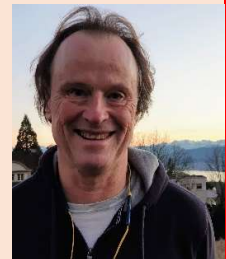
TOPIC	:	**SciDVS and hardware event camera denoising**
SPEAKER	:	**Prof Tobi Delbruck** **Sensors Group, Inst. of Neuroinformatics, UZH-ETH Zurich** https://sensors.ini.ch
DATE	:	**Monday, 3 February 2025**
TIME	:	**4:00PM-5:00PM**
VENUE	:	**E7-03-09 - Seminar Room 4** **(Engineering Blk E7, College of Design and Engineering, NUS)**

ABSTRACT

In this talk, two areas of research in our research group in Zurich will be presented. The first is our latest event camera called SciDVS, which achieves more than an order of magnitude improvement over the state of the art for scientific event camera applications requiring high sensitivity and low noise.
As second area explored in this talk, our investigation and latest results and scientific insights into event camera noise are presented. In particular, the talk will focus on how to effectively and cheaply denoise event camera output, even within the camera readout.

BIOGRAPHY

Tobi Delbruck (IEEE M'99–SM'06–F'13) received a B.Sc. degree in physics from University of California in 1986 and a Ph.D. degree from Caltech in 1993 in the inaugural class of the Computation and Neural Systems program founded by John Hopfield, as a student of Christof Koch, David van Essen and Carver Mead. Currently he is a Professor of Physics and Electrical Engineering at ETH Zurich in the Institute of Neuroinformatics, University of Zurich and ETH Zurich, Switzerland, where he has been since 1998. He directs the Sensors group together with Prof. Shih-Chii Liu. It focuses on neuromorphic event sensors and processing, with recent focus on theory and hardware accelerators for AI. He co-organizes the Telluride Neuromorphic Engineering workshop and has organized live demonstration sessions at ISCAS, NeurIPS, and AICAS and two Confession Sessions at ISCAS. Delbruck is past Chair of the IEEE CAS Sensory Systems Technical Committee. He worked on electronic imaging at Arithmos, Synaptics, National Semiconductor, and Foveon and has co-founded 3 companies inilabs, insightness, and inivation. He invented the adaptive photoreceptor circuit. The MOS pseudo resistor used in it is a key part of the most cited JSSC paper of the 2005-2015 decade in the neural-amplifier paper from R. Harrison. He also invented the "bump" circuit and developed open-source ultra wide dynamic range digitally programmable bias current generators used in many neuromorphic chips. His IEEE J. Solid State Circuits paper on the dynamic vision sensor silicon retina event camera is the 4th most cited in the 2005-2015 decade. These event camera developments inspired the Sensors Group's recent work on activity-driven AI hardware accelerators, e.g. *NullHop* and *DeltaRNN*, which are among the first to exploit neuromorphic activation sparsity for saving time and energy like spiking neural networks, but in a way that is much more compatible with using DRAM memory for cost-efficient scaling to large deep networks. Over the past 5 years he has been working towards using these hardware AI circuits for adaptive nonlinear robotic control. His papers have been awarded 13 IEEE awards and is a Fellow of the IEEE for his work on neuromorphic sensors and processing.

https://cde.nus.edu.sg/ece/highlights/events/