David Schwartz, PhD

EDUCATION

Ph.D., Mechanical Engineering, Emphasis in Controls & Dynamic Systems, UCLA ***March 2010***
Dissertation: "Mass Perturbation Techniques for Tuning and Decoupling of a Disc Resonator Gyroscope"

M.S., Mechanical Engineering, Controls Emphasis, UCLA, GPA 4.0 ***June 2006***
Focus on mechatronics, dynamics, stochastic processes, optimal control theory, dynamic programming and system identification.

B.S., Aerospace Engineering, UCLA, *Cum Laude* ***June 2005***

ANALYSIS & DESIGN TOOLS

MATLAB, Simulink, Nastran, Femap, Python, C++, EAGLE, Visio, Modelica, IMAT, MS Project

WORK EXPERIENCE

Active US Government Secret Security Clearance

Giant Magellan Telescope Organization, Integrated Modeling Lead ***December 2016–Present***

ATA Engineering Inc., Project Engineer ***August 2012 – November 2016***

Integrated Modeling. Currently overseeing an effort to integrate telescope structural elements with control systems in an end-to-end optical simulation for the Giant Magellan Telescope (GMT). The effort involves exporting component mode superelements from Nastran, converting these into state space models that are used in a Simulink co-simulation with an optical simulation, designing controllers, performing design studies and developing requirements for the other groups.

FE Modeling and Analysis. Led ATA's team of analysts who wrote the bulk of the critical design review analysis reports for the James Webb Space Telescope's Star Tracker assembly. Provided detailed finite element analysis of the optics thermal distortion and joint stress of various configurations of the star tracker assembly. Results of these analyses were regularly used to guide design decisions and assess the final design.

Uncertainty Quantification. Assessed the effects of stochastic variations on the optical pointing accuracy of a star tracker assembly by applying a combination of Nastran capabilities and tailored MATLAB and Python scripts. These tools were used to find the sensitivity to various uncertainty factors before applying these factors in a Monte Carlo analysis.

Industrial Control. Managed electronics and software team for three different automated assemblies. Each used a PLC (programmable logic controller) to control a customer-designed process for a photolithography laser. SIFs (safety instrumented functions) were designed and used to ensure both personnel and machine safety via electrical and software interlocks.

Robotics. Built prototype robotic car designed to autonomously push golf balls off of a green. Performed control design for a gravity offloader prototype as part of a Phase I SBIR. Active participant in internal research involving autonomous control of small inverted pendulum robots, in coordination with Professor Bewley at UCSD.

Postdoctoral Scholar, PI: Professor Robert T. M'Closkey ***January 2011 – July 2012***
MEM Gyroscopes. Design, testing, system identification and control of micro-scale vibratory gyroscopes. Specifically investigating post-fabrication processes to improve performance under a DARPA's MRIG program. Designed a novel micro-gyroscope that would facilitate the utilization of mass perturbations for tuning modal frequencies. The design was used to win a DARPA multiyear contract for Professor M'Closkey's controls laboratory. Designed the experimental devices that were used to test and alter the gyroscope's modal properties. The test data was used to develop an algorithm amenable to a production environment, and the algorithm was then used to reliably tune devices from multiple wafers.

Consultant, ruubix (now Cue) ***June 2011 – July 2012***
Embedded Control. Designed the circuit board and programmed the microcontroller that runs the piezoelectric and biochemical processes necessary for lab on a chip applications.

Lecturer, Department of Mechanical and Aerospace Engineering, UCLA ***June 2010 – June 2012***
Taught *Introduction to Feedback Control of Dynamic Systems* and *Introduction To Modeling and Analysis of Dynamic Systems (Systems and Signals).*

Research Assistant/Staff Researcher, UCLA ***September 2006 – December 2010***
PI: Professor Robert T. M'Closkey Research mass perturbation techniques for tuning and linear acceleration coupling of vibratory gyroscopes using a macro scale resonator.

Technical Specialist, Northrop Grumman, Mission Systems ***June 2004 – July 2007***
Radar Analysis. Worked on pre and post mission analysis for a radar group that specializes in missile defense and shuttle missions. Helped update the old Fortran framework to C and MATLAB for development of a GUI that mission analysts use to develop high-resolution imagery from radar data.

Sailing Instructor, UCLA Marina Aquatic Center ***Summer 2009 – 2012***
Assist with the teaching of several sailing courses each academic quarter.

AWARDS AND HONORS

- Recognized as JMEMS RightNow Paper "Modal Parameter Tuning of an Axisymmetric Resonator via Mass Perturbation" (2015)
- Mechanical and Aerospace Engineering Department Award for Outstanding PhD Student (2010)
- Best Speaker in Group, 2008 Automatic Controls Conference
- *Guardian of Freedom* award for high resolution imagery done for the Track-Ex mission, while working for Northrop Grumman (2006)
- UCLA Department of Mechanical and Aerospace Engineering Graduate Fellowship (2005)
- UCLA Regents Scholar (Full Scholarship) (2001−2005)
- Boeing Scholar (Awarded to outstanding Mechanical/Aerospace Engineering students) (2005)

PUBLICATIONS

Schwartz, D., Kim, D.J., Stupar, P., DeNatale, J., and M'Closkey, R.T. "Modal Parameter Tuning of an Axisymmetric Resonator via Mass Perturbation." IEEE Journal of Microelectromechanical Systems, No. 99, 2015.

Schwartz, D.M., Kim, D.J., M'Closkey. R.T. "A Frequency Domain Model Based Approach to Multi-Modal Mass Tuning of a Micro Gyroscope", American Control Conference, 2012.

Schwartz, D.M., Kim, D.J., M'Closkey, R.T. "Decoupling of a Disk Resonator Gyro from Linear Acceleration via Mass Matrix Perturbation". ASME Journal of Dynamic Systems, Measurement, and Controls, Vol. 134, No. 2, p. 021005, 2012.

Schwartz, D.M., Kim, D.J., M'Closkey, R.T., Challoner, D.A."Frequency Tuning of Disc Resonator Gyroscopes Via Resonator Mass Perturbation Based on an Identified Model". US Patent No. 20090301193, December 10, 2009.

Schwartz, D.M., Kim, D.J., and M'Closkey, R.T. "Frequency Tuning of a Disk Resonator Gyro Via Mass Matrix Perturbation." ASME Journal of Dynamic Systems, Measurement, and Controls 131, No. 6 (2009): p. 061004.

Schwartz, D.M., Kim, D.J., and M'Closkey, R.T., "Frequency Tuning of a Disk Resonator Gyro Via Mass Matrix Perturbation". American Control Conference, p.3740-3745, 2008.