JEFF IRION, Ph.D.

<see my webpage> https://jefflirion.github.io https://github.com/jefflirion
<provided via email> www.linkedin.com/in/jefflirion

Professional Experience

- **SENIOR SOFTWARE ENGINEER**, Zoox *May 2021 – Present*
  - Stay tuned...
- **SENIOR ROBOTICS SOFTWARE ENGINEER**, Neato Robotics *November 2018 – May 2021*
  - Contributed to C++ robot vacuum code base with a focus on grid mapping, navigation, and map-related algorithms (e.g, A*, C-space expansion, BFS, DFS, ray tracing, etc.).
  - Demonstrated expertise in multi-threaded programming, IPC mechanisms, and system design.
  - Drove a push towards test-driven development (TDD) and continuous integration (CI). Implemented checks for coding style, static analysis, unit test coverage, and memory leak detection.
  - Implemented 24/7 simulation testing for robotic vacuum software.
  - Co-authored a SQLite database library used for storing data on the robot.
- **RESEARCH SCIENTIST**, Bosch *May 2016 – November 2018*
  - Devised and implemented novel algorithms for distributed Graph SLAM optimization on Apache Spark.
  - Programmed a complete Graph SLAM framework in Python, including data I/O, vertices, edges, $SE(2)$ and $SE(3)$ pose operations, and fully analytic Jacobians.
  - Processed 3-D point clouds from an HDL-64E Velodyne LiDAR scanner and developed a method for incorporating ground plane images into the Graph SLAM optimization.
  - Contributed to the Bosch open-source library for ADMM optimization on Apache Spark.

Education

Ph.D., Applied Mathematics, University of California, Davis. December 2015.
3.83 GPA. Adviser: Dr. Naoki Saito

B.S., Chemical Engineering, University of California, San Diego. June 2009.
3.75 GPA. Minors in Mathematics and Economics

Honors & Awards

- JSIAM Best Paper Award (2014)
- NDSEG Fellowship
- UC Davis VIGRE Award
- National Merit Scholar
- UCSD Regents Scholar
- UCSD Provost's Honors

Skills

- C++
- Python
- ROS
- Make
- CMake
- Bash
- Linux
- R
- MATLAB
- SQL
- Git
- LaTeX
- Apache Spark

Research Experience

- **GRADUATE RESEARCH IN APPLIED MATH**, UC Davis June 2012 – January 2016
  - Developed algorithms for analyzing data on graphs; implemented these methods in MATLAB.
  - Developed methods for using graph-based techniques to analyze matrix data and demonstrated an 83.7% improvement over previous results in approximation experiments.

Selected Coursework

- Numerical Methods
- Large-Scale Scientific Computation
- Applied Statistics
- Information Theory and Coding
- Graphs & Networks
- Numerical Optimization

Selected Publications

- J. Irion and N. Saito, "Efficient Approximation and Denoising of Graph Signals Using the Multiscale Basis Dictionaries," *IEEE Transactions on Signal and Information Processing over Networks*, vol. 3, 2017.

- J. Irion and N. Saito, "Hierarchical Graph Laplacian Eigen Transforms," *Japan SIAM Letters*, vol. 6, 2014. ***(Best paper award)***

Online Courses

- Udacity Robotics Nanodegree `https://graduation.udacity.com/confirm/T6R5PPE`
- Udacity Self-Driving Car Nanodegree, Term 1

Personal Projects

- **Graph SLAM solver** `github.com/jefflirion/python-graphslam`
  - Self-contained, extensible Graph SLAM solver with support for $\mathbb{R}^2$, $\mathbb{R}^3$, $SE(2)$, and $SE(3)$ datasets.
- **ADB library in Python** `github.com/jefflirion/adb_shell`
  - Implemented the ADB protocol in Python to enable control of Android devices from Python apps.
- **Android TV smart home integration** `github.com/jefflirion/python-androidtv`
  - Wrote a package for controlling Android TV devices and integrating them into Home Assistant.
- **Powerlifting calculator** `jefflirion.github.io/powerlifting/`
  - Wrote a powerlifting calculator in JavaScript to calculate total, Wilks score, and Malone score.

Hobbies & Interests

- Home Assistant contributor – codeowner for the Android TV integration — March 2018 – Present
- Associate Editor and contributing author – *POWER* magazine — May 2012 – April 2016
- Competitive powerlifter – elite status in the 220 and 242 lbs. classes — June 2006 – November 2014