

# WINSTON HURST

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Email: [wdurhamh@gmail.com](mailto:wdurhamh@gmail.com); Phone: (214)-476-0770; Santa Barbara, CA  
Webpage: <https://wdurhamh.github.io/winston.hurst.io>

**Summary:** Versatile problem solver with published research at the intersection of communications, controls, and signal processing. Industry experience in software development for high-impact projects. Experienced in machine learning, algorithm design, and software with extensive hands-on hardware experience.

## EDUCATION

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**Ph.D., Electrical Engineering - UC Santa Barbara** 2019 - 2025 (Expected)  
Graduating PhD student; Advisor: Dr. Yasamin Mostofi; GPA: 3.96

**B.S., Computer Science - Brigham Young University** Graduated 2016  
GPA: 3.99; Magna Cum Laude with Honors; Full tuition academic scholarship all years

**Relevant Coursework:** ML and Data Mining, Theoretical ML, Optimal Control, Nonlinear Control Systems, Stochastic Processes, Optimal Estimation and Filtering, Algorithm Design and Analysis

## RESEARCH EXPERIENCE

**Graduate Student Researcher - UC Santa Barbara** Santa Barbara, CA; 2019 - Present

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### Machine Learning and Stochastic Methods for Motion Planning in Communication Systems

- Minimized communication delays by optimizing mobile relay trajectory using DRL (PPO)
- Reduced training time with novel transfer learning technique between problem instances
- Optimized stochastic queueing models of mobile relay, relevant for general vehicle routing problems
- Integrated CGAL computational geometry library into Python code base with custom C++ bindings
- Published comprehensive survey on planning for autonomous vehicles in 6G communication networks

### Signal Processing for Crowd Analytics with Real-World mmWave Radar

- Developed statistical pipeline for state-of-the-art crowd size estimation using mmWave radar data
- Extracted key crowd motion dynamics with novel flow-based pipeline with statistical filtering
- Validated theoretical methods with extensive, robust measurement campaigns

### RF Field Control with Diffraction-Based Metasurface

- Accelerated iterative design process with custom object-oriented Python server for high-end EM simulator
- Manufactured cutting-edge electromagnetic metasurface capable of multi-beam beamforming

### Decentralized Control for Energy-Efficient mmWave Relay

- Developed a novel auction-based crowdsourcing scheme for relay coordination
- Improved coverage in dead zones without additional service provider infrastructure costs

### Academic Services

- TA Positions: Principles of Optimization, Probability Theory; Outstanding ECE TA Award 2019 & 2020
- Peer Reviewer: JPROC, ACC, CDC, TCNS, TWC, SPL

## INDUSTRY EXPERIENCE

**Team Lead/Software Engineer - Epic Systems** Madison, WI;  
2016-2019

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### Leadership and Communication

- Led team of 8 developers integrating Epic software with national health systems in European countries (> \$1M total budget), coordinating across stakeholders and meeting strict timelines
- Coached underperforming team member through weekly goal setting and evaluation
- Eliminated project budget overruns through the design and rollout of a standardized estimation process

## Software Engineering

- Implemented full-stack features in production environment using OOP and MVC architecture
- Streamlined patient rooming experience with physician voice assistant prototype for mobile devices
- Reduced physician administrative burden with NLP application for parsing clinical notes

## SKILLS

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**Optimization, Control, & Planning:** Deep Reinforcement Learning, Convex Optimization, Dynamic Programming, Model Predictive Control, Vehicle Routing Problem, Cost Function Design

**RF Sensing:** TI AWR2243BOOST mmWave radar board, FMCW radar, Geometric Theory of Diffraction

**Coding Languages:** Python, C++, Matlab, Java, JavaScript, VB, MUMPS, C#

**Scientific Computing Tools:** SciPy, PyTorch, CVXPY, CLARABEL, CGAL, CPLEX

**Coding Tools & Concepts:** git, Linux, APIs, MVC, OOP, FSM

## PATENT

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Y. Mostofi, A. Pallaprolu, B. Korany, and **W. Hurst**, "Exploiting diffraction for sensing with RF signals and/or for RF field programming," US Patent App. 18/904812, 2025.

## PUBLICATIONS

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### Communication-Aware Robotics for Next Generation Communication Systems

- **W. Hurst**, S. Evmorfos, A. Petropulu, and Y. Mostofi, "Uncrewed Vehicles in 6G Networks: A Unifying Treatment of Problems, Formulations, and Tools," Proceedings of the IEEE, special issue on 6G, March 2025. **[Impact Factor: 23.2]**
- **W. Hurst** and Y. Mostofi, "Minimizing Wait Time and Age of Information in Mobility-Enabled Communication Systems," IEEE International Conference on Communications (ICC), June 2024.
- **W. Hurst** and Y. Mostofi, "Optimal Dynamic Trajectories for UAVs in Mobility-Enabled Relay Systems," IEEE Conference on Decision and Control (CDC), Dec. 2023.
- **W. Hurst** and Y. Mostofi, "Optimization of Mobile Robotic Relay Operation for Minimal Average Wait Time," IEEE Transactions on Wireless Communications, vol. 22, number 6, June 2023.
- **W. Hurst**, H. Cai, and Y. Mostofi, "Communication-Aware RRT\*: Path Planning for Robotic Communication Operation in Obstacle Environments," IEEE International Conference on Communications (ICC), June 2021.

### Crowd Analytics with mmWave Radar

- A. Pallaprolu, A.P. Kattakola, **W. Hurst**, U. Madhow, A. Sabharwal, and Y. Mostofi, "Crowd Size Estimation for Non-Uniform Spatial Distributions with mmWave Radar," Submitted to ASILOMAR, 2025.
- A. Pallaprolu, P. Peng, S. Sandhu, **W. Hurst**, and Y. Mostofi, "Crowd Analytics with a Single mmWave Radar," 30th International Conference on Mobile Computing and Networking (MobiCom), November 2024.

### RF Field Programming and Sensing

- A. Pallaprolu, **W. Hurst**, and Y. Mostofi, "Embracing Diffraction: A Paradigm Shift in Wireless Sensing and Communication," Submitted to IEEE Journal of Selected Topics in Electromagnetics, Antennas and Propagation, 2025.
- A. Pallaprolu, **W. Hurst**, S. Paul, and Y. Mostofi, "I Beg to Diffract: RF Field Programming With Edges," 29th Annual International Conference on Mobile Computing and Networking (MobiCom), October 2023.

### Decentralized Control for Energy-Efficient mmWave Relay

- **W. Hurst** and Y. Mostofi, "Relay Incentive Mechanisms Using Wireless Power Transfer in Non-Cooperative Networks," Transactions on Wireless Communications, 2025.
- **W. Hurst** and Y. Mostofi, "Multi-Attribute Auctions for Efficient Operation of Non-Cooperative Relaying Systems," accepted, American Control Conference (ACC), 2025.

- **W. Hurst**, A. Pallaprolu, and Y. Mostofi, "Emergent Cooperation for Energy-efficient Connectivity via Wireless Power Transfer," IEEE GLOBECOM, 2024.