

BLAIR JOHNSON

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Education

Georgia Institute of Technology — Atlanta, Georgia

Aug. 2018 – May 2022

Bachelor of Science in Electrical Engineering | Stamps President's Scholar

GPA 3.9/4.0

Honors and Awards

Stamps President's Scholar

2018

Georgia Institute of Technology

Best Overall Project, ECE

2022

Georgia Institute of Technology Capstone Design Expo

Experience

Intel Corporation

May 2021 – Aug. 2021

Deep Learning Research and Development Intern

Atlanta, GA

- Used C++ to write a prototype SYCL feature that will improve performance and programmability of OpenCV.
- Won a company-wide intern hack-a-thon creating prototype computer vision business applications using OpenVINO.

Georgia Tech Research Institute

May 2019 – Pres.

High Performance Computing and Data Analytics Student Researcher

Atlanta, GA

- Worked on many of Machine Learning and Data Analytics research projects for both internal and external sponsors.
- Topics include: Streaming Computer Vision, Graph ML for Cybersecurity, Resource-Efficient ML, DL for 5G Network Slicing, Historical Population Mapping, ML Accelerator Benchmarking, Naval Vessel Trajectory Tracking.

CurbSide.ai

Mar. 2020 – Aug. 2021

Computer Vision Engineer (Co-Founder)

Atlanta, GA

- Developed low-latency Computer Vision models and streaming DSP pipelines for monitoring and reinforcing safe riding behavior among dockless personal electric vehicle users via low-cost embedded systems.
- Achieved 20x latency reduction for real-time computer vision execution on < 7Watt ARM CPU.
- Designed custom Deep Learning architectures and automated data-ingest and training pipelines for rapid prototyping.

Publications

Risk Aware Triage to Attenuate Observational Uncertainty in Intelligence Environments

2020

GTRI IRAD 2020 Journal (internal)

First Author

Projects

Haptic Feedback Wearable Device for People with Visual Impairments | Python, DepthAPI **Aug. 2021 – May 2022**

- Winning project of ECE category at Georgia Tech Capstone Design Expo.
- Designed and built wearable haptic motor display
- Utilized Intel Movidius Myriad X vision co-processor to perform real-time depth perception and point cloud sampling
- Conducted experimental testing procedures to tune hardware and software components to improve user experience

Deep Learning for 5G Network Slicing (GTRI) | Python, PyTorch

Sep. 2021 – Pres.

- Designed a novel unsupervised learning framework for optimal packet queue management under slicing scheme.
- Implemented and trained time-series network forecasting models using PyTorch.
- Evaluated empirical risk associated with real-time 5G network slicing under different resource allocation algorithms.
- Performed literature review of recent work in predictive 5G network slicing.

Historical Populations Mapping (GTRI) | Python, QGIS, GEOS, OGR

Sep. 2021 – Pres.

- Provided data engineering support for researchers modeling the movement of historical populations in North America.
- Used QGIS and OGR to generate polygon masks of population shifts over time using spatio-temporally interpolated smallpox outbreak data.

Deep Learning Accelerator Benchmarking (GTRI) | Python, TensorFlow

Jan. 2021 – May 2021

- Wrote automated benchmarking module for evaluating and comparing deep learning accelerator devices.
- Used TensorFlow to measure inference times across different layer types, common algorithms, and data types.

Deep Reinforcement Learning for 5G Network Slicing (GTRI) | *Python, PyTorch* Aug. 2020 – Nov. 2020

- Performed literature review of previous research in the area of ML for network slicing.
- Studied existing implementation of deep RL algorithm for TCP replacement.

AI Tracks At Sea (GTRI | Naval Information Warfare Center) | *Python, Docker, TensorRT* Nov. 2020–Dec. 2020

- Designed and built computer vision pipeline to generate time-correlated GPS tracking data for ships in a video feed.
- Utilized object detection algorithms, least-squares optimization, Kalman Filtering, and additional DSP methods to produce accurate real-world trajectories from 2D input.

BirdsEye (CurbSide.ai) | *Python, Pytorch, TensorFlow, TensorFlow Lite, C++* Mar. 2020 - Aug. 2021

- Designed custom CNN architectures combining state-of-the-art optimizations to minimize latency on unique high-resolution streaming classification task. Achieved real-time operation on Raspberry Pi with low overhead.
- Directed the collection and labeling of a large dataset of street-level vehicle imagery.
- Designed algorithms that combine vision data with vehicle telemetry to provide quantitative measures of rider behavior.
- Employed real-time digital signal processing algorithms to aggregate streaming data sources into risk metrics.
- Implemented prototype ultra-low-cost streaming BirdsEye service on <1Watt \$20 K210 Neural Embedded System.

Hybrid Deep Learning (GTRI) | *Python, TensorFlow, PyTorch* Aug. 2019 - May 2020

- Researched the feasibility of distributed deep representation learning at the edge.
- Wrote model architecture analysis tool for bandwidth-constrained split local-cloud encoder decoder networks.
- Developed experiments demonstrating the feasibility of multi-view distributed class prediction on a synthetic task.
- Designed and demonstrated the usefulness of a low-cost self-certainty metric for triaging multiple sensor readings for robustness when network bandwidth is heavily constrained.
- Work published in GTRI IRAD 2020 Journal and presented at IRAD Extravaganza virtual symposium.

Deep Learning NetFlow Traffic Analysis and Risk Assessment (GTRI) | *Python, TensorFlow* May 2019 - Aug. 2019

- Leveraged supercomputer to parse, enrich, label, and train graph convolutional networks on multi-terabyte dataset of NetFlow traffic logs for automated risk-assessment of IP subnets.
- Prepared progress reports and project needs for communication to DoD research sponsor.

Autonomous Source Seeking in Turbulent Fields (Georgia Tech RoboSense) | *MATLAB* Aug. 2018 – Dec. 2018

- Worked with a student team to research control algorithms for autonomous source seeking agents in noisy environments.
- Implemented a novel source-seeking control algorithm on robotic blimps for real-world motion tracking tests.

NLP Analysis of Gender-on-Gender Violence in CSI: (GT English Project) | *Python* Aug. 2018 – Dec. 2018

- Used keyword searches to identify sentences depicting on-screen violence using screenplays of six season of CSI: Crime Scene Investigation.
- Used Google Cloud API to identify subjects and objects of physical violence. Census data was used to predict likely gender of each aggressor and victim.
- Data was analyzed for frequencies of different types of gender-on-gender violence, and metrics were compiled into a descriptive infographic.

3D Visualization of Power System Data (UTK CURENT | NSF | DOE) | *MATLAB* Jun. 2016 – Jul. 2016

- Created a power grid data visualization program within MATLAB to analyze major disturbances.
- Processed, cleaned, and created 3D geospatial animations of events.
- Presented results at NSF site visit poster symposium.

Survey of Transient Instability Events (UTK CURENT | NSF | DOE) | *MATLAB* Jun. 2015 – Jul. 2015

- Utilized MATLAB and Simulink to model the breaker dynamics that resulted in Brazil's 2009 blackout.
- Analyzed performance of transmission line breakers and the effect of opening times on transient instability.
- Presented results at NSF site visit poster symposium.

Technical Skills

Languages: Python, C/C++, SQL, MATLAB, Fortran, HTML/CSS

Libraries: TensorFlow, Pytorch, OpenCV, NumPy, Pandas, Scikit-Learn, Dask, NetworkX, Matplotlib

Software/Technologies: Git, Docker, TFLite, TensorRT, OpenVINO, SYCL, OpenGL, Slurm, Google Cloud, AWS

Operating Systems: Linux, Windows, OSX

ML Algorithms: CNNs, DNNs, LSTMs, Graph Convolutional Networks (GCNs, GraphSAGE), Least Squares Methods, Graph Bayesian Belief Propagation, Siamese Networks, Multi-view Learning, Knowledge Distillation

Additional Skills: Digital Signal Processing, Control System Design, Embedded Systems, Numerical Optimization, Computational Modeling, High Performance Computing

Leadership / Extracurricular

Electrify Georgia Tech

Co-Founder & VP of Research

Aug. 2021 - Pres.

Georgia Institute of Technology

- Prepared and presented feasibility report to the Office of Sustainability and Landscaping Services. Partnership resulted in the announcement that GT Landscaping Services will switch to all-electric landscaping equipment, beginning with electric leaf blowers.
- Prepared and presented feasibility report to Georgia Tech Police Department. Partnership resulted in the purchase of 3 pilot electric patrol vehicles. Data from this pilot program will be used to justify future fleet electrification efforts.
- Passed unanimous student government resolution in support of campus electrification.
- Worked with campus stakeholders to build electrification plans for phasing out fossil fuel usage.
- Organized tabling events and social media posts for raising campus awareness.
- Conducted building electrification and industrial heat pump research for building electrification feasibility report.