Herrick Chang

Curriculum Vitae

Education

Expected Dec. 2012 — **PhD, Mechanical Engineering**, *University of California, Los Angeles*, *GPA: 3.7/4.0.*

Sept. 2007 – Jun. 2009 — **MS, Mechanical Engineering**, *University of California, Los Angeles*, *GPA: 3.7/4.0.*

Sept. 2003 – Jun. 2007 — **BS, Electrical Engineering**, *University of California, Los Angeles*, *GPA: 3.3/4.0.*

Research Experience

Sept. 2007 – present — **Graduate Student Researcher**, *University of California, Los Angeles*, Los Angeles, CA.
- Working under Professor T-C. Tsao.
- Research in efficient and accurate inversion of non-minimum phase systems.
- Feedforward, repetitive, and iterative learning control research.
- Developed control algorithms for piezoelectric actuators, linear motors, and atomic force microscopes.
- Developed and implemented efficient, high performing, fixed-point control algorithms for use on FPGAs.
- Experience with SPI interface for digital-to-analog converters, SPI interface to stepper motor drivers, quadrature encoder interface, delta operator filter realization libraries, etc.

Jul. 2012 – Aug. 2012 — **Graduate Student Mentor**, *University of California, Los Angeles*, Los Angeles, CA.
- Mentor to undergraduate student on scanning probe microscopy project.
- Implemented fast frequency detection algorithms for tuning-fork based scanning probe.
- Designed printed circuit board layout of an tuning fork oscillator and pre-amplifier circuit.

June 2006 – Sept. 2007 — **Undergraduate Researcher**, *University of California, Los Angeles*, Los Angeles, CA.
- Signal processing of analog waveforms using Labview FPGA.
- Implemented Labview FPGA algorithms enabling nanometer precision in motion controlled devices.

Sept. 2005 – Dec. 2006 — **Undergraduate Researcher**, *University of California, Los Angeles*, Los Angeles, CA.
- Worked under Professor Ali H. Sayed.
- Implementation of Ultra Wideband (UWB) physical layer using Xilinx System Generator.
- Executed timing techniques between transmitter and receiver.
- Adapted simple channel coding techniques for robust performance.

Jul. 2004 – Aug. 2004 — **Intern**, *Naval Research Laboratory*, Washington D.C..
- Worked on determining M^2-value for a Nd:YAG laser.
- Designed layout of particular experiment while considering limited space.
- Calculated optimal placement of lens, mirrors, wedges, etc.

Industry Experience

Jul. 2012 — **Consultant**, *University of California, Los Angeles*, Los Angeles, CA.
- Worked with Dr. Steven Schwartz on determining force attenuation on youth football helmets.
- Designed and executed experiments to collect accelerometer data for various locations on helmets.

Aug. 2010 – Nov. 2010 — **Intern**, *Western Digital*, Irvine, CA.
- Simulate, implement, and test new fixed-point adaptive controllers for hard drive read-write heads.
- Designed adaptive control algorithms to improve performance of read-write heads for track-following.
- Wrote controller firmware in C for fixed-point micro-controller.

Teaching Experience

Jul. 2011 – Jun. 2012 **National Science Foundation GK-12 Fellow**, *University High School*, Los Angeles, CA.
- Worked with Mr. Bob Baker (Physics).
- Helped design demonstrations and experiments to explain class concepts.
- Served as in-class engineer and role model for students in high school science classes.

Sept. 2011 – Jun. 2012 **Robotics Club Mentor**, *University High School*, Los Angeles, CA.
- Robotics Mentor for University High School Robotics team.
- Helped create bike generator project for students to work on.
- Instructed students how to build LED bar graph to measuring the voltage generated from bike generator.
- Taught students soldering skills by soldering a USB charger to the bike generator.

Dec. 2007 – Jun. 2011 **Graduate Teaching Assistant**, *University of California, Los Angeles*, Los Angeles, CA.
- Courses include Systems and Dynamics, Classical Control, Digital Control, and Engineering Ethics.

Sept. 2010 – Dec. 2010 **Teaching Assistant Consultant**, *University of California, Los Angeles*, Los Angeles, CA.
- Created lesson plans and instructed new teaching assistants.

Technical skills

Labview:	Labview, Real-Time, FPGA	Xilinx FPGA:	ISE, SDK, VHDL
Mathworks:	Matlab, Simulink, XPC Target	Circuits:	PSPICE
Programming:	C, C++	PCB Layout:	PCB Artist

Awards & Distinctions

- Invited Instructor at NASA-AMES Pre-Service Teacher Institute, 2012
- SEE-LA National Science Foundation GK-12 Fellowship Recipient, 2011-2012
- Invited Speaker at Science and Engineering Discussion Panel for University Senior High School's Academy of Engineering, 2012
- GK-12 Conference - Invited Poster Session for Graduate GK-12 STEM Research, 2012
- Best Paper Award (Theory), International Symposium of Flexible Automation, 2010
- Chinese American Construction Professionals Scholarship Recipient, 2008
- Xerox Technical Minority Scholarship Recipient, 2004-2005
- Dean's Honors List, Spring 2004

Professional Affiliations

- Institute of Electrical and Electronics Engineers (IEEE)
- American Society of Mechanical Engineers (ASME)

Publications

H. L. Chang and T.-C. Tsao, "Efficient fixed-point realization of approximate dynamic inversion compensators for non-minimum phase systems," in *American Control Conference, 2010*, June 2010.

——, "Repetitive control of a levitated shaft - FPGA implementation based on powell-chau filters," in *International Symposium on Flexible Automation, 2010*, July 2010.

Y. Wang, K. C. Chu, H. L. Chang, and T.-C. Tsao, "Laguerre based adaptive control of piezoelectric actuator for nanopositioning," in *Conference on Decision and Control, 2010*, December 2010.

H. L. Chang and T.-C. Tsao, "High sampling rate dynamic inversion - filter realization and applications in digital control," *IEEE/ASME Transactions on Mechatronics*, Accepted for Publication, 2012.