

# Tariq Soliman

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## EDUCATION

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### The University of Queensland (UQ)

*Bachelor of Engineering (Hons) and Master of Engineering, Major in Mechatronics*  
*First Class Honours - 6.8/7 GPA*

St Lucia, QLD

Feb. 2019 – Nov. 2024

### National University of Singapore (NUS)

*Exchange Program*

Singapore

Aug. 2022 – Feb. 2023

### Westpac

*W100 Asian Exchange Scholar & Leadership Development Program*

Singapore

Sep. 2022

## EXPERIENCE

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### Research Assistant

*The University of Queensland*

Dec. 2024 - Present

St Lucia, QLD

- Investigating dimension importance estimation/query performance prediction with deep learning embeddings generated for information retrieval
- Building on work from Matryoshka Representation Learning and Dimension Importance Estimation for Dense Information Retrieval

### Tutor

*The University of Queensland, ITAR, Cluey Learning & Privately*

Mar. 2019 – Nov. 2024

St Lucia, QLD

- UQ Courses: Programming for Engineers, Introduction to Computer Systems, Robotics and Automation
- 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, helping to write tests for code, marking assessments
- Also for the Indigenous Tutorial Assistance and Retention (ITAR) program, online for Cluey Learning, privately for high school students

### Undergraduate Digital Engineer

*Hatch*

Jan. 2024 – Jun. 2024

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
- Utilising Research in Visual Simultaneous Localisation and Mapping in ROS2 with RGB camera for autonomous path planning in GPS denied environments

### Research Assistant

*Singapore Sports Institute*

Dec. 2022 – Feb. 2023

Singapore

- Implemented a custom deep learning model in keras that could classify a subset of fencing movements based on data from four Inertial Measurement Units
- Collected data from seven athletes for training the model and achieved 75-80% accuracy on windows of data from an eighth unseen athlete
- Developed an application with a GUI in PyQt (Qt for Python)

### First Year Engineering Student Mentor

*The University of Queensland*

Feb. 2022 – Apr. 2022

St Lucia, QLD

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

### Research Assistant

*The University of Queensland*

Nov. 2021 – Feb. 2022

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

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- 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 – March 2024
- 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 could autonomously collect coffee beans buried in sand. I was responsible for localisation using a camera and ArUco markers and control algorithms
  - 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 Simultaneous Localisation And Mapping (SLAM) with autonomous path planning in order to map and explore an unseen test area
  - Helped manufacture and program a robot to collect coffee beans autonomously from a sand pit with localisation using ArUco markers
- 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
  - Created a [personal blog](#) to share things I am learning about.
  - Completed [Advent of Code 2023](#) and 2024 [with all 50 stars in C++](#)

## TECHNICAL SKILLS

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**Languages:** Python, C, C++ (modern), JavaScript, TypeScript, Java, Bash, Promela, Matlab, Swift, Lua, Verilog, Assembly (AVR & ARM), Solidity

**Frameworks:** React, Expo (React Native), Node.js, PyTorch, Tensorflow (with keras), ROS2, PyQt, Simulink, FreeRTOS, Firebase

**Developer Tools:** Git, Linux, (Neo)Vim, i3wm, VS Code, Vivado, Jupyter Notebook, Jira, Latex

**Libraries:** Pandas, NumPy, Matplotlib, SciPy, scikit-learn, scikit-image, OpenCV, 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)