Daniel Zhan

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EDUCATION

B.S. Engineering Physics & Computer Science – *May 2023*
Cornell University
Relevant Coursework:

- Computer Science: Machine Learning, Algorithms, Operating Systems, Computer Systems Organization, Functional Programming, Honors Discrete Structures, Market Networks, Computer Game Architecture, Robot Learning
- Physics: Analytical Mechanics, Electromagnetism I + II, Quantum Mechanics I + II, Statistical Thermodynamics, Electronic Circuits, Controlled Fusion, Mathematical Physics I + II, Astronomy and Cosmology, Experimental Lab
- Teaching Assistant for the following courses: Mechanics, Electromagnetism, Waves, Data Analytics

EXPERIENCE

Software Engineer – ***Aug. 2023 - Present***
Lockheed Martin - Moorestown, NJ

- Calculated incoming ballistic missile trajectories and predicted targets to enable interception of said missiles in C++.

Software Engineer – ***Sept. 2020 - Jun. 2023***
Cornell Mars Rover - Ithaca, NY

- Designed and implemented a robotic arm controls software package in C++ using ROS 2.
- Implemented a Forward Kinematics arm control scheme that allows control over individual arm joint motors directly.
- Designed and implemented an Inverse Kinematics-based control scheme for the robotic arm that allows direct control over the position and orientation of the end effector to enable and accelerate execution of complicated robotic arm tasks by 1000% on average. Used MoveIt 2 as an Inverse Kinematics solver and motion planning library.

Undergraduate Research Assistant – ***Sept. 2021 - May 2023***
Fuchs Group, Cornell University - Ithaca, NY

- Developed a computational quantum dynamics model of the NV center in Python using the QuTiP package.
- Discovered that driving the NV center with a pulsing magnetic field near resonance reduces the photoluminescence of certain state transitions by ~20%, which implies the NV center could be useful as a quantum magnetic field sensor.

Cornell Laboratory of Plasma Studies - Ithaca, NY

- Developed upon two and three-dimensional magnetohydrodynamics simulations of ablating plasmas in Fortran 90.
- Simulated magnetic field conditions to ablate metals into coherent plasma jets for use in nuclear fusion applications.
- Utilized explicit concurrent programming methods in the space domain using parallel processing over 32 computing cores along with interacting boundaries between simulation cells to accelerate computation speed by ~3000%.

Physics Lab Technician Intern – ***Jun. 2021 - Aug. 2021***
Honeywell - Broomfield, CO

- Developed an automated tester for Honeywell's ion trap qubit chip to verify the chip's electrical properties are consistent with specifications and ensure proper electromagnetic manipulation of the trapped ion.
- Designed and implemented live hardware calibration, capacitance and resistance tests over electrode pairs, various test statistics, support for custom test settings, and a GUI to measure the electrical characteristics of the ion trap chip using Python and digital multimeters. Reduced chip testing time by over 95% and eliminates sources of human error.

Robotic Process Automation Intern – ***Jun. 2020 - Dec. 2020***
Honeywell - Broomfield, CO

- Developed automation scripts using Robotic Process Automation concepts to accelerate the processing of competitor medication documentation by >2000% using Python and the Pandas and Selenium libraries.

PROJECTS

Aphelion Defense

- Served as team lead and programmer for an interdisciplinary team of 10 to develop a mobile video game in C++.
- Implemented unit pathfinding algorithms and designed an intuitive UI to help newcomers learn quickly.
- The game is currently available in beta and includes robust networking features for multiplayer.

County Political Leaning Predictor

- Implemented a machine learning model using PyTorch to predict the political leaning of every U.S. county based on demographics data including median age, income, and education level. Achieved >85% accuracy when compared to 2016 presidential election results.

Flappy Bird AI

- Implemented a reinforcement learning model to learn about Flappy Bird using Python and PyGame. After learning for several hours, the Flappy Bird AI achieved a score of over 10,000, an impossible score to achieve for humans.

SKILLS & TECHNOLOGIES

Skills:
Research, Computational Modelling, Numerical Methods, Circuit Design and Analysis, Arduino Microcontrollers, Systems Programming, Robotics, Machine Learning, Concurrent Programming, Website Development
Technologies:
Python, Flask, Java, C++, OCaml, HTML/CSS, Git, Unix, Fortran, Docker, ROS, MoveIt
Activities:
Team Captain @ Cornell Badminton Club Team, Instructor for PE 1441 (Intermediate Badminton), Vice President & Mentor @ Cornell Applied and Engineering Physics Society, Mentor @ Association for Computer Science Undergraduates