Daniel J Calderone

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EDUCATION

PhD - Electrical Engineering, UC Berkeley
Advisor: Prof. S. Shankar Sastry, May 2017, GPA: 3.82/4.0

THESIS: *Models of Competition for Intelligent Transportation Infrastructure: Parking, Ridesharing, and External Factors in Routing Decisions*

BS - Mechanical Engineering, Univ. Maryland, College Park
May 2010, GPA: 3.98/4.0, Summa Cum Laude

SKILLS / SOFTWARE

Languages: Python, JavaScript, MATLAB
Select packages: cvxpy, pandas, CVX, YALMIP

RESEARCH

DETAILS: `danjcalderone.github.io/research`

AREAS: Convex and nonlinear optimization, Markov decision processes, routing games, stochastic population games, dynamic game theory, linear algebra visualization, graph theory visualization

PROJECTS (papers below)

MARKOV DECISION PROCESS CONGESTION GAMES
Summary: Formulated a version of routing games where individual agents solve a Markov decision process as opposed to a shortest path problem.
Applications: ride-sharing, urban parking, aircraft control management.

CONTINUOUS-TYPE POPULATION GAMES
Summary: Developed equilibrium concept and potential function for population games with preferences modeled as multi-dimensional mass distribution.
Applications: general non-homogeneous population preferences, transportation choice problems.

BRAESS PARADOX IN ROUTING GAMES
Summary: Studied graph-theoretic properties of Braess paradox in routing games and MDP congestion games.

STABILITY OF LEARNING DYNAMICES IN GAMES
Summary: Stability of gradient play in continuous-action two-player games.
Applications: learning in neural networks, generative-adversarial networks, multi-agent optimization

PARKING ROUTING GAMES
Summary: Formulated a version of routing games where agents consider street parking choice as well as travel time.
Applications: urban street parking.

TEACHING EXPERIENCE (@UW & UCB)

Lin Sys Theory/Lin Algebra (AE510/AA510) — **Win20, Fall20, Win21**
Estimation and Kalman Filters (AE514/AA549) — **Spr19, Fall20, Spr21**
SISO/MIMO Control (AE513B/AA447) — **Fall19, Spr21**
Convex Optimization (ECE578B) — **Win21**
Network Dynamics (AA597) — **Spr22**
Statics (AA210) — **Spr22**
Robotic Manipulators (EE125) — **Fall13**
EE Intro Survey Course (EE16A) — **Fall15**

SELECT TOPICS —
Linear systems: matrix spectra, ODEs, control/observe, lyapunov, matrix decomps
Convex optimization, vector duality, simplex method, IPMs
Robotic manipulators: homogeneous transform, forward/inverse kinematics,
Graph theory: matrix decomps, Laplacian spectra, agreement protocol
Controls: Pole placement, LQR/LQG, optimal control, loop-shaping
Freq. Domain: Laplace/fourier transforms, DFT, transfer funcs
Estimation: Kalman/particle filters, camera transforms, sysID, SLAM,

PERSONAL PROJECTS

INTERACTIVE MATH VISUALIZATIONS

Dates: Win2021- present

Summary: I am developing a collection of interactive visualizations for an online textbook teaching linear algebra, optimization, and other subjects.

WEBSITE: `danjcalderone.github.io/dcmath`

SELECT EXAMPLES —

Ex1. Hypershapes	`danjcalderone.github.io/dcmath/linalg/hypershapes`
Ex2. Matrices	`danjcalderone.github.io/dcmath/linalg/matrices`
Ex3. Inner Products	`danjcalderone.github.io/dcmath/linalg/innerproducts`
Ex4. Matrix Products	`danjcalderone.github.io/dcmath/linalg/matrixmultiply`
Ex5. Inverses	`danjcalderone.github.io/dcmath/linalg/inverses`

PAPERS

Markov Decision Process Routing Games, ICCPS 2017
Infinite Horizon Average-Cost Markov Decision Process Routing Games, ITSC 2017
Adaptive Constraint Satisfaction for Markov Decision Process Congestion Games: Application to Transportation Networks. (submitted) Automatica Dec 2021
Variable Demand and Multi-commodity Flow in Markovian Network Equilibrium. (submitted) Automatica Oct 2021 Multi-Dimensional Continuous Type Population Potential Games, CDC 2019
External-Cost Continuous-Type Wardrop Equilibria in Routing Games, ITSC 2017
Sensitivity Analysis for Markov Decision Process Congestion Games, CDC 2019 Stability of Gradient Learning Dynamics in Continuous Games: Scalar Action Spaces CDC 2020
Stability of Gradient Learning Dynamics in Continuous Games: Vector Action Spaces
Understanding the Impact of Parking on Urban Mobility via Routing Games on Queue-Flow Networks, CDC 2016 Lane Pricing via Decision-Theoretic Lane Changing Model of Driver Behavior, CDC2015
Pricing for Coordination in Open-Loop Differential Games, IFAC 2014
Pricing Design for Robustness in Linear-Quadratic Dynamic Games, CDC 2013
Energy Management via Pricing in LQ Dynamic Games, ACC 2013
Pricing in Linear-Quadratic Dynamic Games, Allerton 2012

WORK EXPERIENCE

eBay Advertising, Brisbane/San Jose, CA
Intern, Summer-Fall 2014
Developed regression models for predicting the impact of advertising on eBay sales. Built a dashboard that makes ongoing recommendations about which ads to cut to increase sales while minimizing impact to ad revenue.

Army Research Lab, Adelphi, MD
Intern, Summer 2009
Investigated biological systems for low power communications in small robotic platforms.

Johns Hopkins Applied Physics Lab, Columbia MD
Intern, Summer 2008
Finite element modeling of human torso for studying blast trauma.

Alfred Gessow Rotorcraft Center, UMD, College Park
Intern, Summer 2007
Assisted with fabrication of experimental helicopter rotors for hover-stand test.

OUTREACH EXPERIENCES

EE Graduate Outreach Program (UCB) - Spring 2013-Fall 2016
EEGSA Co-President (UCB) - Fall 2013-Spring 2014
EEGSA Visit Day Student Coordinator (UCB) - Spring 2013
Resident Assistant (UMD) - Fall 2008-Spring 2010
Student Honor Council Member (UMD) - Fall 2007-Spring 2008