

Research Interests: Operating Systems, Mobile/Embedded Computing, Virtualization, CMOS image sensing

Education: **PhD, Computer Science**
Columbia University, New York, NY (September 2010 - Present)

Master of Science, Computer Science
Columbia University, New York, NY (February 2011)

**BSE, concentration in Electrical and Computer Engineering /
Mathematics Minor**
Calvin College, Grand Rapids, MI (May 2003)

Work Experience: **Columbia University**, New York, NY, August 2010 – Present
PhD Candidate, Computer Science Department
Achievements include:

- Designed and implemented a smartphone virtualization architecture for Android
- Reviewed paper submissions for VEE 2012, Eurosys 2012, and ASPLOS 2012
- Contributed “world switch” ARM assembly to KVM for ARM project which efficiently saved and restored CPU state when switching between host and guest execution.

Columbia University, New York, NY, August 2010 – Present
Teaching Assistant, Operating Systems ([COMS W4118](#)), Computer Science Department
Achievements include:

- Designed and solved homework assignments involving modifications to both the kernel and the user space of the Android platform.
- Assignments included process tree investigation, novel kernel synchronization mechanism based on device orientation, Linux scheduler modification, and virtual memory subsystem investigation.
- Provided students with a Debian Linux based VMware virtual appliance which had ARM cross-compiling tools, the Android SDK, source code management software, and all other tools required for the course.
- Compiled a custom Android SDK distribution which included a modified QEMU (to support sensor emulation for parallel device/emulator development), customized boot sequence / init program, and custom kernel.
- Created and maintained git repositories for all student homework submissions using gitosis, and a set of custom management shell scripts.
- Supported students course work using a class bulletin board and regular office hours.

Gentex Corporation, Zeeland, MI, June 2003 - August 2010

Senior Electronics Research Engineer, Advanced Technology Department

Achievements include:

- Participated in the design of several CMOS image sensors.
- Innovated and co-designed digital control logic for a custom HDR CMOS image sensor.
- Designed and optimized a custom HDR visualization algorithm for the display of image data from a custom HDR CMOS image sensor.
- Architected the embedded framework for a vehicle high beam control system which used a custom HDR CMOS image sensor.
- Implemented a custom Bayer demosaicing algorithm in C.
- Designed, tested and maintained an FPGA-based embedded system used as a frame-grabber for several custom image sensors.
- Designed, tested and maintained cross-platform data acquisition / storage / visualization software suite supporting advanced product development
- Designed advanced production test / control software for wafer-level testing of custom image sensors.
- Created, developed, and tested a proprietary serial communication protocol and PCI-based implementation to facilitate advanced tester applications.
- Ported and maintained Linux/BSD/OSX versions of company-wide software libraries for internal cross-platform software development.
- Developed Linux kernel drivers and control software for both custom and off-the-shelf image sensors.

Solidus Design, Grand Rapids, MI, January 2002 - May 2003

Web Programmer

Achievements include:

- Created e-commerce solutions for customers using PHP, Perl, PostgreSQL and Apache.
- Maintained existing e-commerce infrastructure.
- Interfaced with both designers and customers to determine design requirements and feasibility within a negotiated schedule.

Electrical Engineering Department, Calvin College, Grand Rapids, MI

Senior Design Project, September 2002 - May 2003

Project Details / Achievements include:

- A PCI card encapsulating an embedded system running the Linux operating system that transparently filters network traffic and appears to the host machine as a standard network interface card.
- Developed a project schedule including work/task distribution.
- Designed / fabricated / Debugged the PCI Card.
- Ported the *colilo* bootloader to the MCF5249 and re-contributing the code to the OpenSource project.

Electrical Engineering Department, Calvin College, Grand Rapids, MI

Research Assistant, May 2002 - August 2002

Achievements include:

- Developed a network monitoring system for a Beowulf Cluster.
- Designed / developed a PCI card to implement the network monitoring system.
- Wrote a custom netfilter hook / PCI driver in the Linux kernel to facilitate hardware-based network traffic monitoring.
- Presented the PCI card monitoring system design at the 13th Annual Argonne Symposium for Undergraduates in Science, Engineering and Mathematics.

Publications:

- C. Dall, J.C. Andrus, A. Van't Hof, O. Laadan, J. Nieh, "The Design, Implementation, and Evaluation of Cells: A Virtual Smartphone Architecture," ACM Transactions on Computer Systems (TOCS), Volume 30, Issue 3, August 2012
- J.C. Andrus, J. Nieh, "Teaching Operating Systems Using Android," Proceedings of the 43rd ACM Technical Symposium on Computer Science Education (SIGCSE 2012) (**Best Paper**)
- J.C. Andrus, C. Dall, A. Van't Hof, O. Laadan, J. Nieh, "Cells: A Virtual Mobile Smartphone Architecture," Proceedings of the 23rd ACM Symposium on Operating Systems (SOSP 2011) (**Best Paper**)
- J.C. Andrus, C. Dall, A. Van't Hof, O. Laadan, J. Nieh, "Cells: A Virtual Mobile Smartphone Architecture," Columbia University Technical Report CUCS-022-11

**Patents /
Inventions:**

- J.C. Andrus, T.R. Friend, J.H. Bechtel, Jon; R.R. Turnbull, “Device with Improved Serial Communication,” U.S. Patent [7405650](#).
- J.C. Andrus, T.R. Friend, J.H. Bechtel, Jon; R.R. Turnbull, “Vehicular Communication System Having Improved Serial Communication,” U.S. Patent [7920601](#).
- D. Van Blerkom, J.C. Andrus, J.H. Bechtel, “Imaging Device,” U.S. Patent [8144223](#).
- J.H. Bechtel, J.C. Andrus, “High Dynamic Range Imaging Device”, U.S. Patent [8289430](#).
- J.H. Bechtel, J.C. Andrus, “Imaging Device,” U.S. Patent Application [US20090190015](#).
- J.H. Bechtel, J.C. Andrus, “Imaging Device,” U.S. Patent Application [US20090256938](#).
- J.H. Bechtel, J.C. Andrus, “High Dynamic Range Imaging Device”, U.S. Patent [8305471](#).
- D. Van Blerkom, R. Yassine, J.H. Bechtel, J.C. Andrus, “Imaging Device”, U.S. Patent [8378284](#).
- J.C. Andrus, J.H. Bechtel, T.B. Sherman, “Digital Image Processing and Systems Incorporating the Same,” U.S. Patent Application [US20100195901](#).
- J.H. Bechtel, J.C. Andrus, T.B. Sherman, “Digital Image Processing and Systems Incorporating the Same,” U.S. Patent Application [US20100195908](#).
- J.H. Bechtel, J.C. Andrus, T.B. Sherman, “Digital Image Processing and Systems Incorporating the Same,” U.S. Patent Application [US20100303349](#).
- J.H. Bechtel, J.C. Andrus, G.S. Bush, D.J. Wright, J.L. Schneider, T.B. Sherman, “Automatic Vehicle Equipment Monitoring, Warning, and Control System,” U.S. Patent Application [US20120050074](#).
- J.H. Bechtel, J.C. Andrus, “Imaging Device”, U.S. Patent Application [US20130009042](#).

Awards:

- Best Paper Award - SOSIP 2011, “Cells, A Virtual Mobile Smartphone Architecture”
- Best Paper Award - SIGCSE 2012, “Teaching Operating Systems Using Android”
- Columbia University, CS Department, Andrew P. Kosoresow Memorial Award for Outstanding Performance in TA-ing and Service, 2011
- Facebook Fellow, 2012-2013
- Qualcomm Innovation Fellowship Finalist, 2012-2013

Relevant Skills:

- Expert in Android OS internals (build system, Linux kernel)
- Expert in CMOS image sensor design, characterization, verification and bring-up
- Expert in C/C++ including STL, threading, and networking (Berkeley sockets, lwIP, low-level Ethernet)
- Expert in cross-platform Qt C/C++ GUI API
- Expert GNU/Linux and Apple OSX operating systems for programming and systems administration
- Expert in shell-scripting, GNU Makefiles
- Proficient in Objective-C and iPhone SDK development
- Proficient in basic image processing algorithms and GPGPU techniques
- Proficient in Perl, HTML, PHP
- Proficient in basic logic design / simulation using Verilog HDL and schematic entry
- Excellent problem-solving and system debugging skills
- Excellent ability to quickly master challenging, complex systems