

# Darin Tsui

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## Experience

### Graduate Research Assistant

Atlanta, GA

AI ML AND INFORMATION RESEARCH (AMIR) GROUP

Jun. 2023 - Present

- Improved supervised and generative model performance on biological datasets by 60% through L1 regularization.
- Applied Walsh-Hadamard transforms on variational autoencoders to extract explainable features.

### Medical Imaging Data Engineering Intern

San Diego, CA

SURGALIGN

Jan. 2023 - Aug. 2023

- Designed an internal MRI image processing application using Python that reduced preprocessing time per sample.
- Assisted in developing ground truth dataset of imaging data to assess the effectiveness of deep learning models.
- Validated deep learning models against surgeon-generated data using Sørensen–Dice coefficient statistical testing.

### Development Engineer

La Jolla, CA

INTEGRATED SYSTEMS NEUROENGINEERING LABORATORY

Jun. 2022 - Jul. 2023

- Developed feature extraction and machine learning pipeline for bioelectronic COVID-19 detection using scikit-learn.
- Achieved accuracies of 98.5% when detecting COVID-19 proteins, improving classification by 30.1%.
- Published first-author 4-page paper to the Conference of the IEEE Engineering in Medicine and Biology Society (EMBC).

### Research Lead

La Jolla, CA

TALKE BIOMEDICAL DEVICE LABORATORY

Dec. 2021 - Aug. 2023

- Designed low-cost vision system for minimally invasive surgery using OpenCV with fiducial markers.
- Implemented Kalman filtering to achieve sub-millimeter error in design-validation testing.
- Published first-author papers to IEEE and the ASME Annual Conference on Information Storage and Processing Systems.

## Projects

### Brain-Computer Interface (BCI) Signal Classification

Jan. 2023 - Apr. 2023

- Designed a novel feature extraction algorithm for electroencephalogram (EEG) data by ensembling time-based data.
- Improved state-of-the-art accuracy from 61.04% to 63.16% using PyTorch neural network architecture.

### Convolutional Neural Networks (CNN) for Plankton Classification

Jan. 2023 - Apr. 2023

- Implemented AlexNet for plankton image classification using PyTorch.
- Increased model robustness by synthetically manipulating imaging data, improving the classification accuracy by 27%.

### Tumor Imaging Classification

Sept. 2022 - Dec. 2022

- Implemented convolutional neural networks (CNN) with TensorFlow implementation on brain MRI images, achieving 78.43% accuracy after 10 epochs.
- Compared CNN implementation with K-Nearest Neighbors using scikit-learn, achieving 77.49% accuracy.

## Leadership

### President

San Diego, CA

IEEE AT UC SAN DIEGO

May 2022 - May 2023

- Managed operations for UC San Diego's 350+ student body by communicating with and delegating tasks to officers.
- Co-founded IEEE's Supercomputing Team with the San Diego Supercomputing Center (SDSC), increasing membership count by 10%.
- Hosted technical workshops on deep learning and classical machine learning by explaining mathematical concepts with relatable examples.

## Education

### Georgia Institute of Technology

Aug. 2023 - Present

PH.D. IN ELECTRICAL AND COMPUTER ENGINEERING

### University of California San Diego

Sept. 2019 - Jun. 2023

BACHELOR OF SCIENCE IN BIOENGINEERING, GPA 3.939

## Skills

**Programming** Python, MATLAB, Bash (Linux Shell Scripting)

**Libraries** PyTorch, TensorFlow, Scikit-learn, OpenCV, Scipy, Matplotlib, Numpy, Pandas

**Relevant Coursework** Statistical Learning, Neural Networks and Deep Learning, Bioinformatics Statistical Analysis