# Jonathan Perkins

Software Engineer

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**jayandsparrow.com**

## PROFESSIONAL EXPERIENCE

### **Software Engineer** at *Parsons Corporation*
Jan 2025 – Present

- **Designed and built a full stack web application using React with TypeScript (frontend) and FastAPI with Python (backend),** complete with Oauth and user privileges used to configure and visualize CNN and transformer neural network optimization pipelines
- **Wrote REST APIs** for user authentication, model training parameters, module ordering, and model optimization metrics to be shared via 20 different HTTP request endpoints using JSON
- **Redesigned method of creating objects from 37 classes,** removing the need for the API layer to be frequently updated and reducing time taken to make improvements to modules by more than 50%.
- Maintained SQL database with 12 tables including user credentials and model pruning results
- **Researched UI/UX methods** of visualizing model subnet generation via Neural Architecture Search
- Collaborated in writing Docker images, GNU Make scripts, automated testing, and documentation
- Made dozens of contributions to 2 GitLab repositories used for the optimization engine

### **Software Developer (Intelligence Analyst II)** at *Queen Associates, Inc. (DarkTower)*
Oct 2023 – Jan 2025

- **Automated retrieval of 25+ TB of leaked data** across multiple Linux virtual machines, allowing for analysts to retrieve 200 times more data than was initially possible in given time frames
- **Wrote 7 Python and Bash scripts** according to specific needs of analysts — including a JSON parser used to scrape leaked credentials from encrypted communication applications and export relevant data to CSV — increasing team's card data collection efficiency by a factor of 100
- Analyzed more than 3 million leaked documents, collected information on 600 social media accounts using custom web scraping tools, and queried dozens of SQL databases with MariaDB
- Wrote or collaborated on **48 technical reports** detailing software, threats, and vulnerabilities to Fortune 500 clients; created 90+ graphics in Data Studio and Python to visualize cyber threat trends
- Tested capabilities of malicious applications written in **C#/.NET, Python, Bash, VBA, JavaScript, and PHP** and helped build custom OSINT tools for Fortune 500 clients and DarkTower analysts

### **Machine Learning Researcher** at the *University of Alabama at Birmingham*
Aug 2022 – Dec 2024

- Trained and validated **40+ machine learning models in Python** using Scikit-learn, Pytorch, Pyro, Nimfa, and other ML/AI libraries; used EVR and training loss from MSE and KL-divergence to demonstrate effective techniques in handling dense hyperspectral HDF5 data
- **Demonstrated methods of removing 100% of cosmic rays** and 92% of background noise from data collected from solar energy materials via cathodoluminescence spectroscopy
- Trained and validated unsupervised and semi-supervised **variational autoencoder deep neural networks** (DNNs) for spectral and image feature detection

- **Created and presented 120+ figures** demonstrating data cleansing techniques, latent space representations of data, and accuracy of models with Python and Data Studio / Looker Studio
- Presented research progress and discussed publications on machine learning and nonlinear optics with a research group on a weekly basis, collaborating on various research projects

**Data Scientist Intern** at the *National Science Foundation (NSF)*
May 2023 – Aug 2023

- Participated in a Research Experience for Undergraduates (REU) program as a computational data scientist tasked with cleansing and modeling spectroscopic data in Python
- Tested 31 signal processing filters and trained **PCA and NMF unsupervised machine learning models** to obtain parts-based representations of noisy data, greatly improving accuracy of analysis
- Demonstrated locations and potential causes of photovoltaic (solar cell) material degradation

## EDUCATION

**B.S. Computational Physics** from the *University of Alabama at Birmingham*, **3.75 GPA**
May 2022 – Dec 2024

- Minors in **Computer and Information Sciences** and Mathematics
- Coursework: computational physics, applied machine learning, object-oriented programming, algorithms and data structures, multivariable/vector calculus, differential equations, quantum mechanics, electromagnetic theory, linear algebra, chemistry, biology, computer vision
- Honors: **NASA Alabama Space Grant Consortium scholarship**, other local physics grants, Society of Physics Students, **distinguished honors**, presidential honor roll

## SKILLS

**Languages:** Python, JavaScript, TypeScript, HTML5, CSS, C/C++, Java, MATLAB, R, SQL

**Frameworks/libraries:** React, Node.js, Express.js, Next.js, Tailwind CSS, TensorFlow, Numpy, Pandas, Matplotlib, Scipy, Sci-kit learn, Pytorch, OpenCV, Jupyter, FastAPI, Django

**Tools:** Linux, Git, Docker, Bash, Powershell, GNU utils, Windows, MacOS, Vim, VSCode, Excel, MS Suite, web hosting, Google Cloud, AWS (S3, Lambda), Vercel, high performance computing (HPC), APIs, JWTs, async, HTTPS, SSH, IPv4/IPv6, CI/CD, unit testing, debugging, PostgreSQL, MySQL, SQLite, ORMs

**Soft skills:** communication, problem solving, analytical thinking, innovation, reliability, flexibility

**Spoken languages:** Spanish, Portuguese, French; conversational in Italian, Chinese, Levantine Arabic

## PROJECTS

**Full Stack Website** – *foureyedbutterfly.com*

- CRUD application built using **JavaScript, CSS, React/Vite, Node.js, Express.js, Axios, Cloudinary, and MySQL**; deployed on a DigitalOcean Ubuntu server with an Nginx reverse-proxy; used by Ruby M. as a personal blog; implemented token-based user authentication and credential encryption.

**Portfolio** – *jayandsparrow.com, research.jayandsparrow.com*

- React/Next.js applications built using JavaScript, TypeScript, and Tailwind CSS deployed on Vercel