HENRY BARROW

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PhD Candidate at UC Berkeley

OBJECTIVE

Begin a lasting career in an innovative and collaborative environment that will allow me to learn from and teach others as I apply my expertise to solve challenging and impactful problems.

EDUCATION

Ph.D. in Electrical Engineering (EECS), anticipated December 2015 **(2009-2015)**
University of California, Berkeley, CA
GPA: **3.77** Advisor: Prof. Clark Nguyen

Thesis Project: Harness the scaling benefits and performance advantages of micromechanical capacitive-gap transduced resonators with high Q-factors to realize tiny clock oscillators and tunable high-order coupled resonator filters. These devices enable reductions in both power and cost of next-generation electronic systems.

Relevant Areas of Knowledge and Interest: MEMS simulation and design, inertial sensing, fabrication process development, FEM techniques, network analysis, transducer modeling, filter design, system engineering, analog design, radio architectures, nanofabrication, advanced IC processing, resonant circuits, electromagnetics, communication systems, wireless sensor networks, solid mechanics, operation of semiconductor devices, thermal circuits, vacuum technology, noise, and microscopy.

Relevant Coursework: Parametric and Optimal Design of MEMS, Oscillations in Linear Systems, RF Integrated Circuits, Applied Electromagnetic Theory, Microfabrication Technology, Advanced IC Processing and Layout, Nanoscale Fabrication, and Design of Basic Electromechanical Devices.

B.S. in Electrical Engineering **(2005-2009)**
University of Arizona, Tucson, AZ
GPA: Electrical Engineering **4.00**, Overall Cumulative **3.93**

Undergraduate Research: Worked under Prof. William Ryan to demonstrate advanced channel coding techniques for high noise applications.

Relevant Coursework: Analog Circuit Design, Circuit Theory, Digital Logic, Embedded Microcomputer Systems, Engineering Systems Analysis, Electromagnetics, Device Electronics, Digital Signal Processing, Digital Communications, Microwave Engineering I & II, and Antenna Theory & Design.

ENGINEERING WORK EXPERIENCE

Graduate Student Researcher **(2009-2015)**
Berkeley Sensor and Actuator Center, Nguyen Lab
Designed, fabricated, and characterized all devices described in my thesis project. Also conducted research targeting benchmarks outlined in DARPA's Chip-Scale Spectrum Analyzer Program.

Graduate Student Instructor
UC Berkeley EECS Department
EE40 – Electronic Circuit Design w/ Prof. Michel Maharbiz **(Spring 2015)**
Led two lab sessions focused on basic analog circuit design and microcontroller programming.
EE143 – Microfabrication Technology w/ Prof. Ali Javey **(Spring 2014)**
Assisted two lab sessions in fabricating MOS transistors, wrote test questions, and held office hours.

EE140 – Analog Integrated Circuits w/ Prof. Clark Nguyen **(Spring 2013)**
Created homework, supervised IC test lab, taught discussion sections, and held office hours.
EE245 – Introduction to MEMS Design w/ Prof. Clark Nguyen **(Fall 2011)**
Created homework problems and solutions, taught discussion sections, and held office hours.

MEMS Design Intern **(Summer 2014)**
Analog Devices, Wilmington, MA
Aided in the design and characterization of next generation commercial MEMS inertial sensors. Applied my experience with MEMS resonators and vacuum probe stations to optimize gyroscope *Q* vs. pressure measurements.

Electrical Test Systems Intern **(Summer 2009)**
ATK Orbital, Ogden, UT
Created a report that outlined accuracy calculations for all sensors present on the Ares program test motors. Helped improve the process for determining placement of sensors on the Ares I-Y rocket.

TECHNICAL SKILLS

Programming/Software: Coventorware, ANSYS, Advanced Design System, Cadence, SPICE, Python, MATLAB, Mathematica, Labview, and OS_X/Windows/Linux operating systems.

Electrical Measurements: Automated control and data extraction from network analyzers, power supplies, spectrum analyzers, oscilloscopes, and temperature controllers via GPIB. Interfacing with chip scale devices through wire bonding or using a probe station. PCB design and in-house fabrication. Microwave signal routing using BNC and SMA connectors. NWA calibration and impedance testing.

Clean Room Processing Experience: Sputtering (AlN, Ni, Al, Mo, W), reactive ion etching (Si, SiO_2, Si_3N_4, diamond, AlN, Mo, W), DRIE, sputter etching, oxidation, annealing, CVD (Si, SiO_2, Si_3N_4), wet etching (HF, piranha, KOH, Si Etch, Ni Etch), metal liftoff, DUV lithography, CPD, profilometry, SEM, confocal microscopy, microspectrophotometry, and wafer cleavage.

Microscale Testing: Operation and repair of (vacuum) probe stations and micromanipulators, careful chip handling and storage, bonding devices to packages or circuit boards, in-house PCB design and fabrication, and automated data acquisition and system control.

PUBLICATIONS

1. H. G. Barrow and C. T.-C. Nguyen, "***A Protocol for Automated Passband Correction of High-Order Microelectromechanical Filters***," in Proceedings of the 2014 IEEE International Frequency Control Symposium, Taipei, Taiwan, 2014. PDF

2. H. G. Barrow, T. L. Naing, R. A. Schneider, T. O. Rocheleau, V. Yeh, Z. Ren, and C. T.-C. Nguyen, "***A Real-Time 32.768-kHz Clock Oscillator Using a 0.0154-mm² Micromechanical Resonator Frequency-Setting Element***," in Proceedings of the 2012 IEEE International Frequency Control Symposium, Baltimore, MD, 2012. (Best Paper Finalist) PDF

3. W. C. Li, Y. Jiang, R. A. Schneider, H. G. Barrow, L. Lin, and C. T.-C. Nguyen, "***Polysilicon-Filled Carbon Nanotube Grass Structural Material for Micromechanical Resonators***," in Micro Electro Mechanical Systems (MEMS), 2011 IEEE 24th International Conference on, Cancun, Mexico, 2011, pp. 477–480. PDF

REFERENCES AVAILABLE UPON REQUEST