

# Jacob Davis

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## Education

### Clemson University

Bachelor of Science in Computer Science and Mathematical Sciences (GPA: 3.96)

Clemson, SC

Aug. 23 – May. 27

- **Honors & Certifications:** Clemson University Honors College, Clemson Dixon Fellows Program, Cadence AI/ML Fundamentals
- **Clubs & Affiliations:** Clemson Cadence Project (Leader), Undergraduate Teaching Assistant, Clemson Symphony Orchestra (Leader)
- **Relevant Coursework:** Operating Systems, Network Programming, Databases, GPU Programming, Design and Analysis of Algorithms

## Experience

### NASA Goddard Space Flight Center

Software Engineer Intern

Greenbelt, MD

Jun. 25 - Present

- Implement a sky localization algorithm for compact binary mergers detected by LIGO/Virgo/KAGRA using GPU programming, achieving a **performance increase by a factor of three** compared to C code parallelized on the CPU.
- Migrate performance-critical code in open source software used in production environments at gravitational-wave observatories to parallel processing frameworks, **reducing runtime by 99%** compared to sequential code.
- **Skills Used:** JAX, CUDA, OpenCL, OpenMP, NumPy, Python, C

### Clemson University International Center for Automotive Research

Software Engineering Research Intern

Greenville, SC

Aug. 24 - May. 25

- Trained and fine-tuned YOLOv8 and LiDAR segmentation models for object detection using a custom labeled dataset of outdoor environments, achieving **95% accuracy** in differentiating classes of trails and vegetation.
- Collaborated with Applied Research Associates to develop a sensor data collection system for an off-road autonomous vehicle, including thermal, hyperspectral, stereo vision, and time of flight sensors.
- **Skills Used:** PyTorch, Classification Modeling, ArenaView, ZED SDK, Boson SDK

### Cadence Design Systems

Application Engineer Intern

San Jose, CA

May. 24 - Aug. 24

- Achieved **99% functional coverage** in a sous vide controller design using Universal Verification Methodology, pinpointing over **20** bugs in the RTL code for a controller design across **30+** features.
- Designed C++ and Python programs to automate generating and running simulations in Cadence tools, increasing workflow efficiency for simulating test cases by **30%**.
- Delivered two technical design reviews in collaboration with a verification team, ensuring alignment with design specifications.
- **Skills Used:** UVM, SystemVerilog, C++, Linux, Shell Scripting, Cadence Xcelium, Cadence SimVision

### Network Systems and Control Group

Machine Learning Research Assistant

Clemson, SC

Sep. 23 - May. 25

- Developed neural networks leveraging gradient clipping in distributed training settings on Clemson's Palmetto Cluster, improving image classification accuracy by **15%** compared to conventional training algorithms on heterogeneous data distributions.
- Led **10+** research meetings about learning PyTorch and how to use AWS resources for high-performance computing.
- **Skills Used:** PyTorch, AWS, ResNet, Git

## Projects

### High-Performance Cluster Computing | Spack, Slurm, OpenMPI, Docker

Jan. 25 - Present

- Assemble a four-node Raspberry Pi mini-cluster to simulate Clemson's **TOP500** Palmetto Cluster by configuring the environment using Spack to run OpenMPI applications and LINPACK benchmarks (maximum performance of **~14.5 GFLOPs**).
- Train and prepare with a team of six undergraduates to compete in SC25's international Student Cluster Competition (SCC).

### Computer Vision Paper Synthesizer | Python, YOLO, MediaPipe

Sep. 25

- Leveraged YOLO and MediaPipe to draw and play a synthesizer on paper, achieving **85% accuracy** in detecting keys.
- Won the **"Best Musical Hack Award"** at HackMIT against **300+ teams**.

### Asteroid Collision Simulator | JavaScript, Vue, Godot

Sep. 25

- Constructed an asteroid collision simulator featuring seismic impact activity, interactive visualizations, and high user accessibility.
- Won the **"Most Inspirational Award"** at Clemson's NASA Space Apps Challenge.

### Quantum-Hybrid Tornado Classification Models | Python, Qiskit, sklearn

Oct. 25

- Engineered classification models for tornado strength including logistic regression, support vector machines, random forest, and gradient boosting utilizing quantum computing to engineer features for a **50% increase in recall**.
- Designed a custom dataset resulting in a **33% increase in AUC scores** compared to Savannah River National Laboratory's dataset.