Matthew Boler

770-855-5529
#501 Webster Road, Lot 315
meb0054@auburn.edu
Auburn, AL 36832
https://mattboler.github.io/

Education

- **Auburn University** — Auburn, AL
  Ph.D., Mechanical Engineering — *Anticipated May 2025*
- **Auburn University** — Auburn, AL
  M.S., Mechanical Engineering (Thesis Option), ***3.86*** *GPA* — *August 2021*
  - Thesis: "Observability-Informed Measurement Validation for Visual-Inertial Navigation"
  - Advisor: Dr. Scott Martin
- **Auburn University** — Auburn, AL
  B.S. Mechanical Engineering, Computer Science Minor, ***3.56*** *GPA* — *May 2019*

Experience

- **GPS and Vehicle Dynamics Laboratory** — Auburn, AL
  Graduate Research Assistant — *2019 - Current*

  Multispectral Visual Navigation
  - Developed a Multi-State Constraint Kalman Filter (MSCKF) with holonomic constraints and online extrinsic calibration for GPS-denied infrared+INS ground vehicle navigation.
  - Designed a full-smoothing visual-inertial SLAM system using ISAM2 and a novel geometric validation module for robust feature initialization.
  - Reduced sensitivity of visual SLAM systems to dynamic environments by adaptively segmenting static and dynamic image regions using YOLO and monitoring feature behavior.

  Autonomous Tiger Racing
  - Developed a robust ground-removal algorithm for LIDAR obstacle detection to handle large bank angles using a smoothed height-variance map in ROS and PCL.
  - Developed a combined offline graph SLAM and online particle filter localization subsystem using LIDAR, wheel odometry, and IMU.
  - Developed a lighweight path planning node in ROS to generate minimum-jerk trajectories at 200Hz.
- **Sandia National Laboratories** — Albuquerque, NM
  Intern - Navigation, Pointing, and Control — *2020*
  - Designed experiments to determine performance characteristics of image registration methods for multispectral/hyperspectral imaging systems.
  - Implemented modified Fourier-Mellin, SIFT, and other algorithms to improve registration performance between visual-spectrum and hyperspectral images.

Skills

Languages: C++, Python, Matlab, Julia

Software: Git, LaTeX, Docker, Robot Operating System (ROS) 1 and 2

Libraries: Numpy, SciPy, Pandas, OpenCV, PyTorch, Eigen, PCL