

Abrar Anwar

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EXPERIENCE

SANDIA NATIONAL LABORATORIES | R&D INTERN

May 2020 – Present | Albuquerque, NM | PI: Dr. Craig Vineyard

- Developed evolutionary method to generate spiking neural network circuits for low-power **neural network-hardware co-design**
- Experimented on classification, control, and **Atari** with a **ResNet** extractor
- Gained a 2x speedup on **HPC** systems by implementing asynchronous parallel training using **OpenMPI**
- Analyzed neural architecture search methods for low-power conditions
- Led to conference poster and report: *"Evolving Spiking Circuit Motifs using Weight Agnostic Neural Networks"*

SANDIA NATIONAL LABORATORIES | R&D INTERN

May 2019 – July 2019 | Albuquerque, NL | PI: Dr. Brad Aimone

- Designed brain-inspired **localization** methods for a hypersonic vehicle
- Architected a lightweight, rotation-invariant feature for elevation data
- Trained a rotation-invariant **feature extraction autoencoder** in PyTorch to reduce storage of **place recognition** maps.
- Explored hierarchical, dense coding approaches to allow for sub-linear growth in map storage

BUILDING WIDE INTELLIGENCE PROJECT (AI LAB)

UT AUSTIN | UNDERGRADUATE RESEARCH INTERN

May 2018 – Present | PI: Dr. Peter Stone | Supervisor: Dr. Justin Hart

- Peer mentor/TA for Autonomous Robotics course associated with the lab for three semesters
- Managed and lead several robotics projects
- Using **eye tracking** and **virtual reality** to model the navigational intent of humans interacting with robots
- Created a **word embedding model** in **Tensorflow** with triplet-loss training that allows for predicting generalizable human-like object shelving. Developed data collection methods in JavaScript using Amazon MTurk
- Used semantic info to generate weighted features for **visual SLAM** to increase accuracy by 60% in dynamic environments by reducing drift

PROJECTS

DEEPHHD | PROJECT FOR GEOMETRIC FOUNDATIONS OF DATA SCIENCE

Spring 2020

- Developed an **optical flow estimation** deep neural network by reconstructing the Helmholtz-Hodge Decomposition using a U-Net inspired architecture in **PyTorch**
- Working on using a **deep reinforcement learning** module to selectively refine residual patches in a coarse-to-fine manner

GAUSSIAN PROCESSES FOR DETECTING COCONTRACTION |

PROJECT FOR GRAD MACHINE LEARNING

Spring 2020

- Implemented Gaussian processes (GP) from scratch to detect muscle cocontraction from shifts in the hyperparameters of temporal sliding windows of the non-parametric GP models using motion capture data

EDUCATION

UNIVERSITY OF TEXAS, AUSTIN

B.S. IN COMPUTER SCIENCE

Expected May 2021

GPA: 3.66

Thesis: *"Learning Consistent Space-Time Representations for Predictive Physical Simulations"* (expected Dec 2020)

NATIONAL UNIVERSITY OF SINGAPORE

EXCHANGE PROGRAM FALL 2019

SKILLS

PROGRAMMING

Python • C/C++

Java • MATLAB

JavaScript • R

TECHNOLOGY

PyTorch • Tensorflow • Linux

HPCs • OpenCV • ROS

OpenMPI • scikit-learn

COURSEWORK

GRADUATE

Machine Learning

AI/Decision Making (RL)

Advanced Probability (current)

UNDERGRADUATE

Autonomous Robotics I/II (TA)

Geometric Foundations of Data Science

Computer Vision

Natural Language Processing

Predictive Analytics

Quantum Computing (current)

HONORS/AWARDS

Gilman International Scholar

Horatio Alger Honeywell Scholar

FRI Summer Research Fellow 2018

University Honors

LINKS

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