DAVID GRIMSMAN

Brigham Young University, 2264 TMCB, Provo, UT 84602 ◯ Grimsman@cs.byu.edu

CURRENT POSITION

July 2021-Present — **Assistant Professor, Computer Science Department**
Brigham Young University

EDUCATION

June 2021 — **PhD, Electrical Engineering**
University of California, Santa Barbara
Santa Barbara, California
Advisor: Jason Marden (also worked closely with João Hespanha)

August 2016 — **MS, Computer Science**
Brigham Young University
Provo, Utah
Advisor: Sean Warnick

April 2006 — **BS, Electrical Engineering**
Brigham Young University
Provo, Utah

PUBLICATIONS

Journal

P. E. Paré, **D. Grimsman**, A. T. Wilson, M. K. Transtrum and S. Warnick, "Model boundary approximation method as a unifying framework for balanced truncation and singular perturbation approximation," *IEEE Transactions on Automatic Control*, 2019. doi:10.1109/TAC.2019.2908523
arXiv version: https://arxiv.org/abs/1901.02569

D. Grimsman, M. S. Ali, J. P. Hespanha, and J. R. Marden, "The impact of information in greedy submodular maximization," *IEEE Transactions on Control of Network Systems*, 2018. doi:10.1109/TCNS.2018.2889005
arXiv version: https://arxiv.org/abs/1807.10639

L. D. R. Beal, D. Peterson, **D. Grimsman**, S. Warnick and J. D. Hedengren, "Integrated scheduling and control in discrete-time with dynamic parameters and constraints," *Computers and Chemical Engineering*, 2018. doi:10.1016/j.compchemeng.2018.04.010

Submitted Papers

D. Grimsman, M. R. Kirchner, J. P. Hespanha and J. R. Marden, "The impact of message passing in agent-based submodular maximization," *Submitted to IEEE Transactions on Control of Network Systems*.

Conference Proceedings

R. Konda, **D. Grimsman**, J. R. Marden, "Execution order matters in greedy algorithms with limited information", *Submitted to 2020 American Control Conference*.

R. Konda, R. Chandan, **D. Grimsman**, J. R. Marden, "Balancing asymptotic and transient efficiency guarantees in set covering games", *Submitted to 2020 American Control Conference*.

Conference Proceedings

D. Grimsman, J. H. Seaton, J. R. Marden and P. N. Brown, "The cost of denied observation in multiagent submodular optimization," *IEEE Conference on Decision and Control*, 2020.

H. Sun, **D. Grimsman** and J. R. Marden, "Distributed submodular maximization with parallel execution," *American Control Conference*, 2020. doi:10.23919/ACC45564.2020.9147476

D. Grimsman, J. P. Hespanha and J. R. Marden, "Stackelberg equilibria for two-player network routing games on parallel networks," *IFAC American Control Conference*, 2020. doi:10.23919/ACC45564.2020.9147705
arXiv version: https://arxiv.org/abs/2003.05882

D. Grimsman, J. P. Hespanha and J. R. Marden, "Strategic information sharing in greedy submodular maximization," *IEEE Conference on Decision and Control*, 2018. doi:10.1109/CDC.2018.8619166

D. Grimsman, M. S. Ali, J. P. Hespanha, and J. R. Marden, "Impact of information in greedy submodular maximization," *IEEE Conference on Decision and Control*, 2017. doi:10.1109/CDC.2017.8264080

D. Grimsman and S. Warnick, "Deadbeat-like approximations for sequencing non-rigid heaps," *IEEE Conference on Decision and Control*, 2016. doi:10.1109/CDC.2016.7798863

D. Grimsman, V. Chetty, N. Woodbury, E. Vaziripour, S. Roy, D. Zappala and S. Warnick, "A case study of a systematic attack design method for critical infrastructure cyber-physical systems," *American Control Conference*, 2016. doi:10.1109/ACC.2016.7524931

COURSES TAUGHT

CS 312: Algorithm Design and Analysis	Fall 2021
CS 412: Linear Programming/Convex Optimization	Winter 2022

RESEARCH PROJECTS

Value of information in multiagent systems **UC Santa Barbara**

- Investigating how communication among agents in a system affects the overall performance of the group
- Described precisely how performance degrades as communication links among the agents disappear
- Showed the optimal graph structures, in terms of overall performance, given a link budget
- Described how strategic information sharing improves performance
- Proved that an increase in information sharing above the nominal amount can dramatically improve results.

Security of networks **UC Santa Barbara**

- Presented a novel formulation of network security against a crossfire attack as a Stackelberg game
- Gave a closed-form expression for the value to the router in knowing the exact attacker budget

Security of cyberphysical systems **BYU**

- Modeled river system dynamics for the Sevier River in Central Utah
- Performed a vulnerability analysis to various attacks
- Estimated that an effective attack across the entire river system could incur a cost of $70 million in crop losses

RESEARCH PROJECTS (CONT.)

Stock market as an indicator for internet health **Achilles Heel Technologies**

- Led a team that investigated whether the NASDAQ order book could be used as an indicator for internet outages
- Leveraged various machine learning methods on various frequency signals of the order book
- Successfully concluded that this data was not a good indicator of internet health

Efficiency of batch flow systems **BYU**

- Improved a model for batch flow systems
- Showed that this improvement yields an increased performance of approximate dynamic programming algorithms

Modeling atmospheric phenomenon **MIT Lincoln Laboratories**

- Modeled how a weather phenomenon affects optical signals
- Leveraged MATLAB and Monte Carlo simulations

Parameterization/model reduction of linear systems **BYU**

- Created a parameterization of linear systems

OTHER PROFESSIONAL WORK

UC Santa Barbara – Research Asst/Teaching Asst **Sep 2016-Jun 2021**

- Major research projects listed above
- Mentored an undergraduate student during a summer program, resulting in a conference publication
- A leader in organizing weekly lab meetings, meetings with visiting CCDC speakers, and other lab social events

Achilles Heel Technologies – Director of Prod. Dev. **Jan 2018-Jun 2021**

- Helped lay the theoretical foundation for the company's patent
- Led a team to explore the use of finance data as an indicator of internet health (see "Research Projects"), a project where we were a sub-contractor funded by the Department of Homeland Security

Applied Invention – Analytics Team Member **Mar 2015-Aug 2019**

- Helped develop a simplified model for how water moves through soil, and matched it to available data
- Member of a team which develop an algorithm for simultaneously clustering customers and products
- Designed part of an algorithm for automatically setting prices for a Fortune 500 company

Brigham Young University – Research Asst/Teaching Asst **Jan 2014-Aug 2016**

- Major research projects listed above
- Mentored several undergraduates in research and presenting

MIT Lincoln Laboratories – Summer Intern **Jun 2015-Aug 2015**

- Developed a model which was made available to missile testing sites

OTHER PROFESSIONAL WORK (CONT.)

BrainStorm – IT Manager/Trainer **Jul 2006-Dec 2013**

- Was a key member of the team that pioneered the Customer Immersion Experience (CIE), a sales program that Microsoft implements for its top customers. This program affected $1 billion of revenue in 2011.
- Effectively coached internal Microsoft sales staff and partners domestically and internationally on the CIE, influencing Microsoft's worldwide sales revenue
- Innovatively and independently redesigned the training curriculum used by all BrainStorm trainers to be scenario-focused, setting the company apart from competitors
- Designed and created a mobile app for BrainStorm QuickHelp, allowing customers to access video content on mobile devices

Brigham Young University – Teaching Asst **Aug 2005-Apr 2006**

- Taught a lab section
- See below for courses worked

California Dept of Corrections – Help Desk **May 2005-Aug 2005**

- First-level software support for Dept of Corrections facilities: jails, prisons, etc.
- Assisted with server hardware upgrades

Missionary Training Center – Teacher **Aug 2004-Apr 2005**

- Taught a 3-week course training new missionaries for the Church of Jesus Christ of Latter-day Saints
- Earned exceptional scores on student feedback
- Facilitated the use of new training materials

AWARDS

UC Santa Barbara ECE Outstanding TA Award	2020
UC Santa Barbara Grad Slam Semifinalist	2018
NSF IGERT Network Science Fellowship	2016
BYU 3-Minute Thesis CS Department Winner	2016
BYU Student Research Conference Best Session Presentation	2014, 2016
BYU Heritage Scholarship Award Winner	2000

OTHER TEACHING/PRESENTING EXPERIENCE

UC Santa Barbara

Teaching Assistant	ECE 147A: Feedback Control Systems	Fall 2019	Andrew Teel

Brigham Young University

Teaching Assistant	CS 513: Robust Control	Fall 2015	Sean Warnick
Teaching Assistant	CS 401R: Introduction to Feedback Systems	Fall 2015	Sean Warnick
Teaching Assistant	CS 312: Algorithm Design and Analysis	Spring 2014	Vasu Chetty
Teaching Assistant	MATH 110: College Algebra	Winter 2006	
Teaching Assistant	ECEn 380: Signals and Systems	Winter 2006	Winn Stirling
Teaching Assistant	ECEn 360: Lines and Fields	Fall 2005	Karl Warnick

BrainStorm

Effectively trained end-users how to use Novell and Microsoft software, mostly in 1- or 2-day courses
Trained others on master trainer techniques
Became a Microsoft Master Certified Trainer (MCT)

OTHER TEACHING/PRESENTING EXPERIENCE (CONT.)

Missionary Training Center

Taught a 3-week course to train missionaries for The Church of Jesus Christ of Latter-day Saints

ACADEMIC AND PROFESSIONAL PRESENTATIONS

- *The Impact of Information in Cooperative and Non-Cooperative Systems*, Dissertation defense, June 2021, Santa Barbara, CA (remote)
- *The impact of message passing in agent-based submodular maximization*, Conference on Decision and Control, Dec 2020, Jeju Island, Republic of Korea (remote)
- *The cost of denied observation in multiagent submodular optimization*, Conference on Decision and Control, Dec 2020, Jeju Island, Republic of Korea (remote)
- *The Impact of Information in Cooperative and Non-Cooperative Systems*, Dissertation proposal, March 2019, Santa Barbara, CA
- *Strategic Information Sharing in Greedy Submodular Maximization*, Conference on Decision and Control, Dec 2018, Miami Beach, FL
- *Value of Information in Greedy Submodular Maximization*, Southern California Control Workshop, May 2018, Riverside, CA
- *Synergy without Strategy*, UC Grad Slam Competition, April 2018, Santa Barbara, CA
- *Impact of Information in Greedy Submodular Maximization*, Conference on Decision and Control, Dec 2017, Melbourne, Australia
- *Deadbeat-Like Approximations for Sequencing Non-Rigid Heaps*, Conference on Decision and Control, Dec 2016, Las Vegas, NV
- *A Case Study of a Systematic Attack Design Method for Critical Infrastructure Cyber-Physical Systems*, American Control Conference, Boston, MA, Jul 2016
- *The Asynchronous t-Step Approximation for Scheduling Batch Flow Systems*, Master's Thesis Defense, June 2016, Provo, UT
- *Structural and Dynamic Parameters in Linear Time-Invariant Systems*, BYU Student Research Conference, March 2016, Provo, UT
- *Scheduling Batch Flow Processes*, BYU 3-Minute Thesis Competition, Feb 2016, Provo, UT
- *System Vulnerability Analysis*, MAGICC Lab invited speaker, Jan 2016, Provo, UT
- *Memory Approximation in Batch Flow Shop Models*, BYU Student Research Conference, March 2014, Provo, UT
- *Customer Immersion Experience for Microsoft CRM*, Microsoft Worldwide Partner Conference, July 2013, Houston, TX
- *Customer Immersion Experience for Microsoft CRM*, Microsoft Worldwide Partner Conference, July 2012, Toronto, Canada
- Session presenter at Microsoft TechEd, May 2011, Atlanta, GA
- Featured presenter at Novell's Best of BrainShare events, 2008: Boston, MA; Montreal, Canada; Toronto, Canada; Phoenix, AZ; Irvine, CA
- Session presenter at Novell BrainShare, 2007-2008: Salt Lake City, UT
- Session presenter at GWAVACon, 2007: Sydney, Australia; 2008: San Diego, CA; 2008: Berlin, Germany

SERVICE

Referee for Journals

Automatica
IEEE Transactions on Automatic Control
IEEE Transactions on Control of Network Systems
IEEE Control Systems Letters
SIAM Journal on Control and Optimization

Referee for Conference Proceedings

IEEE Conference on Decision and Control
American Control Conference
IFAC World Congress

OTHER

- Python, MATLAB, LaTeX, Java, C++, C#, R
- Have used neural networks, clustering algorithms, reinforcement learning in various projects.
- Eagle Scout