Continuous Mobile Vision: Rethinking Vision Systems for Efficiency and Privacy

Robert LiKamWa
Rice University

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Abstract

The future of computing is in allowing our devices to see what we see; envisioned wearable systems will continuously interpret vision data for real-time analytics. However, today’s system software and imaging hardware are ill-suited for such continuous mobile vision. Current systems – highly optimized for photography – fail to achieve sufficient energy efficiency or privacy preservation. This talk provides a rethinking of the vision system stack that includes application frameworks, operating system and sensor hardware to improve efficiency by two orders of magnitude. This cross-layer rethinking contributes: (1) a split-process application framework that eliminates redundancy in data movement and processing across multiple concurrent applications, (2) operating system optimizations for energy proportional image capture, and (3) a mixed-signal image sensor architecture that processes data in the analog domain to eliminate the efficiency bottleneck of analog-digital conversion. The talk will briefly share future plans to further continuous mobile vision by exploiting the hardware/software boundary for improved energy efficiency and effective privacy preservation, opening the door to integrate our devices with our real-world environments and ultimately, our own lives.

Bio

Robert LiKamWa is a final-year PhD Student at Rice University. As a Mobile Systems researcher, he operates at the intersection of Operating Systems and Computer Architecture. His dissertation research focuses on efficient system support for continuous mobile vision. He has interned and collaborated with Microsoft Research and Samsung Mobile Processor Innovation Lab on various projects related to vision systems. LiKamWa is supported by a Texas Instruments Graduate Fellowship, and received best paper awards from ACM MobiSys 2013 and PhoneSense 2011.
Faculty Host: Uli Kremer