

Stephen Jarrell

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PERSONAL SUMMARY

I am a driven life-long learner of machine learning with recent experience developing and deploying computer vision models for early wildfire detection in California, maritime domain awareness for the US Navy, stereo biomass estimation, and 3D MRI diagnosis. I am a Computer Science and Engineering Graduate Student and I enjoy prototyping and reading research papers to stay informed on the exciting state-of-the-art of machine learning.

EDUCATION

University of California, San Diego (UCSD) **Sept. 2021 – June 2023**
MS in Computer Science and Engineering specializing in Artificial Intelligence *San Diego, CA*

University of California, San Diego (UCSD) **Sept. 2017 – June 2021**
BS in Cognitive Science specializing in Machine Learning & Neural Computation *San Diego, CA*

WORK EXPERIENCE

Advanced Robotics and Controls Lab at UCSD **Jan. 2023 – Present**
Graduate Researcher *San Diego, CA*

- Building an autonomous surgical robot to perform emergency surgery on victims of severe accidents who would otherwise die before reaching a hospital with a qualified surgeon
- Working in a small Computer Vision team of two, a Research Scientist from Intel Labs and myself, researching generative models with Neural Radiance Fields (NeRF) and SLAM

Project Tidal - X, the Moonshot Factory **Sept. 2022 – Dec. 2022**
Software Engineer – Computer Vision Intern *Mountain View, CA*

- X, formerly known as Google X, is Alphabet's moonshot factory for the research and development of world changing technologies.
- Employed state-of-the-art pose estimation research to improve the pre-existing pose estimation model and accelerate a new CenterNet pose architecture for real-time deployment
- Trained a new production object detector, Foreign Fish V2, a consolidated detection model for both the disease and biomass pipelines
- Traveled to Indonesia to conduct high-quality stereo data collection of seagrass images in order to generate 3D structure-from-motion meshes of seagrass for quantifying biomass and carbon sequestration. We presented our efforts at the G20 Ocean Conference.

Cerebras Systems Inc. **June 2022 – Sept. 2022**
Applied Machine Learning Intern *San Diego, CA*

- Built V-Net in PyTorch, a volumetric segmentation model, to predict knee tissue pathologies from 3D MRI scans, advancing the efficiency and accuracy of modern MRI analysis and diagnosis
- Collaborated with the SKM-TEA Stanford researcher team to deploy their novel research on Cerebras hardware.

University of California, San Diego (UCSD) **Jan. 2022 – June 2022**
Graduate Teaching Assistant *San Diego, CA*

- Courses taught: CS 108: Data Science in Practice and CS 118A: Supervised Machine Learning Algorithms
- Authored new machine learning curriculum, developed auto-grading infrastructure, and led weekly discussion classes and office hours for project-oriented course sizes of 350 to 480 junior and senior undergraduate students

Saildrone Inc. **June 2021 – Aug. 2021**
Machine Learning Engineer Intern *Alameda, CA*

- Developed and deployed deep neural networks in a two-person team for object detection on the Saildrone Fleet of unmanned, solar, ocean drones: currently used for maritime security & surveillance by the US Navy and developed using PyTorch
- Modified ResNet Block skip connections to facilitate 50% pruning of the model without sacrificing classification accuracy across classes: F1-score (Recall @ Precision 80 = 91.84)
- Accelerated the detection inference on drones by quantizing and pruning 350 GFLOPs of excess computations in the ResNet conv layers and FPN, achieving real-time detection capabilities for deployed drones
- Expanded the data augmentation pipeline to include "bag of tricks" from YOLOv4 and YOLOv5 to further improve our RetinaNet

San Diego Supercomputer Center **Nov. 2020 – June 2021**
Machine Learning Software Engineer Intern *San Diego, CA*

- Developed Deep Learning models on a supercomputer cluster for object detection and segmentation, such as Faster R-CNN and

Mask R-CNN, using PyTorch and Python.

- Engineered these Wildfire Smoke Detection models for deployment at high-altitude weather stations across California
- Automated image preprocessing for training and performance evaluation of the model, frame-by-frame, for hundreds of videos
- Coordinated amongst a global team of Deep Learning Researchers to program state of the art methods for proprietary image data

Computational Neural Data & Dynamics Lab

Dec. 2019 – Mar. 2020

Undergraduate Researcher

San Diego, CA

- Facilitated Neuroscience Researchers, as part of President Obama's BRAIN Initiative, in creating the first taxonomy of every cell in the mammalian brain, by deploying Unsupervised Machine Learning methods to a web portal using Python
- Built pipelines in a Linux environment to efficiently process RNA-seq, methylation and chromatin acc data for neural cell clustering

SKILLS

- **Programming Languages:** Mastery of Python, C, C++
- **Mathematics of Machine Learning:** Convex Optimization, Numerical Optimization, Vector Calculus, Linear Algebra, Probability
- **Machine Learning Domains:** Deep Learning, Supervised Learning, Unsupervised Learning, Reinforcement Learning
- **Relevant Python Libraries/Frameworks:** PyTorch, TensorFlow, NumPy, Pandas, Scikit-learn

PROJECTS (Website for more projects @ <http://stephenjarrell19.github.io/>)

- Deep Reinforcement Learning with TensorFlow and DDPG to optimize a continuous control policy for a Bipedal Walker (OpenAI)
- Deep Dream with TensorFlow to visualize the "black-box" of SOTA image recognition models (ResNet101, VGG16, InceptionV3)