Charles J. Vorbach

charliea0.github.io
362 Memorial Drive, Cambridge, MA 02139 • cvorbach@mit.edu • (914) 525-8764

Education

Massachusetts Institute of Technology *Cambridge, MA*
Candidate for Bachelor of Science in Computer Science and Engineering; GPA 4.7/5.0 *Expected June 2021*

Experience

MIT Driverless: Controls Team *Cambridge, MA*
Controls Lead *2019*

- Responsible for delivering autonomous path planning and vehicle controller for Formula Student Germany Driverless.
- Developer of vehicle models for both LQR and for nonlinear MPC controllers.
- Oversee development of path planning strategies, vehicle reference speed estimators, and track boundary generation.
- Integrated vehicle's ROS to CAN interface and helped port Matlab code-generated C++ to embedded systems.

MIT Space Systems Laboratory: International Space Station Astrobees *Cambridge, MA*
Undergraduate Researcher *2019*

- Integrating embedded software for MIT's ground test copies of the ISS Astrobee robotic astronaut assistants.
- Helping to debug research projects before their deployment onboard the ISS.
- Working with ROS, Gazebo, Matlab code-generated C++, force allocation models, estimators, and PID control.

MIT Formula SAE Electric Racecar: Software Team *Cambridge, MA*
Team Member *2018-2019*

- Leading 2020 power limiting.
- Built 2019 vehicle's torque-vectoring controller using normal force and vehicle tire models.
- Improved sensing with direct groundspeed measurement, real-time derivative filtering, and higher wheel-speed resolution.
- Wrote low voltage system power manager monitoring the cooling pumps, fans, and regenerative brakes.
- Helped translate codebase to STM32 chip family and reimplement vehicle control unit using real-time operating system.

Ocado Technology: 10x Research and Development *London, United Kingdom*
Mechatronics Engineering Intern *June – August 2018*

- Developed a miniature, test version of Ocado's flagship robotic warehousing system for 10x research team.
- Experimented with low-energy electropermanent magnetic gripping, contact sensing, and optical distance tracking.
- Implemented robot operating system, centralized movement planner, and Wi-Fi communication in C and C++ on low-cost ESP32 and ESP8266 microcontrollers.

PepsiCo Demand Xccelerator: Shopper Insights and Capabilities *White Plains, NY*
Data and Software Engineering Intern *June – August 2017*

- Developed web API and online dashboard for predicting new product performance using PepsiCo's existing household- and store-level shopper databases.
- Worked in Python, Typescript, and SQL. Extensively employed Angular 2, Flask, and SQLAlchemy.
- Coordinated project's development with other PepsiCo teams to accommodate legal, security, and maintenance requirements.

MIT Robotics Team MicroTransat: Autonomous Atlantic Crossing *Cambridge, MA*
Electronics and Programming Subteam *2017-2018*

- Lead software development for GPS navigation, sensor reading, motor control, and power management in C and C++.
- Helped design vehicle's electronics package including microcontrollers, batteries, motors, solar panels, and sensors.
- Implemented global coordinate navigation minimizing distance along preselected transatlantic route.

Skills and Interests

Relevant Coursework: Advances in Computer Vision; Design and Analysis Algorithms; Artificial Intelligence; Software Construction; Computational Structures; Fundamentals of Programming; Differential Equations; Linear Algebra;
Proficient With: Embedded C and C++; Python;
Interested In: Robotics Control and Sensing; Computer Vision; Full-Stack Development;

Activities and Honors

MIT Course Planner Development Team: Full Stack Developer *September 2018*
MIT Student Information Processing Board Keyholder: IAP Classes Coordinator *September 2017*
MIT Robotics Team: Microtransat Autonomous Atlantic Crossing Competition *September 2017*
Eagle Scout, Boy Scouts of America *October 2016*
Licensed Ham Radio Operator *August 2016*