Darin Tsui

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Education

University of California San Diego — San Diego, CA
Bachelor of Science in Bioengineering, GPA 3.939 — September 2019 – June 2023

Experience

Talke Biomedical Device Lab, Research Lead — December 2021 – Present

- Designed and developed a surgical navigation system through the optical tracking of fiducial markers.
- Interfaced ArUco markers with 3D homography and linear Kalman filtering using Python and MATLAB.
- Achieved sub-millimeter error results in design-validation accuracy testing.
- Submitted a 12-page paper to the Journal of Advanced Mechanical Design, Systems, and Manufacturing (JAMDSM).
- Presented to the 2022 Micromechatronics for Information and Precision Equipment (MIPE) Conference.

Swartz Center of Computational Neuroscience, Researcher — March 2021 – Present

- Collaborated with Microsoft's Human Factors team to create an EEG-based stress detection pipeline.
- Interfaced Random Forest algorithm with asymmetrical and transient EEG activity in Python and MATLAB.
- Improved classification of stress vs. non-stress groups by 34.3% in correlation with physiological features.
- Currently preparing a 4-page paper to the Conference of the IEEE Engineering in Medicine and Biology Society.

Johnson & Johnson, Instruments R&D Intern — June 2022 – August 2022

- Worked at Auris Health, Johnson & Johnson's flexible robotics division for minimally invasive surgery of urology.
- Supported design-validation clinical trials through preparation and sterilization of instrument kits.
- Performed root cause analysis towards the failure of instrument devices.
- Designed near-infrared camera system for optical calibration in endoscopes.

Projects

Statistical Learning of Virus Detection with Nanosensor — March 2022 – Present

- Capstone project focused on designing a point-of-care viral detection hardware and software interface.
- Currently using supervised machine learning to detect viral traces in a graphene field-effect transistor (GFET).
- Performed optimization testing in biosamples to reduce power consumption and improve sensitivity.

Brain Tumor Classification — September 2022 – December 2022

- Performed binary classification analysis on brain MRI images given models of various complexities.
- Models explored include: convolutional neural networks (CNN), principal component analysis (PCA) with CNN, and K-Nearest Neighbors (KNN).
- Achieved an accuracy of 78.43% after 10 epochs with CNN.
- Additionally achieved an accuracy of 77.49% at 73 nearest neighbors with KNN with 5-fold cross-validation.

Leadership

IEEE at UC San Diego, President — May 2022 – Present

- Oversaw and managed operations for UC San Diego's 300+ student body.
- Partnered with the San Diego Supercomputing Center (SDSC) to co-found IEEE's Supercomputing Team.
- Hosted technical seminars for artificial intelligence, robotics, and wearable sensors.
- Mentored project teams focused in machine learning and sensor design.
- Awarded Outstanding IEEE Large Student Branch award for maintaining strong project activities during tenure.

Technical Skills

Hardware: Arduino, 3D Printing.
Software: Python, MATLAB, Bash (Linux Shell Scripting), SOLIDWORKS.
Libraries: Tensorflow, SciKit-Learn, OpenCV, Scipy, Matplotlib, Numpy, Pandas.
Professional Organizations: Institute of Electrical and Electronics Engineers (IEEE), Biomedical Engineering Society (BMES), Tau Beta Pi (TBP).
Relevant Coursework: Statistical Learning, Biosystems and Control, Principles of Bioinstrumentation and Design, Computational Methods in Engineering.