

Emrullah Celik

Brighton, MA 02135 • (617)-697-0502 • emrullah.celik0202@gmail.com

No Visa Sponsorship Required • [linkedin.com/ecelik](https://www.linkedin.com/in/ecelik) • [github/ecelik](https://github.com/ecelik)

PROFESSIONAL SUMMARY

Master's student in Systems Engineering at Boston University with a strong background in control systems, machine learning, differentiable optimization, robotics and embedded system development. Passionate about translating advanced mathematical models into high-performance hardware solutions. Academically exposed to classical and advanced control methods through graduate coursework and research with strong interest in applying these techniques to real-world embedded control systems.

Key Skills

- Python, C, Assembly, Verilog
- Control Theory (LQR, CLF, CBF, Observers, QP, MPC, OC)
- Embedded Computers (Jetson Nano, Raspberry Pi, Arduino)
- Microprocessors (Arm Cortex M4, Nordic NRF52, STM32)
- I2C, SPI, UART
- Intermediate Circuit Design (LTspice)
- Deep Learning (Pytorch), OpenCV
- Linux, ROS, Git

EDUCATION

Master of Science, Systems Engineering, 3.90/4.00 CGPA

9/2023 – 8/2025

Boston University, Boston, MA,

Relevant coursework:

- Optimization Theory and Methods
- Dynamic Systems
- Probability with Statistical Applications
- Advanced Stochastic Modeling
- Nonlinear Control Theory
- Optimal Control

Bachelor of Science (BS), Electrical and Electronics Engineering, 3.72/4.00 GPA, High Honors

07/2022

Middle East Technical University, Ankara, Turkiye

Relevant coursework:

- Data Structures and Algorithms in C++
- Computer Architecture 1&2
- Introduction to Microprocessors
- Numerical Methods and Optimization
- Introduction to Computer Networks
- Linear algebra & Differential Equations
- Circuit Theory 1&2
- Analog-Digital Circuit Design

PROFESSIONAL EXPERIENCE

Graduate Research Assistant

09/2023 – 08/2025

Boston University/Systems Engineering, Boston/MA

A Hardware-in-the-Loop Testbed for Mixed-Reality Simulation of Connected and Autonomous Vehicles (in review)

- Implemented a **QP-CBF-CLF** controller for a five-dimensional vehicle kinematic model in Frenet coordinates
- Applied data-driven, differentiable optimization to multi-agent traffic scenarios, learning optimal hyperparameters for QP
- Developed an end-to-end control pipeline integrating deep-learning-based sensor fusion (LiDAR and camera) for robust state estimation and control
- Established a CARLA hardware-in-the-loop framework for digital-twin simulation and real-world deployment

Torque Vectoring for Multi-motor Electrical Vehicle on Quest-V RTOS (in progress)

- Developing a four-motor torque-vectoring algorithm in Simulink using **PID** and **MPC** for deployment on a miniature vehicle
- Deploying the algorithm on an onboard computer running the Quest-V real-time operating system
- Upon validation, deploying and testing the algorithm on a full-scale EV (Drako GTE)

Embedded Software Intern

05/2023 - 08/2023

Giner Labs, Waltham/MA

Develops electrochemical and biochemical sensors and generators.

- Implemented proof of concept wearable device firmware and circuit (**LTspice**) for in-house developed **custom electro-chemical sensor**
- For **amplifier and drive circuit** implementation, selected and procured circuit components to meet performance requirements
- Developed software in the **Nordic MCU** platform for data collection, storage, and processing
- Integrated drive circuit with the MCU, collected data with **ADC** and visualized sensor data real-time on PC via Python (**UART** protocol)
- Collaborated with a cross-functional team to design a prosthetic knee hardware test setup, developing **Arduino**-based firmware and custom drive circuitry for electric-motor-driven gait analysis
- Proactively sourced and procured an **oscilloscope**
- Utilized the **oscilloscope** extensively for circuit debugging, ensuring real-world measurements closely matched simulated results

Software Developer

12/2021 - 08/2022

IKON R&D, Turkiye/Ankara

Working on VTOL with extended communication capabilities; has 40+ employees and is in METU Techno city

- Worked with OpenVins and Vins Fusion. Created the environments in **docker** and made the algorithms work with custom hardware made up of IMU and global shutter camera.
- Analyzed data temporal alignment via **ROS** and developed methods to collect **IMU** and camera data synchronously on **Raspberry Pi**
- Calibrated camera and IMU using Kalibr
- Developed visual-inertial navigation algorithm to be able to navigate in GPS-denied environments
- Collaborated with a team of 3, **Extended Kalman filter** for sensor fusion and relevant subsystems implemented
- Worked on image perspective wrapping, IMU configuration, and data reading in C++ with **I2C** on **Jetson Nano**
- Utilized Python for prototyping and later converted to C++ for optimization and speed, FPS increased by x4

Intern

08/2021 - 08/2021

ASELSAN, Turkiye/Ankara

Listed in Defense News' top 100 companies, works in a wide range of topics such as satellites, navigation, avionics, surveillance, etc.

- Integrated the Milestone Video Management System with ASELSAN's security platform using its **HTTP-over-TCP API**
- Developed Python modules to authenticate with the server and request both live and archived video streams
- Implemented a **real-time video decoding** pipeline to process and visualize image streams with minimal latency
- Designed a **PyQt**-based GUI for seamless display of live and playback video feeds

PROFESSIONAL DEVELOPMENT/AFFILIATIONS

Deep Learning Specialization Coursera, DeepLearning.AI, June 2020

Machine Learning Coursera, Stanford University, April 2020

Git Version Control Coursera, Atlassian, February 2020

PROJECTS

Optimal Control Course Project – 2025

Developed an **MPC**-based overtaking controller in CARLA with an IMU–GPS fusion **Extended Kalman filter**, and benchmarked its fuel efficiency, control effort, and robustness against LQR and PID, worked in a team of 3

Microprocessor Term Project – 2022

Implemented the term project in **Assembly** on an ARM Cortex-M4 processor; see the GitHub repository for details.

EE493 Capstone Project – 2022

A team of 5 people worked on a "Home Security" project. Specifically, handled face detection & recognition (Jetson Nano), cloud storage automation (Google Drive & Python), and database management (SQLite). Everything implemented on **Jetson Nano**.

FPGA - Multicycle CPU design - 2021 *Computer Architecture Lab Project*

As part of the computer architecture course for the given requirements, designed a 16-bit instruction set architecture (ISA), data path, and control path. Each instruction was tested with ModelSim.

FPGA-Based Point of Sale (POS) Terminal – 2021

Using Cyclone V FPGA with Quartus a Point of Sale (POS) machine was designed. The algorithm was written in Verilog HDL. By using the VGA port of FPGA, the menu was shown on the monitor. User interaction was achieved with 4 push buttons and 2 switches. The demo video can be found in the link.

Teknofest Swarm UAVs Simulation Competition - 3rd Place - 2020

Collaborated in a team of 5 to develop swarm intelligence algorithms for UAVs, focusing on obstacle avoidance without direct communication. Successfully achieved 3rd place in the Competition. The demo video can be found in the link.