# Abrar Anwar

abraranwar.github.io | abraranwar123@gmail.com | 713.924.8749

## EXPERIENCE

### SANDIA NATIONAL LABORATORIES | Research Intern
May 2020 – Present | Albuquerque, NM | PI: Dr. Craig Vineyard
- Developed and optimized evolutionary method to evolve spiking-like neural network circuits for low-power, **edge computing** cases, specifically neuromorphic computing
- Assessed my approach on various tasks ranging from classification and continuous control, to playing **Atari** using a **ResNet** feature extractor
- Implemented parallel, asynchronous evolutionary training to speed up training process by 2x on **HPC** systems using **OpenMPI**
- Working on extensions for low-power **neural network-hardware co-design**
- Led to conference poster and technical report: *"Evolving Spiking Circuit Motifs using Weight Agnostic Neural Networks"*

### SANDIA NATIONAL LABORATORIES | Autonomy Intern
May 2019 – July 2019 | Albuquerque, NL | PI: Dr. Brad Aimone
- Developed brain-inspired **localization** network for a hypersonic glide vehicle
- Designed rotation-invariant representations of images using Monte Carlo-like partial pixel estimation to develop a lightweight, circular feature
- Trained a rotation-invariant **feature extraction autoencoder** to reduce storage requirements 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 Researcher
May 2018 – Present | PI: Dr. Peter Stone | Supervisor: Dr. Justin Hart
- Peer mentor/TA for Autonomous Robotics course associated with the lab
- Managed and lead several projects, mentoring students in research
- Using **eye tracking** and 3D depth tracking to model the navigational intent of humans interacting with robots
- Created a **word embedding model** to shelve groceries in a human-like manner with triplet-loss training that allows for predicting generalizable human-like object placement. Designed Amazon MTurk expirements to collect data.
- Designed experiments to quantify humans' ability to interpret the gaze of virtual/physical agents
- Combined semantic info from object detection with **visual SLAM** to increase SLAM 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.
- Working on using a **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

### 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

Github:// **AbrarAnwar**
LinkedIn:// **AbrarAnwar**
Blog:// **abraranwar.github.io**