

Yu M. Chi

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Research Interests

Analog and Mixed Signal CMOS circuits and systems, image compression and processing.

Education

2003 – 2007

Johns Hopkins University

Baltimore, MD

BS, Electrical Engineering

Advance EE Coursework: Mixed Signal VLSI, Digital VLSI, Analog Integrated Circuits, Wavelets and Filter Banks, Digital Multimedia Coding and Processing, Digital Signal Processing, Basic Communications, Control Systems

Experience

2004-Present

Undergraduate Research Assistant

Advisor: Prof. Ralph Etienne-Cummings

Gradient Based Motion Estimation – Developed optical flow based motion compensation algorithm for video compression. Modified reference H.263 source code to incorporate evaluate performance of the fast motion search algorithm.

CMOS APS Noise Analysis – Performed in-depth characterization of custom pixel-level ADC circuits.

DARPA STTR Phase I – Design and implementation of custom, high performance image compression algorithms. Evaluation of H.263 and H.264 video encoders for embedded applications. Worked with industry partners in building ultra compact, aerial deployable sensors operating on a UWB mesh network.

Pixel Level ADC – Implemented in-Pixel single slope ADC. Interfaced imager chip with board and custom written data acquisition software.

Lab Assistant – Verification of ASIC design with Verilog, PCB layout and design for sonar sensors, programmed FPGA for real-time signal processing sonar data. Installation and support of EE CAD software.

2006-Present

Engineering Consultant

Innovative Wireless Technologies

Wireless Surveillance Network – Designed video surveillance camera system around custom developed CMOS image sensor. Built prototype including circuit boards and firmware. Sensor successfully tested on an ultra low bandwidth ad-hoc wireless network.

2004-Present

VLSI CAD Administrator

Department of Electrical and Computer Engineering

Installation, configuration and support of the Cadence and Synopsys CAD tools. Assisted undergraduate and graduate students in the use and troubleshooting of Cadence and Verilog for VLSI design.

2002

Research Assistant

Department of Cardiothoracic and Vascular Surgery
UT Southwestern Medical Center

2001

Customer Service Representative

Best Buy

Lewisville, TX

Recognized for best sales record for store warranty plans.

Major Course Design Projects

16-bit CPU – Layout and simulation of a microprocessor with Cadence at physical mask level
Adaptive Noise Cancellation Filter – VLSI design of adaptive analog filter banks for noise suppression
Optical Flow for Video Compression – Devised a gradient based approach to video motion compensation
Wavelet Based Optical Flow – Adapted classical optical flow algorithms to a multi-resolution approach using wavelets.
Hi-Fi AM Radio – Designed a high quality superheterodyne AM radio using only discrete bipolar transistors.

Professional Activities

2005 Word Serial Address Event Workshop – Layout and Design of CMOS Imager with an AER interface.
2006 IEEE International Symposium on Circuits and Systems – Lecture presentation.
Student Member, IEEE

Volunteer Activities

2006 Summer Robotics Camp – Taught middle school students the basics of website design.

Awards

2006 Deans List – Johns Hopkins University
2006 William Huggins Summer Research Fellowship – Department of Electrical and Computer Engineering
2006 4th Place Best Paper Award – Sensory Systems Track, ISCAS '06

Skills

VLSI Design – Cadence Virtuoso, SoC, Encounter, Verilog, L-Edit, Magic
Electronics CAD – SPICE, Protel DXP
Programming – C/C++, Java, Assembly
Scientific – MATLAB, LaTeX
Windows and UNIX Administration

Publications

Refereed Conference Proceedings

Y. M. Chi, U. Mallik, M. A. Clapp, E. Choi, G. Cauwenberghs and R. Etienne-Cummings, “CMOS Pixel ADC with Change Detection,” *IEEE International Symposium on Circuits and Systems, 2006*
Y. M. Chi, T. Tran and R. Etienne-Cummings, “Optical Flow Approximation of Sub-Pixel Accurate Block Matching for Video Coding,” *IEEE International Conference on Acoustics, Speech and Signal Processing, 2007*
(Accepted, to appear April 2007)
Y. M. Chi, P. Carpenter, K. Colling, G. Cauwenberghs and R. Etienne-Cummings, “Video Sensor Node for Ad-hoc Wireless Networks,” *IEEE Conference on Information Sciences and Systems*.

Journal

Y. M. Chi, U. Mallik, M. A. Clapp, E. Choi, G. Cauwenberghs and R. Etienne-Cummings, “CMOS Pixel ADC with Change Detection,” *IEEE Journal of Solid State Circuits* (Accepted, to appear Sept. 2007)