Branndon Jones

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Mechanical Engineering PhD candidate looking for an opportunity to apply my knowledge and skillset to solve real-world challenges. Driven, dedicated individual with excellent communication skills and proven track record of mastering new software technologies. Successful working in team environments as well as an individual contributor.

Education

Tennessee State University – Nashville, TN (2020-Present)

PhD candidate, Engineering and Computational Sciences, Engineering Systems Cumulative GPA: 4.00 / 4.00

Tennessee State University – Nashville, TN (2018 - 2020)

Master of Engineering in Mechanical Engineering

Cumulative GPA: 4.00 / 4.00

University of Tennessee – Knoxville, TN (2013 - 2018)

Bachelor of Science in Biomedical Engineering, Reliability and Maintainability Minor Cumulative GPA: 3.41 / 4.00

Experience & Research

Graduate Research Assistant – Tennessee State University (Nashville, TN)

August 2018 - Present

- Utilizing a custom electromagnetic modeling and simulation software called IRIS, I modeled and simulated ground and maritime virtual environments for generation of synthetic remote sensing images.
- Developed a software interface for simulation of Synthetic Aperture Radar, IR, and Lidar in virtual Environments.
- Leading the development of an image processing technique for post processing of training images.
- Prototyped customizable deep learning frameworks for object detection and classification, Research funded by the Office of Naval Research, Airforce Research Lab, and Army Research Lab.
- Lead and co-authored publications for SPIE and DDDAS conferences.

Air Force Research Lab (AFRL) Minority Leaders Research Collaboration Program (ML-RCP)

Evaluating Assurance of AI-Enabled Classifiers Trained Based on Synthetically Generated SAR Imagery

August 2022 – July 2024

- Project explored the methodologies for identification and mitigation of threats and security vulnerabilities pertaining to modern AI-enabled systems.

- Established a streamline methodological framework by which the measure of quality assurance of AI-based codes can be estimated using principles evaluation metrics recommended by software quality standards.

Internship – Air Force Research Lab (AFRL) Information Directorate (Rome, NY)
June 2023 – August 2023

- Arctos Department of Defense summer intern for the data quality assurance division at AFRL, Rome.
- Developed programs for quality checking generated data to feed into machine learning pipelines, including data readability methods, as well as data encryption and cryptography methods used for data security.

Georgia Tech Research Institute Independent Research and Development Project
December 2021 – May 2022

- Utilizing a custom electromagnetic modeling and simulation software, I modeled and simulated virtual environments for generation of synthetic LiDAR remote sensing images in Degraded Visual Environments (DVE) for the development of customizable deep learning frameworks for object detection and classification. This research is funded by Georgia Tech Research Institute (GTRI).

Clinical Immersion – University of Tennessee Medical Center (Knoxville, TN)
May 2017 – August 2017

- Selected by the head of the Biomedical Engineering Department to collaborate with medical professionals at the UT Medical Center to research and select feasible medical devices that are currently needed as senior design project ideas for the BME Department.
- Lead senior design team in researching and developing an affordable, durable, usable, multi-size breast biopsy training phantom. Phantom is made of silicone as well an ultrasound reflective powder material to mimic breast tissue and tumors.

Publications

Jones, B., Ahmadibeni, A., and Shirkhodaie, A., "Marine Vehicles Simulated SAR Imagery Datasets Generation," SPIE DCS, paper 11420-24, April (2020).

- Generated unique multimodality synthetic SAR imagery of physics-based CAD models of target marine vehicles to create an extensive dataset to train deep learning classifiers. Target vehicles are systematically scanned from various azimuth and elevation angles as well as from different ranges and various operating environments.

Ahmadibeni, A., Borooshak L., Jones, B., and Shirkhodaie, A., "Automatic Target Recognition of Aerial Vehicles Based on Synthetic SAR Imagery Using Hybrid Stacked Denoising Autoencoders," SPIE DCS, Algorithms for Synthetic Aperture Radar Imagery XXVII, paper 11393-25, April (2020).

- Implemented a two-step Hybrid Stacked Denoising Auto-Encoder as an effective holistic denoiser and classifier model. Generated unique multimodality synthetic SAR imagery of physics-based CAD models of more than 300 target aerial and ground vehicles to create an extensive dataset.

Jones, B., Ahmadibeni, A., Beard, M., and Shirkhodaie, A., "Physics-based SAR Modeling and Simulation for Large-scale Data Generation of Multi-Platform Vehicles for Deep Learning-based ATR," 2020.

- Generated unique multimodality synthetic SAR imagery of physics-based CAD models of target aerial, ground, and marine vehicles to create an extensive dataset to train Automatic Target Recognition systems. Target vehicles are systematically scanned from various azimuth and elevation angles as well as from different ranges and various operating environments. In realworld environments, targets of interest may be subjected to obscuration, camouflage, and deception. Utilizing virtual environment models, such conditions can be modeled to create an improved situational awareness of potential TOI's.

Jones, B., Ahmadibeni, A., Shirkhodaie, A. "Physics-based Simulated SAR Imagery Generation of Vehicles for Deep Learning Applications," SPIE Optics and Photonics Conference, Paper 11511-29, August 24-28, (2020).

- Generated unique multimodality synthetic SAR imagery of physics-based CAD models of target aerial, ground, and marine vehicles to create an extensive dataset to train Automatic Target Recognition systems. Target vehicles are systematically scanned from various azimuth and elevation angles as well as from different ranges and various operating environments. Introduced aspects of synthetic ship wake modeling of moving marine vehicles for the training of oceanic SAR deep learning classifiers.

Ahmadibeni, A., Jones, B., Smith, D., and Shirkhodaie, A., "Dynamic Transfer Learning From PhysicsBased Simulated SAR Imagery for Automatic Target Recognition," (2020).

- Two-step deep learning technique in support of DDDAS for robust ATR via transfer learning using simulated SAR imagery. The first Deep Learning model performs noise suppression of input SAR images via a Multi-resolution Stacked Denoising Autoencoder architecture. The second DL model includes a Multi-output Convolutional Neural Network architecture suitable for multi-feature classification of ATR pertaining to the DDDAS paradigm.

Ahmadibeni, A., Jones, B., Shirkhodaie, A., "Transfer Learning from Simulated SAR Imagery Using MultiOutput Convolutional Neural Networks," SPIE Optics and Photonics Conference, Paper 11511-30, August 24-28, (2020).

- Implemented a Multi-output Convolutional Neural Network (M-CNN) as an effective multifeature classifier model. Employed IRIS Electromagnetic modeling and simulation software to generate systematic simulated SAR images from an array of physics-based CAD models of 350 target vehicles scanned from different azimuth and elevation angles. Proposed a stepwise retraining of a CNN via a transfer learning technique for denoising and classification. The proposed classifier achieves higher levels of model generalization on unseen data when tested against IRIS-SAR datasets. Performed multi-feature classifications of target vehicles using the MCNN model. The

proposed M-CNN shows both efficiency and effectiveness in performing multifeature classification of test target vehicles simultaneously.

Jones, B., Ahmadibeni, A., Shirkhodaie, A., "Simulated SAR Imagery Generation of Marine Vehicles and Associated Wakes using Electromagnetic Modeling and Simulation Techniques," SPIE Optics and Photonics Conference, Paper 11843-12, August 1, (2021).

- Implemented a Multi-output Convolutional Neural Network (M-CNN) as an effective multifeature classifier model. Employed IRIS Electromagnetic modeling and simulation software to generate systematic simulated SAR images from an array of physics-based CAD models of 350 target vehicles scanned from different azimuth and elevation angles. Proposed a stepwise retraining of a CNN via a transfer learning technique for denoising and classification. The proposed classifier achieves higher levels of model generalization on unseen data when tested against IRIS-SAR datasets. Performed multi-feature classifications of target vehicles using the MCNN model. The proposed M-CNN shows both efficiency and effectiveness in performing multifeature classification of test target vehicles simultaneously.

Reviewer for Journal and Conferences

Defense and Technology Journal – Elsevier, May (2021)

Student Presentation

Synthetic SAR Data Generation for Deep Learning Based Surveillance Systems, Minority Science and Engineering Improvement Program (MSEIP) Student Research Conference, October (2023).

IRIS: Simulated Multimodality Dataset Generation of Multi-Platform Vehicles for Automatic Target Recognition, 2022 AIME Annual Conference, September (2022).

IRIS-LIDAR: Simulated LIDAR Dataset Generation of Multi-Platform Vehicles for Automatic Target Recognition, 2022 Systems Engineering and Architecture Technology Network Symposium, August (2022).

Ground and Airborne Synthetic Aperture Multimodality Imagery Generation for Deep Learning Classifiers Transfer Learning, Lockheed Martin Research Day Meeting, May (2022).

Ground and Airborne Synthetic Aperture Radar Imagery Generation for Deep Learning Classifiers Training, NAVSEA Crane Research Day Meeting, April (2022).

Research Awards

1st Place, Best Paper Presentations and 3rd Place, Best Student Papers, "Dynamic Transfer Learning From Physics-based Simulated SAR Imagery for Automatic Target Recognition," InfoSymbiotics/DDDAS2020 Conference, October 2020.

Technical Skills

Remote Sensing (SAR, LIDAR, IR): Knowledge of various remote sensing modalities with extensive understanding of synthetic SAR imaging simulation and modulation.

Virtual Environment Modeling and Simulation: Designed physics-based virtual environments for modeling and simulation of real-world environments for training purposes.

Machine Learning: Understand the concepts of machine learning techniques for automatic target recognition.

Project Management: Lead senior design team in researching and developing an affordable, durable, usable, multi-size breast biopsy training phantom. Assigned and coordinated meetings, goals, and requirements to complete project on time.

Technical Writing: Wrote numerous technical reports/write-ups, as well as paper publications using various formatting guidelines. learned numerous skills and techniques for accomplishing these goals while staying in the guidelines for the required paper.

Computer Skills

3D Modeling and Design – SolidWorks, 3Ds Max

Programming Languages and Software's – Python, MATLAB, ANSYS

Deep Learning Libraries – Tensorflow, Keras, PyTorch, Scikit-Learn

Custom Software for modeling and Simulation – IRIS (Integrated Robotics Interface System)

National Awards and Recognition

2020-Present:	Awarded Preparing Our Tomorrow Uniquely in STEM (POTUS) Fellowship (35 awarded annually, funds valued at $50,000)
2018-2020:	Awarded National Science Foundation Tennessee Louis Stokes Alliance for Minority Participation Bridge to the Doctorate fellowship (12 awarded annually, funds valued at $44,000)