

# FELIPE BORJA

Mechatronics Engineering Researcher & Robotist

 [linkedin.com/in/fborja/](https://www.linkedin.com/in/fborja/)  
 [github.com/felipeborja](https://github.com/felipeborja)  
 [ipe.borja@gmail.com](mailto:ipe.borja@gmail.com)  
 787-505-3196

## EDUCATION

- Carnegie Mellon University** (3.9 GPA) Aug 2021 – May 2023  
*Master of Science in Mechanical Engineering* Pittsburgh, PA
- Virginia Tech** (3.8 GPA) June 2019 – May 2021  
*Master of Science in Mechanical Engineering* Blacksburg, VA
- Harvey Mudd College** (3.3 GPA) Aug 2015 – May 2019  
*Bachelor of Science in Mechatronics* Claremont, CA

## PROFESSIONAL EXPERIENCE

- MIT Lincoln Laboratory** May 2021 – Aug 2022  
*Advanced Capabilities and Systems Intern* Lexington, MA
- Analyzed open-source LIDAR/IMU SLAM packages and integrated them into the ROS framework for Group 107 UAV missions.
  - Conducted an in-depth investigation into 3D semantic segmentation algorithms for UAV-based camera and LIDAR mapping.
  - Semantically labelled fifty high-definition maps constructed from UAV flight imagery data.
- NASA Ames Research Center** June 2020 – Aug 2020  
*NARI Research & Development Intern* Mountain View, CA
- Led a team of eight interns to research and develop a low-cost reconnaissance and payload UAV for U.S. Coast Guard (USCG) search-and-rescue missions; an economically viable and NDAA-compliant alternative to foreign commercial UAVs.
  - Designed a compact, weather-resistant camera gimbal with integrated RGB and FLIR thermal cameras.
  - Established a regulatory-compliant supply chain to ensure drone components were ready for domestic mass-production.
  - Presented results to USCG and NASA Ames leadership and produced a [standard USCG memo](#) to publish results for USCG access.
- Doosan Bobcat** Sept 2018 – May 2019  
*HMC Industry-Sponsored Clinic (Capstone) Intern* Claremont, CA
- Designed and developed low-cost system for localization of autonomous skid steer loaders in indoor, GPS-denied environments. Work resulted in a [patent](#) with the Co-Op team as named inventors.
  - Integrated *Decawave* ultra-wideband tag-and-anchor localization system with *Bobcat* construction loader machine controls via serial communication in ROS.

## PUBLICATIONS AND POSTERS

- **F. Borja**, S. Bergbreiter, and L. Viornerly, “[Spring-Powered Tether Launching Mechanism for Improving Micro-UAV Air Mobility](#),” in *International Conference on Robotics and Automation*, 2023. [Poster]
- K.B. Fillingim, R. Nwaeri, , **F. Borja**, K. Fu, C.J.J. Paredis, “[Design Heuristics: Extraction and Classification Methods With Jet Propulsion Laboratory’s Architecture Team](#),” in *ASME Journal of Mechanical Design*, 2020. [Journal Paper]
- K.B. Fillingim, R. Nwaeri, , **F. Borja**, K. Fu, C.J.J. Paredis, “[Design Heuristics: Analysis and Synthesis From Jet Propulsion Laboratory’s Architecture Team](#),” in *Conference on Design Theory and Methodology*, 2018. [Conference Paper]

 Active Confidential Security Clearance & U.S. Citizen

## SKILLS

### Programming Languages

Python Matlab C++ Java

### Frameworks

ROS Numpy OpenCV Arduino

### Design & Manufacturing

SOLIDWORKS Fusion 360 Machining  
FDM Printing SLA Printing Laser Cutting  
Electro-Mechanical Hardware Design

### Technical

Git Linux  $\LaTeX$  Gazebo

### Non-Technical

Research formulation Data visualization  
Team leadership Science communication

## RESEARCH EXPERIENCE

- CMU Micro-Robotics Lab** May 2022 – Present  
Investigating the optimal design and fabrication tradeoffs of a novel spring-actuated impulsive tethering mechanism on micro-UAVs for the improvement of aerial mobility operations. Presented results at ICRA 2023. Research is ongoing.
- CMU Zoom Lab** Aug 2021 – May 2022  
Investigated and designed spider-inspired impulsive tether launching mechanisms that could be used by cm-scale robots to build web structures and traverse difficult terrain.
- VT Uncrewed Systems Lab** May 2019 - Aug 2021  
Investigated automated aerial mapping and semantic segmentation of complex environments with a multi-agent team. Cooperation between UAVs with separate sensing payloads enabled surveying and mapping of points of interest.