Brendon Forsgren

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LinkedIn Profile

EXPERIENCE

VectorNav Technologies, Dallas, Texas, USA

- Navigation Engineer — Sep 2023–Present
  - Developed an EKF for airspeed-aided inertial navigation in GPS-denied environments
  - Implemented a forward-backward smoother to generate a truth reference used to evaluate INS performance in GPS-denied/degraded environments
  - Ported a Hard/Soft Iron calibration routine from C to modern C++

Brigham Young University, Provo, Utah, USA

- Graduate Research Assistant, BYU MAGICC Lab — Apr 2018–Aug 2023
  - Research in cooperative GPS-denied navigation
  - Developed robust outlier detection algorithms for multi-agent SLAM operating in high outlier regimes
  - Developed robust multi-agent pose graph optimization algorithms

Air Force Research Laboratory, Munitions Directorate, Eglin Air Force Base, FL

- NSF-AFRL Graduate Research Intern — Oct 2022–Apr 2023
  - Implemented a MSCKF for accurate GPS-denied navigation of high flying vehicles
  - Team lead role in preparation for real-time flight test of MSCKF
  - Developing a novel cooperative navigation framework that scales with the number of vehicles and requires low communication bandwidth
- AFRL Scholars Intern, Secret Security Clearance — Jun 2021– Aug 2021
  - Implemented a cooperative pose graph optimization algorithm
  - Demonstrated cooperative pose graph optimization algorithm in a real-time hardware demonstration

Near Earth Autonomy, Pittsburgh, PA, USA

- Robotics Engineering Intern — May 2019 – Aug 2019
  - IMU evaluation for GPS enabled missions
  - Integrated external IMU system with existing hardware in several autonomous flights
  - Evaluation of IMU noise characteristics

EDUCATION

Brigham Young University, Provo, Utah, USA

- PhD candidate in Mechanical Engineering (5th year) — Aug 2023
  - Graduate GPA: 3.93/4.0
- B.S. in Mechanical Engineering — Apr 2018
  - Cumulative GPA: 3.86/4.0

SKILLS

Computer Programming

- Languages: C++, Python, Matlab
- Familiarity publisher/subscriber frameworks like ROS

Computer Vision

- Used stereo vision to track and catch a baseball traveling at 40mph
- Implemented a tightly-coupled visual-inertial odometry algorithm
- Demonstrated a lane following algorithm on a small scale self-driving car

State Estimation/Localization

- Familiar with Kalman filters, Particle filter, and SLAM algorithms
- Familiarity with factor graphs and non-linear optimization techniques over Lie Groups
- Implemented a Fixed-lag Smoother in real time on Turtlebot data

Sensors

- Familiarity with IMU sensors including magnetometers
- Image processing and calibration for RGB/RGB-D cameras

- Airspeed Sensors and pressure altimeters
- GNSS receivers and signals

PUBLICATIONS

- *Direct Relative Edge Optimization, a Robust Alternative for Pose Graph Optimization*, IEEE Robotics and Automation Letters, 2019
- *Group-k Consistent Measurement Set Maximization for Robust Outlier Detection*, IEEE IROS 2022
- *Incremental cycle bases for cycle-based pose graph optimization*, IEEE Robotics and Automation Letters, 2023
- *Group-k Consistent Measurement Set Maximization via Maximum Clique over k-Uniform Hypergraphs for Robust Multi-robot Map Merging*, International Journal of Robotics Research, 2024
- *Cooperative Navigation of Autonomous Vehicles in Challenging Environments*, BYU Scholars Archive, 2023