

JONATHAN PILAND

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EDUCATION

2020 – 2024

Duke University (GPA: 4.00)

BSE, Electrical and Computer Engineering; BSE, Biomedical Engineering;
Minor, Music Performance (violin)

EXPERIENCE

2022.08 – present

Undergraduate Researcher, Arya Lab at Duke University

- Applying advanced machine learning techniques to optimize placement of unique DNA origami nanostructures onto respective binding sites on silica; developing algorithms using Python and running coarse-grained molecular dynamics simulations on HPC servers (Slurm)

2022.01 – 2022.07

Undergraduate Researcher, Bartesaghi Lab at Duke University

- Developed full-stack web application (Kotlin source) for analysis of live-streaming cryo-EM data; implemented interactive 3D view using Three.js, created 2D visualizations using Plotly.js, and developed custom playback controls for viewing micrograph series

2021.06 – 2021.08

Undergraduate Researcher, Data+ at Duke University

- Analyzed the performance of RNN and simple feed-forward NN agents in a simulated game of adaptive waveform design (PyTorch); identified optimal strategies for successful transmission and evasion methods to defeat greedy-algorithm agents

2021.05 – 2021.08

Independent Study – Human Activity Visualizer, Younes Lab at Duke University

- Developed full-stack Material-UI based application in React.js running on Duke Linux VM for 3D visualization (Three.js) of wearable sensor data with activity recognition training labels

PROJECTS

2020.08 – present

Design of transhumeral prosthesis for upper-arm amputation (Duke eNable)

- Designed myoelectric arm and gained experience with CAD (Fusion 360) and fabrication technologies including laser and waterjet cutting, 3D printing, and soldering
- Validated custom myoelectric sensor instrumentation amplifier circuit using power supply, oscilloscope, and multimeter; currently integrating all components for initial prototype

2020.03 – 2020.07

Design and fabrication of embedded system for IoT three-dimensional LED display

- Created design to individually address 8x8x8 LED display using two-dimensional multiplexing and shift registers; soldered 1,200+ connections including wire frame
- Developed code to connect Real-Time Clock (RTC) and ambient sensor modules to Arduino Mega communicating via serial to ESP8266 Wi-Fi module
- Created programming circuit for ESP on breadboard and successfully deployed custom web service as embedded software, available to the internet via port forwarding
- Used 18AWG wire and 10A-rated power supply to deliver high current to LED display

2019.01 – present

Various projects in HTML, JavaScript, Python, and C++

- Developed desktop productivity tools, including a mouse-free autocomplete launcher

SKILLS

Coursework

Computer Architecture, Molecular Engineering, Quantitative Physiology with Biostatistics, Fields and Waves, Solid Mechanics, Linear Algebra, Multivariable Calculus, Differential Equations, Organic Chemistry, Molecular Biology, Music Theory, Music Performance

Programming and Markup Languages

Python, Java, JavaScript, Kotlin, HTML, CSS, C, C++, Assembly, MATLAB; some experience with GLSL (*Notable experience in the PyTorch library and with React.js, Three.js, and Material-UI frameworks*)

Software

VS Code, Visual Studio, IntelliJ, Bash, Vim, Windows, WSL, GitHub/GitLab, LaTeX, Office 365, G Suite, Creative Cloud (Ae, Ai, Ps, Pr), Autodesk Inventor, Fusion 360, Blender, Audacity, MuseScore

Hardware

Soldering, circuit validation and troubleshooting, GPIO interfaces, ICSP, transistors, Arduino, Raspberry Pi, amplifier circuits, analog circuits, digital circuits, multiplexing, RF communication

Interpersonal

Passion, perseverance (devoted violinist and runner), leadership (co-musical director of Duke SBSB a cappella), communication (first-year advisory counselor), curiosity (see projects)

Certifications

General Class Amateur Radio License, Pratt Student Shop Safety Training, Sport Club Driver