

Yoke Peng Leong

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Education

2012 - Present	California Institute of Technology Ph.D. in Control and Dynamical Systems <i>Adviser: Dr. John Doyle and Dr. Joel Burdick</i>	Pasadena, CA
2011 - 2012	Northwestern University M.S. in Mechanical Engineering (Specialization: Robotics & Control) <i>Thesis: Surface Feature Detection Based on Proprioception of a Robotic Finger during Haptic Exploration</i>	Evanston, IL
2008 - 2012	Northwestern University B.S. in Mechanical Engineering (Concentration: Mechatronics) Minor: Economics <i>Summa cum Laude</i>	Evanston, IL

Honors and Awards

- Caltech Computing and Mathematical Sciences (CMS) Fellowship, 2012-2013
- Tau Beta Pi Engineering Honors Society Fellow, 2012-2013
- Malaysian Public Service Department Scholarships for Undergraduate Education Abroad at USA, 2007-2012

Current Research Projects

Nonlinear Optimal Control

Adviser: Joel Burdick, John Doyle

- Synthesized control Lyapunov functions of stochastic nonlinear systems using Sum of Squares method
→ Constructed a novel general approach to compute suboptimal controller with guarantees on performance and approximation errors
- Solved high dimensional (> 6D) linear Hamilton Jacobi Bellman equation, a PDE, using tensor decomposition and alternating least squares in MATLAB
→ Increased the speed (hours to minutes) and stability of the alternating least squares algorithm

Control Engineering in Neuroscience

Adviser: Joel Burdick, John Doyle

- Designed and conducted human subject experiments to study human sensorimotor control feedback based on robust control theory
- Processed and analyzed motion capture data using Bash and MATLAB to confirm theoretical predictions
→ Discovered important trends (predicted by theoretical analysis and confirmed with experiments) that were neglected in previous studies

Research Experience

- May 2014 - July 2014 **IMDEA Software Institute** Madrid Institute for Advanced Studies
Research Intern (Adviser: Dr. Pavithra Prabhakar)
- Synthesized optimal control strategy for hybrid dynamical systems using an abstraction-refinement procedure that preserves the transition cost
-> Developed a tool in Python for synthesizing the controller
- July 2012 - Aug 2012 **Underwater Robotics Research Group** Universiti Sains Malaysia
Research Assistant (Adviser: Dr. Mohd Rizal Arshad)
- Modeled underwater acoustics wave propagation for jellyfish detection
- Developed a model to estimate backscattering wave strength of a jellyfish
- Dec 2010 - Jun 2012 **Murphey Lab** Northwestern University
Undergraduate Researcher (Adviser: Dr. Todd Murphey)
- Created a 3D dynamic model of 3-joint finger tapping and sliding in Mathematica
- Extended the hybrid system switching time optimization to systems with mixed dynamics and impulses
-> Constructed a new smoothing algorithm to detect and localize surface feature from noisy proprioceptive measurements of a robotic finger using the impulsive hybrid system optimization technique

Publications

Teaching Experience

Teaching Assistant

- ME 115 Introduction to Kinematic and Robotics (Spring 2015)
- CNS 186 Vision: From Computational Theory to Neuronal Mechanisms (Winter 2015)
- ACM 104 Linear Algebra (Fall 2014)

Guest Lecturer

- CDS 240 Nonlinear Dynamical Systems (April 22, 2016)
- CDS 212 Introduction to Modern Control (May 14, 2015)

Students Advised

- Elis Stefansson (KTH Institute of Technology, Caltech Summer Undergraduate Research Fellowship, 2015)

Work Experience

May 2016 - Sept 2016	Datascope Analytics <i>Data Science Intern</i> - Developed a survey analysis website application that can automatically generate useful data relationships using Django and AngularJS - Facilitated group discussions with the executive team of a client in a brainstorming workshop - Created a website application that displays the train rumbling by the office using the Chicago Transit Authority's Train Tracer API - Released a Python package that simplifies analysis of time series data at irregular time intervals - Wrote a blog post that discusses the rise of the Internet of Things	Chicago, IL
Sept 2010 - Jun 2012	Northwestern University Athletic Department <i>N'CAT Tutor</i> - Assisted student athletes in improving their academics performances in various freshman engineering classes (e.g. MATLAB, Linear Algebra, Physics) and Mechanical Engineering classes (e.g. Fluid Mechanics, Thermodynamics) via weekly one-to-one tutoring sessions - Motivated student athletes to do well in both sports and academics by giving advice on time management and stress management	Evanston, IL
Feb 2009 - Jun 2012	Northwestern University Information Technology <i>Technology Lab Consultant of Academic & Research Technology (A&RT)</i> - Aided users with A&RT-supported applications and utilities including Internet based applications, word processing, spreadsheet generation and manipulation, document format conversion, and information recovery - Developed a student job applications website which involves database management, browser scripting, and server scripting	Evanston, IL
Jun 2011 - Sept 2011	Murphey Lab <i>Undergraduate Researcher</i> (Experience summarized above)	Evanston, IL

Jun 2010 - Sept 2010	Ethos & Company <i>Strategy & Management Consulting Intern</i> - Collaborated with colleagues on two projects: (a) Developed a framework to capture key synergies within the national automotive industry (b) Assisted a global agribusiness corporation to achieve 5-year growth and profitability target - Conducted company/industry research and performed data analysis using Excel to discover trends and test hypotheses - Developed and conducted presentations for both the client and project team	Malaysia
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Leadership Experience

Jun 2014 - May 2016	Caltech Graduate Student Council <i>CDS Option Representatives</i> <i>Research Communication Chair (2015-2016)</i> - Advocated for graduate students in CDS option (major) and international graduate students - Organized the 2016 GSC Graduate Student Poster Session - Organized two lunches for "Take an alumni to lunch" series - Coordinated off campus concert trips for 20 - 30 graduate students per trip	
Summer 2014, 2015	Caltech Teaching Conference <i>Committee Member</i> - Organized and facilitated a session that discusses teaching and mentoring (2015) - Facilitated a session on creating an academic career portfolio (2014)	
Feb 2011 - Feb 2012	Tau Beta Pi Engineering Honors Society, IL-Gamma Chapter <i>Recording Secretary</i> - Reformed project management and record-keeping of the group using Google products for more efficient communication and exec board transition - Organized various community service activities - Created a graduate school mentoring program for members interested in pursuing a graduate degree	
Sept 2009 - Apr 2011	Engineers for a Sustainable World <i>Webmaster & Project Team Member</i> - Designed a lever mechanism which assists technicians in priming a ram pump using NX for a hydraulic ram pump installation project in Philippines - Redesigned layout of ESW's official website (http://www.eswnu.org) to ease user navigation - Reconstructed the website by incorporating CSS in style designing and PHP in scripting	
Sept 2009 - Dec 2010	Gateway Science Workshop <i>Facilitator (Engineering Analysis)</i> - Facilitated weekly two-hour group study workshops for engineering freshmen enrolled in Engineering Analysis (MATLAB, Linear Algebra, Mechanics, Ordinary Differential Equations) - Engaged students in group discussions to encourage critical thinking on engineering concepts and applications - Monitored students' progress and made changes to the workshop accordingly	
Sept 2008 - Jun 2009	Northwestern University Solar Car Team (NUsolar) <i>Electrical Team Member & Business Team Member</i> - Worked on a solar powered car that won 3rd place in the Formula Sun Gran Prix 2009 - Designed and built circuitry for the solar car's new electrical system - Researched sponsorship opportunities for the solar car project	

Community Service

- Dec 2008 - Present **Alternative Student Breaks**
- Participated in a week-long service learning trip during school breaks
 - Volunteered at children hospital, national parks, and various local non-profit organizations in the United States
- Oct 2013 - Present **Caltech RISE Program**
- Assisted high school students who are weak in mathematics and sciences to learn the subjects

Language Skill

English (Fluent), Mandarin (Fluent), Cantonese (Native), Malay (Fluent), Japanese (Basic)

Computer Skill

Advanced: Mathematica, MATLAB

Intermediate: Python, Javascript, HTML, CSS

Basic: Simulink, C/C++, Bash, NX (Unigraphics), ANSYS

Last updated: October 21, 2016