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Presents

Computational Neuroscience for Technology: Event-based Vision Sensors and Information Processing

Professor Jorg Conradt

Assistant Professor, Department of Electrical and Computer Engineering & Center of NeuroEngineering
At Technische Universitat Munchen

Abstract: In recent decades the field of Computer Vision has developed sophisticated algorithms for problems such as object tracking or motion extraction based on sequences of high-resolution camera images. Applying such algorithms in real-time robotics reveals an inherent problem: they typically require high data bandwidth and high processing power, which results in substantial computing machinery and/or delayed processing of data. As part of an optimized biological solution for vision, our brain developed retinal receptor cells that largely respond with asynchronous events ("neural spikes") to temporal changes of brightness. Such encoding of visual information substantially reduces the amount of transmitted data and simultaneously increases temporal precision.

Recently "silicon retinas" have been developed as specialized vision sensors to provide such neuro-inspired vision input for technical systems. Visual information obtained from these sensors differs substantially from traditional sequences of images, which requires an "event-based" redesign of computer vision algorithms. This talk introduces the neuro-inspired vision sensors and presents event-based algorithms for applications such as real-time computation of optic flow and visual object tracking at high update rates on minimalistic computing hardware.

Biography: Jörg Conradt is Assistant Professor at the Technische Universität München in the Department of Electrical and Computer Engineering, Center of NeuroEngineering. He holds an M.S. degree in Computer Science / Robotics from the University of Southern California, a Diploma in Computer Engineering from TU Berlin and a Ph.D. in Physics / Neuroscience from ETH Zurich. His research group on Neuroscientific System Theory (http://www.nst.ei.tum.de/en/home/) investigates key principles by which information processing in brains works, and applies those to real-world interacting technical systems.

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Donald Bren Hall 4011