Dennis Wai

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Objective:	Obtaining a full-time position as a roboticist, with an emphasis in kinematics and control

Education:
M.S. Mechanical Engineering University of California Berkeley | GPA 3.929 Expected: 2017
B.S. Mechanical Engineering University of California Berkeley | GPA 3.817 2013

Courses:
CS 287 – Intro to Advanced Robotics, Professor Abbeel
EE 215A – Introduction to Robotics, Professor Bajcsy
CS 188/289A – Introduction to AI/Machine Learning, Professor Russell and Efros
EE 192 – Mechatronics Design Lab, Professor Fearing
EE C249A – Intro to Embedded Systems, Professor Seshia
ME 232/233 – Advanced Control Systems, Professor Tomizuka
ME 237 - Control of Nonlinear Dynamical Systems, Professor Hedrick

Professional Experience

JPL Robotics Software Intern under Paul Backes and Jeff Hall, Pasadena, CA May 2013 – Aug 2015

- Incorporated Bullet collision detection software for non-convex geometries in a kinematic workspace analysis software as a data-driven approach to inform the Sample Retrieval and Launch (SRL) rover design
- Developed C/C++ kinematic workspace analysis software to determine workspace accessibility for a 5 / 6 DOF robotic arm. Results from this work led the Mars Program Office to adopt a new mission approach towards Mars Sample Return
- Refactored mobility software for Pluto Fetch Rover to add robot functionalities such as rotating the rover in place and driving the rover with a joystick
- Primary Robotic 6 DOF Arm software engineer for MSTT on both SRL and Fetch Rover platform and responsible for demonstrating robustness in computer-vision assisted sample tube pick up in a broad spectrum of regolith

Mechatronics Graduate Researcher with Professor Tomizuka, UC Berkeley May 2011 –Present

- Applied in simulation trajectory optimization, an optimal control technique, for motion planning for two satellites. Control goal is to have robust and precise tracking between the two satellites for free space optical communication
- Codeveloped state estimation technique, marginalized particle filter, for attitude estimation that offers faster convergence rates for less computation power
- Developed software in Arduino and LabVIEW to manage a wireless sensor network for human motion tracking
- Created and designed via Eagle various controller PCBs for Tailbot, a robot with inertial assisted control by an active tail inspired by lizards, which was a featured robot on the front page of *Nature*

Pioneers in Engineering (PiE) Advisor, UC Berkeley May 2011 – Present

- CEO for the nonprofit Pioneers in Engineering 501©3 Foundation, which promotes STEM education through an exciting, mentorship based process.
- Integral leader in an annual scholarship for high school students. I help raise funds, connect alumni to students, plan logistics for interviews, as well as set direction for the scholarship.
- Spearheaded efforts to recruit Berkeley undergraduates to become robotics mentors for underprivileged high school students in our annual 300+ robotics competition
- Managed a 10-person committee in robotics curriculum development for 90+ UC Berkeley undergraduates
- Organized the inaugural and well-received Robots vs Dinosaur Science Festival, a 100+ event, complete with 8 novel science activities in cooperation with Lawrence Hall of Science in Berkeley, CA

Skills

Software skills: MATLAB/Octave, LabVIEW, Python, C, bash/shell script, Docker, Git/Github, Linux, HTML/CSS
ME/EE skills: EAGLE, PCB layout/manufacturing, forward/inverse kinematics, modern/classical controls, laser cutting, Solidworks
Other skills: Trombone, marimba, fluid Cantonese

Projects (see portfolio at denniswai.com)

Vision-assisted Block Manipulation with Baxter for EE125, UC Berkeley
- Combined ROS ARTag vision tracking with ROS MoveIt on a Baxter platform to stack toy blocks. We were able to successfully vertically stack 10 blocks in succession

Line Following NATCAR for EE192, UC Berkeley
- Programmed a PID controller in C for a line-following car, with camera feedback, that placed 6th at NATCAR

Networked Swarm Robotics for ME102B, UC Berkeley
- Designed/manufactured electrical hardware (motor controller, XBee comms) for a swarm robot network. We placed 2nd for best project within the class.

Ball on a Plate for ME135, UC Berkeley
- Used LabVIEW to implement LQR and PID control to successfully stabilize a ball on a 2 axis plate

Publications

- Joonbum Bae; Haninger, K.; **Wai, D.;** Garcia, X.; Tomizuka, M., "A network-based monitoring system for rehabilitation," Advanced Intelligent Mechatronics (AIM), 2012 IEEE/ASME Interna- tional Conference on , vol., no., pp.232,237, 11-14 July 2012 IEEE Link
- Paul Backes; **Wai, D** et al. "Sampling System Concepts for a Touch-and-Go Architecture Comet Surface Sample Return Mission." American Institute of Aeronautics and Astronautics (AIAA), AIAA SPACE 2014 Conference and Exposition June 2014 AIAA Link
- Yizhou Wang; **Wai, D.;** Tomizuka, M., "Steady-state Marginalized Particle Filter for Attitude Estimation" Dynamic Systems and Control Conference (DSCC) July 2014 ASME Link
- Kyle Edelberg; **Wai, D;** Reid, J; Kulczycki, E; Backes, P. "Workspace and Reachability Analysis of a Robotic Arm for Sample Cache Retrieval from a Mars Rover" American Institute of Aeronautics and Astronautics (AIAA), AIAA SPACE 2015 Conference and Exposition Sept 2015 AIAA Link
- Ryan McCormick; **Wai, D** et al. "Robotic Gripper Design and Testing for Potential Mars Sample Return" International Planetary Probe Workshop (IPPW)