

# Andrew Farabow

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## Education

### **Virginia Tech (2019 - present, graduating in 2023)**

Major GPA: 3.3 B.S. in Computer Science w/ Stat Minor

Elective Courses: Data-Centric Computing Capstone,

Data Analytics and ML 1&2, Regression Analysis,

Mathematical Statistics 1&2, Restricted Research

### **Gonzaga College High School (2015 - 2019)**

## Skills

**Programming:** Python, C, Java, R

**Frameworks:** PyTorch, Lightning, Tensorflow, Keras, Scikit-learn, Pandas, Numpy, RLLib, OpenAI Gym

**Other:** deep learning, RNNs, CNNs, metric learning, reinforcement learning, GANs, autoencoders, data analytics, Linux, Git, AWS, GCP, Docker, Agile/Scrum

## Work Experience

### **Machine Learning Engineer Intern - Vake**

**July 2022 - present**

- Developing a few-shot ship-recognition algorithm using deep metric learning.

### **Research Assistant - Sanghani Center (Virginia Tech)**

**May. 2021 - present**

- Spearheading the effort to create an open-source library of epidemiological models, datasets, and other tools for forecasting the COVID-19 pandemic and the seasonal flu, under the direction of Prof. Naren Ramakrishnan and funded by a NSF REU Supplement.
- Using the library to implement and train influenza-forecasting models for the CDC FluSight Competition
- Created a user-friendly, scikit-learn inspired interface and structured the library to maximize code reuse, simplifying the creation and use of new models and datasets.
- Implemented compartmental, statistical, and machine learning models, as well as datasets and evaluation metrics.

### **Research Assistant - BIST (Virginia Tech)**

**Nov. 2019 - present (school year)**

- Helped develop a ConvNet-based algorithm to predict the position of a bat-inspired sonar sensor within a forest area.
- Tested various model architectures, pre-training techniques, and visualization techniques (saliency maps, UMAP, etc).

### **Research Assistant - Hume Center (Virginia Tech)**

**Sept. 2019 - Dec. 2021 (school year)**

- Built a grid-based, OpenAI Gym-compatible simulation called SensorGrid that replicates key aspects of drone sensing and navigation challenges in a simplified environment, useful for testing reinforcement learning models before deployment to a more computationally-expensive environment, as part of the Raytheon RAAIDS project.
- Designed and trained a Resnet-based object-detecting convolutional neural network architecture, which achieved 97% accuracy on the classification phase of the Lockheed Martin AlphaPilot Dataset.

### **Machine Learning Engineer Intern - Decipher Technology Studios**

**2018 - 2020 (summers)**

- Improved performance of a recurrent autoencoder used to identify anomalies in service logs by adding self-attention.
- Worked on a small team to develop a predictive autoscaler that uses deep reinforcement learning (RL) to control the resources allocated to a microservice, striking a balance between performance and hosting cost.
- Wrote PyTorch implementations of policy gradient, Q-Learning, and actor-critic deep RL algorithms.
- Wrote a simulator for offline training and a microservice for online training and deployment (on Openshift and EKS).
- Added recurrent and convolutional layers to the neural networks to better leverage autocorrelation within the data.

## Publications

- Zhang, L., Farabow, A., et al. (2022). *Small-scale location identification in natural environments with deep learning based on biomimetic sonar echoes*. Manuscript submitted for publication.
- Farabow, A., Doyle, D. (2022). *SensorGrid: A Simulated Sensor Manipulation and Path Planning Environment for Reinforcement Learning Agents*. Manuscript in preperation.

## Awards

### **David Heilman Research Award**

**April 2022**

- Awarded by the VT CS department for excellence in undergraduate research.

### **Best Overall at HackBI**

**January 2017**

- Wrote an app that makes use of machine learning and computer vision techniques to interpret hand-written text.

## Activities

### **Head of Logistics - VTHacks Organizing Team**

**2019 - present**

- Overseeing the team responsible for managing the budget, purchasing meals, recruiting faculty judges, and other tasks.

### **Stage Manager - Gonzaga Dramatic Association Stage Crew**

**2017 - 2019**

- Led a team of over 20 students in the construction of a structure over 20 ft. wide and 8 ft. tall.
- Coded and designed circuits for custom Arduino and Raspberry Pi-based lighting effects and optical illusions.

## Projects

**Movie Neural Style Transfer** - For the capstone project component of my degree, my team created a dataset of frames from Star Wars movies and trained a CycleGAN to modernize the visuals.

**Machine Learning Templates** - Implemented GANs, autoencoders, genetic algorithms, etc. in PyTorch as practice.