Nikolai Nekrutenko

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Education

Cornell University | Ithaca, NY Aug 2021 - Dec 2024
Undergraduate majoring in Physics interested in applying physics and engineering toward complex and open-ended problems. Planning to pursue a Masters of Engineering in Electrical Engineering.

- Relevant Coursework: Chemistry I & II, Calculus II & III, Differential Equations, Electronic Circuits, Intro to Computing, Linear Algebra, Physics I, II & III, Quantum Physics I & II, Analytical Mechanics, Embedded Systems, Adv. Electro/Magnetostatics & Electrodynamics, Signals & Systems

Relevant Work Experience

Drone Development Member | School of Mech. & Aero. Eng. | Ithaca, NY Sep 2023 - Present
Integrating electrical and mechanical engineering through development of a quadcopter with a team under supervision from Dr. Brian Kirby to be used in mechanical and aerospace engineering course labs.

Gimbals R&D Intern | Freefly Systems | Woodinville, WA Jun 2023 - Present
Cross-team collaboration and autonomous research to learn the hardware, software, and physics behind the Mōvi Pro to create an experimental firmware release, develop and test new gimbal technologies and designs.

Student Researcher | Fatemi Lab | Ithaca, NY Mar 2022 - Present
Researcher at the Fatemi Lab, a condensed matter physics and quantum devices lab. Work on a research project under supervision from the PI and grad students, attend and present at weekly lab meetings.

Relevant Projects

Non-Orthogonal Gimbal Development | Freefly Systems Jan 2024 - Present
Developing a physics-based model of forward and inverse kinematics for an experimental non-orthogonal gimbal. Validating its performance by comparing actual vs predicted IMU data in Python.

Mōvi Pro Pan/Tilt Limits | Freefly Systems Jun 2023 - Dec 2023
Developed an embedded systems algorithm for smooth hard stops on Mōvi Pro gimbal pan and tilt axes based on IMU data, gimbal physics, and user input as part of an upcoming experimental firmware release.

Surface Loss Resonators | Fatemi Lab Sep 2023 - Present
Designing a microwave hairpin resonator to measure surface impurities in substrates by detecting variation in resonance due to EM fields. Simulating parameterized designs in Sonnet Suite to find an optimal design.

QCoDeS-Interfacing | Fatemi Lab Jun 2022 - May 2023
Repo of installation shell scripts, drivers, and Jupyter notebooks to setup a Linux computer for interfacing with lab equipment over the GPIB interface with Python and QCoDeS, a data acquisition framework.

NeoPixel FFT Audio Visualizer | Personal Jun 2022 - Jan 2023
Co-designed and wrote a program that visualizes the waveform and intensity of music for a custom-built individually-addressable RGB led matrix using Fast Fourrier Transforms in Python on a Raspberry Pi.

Rocket Sensor Payload | Pennsylvania State University Outreach Sep 2020 - Jun 2021
Developed a 3D printed lightweight Raspberry Pi sensor and imaging payload as part of a PSU outreach with Dr. McEntaffer's lab. Simulated suborbital rocket trajectory in OpenRocket.

FPV Drones and Aircraft | Personal Oct 2019 - Present
Building and flying FPV drones and aircraft with custom-designed 3D printed components, and autonomous flight capabilities using open-source flight software such as Betaflight and iNav.

Extracurricular Activities

Member | Cornell Amateur Radio Club | Ithaca, NY Feb 2023 - Present
Help educate members about the physics behind how radio works, in addition to technical skills such as soldering. Involved with designing a sensor and camera payload to be launched on a weather balloon.

First Degree Black Belt | A Mountain Wind Martial Arts | State College, PA Feb 2013 - Present
Instruct, help lead class and aid students with the practical and philosophical applications of the martial art at a local Dojang. First Degree Black Belt in Tang Soo Do, a Korean martial art.

Skills & Licenses

- Fluent in Russian, French, English; FAA Part 107 Remote Pilot License, Technician FCC Radio License
- Electronics Skills: Microcontrollers, Embedded Systems, Analog/Digital Circuits, Signal Processing
- Prototyping Skills: CAD Prototyping in Fusion 360, Electronics Prototyping, SLA/FDM 3D Printing
- Languages and Tools: Scientific Programming with Python, C, Unix, git, Jupyter Lab, Observable HQ