Mukul Chodhary

mukulchodhary1@gmail.com
+61 479039786
linkedin.com/in/mukulchodhary

Relevant Work Experience

Research Assistant (C, RF Localisation, Security Protocols, MQTT, React.js, FastAPI, PostgreSQL) **Mar 2025 – June 2025**
Department of Electrical and Electronic Engineering, University of Melbourne, Melbourne, Australia

- Researched and developed high-accuracy real-time Bluetooth localisation methods, optimising detection algorithms for improved precision. Analysed Bluetooth security protocols to identify vulnerabilities and enhance system robustness.
- Communicated research findings to clients and stakeholders through reports and presentations, ensuring clarity and practical applicability.

Software Engineering Intern, RADIAN Project (KVM/QEMU VMs, Docker, Linux, Network OS) **Dec 2024 – Mar 2025**
Microsoft, Melbourne, Australia

- Developed intelligent routing solutions on SONiC T2/FRR, achieving a 10x improvement in BGP convergence time and supporting all T2 devices across multiple data centres.
- Created cost-effective multi-T2 virtual topology testing using a mix of cEOS, KVM/QEMU VMs; eliminating reliance on physical chassis and enabling robust validation of network resiliency and performance without taking down production devices.
- Authored detailed documentation and delivered internal demos, showcasing topology designs and project advancements to ensure seamless knowledge transfer and stakeholder alignment.

Student Researcher (TF, OpenCV, Numpy) **Mar 2024 – Nov 2024**
Department of EEE, University of Melbourne, Australia

- Innovated self-supervised transfer learning framework for underwater stereo depth estimation, merging spatial insights from in-air and stereo deep learning models, boosting underwater depth estimation accuracy. Source code: GitHub
- Evaluated on 4 different underwater environment datasets and achieved SOTA accuracies over 8 standard evaluation metrics

Software Engineer Intern (Django, Bash, C, WASM, HTML, CSS) **Mar 2024 – June 2024**
Melbourne Telescope Restorative Project, Museums Victoria, Melbourne, Australia

- Developed Star Map interface for Great Melbourne Telescope, aiding user navigation. Implemented interface with Django, Vue.js, and C++; introduced Docker for streamlined development and deployment
- Automated dev environment set-up and deployment using bash scripts, enhancing productivity

Research Assistant (Kotlin, Objective-C, C, RTOS:ESP-IDF) **Dec 2022 - Jul 2023**
Melbourne Defence Enterprise, University of Melbourne, Melbourne, Australia

- Analysed communication and cryptographic overheads, customising solutions for a government client to extend the prototype device capabilities across 3 areas; information throughput, additional sensors and increased energy efficiency
- Researched, developed, and tested both hardware and software of the prototype

Research Engineer (MATLAB, Python, C++) **Jul 2022 - Jul 2023**
John Neuro Bionics Lab, University of Melbourne, Melbourne, Australia

- Prototyped a cost-effective device for Ophthalmodynamometry to measure intracranial pressure through eye pressure and retinal vessel pulsation, simplifying the procedure requiring two specialists
- Analysed spatial/temporal EEG features from motor imagery trials for BCI use in multiple sclerosis patients; findings published in EMBC 2023

Education

Master of Electrical Engineering (Autonomous Systems) **Feb 2023 - Nov 2025**
The University of Melbourne

- Electrical and Electronics Engineering Discipline Award for Capstone project at 2025 FEIT Endeavour Exhibition.
- 6 scholarships and awards worth $42,500

Master of Electrical Engineering (Exchange Semester) **Jul 2023 - Dec 2023**
Korea Advanced Institute of Science & Technology (KAIST)

Bachelor of Science (Electrical Engineering Systems) **Feb 2020 - Nov 2022**
The University of Melbourne

- 3 scholarships and awards worth $20,000

Concurrent Diploma in Computer Science **Feb 2022 - Nov 2022**
The University of Melbourne

Publications

- **Mukul Chodhary**, Kevin Octavian, SooJean Han, "Efficient Replay Memory Architectures in Multi-Agent Reinforcement Learning for Traffic Congestion Control." IEEE Intelligent Transportation Systems Conference (ITSC), Jul 2024.
- John S Russo, **Mukul Chodhary**, Myrte Strik, Thomas A Shiels, Chin-Hsuan Sophie Lin, Sam E John, David B Grayden, "Feasibility of Using Source-Level Brain Computer Interface for People with Multiple Sclerosis." IEEE Transactions on Biomedical Engineering, Aug 2024.[Link]

Project Work

Learning of dynamical systems from a finite number of closed loop data points | GitHub **Jul 2024 – June 2025**

- Developed a real-time framework using the Sign-Perturbed Sums (SPS) algorithm to learn system dynamics from limited closed-loop data with exact probabilistic guarantees.
- Designed modular, asynchronous architecture for integration with real-time controllers in uncertain environments with Redis pubsub.
- Built efficient Python package for discrete time filter operations with Numba, NumPy, SciPy.

Episodic Control with Multi-Agent Reinforcement Learning (MARL) | GitHub **Jul 2023 - Dec 2023**

- Proposed a novel solution to integrate **episodic memory control** with **graph-based multiagent reinforcement systems** and utilising symmetries in the environment using state space abstractions. Introduced a modular graph-based framework with long-term and short-term memories to implement "**forgetting**" behaviour
- Successfully applied the solution to the Traffic Control problem on a large and complex grid and showed significant improvements compared to other SOTA MARL algorithms

Autonomous Car: ORB-SLAM, Navigation and Path-planning **Jul 2023 - Dec 2023**

- Implemented **a local fernet path planner with MPC controller** and a state-of-the-art SLAM using CARLA simulation environment and ROS in Ubuntu 18

CereCe: BCI-CV wheelchair Project, MBSI, Melbourne, Australia **Jul 2022 – Jul 2023**

- **Led a team of 6–8** in developing a **BCI- and CV-integrated wheelchair**, collaborating with **3 other teams** to integrate **Wi-Fi, A* path planning, and PID control** for precise mobility in tetraplegic patients.
- Designed the electro-mechanical system for the wheelchair and eye-tracking glasses, enhancing control accuracy; findings were presented at the 2024 Australasian Neuroscience Society Conference.

DNN-LSTM with Hybrid MPC for Home Energy Management System (HEMS) | GitHub **Mar 2023 - Jul 2023**

- Integrated **MPC with DNN-LSTM** for predictive optimisation of battery storage, heat pumps, and solar curtailment, minimising electricity costs while maintaining stable home temperatures.

NICEU: Automated NICU Tracheostomy | MUBES Medithon | GitHub **Jul 2022 - Jul 2022**

- Built a **stent-based tracheostomy prototype** to minimise neonatal airway damage and developed a **Java-based Android app** for real-time monitoring.

Chiki's Delivery Service: A Game in Unity| Melbourne, Australia | GitHub **Jul 2022 - Nov 2022**

- Led a **team of four** to develop a 3d game in Unity, with **procedurally generated infinite map** in C#, designing game assets in Blender and improving gameplay based on user feedback.

Volunteer

Education Director and Industry Manager **Sep 2021 - Jul 2023**

Melbourne University Electrical Engineering Club, Melbourne, Australia

- Restructured the organisation by introducing 3 sub-committees, improving knowledge retention and scalability.
- Coordinated 7-8 technical workshops a semester, information sessions, panels and industry nights in collaboration with FEIT, Department of EEE, industry partners and other student organisations
- Conducted interactive discussions with student through weekly workshops and liaised concerns to the Department of EEE
- Organised hackathons for 200+ students, addressing e-waste sustainability (Watthack) and accessibility (Universal Design Sprint).

Education Head **Dec 2022 - Jul 2023**

Organising Committee, Superhack, Melbourne, Australia

- Relaunched a 2-day hackathon promoting gender diversity in STEM for high school students across Victoria.
- Trained 40 university mentors and secured $8,000 in industry sponsorship.

Referees

Referees available on request