

Andrew Kramer

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// Research Experience

NASA Jet Propulsion Laboratory

Visiting Researcher

Pasadena, California, USA

June 2019 - August 2019, December 2019

- Developed lightweight radar-based state estimation for micro-aerial vehicles in visually degraded environments.
- Created a radar-specific occupancy mapping framework for path planning in visually degraded environments.

Autonomous Robotics and Perception Group

Research Assistant, NSTRF Fellow

Boulder, Colorado, USA

August 2017 - Present

- Recipient of a NASA Space Technology Research Fellowship (NSTRF) to research SLAM for subterranean environments.
- Developed a stereo frontend for visual-inertial SLAM in subterranean environments.
- Led collaborative effort with the NASA Jet Propulsion Laboratory to develop and demonstrate radar-based localization and mapping for micro-aerial vehicles in visually-degraded environments.
- Created a weakly-supervised method for learned noise rejection in radar-based occupancy mapping.
- Implemented a custom, GPU-based radar signal processing pipeline using CUDA.
- Currently developing a self-supervised method for learned radar odometry for micro-aerial vehicles.

Toray Composites

Technical Engineering Intern

Tacoma, Washington, USA

June 2011 - September 2011

- Researched the fluid dynamics of roller coating processes.
- Created a mathematical model for roller coating with non-Newtonian fluids.

Sumitomo Chemical

Mechanical Engineering Intern

Niihama, Ehime, Japan

July 2010 - September 2010

- Researched non-indentation as a means to measure the mechanical properties of materials.
- Found a statistical method to predict the yield stress of steels from indentation data.

// Publications

Radar-Inertial Ego-Velocity Estimation for Visually Degraded Environments

A. Kramer, C. Stahoviak, A. Santamaria-Navarro, A. Agha-mohammadi, C. Heckman

International Conference on Robotics and Automation (ICRA 2020)

Visual Inertial (VI) Slam for Subterranean Environments

[[abstract](#)]

A. Kramer, M. Kasper, C. Heckman

12th Conference on Field and Service Robotics (FSR 2019)

// Education

University of Colorado, Boulder

PhD Student in Computer Science

Boulder, Colorado, USA

August 2017 - Present

- GPA 3.95
- Coursework in convex optimization, machine learning, robotics and state estimation.
- Completed comprehensive exam in May 2020, on track to graduate in May 2021.

Seattle University

Graduate Certificate in Computer Science

Seattle, Washington, USA

August 2015 - June 2016

- Coursework in object-oriented development, databases, data structures and algorithm analysis, computer architecture and software engineering.
- Completed all coursework with a GPA of 3.96 while working full-time at The Boeing Company.
- Participated in and lead a study group focused on algorithmic problem-solving.

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University of Washington

B.S. in Mechanical Engineering

Minor in Japanese language

Seattle, Washington, USA

September 2007 - March 2012

- Participated in the EcoCar2 project: converting a conventional car to hybrid gasoline-electric.
- Helped to design and build a race car as a part of the Formula SAE team.

// Work Experience

The Boeing Company

Renton, Washington, USA

Product Review Engineer

November 2012 - July 2017

- Provided engineering support for final assembly of 737 aircraft.
- Developed repair and testing procedures for all structures and systems on the aircraft.
- Worked closely with other engineers, machinists, planners and managers to implement repairs.
- Determined root causes of chronic problems and developed methods to prevent recurrence.

Seattle Safety LLC

Kent, Washington, USA

Mechanical Design Engineer

March 2012 - October 2012

- Designed components and systems for non-destructive crash-testing labs.
- Used computer-aided design (CAD) to model and finite element analysis (FEA) to develop and validate designs.
- Collaborated with other engineers, drafters, purchasers, and machinists to implement my designs.

// Personal Projects

Designed and built an autonomous mobile robot.

- Wrote programs for EKF SLAM, lidar scan alignment using ICP, and SDF map fusion using Gauss-Newton optimization.
- Wrote C++ and Arduino software to coordinate independent processors handling motor control, sensor reading and high-level processing via UART and I²C.
- Working toward a graph SLAM implementation using wheel encoders and lidar.

Designed and built an automated camera mount for astrophotography.

- Used an attitude/heading reference system (AHRS) and GPS to align the camera's axis of rotation with the Earth's.
- Matched camera's rate of rotation to Earth's using a DC motor with PID speed control.

Blogging.

- Detailed tutorials on my robotics projects to help others recreate my results.
- Includes summaries of my sources, theoretical explanations, results and plans for future work.

// Skills

- Solving complex perception problems for field robots in difficult environments
- Sensor fusion using filtering and nonlinear optimization methods
- Developing and implementing deep learning solutions with PyTorch
- Programming with C++, Python, and Matlab
- GPU programming with CUDA
- Self-motivated research, learning, and skill development
- Technical communication and writing
- Team-building, coordinating between groups, and fostering cooperation