Baaqer Farhat

Baaqer Farhat Baaqerfarhat@gmail.com baaqerfarhat +1 312 770-0903

Summary

Passionate about robotics engineering, with a track record of leadership in international competitions and prestigious awards. Particularly interested in robots/manufacturing, controls, EVs, and mechatronics.

Education

California Institute of Technology — **Pasadena, CA**
EE / Robotics Engineering with minor in Control Systems and Dynamics — *Sept 2023 - Present*

Skills

- CUDA/Pytorch
- Linux
- Solidworks/Fusion/Onshape
- Robot Arms (FANUC)
- Altium/KiCAD: PCBs
- Isaac Sim/Lab
- PID/MPC/LQR
- 3-D Printing
- Python/Java/C++
- ROS1 and ROS2
- Rapid Prototyping
- Communication/Leadership

Highlighted Course Work

- **ME/CDS/EE 235A**: Advanced Robotics: Kinematics
- **ME 169**: Mobile Robot Localization/Navigation
- **CDS 212**: Optimal Control and Reinforcement Learning
- **CDS 231**: Robust Control Theory
- **CS 1/2**: Python and Java Programming
- **EE 150 + CS 156**: Deep Learning
- **CDS 131** Linear Systems
- **EE 44/55:** Advanced Circuit Analysis

Internships and Awards

- **Reserach Intern in Autonomous Robotics Lab at Caltech** (**Summer 2025**): Developed a closed-loop spacecraft VIO pipeline, achieving $\pm$0.27 m accuracy relative to ground truth in faulty state estimation via a multimodal Transformer tuning a live MPC.
- **Avalon Robotics Engineering Internship** (**Spring 2024**): Automated manufacturing processes through mechatronics projects, achieving a **25%** increase in operational efficiency for FANUC robotic arm setup.
- **CPS Office of Computer Science Robotics Summer Internship** (**Summer 2023**): Led a team of four to build a mecanum drivetrain from scratch, teaching CAD, programming, and electrical/mechanical integration.
- **Morningstar Summer Internship** (**Summer 2022**): Implemented front-end features to automate backend database updates, improving development efficiency for institutional products.
- **United by STEM: One Team, Two Continents** (**Fall 2023**): Mentored 20+ students in building robot chassis from scratch, teaching mechanical, electrical, and programming fundamentals.
- **FIRST Robotics**: Deans List Award (Midwest): First place in State for student leaders
- **2x FTC Chicago City Championship** (**robotics**): Best FTC team in City
- **FTC Chicago City Control Award** : Most advanced robot design
- FRC Midwest Regional Judge Award and Inspire Award

Projects

- ROS2 Autonomous Robot Explorer and Navigator
- ROS2 Fly Swatter Robot Arm
- Mini-Humanoid Robot: Contributed to the initial prototype of a low-cost Micro-Stompy humanoid robot, later commercialized at 250 USD, for general purpose applications (K-Scale).
- RFID Invetory System for autonomous manufacturing
- Automatic Coolent/water Pump for CNC automation through PLC NEXTEngineer
- Multipurpose probe (Designed Schematic, PCB, and Assembled)
- PID Self Balancing Robot (built + optimized with simulations)
- FTC Cone Delivery Robot: Odometry localization

Publications

- **HyperMPC: Live MPC Tuning via Multimodal Transformers for Real-Time Fault Detection and Recovery in a Spacecraft Simulator**: Baaqer Farhat, *et al.* In preparation, 2025.