The Computational Photometer Multi-Channel Intelligent 3D Sensor Design

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Abstract:
Researchers at the University of Alaska Anchorage and University of Colorado Boulder have built a low cost high performance and efficiency drop-in-place computational photometer to test in field applications ranging from port security and safety monitoring to UAV based environmental monitoring and surveying. The CP (Computational Photometer) integrates off-the-shelf visible spectrum cameras with near to long wavelength infrared detectors and high resolution digital snapshots in a single device. The proof of concept combines three or more detectors into a single multi-channel imaging system that can time correlate read-out, capture, and image processing of all channels concurrently with high performance and energy efficiency. The continuous standard definition stereo vision can be time correlated to megapixel high definition snapshots. This proof of concept has been laid out for a four-layer PCB (Printed Circuit Board) suitable for use in education and in research for low cost high efficiency field monitoring applications that need multispectral and/or three dimensional imaging capabilities. The design supports traditional binocular vision as well as the potential for short range RGB-depth maps using structured light projection for 3D sensing (technology used by PrimeSense and the Microsoft Kinect) – both methods will be compared in this presentation along with off-the-shelf RGB-Depth devices available and use of OpenCV for passive depth mapping. The hardware, firmware and software work is funded by Intel Corporation through an Education and Research Grant along with equipment donations from Altera Corporation and tools provided by Mentor Graphics. The research includes undergraduates and graduate students at both universities and is based on work in progress at UAA in the Computer Prototype and Assembly Lab and the University of Colorado Boulder Embedded Systems Certification Program.

Biography:
Dr. Sam Siewert is an assistant professor in the Computer Science and Engineering department at the University of Alaska Anchorage. He is also an adjunct assistant professor at the University of Colorado at Boulder and teaches summer courses in the Electrical, Computer, and Energy Engineering department. As a computer engineer, Dr. Siewert has worked in the aerospace, telecommunications, and storage industries since 1988. Ongoing interests as a researcher and consultant include embedded systems, computer vision, hybrid reconfigurable architecture, networks and operating systems. Related research interests include real-time theory, digital media, and interactive systems. He received his B.S. in Aerospace and Mechanical Engineering from University of Notre Dame in 1989, and M.S. (1993) and Ph.D. in Computer Science in 2000 from the University of Colorado at Boulder.

Light refreshments will be served.