Tareq “Torque” El Dandachi

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tareqdandachi.github.io

EDUCATION

Massachusetts Institute of Technology (MIT)

B.S. in Electrical Engineering and Computer Science

B.S. in Mechanical Engineering and Quantum Information and Computation

Sep. 2018 - May, 2022

GPA: 4.8/5.0

SKILLS

Hardware & Circuits

FPGA Design, Hardware Simulation, PCB Design, Processor Design, Nanoelectronics, Embedded Systems, Signal Processing, Electromagnetism, Solid State Circuits, SPICE Simulation

Software

Computational Photography, Computer Vision, Controls, Machine Learning, Security Research, Web Design

Physics

Circuit QED, Quantum Simulation, Optics, Superconductivity, Semi-Conductor Physics, Quantum Systems Control, Quantum Measurement, Nanophotonics

Mathematics

Linear Algebra, Group Theory, Complexity Theory, Information Theory, Calculus, Probability, Differential Equations

Mechanical Skills

Mill, Lathe, 3D printing, Robotics, Thermodynamics, Fluid Dynamics

Languages

Software: C, C++, Python, Swift, JavaScript, Ruby, Julia, Kotlin, MATLAB, Java, Objective-C, PHP, bash

Hardware: BlueSpec, Verik, SystemVerilog

EXPERIENCE

- **MIT Quantum Photonics Group (QPG)**
  Undergraduate Researcher
  Built software using tensorflow in python that generates optimal microwave control pulses for diamond-based quantum computers with a web tool to view simulation results. Developed models to simulate arbitrary arrangements of color centers and waveguides. Implemented optimal control theory techniques to find time-varying pulses that, along with other methods discussed in the paper we are publishing, increases the number of qubits we can control on a diamond-based quantum computers by 3 orders of magnitude.
  September 2020 - October 2021
- **MIT Quantum Nanostructures and Nanofabrication (QNN)**
  Undergraduate Researcher
  Developed mathematical methods and implemented an electro-thermal model in python to efficiently simulate superconducting wires and superconducting nanowire single photon detector (SNSPDs).
  May 2021 - October 2021
- **MIT ESI Rapid Response Group (RRG)**
  Web Designer
  Designed the new logo and website for MIT’s Environmental Solutions Initiative new initiative RRG. Link to website: `rrg.mit.edu`
  June - August 2020

PROJECTS

- **FPGA Depth Estimation using a Camera Array**
  Programmed an FPGA to estimate depth information from two camera feeds.
  January 2022 — `Link to github page.`
- **Eclipse - *glasses that modulate epileptic triggers***
  Developed and launched an alpha prototype with a team of product designers. I worked on sensing and modulation, user interaction, designing and performing EEG trials, coding in Microchip Studio and choosing PCB components.
  September 2021 - December 2021 — `Link to product brochure`
- **Non-Photorealistic Renderer**
  Developed a C++ project that processes images and converts them into detailed multi-layered paintings with the ability to interpolate and incorporate design styles from a reference image.
  May 2020 — `Link to github page.`
- **Computer Vision and LIDAR Based Obstacle Avoidance**
  Programmed a self-driving car using ROS to race on a track while avoiding obstacles for MIT’s Robotics Systems and Science. Used image segmentation and classification to build the navigation space and path find around obstacles. Implemented SLAM on LIDAR data with a team to assist navigation.
  February 2020 - May 2020