Tariq Soliman

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Education

The University of Queensland (UQ) — St Lucia, QLD
Bachelor of Engineering (Hons) and Master of Engineering, Major in Mechatronics — *Feb. 2019 – Nov. 2024*

National University of Singapore (NUS) — Singapore
Exchange Program — *Aug. 2022 – Feb. 2023*

Westpac — Singapore
W100 Asian Exchange Scholar & Leadership Development Program — *Sep. 2022*

Experience

Undergraduate Digital Engineer — Jan. 2024 – Present
Hatch — *Brisbane, QLD*

- Researching applications of drones with computer vision for asset monitoring and predictive maintenance
- Implementing a combination of deep learning and traditional computer vision techniques for locating concrete pillars and segmenting surface voids
- Implementing SLAM in ROS2 with RGB camera and IMU data for autonomous path planning

Tutor — Mar. 2019 – Present
The University of Queensland, ITAR, Cluey Learning & Privately — *St Lucia, QLD*

- UQ Courses: Programming for Engineers, Introduction to Computer Systems
- For the Indigenous Tutorial Assistance and Retention (ITAR) program, online for Cluey Learning, privately for high school students
- Lead tutor for courses at UQ. Responsibilities included running tutorials and presenting technical content, training new tutors, helping students with assignments, helping course coordinators draft assessments, marking assessments

Research Assistant — Dec. 2022 – Feb. 2023
Singapore Sports Institute — *Singapore*

- Implemented a custom deep learning model in keras that could classify a subset of fencing movements based on data from four IMUs
- Collected data from seven athletes for training the model and achieved 80-90% on windows of data from accuracy on an eighth unseen athlete
- Developed an application with a GUI in PyQt (Qt for Python)

First Year Engineering Student Mentor — Feb. 2022 – Apr. 2022
The University of Queensland — *St Lucia, QLD*

- Welcomed new engineering students to UQ and helped to answer questions about starting university
- Encouraged engagement in university life and cultutre

Research Assistant — Nov. 2021 – Feb. 2022
The University of Queensland — *St Lucia, QLD*

- Helped to develop the GUI for a MacOS app for sonification of astronomical surveys (like Google Maps for space with sound)
- Used SwiftUI and helped modify a Javascript library that used JQuery for the surveys

Projects

Pose Detection with Pretrained ViTs | *Python, PyTorch* — Feb. 2023 – June 2023

- Performed transfer learning on ViTs pretrained using DINO, MAE and MSN methods inspired by the paper *ViTPose: Simple Vision Transformer Baselines for Human Pose Estimation*
- Training with the COCO Keypoints dataset led to 0.847 $AP_{.5}$ and 0.569 $AP_{.5:.95}$
- Presented a live inference demonstration using the top-down approach with YOLO for detecting people
- Visualised attention maps

Admin App for Tutoring Business | *React, Expo (React Native), Typescript, Firebase* — Jan. 2021 – Present

- Developing a mobile app that allows tutors to report their hours
- Developing a web app interface for admin

Robotics Projects | *Python, ROS2, C, C++, Keras, Embedded Programming* Feb. 2019 – Present

- Designed and manufactured a robot that can find the centre of a test area and shoot infra-red targets with a laser pointer
- Implemented an IoT robot that could turn to face people by recognising their shoes
- Used ROS2 to program a robot to perform Simulataneous Localisation And Mapping (SLAM) with autonomous path planning in order to map and explore an unseen test area

Misc. Projects | *Verilog, Vivado, Assembly (ARM), Solidity, React, Javascript* Aug. 2022 – Dec. 2022

- Implemented parts of an ARM processor at RTL level with verification on an FPGA
- Created a multisignature wallet on the blockchain with Solidity with a web app interface

Technical Skills

Languages: Python, C, C++ (modern), JavaScript, TypeScript, Matlab, Swift, Lua, Verilog, Assembly (AVR & ARM), Solidity
Frameworks: React, Expo (React Native), Node.js, PyTorch, Tensorflow (with keras), ROS, PyQt, Simulink, FreeRTOS, Firebase
Developer Tools: Git, Linux, Azure, (Neo)Vim, VS Code, Vivado, Jupyter Notebook, Jira, Latex
Libraries: Pandas, NumPy, Matplotlib, SciPy, scikit-learn, scikit-image, OpenCV (Python), huggingface, ultralytics
Misc. Skills: Altium (PCB design), Solidworks (CAD), ANSYS (FEA), Circuit Analysis, Signal Processing, PID Control, State Space Modelling, Non-linear Control with Lyapunov Functions, Analysis of MDOF Systems, Modal Analysis, Systems Theoretic Process Analysis (STPA)