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 3.89/4.0*
West High School — Knoxville, Tennessee	**Aug. 2014 – May. 2018**
International Baccalaureate Diploma	*GPA 4.0/4.0*
Austin Peay State University — Clarksville, Tennessee	**June 2017**
*Governor's School For Computational Physics	3 week intensive program*	

Honors and Awards

Stamps President's Scholar	**2018**
Georgia Institute of Technology	

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	*Accepted.*

Projects

Deep Reinforcement Learning for 5G Network Slicing (GTRI) | *Python*   **Sep. 2021 – Pres.**
- Continued literature review of previous research in the area of ML for network slicing.
- Implemented deep learning model to predict network traffic ratios for efficient centralized slice allocation.

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 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, 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 **Aug. 2021 - Pres.**
Co-Founder & VP of Research *Georgia Institute of Technology*
- Worked with campus stakeholders to build electrification plans for phasing out fossil fuel usage.
- Prepared and presented feasibility report to Georgia Tech Police Department, resulting in the purchase of 3 pilot electric patrol vehicles.
- Passed unanimous student government resolution in support of campus electrification.
- Organized tabling events and social media posts for raising campus awareness.
- Conducted building electrification and industrial heat pump research for building electrification feasibility report.