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Felix Marattukalam

Personal Statement

With over eight years of experience across electronics, computer engineering, and applied AI, I bring a strong combination of design-focused teaching, industry collaboration, and end to end hardware-software development. I hold a PhD in Electrical and Electronic Engineering from the University of Auckland, where my research developed contactless human biometrics systems requiring full system design across sensing hardware, embedded electronics, and intelligent software. At the University of Auckland, I have supported design-centric engineering courses, mentoring students through prototyping, iterative design, and building functional integrated systems. I place strong emphasis on bridging academic learning with industry realities and giving students confidence in hardware-software alignment. In industry, I have led the development and deployment of advanced sensing and AI systems, including radar integration and flight-operation automation at Restore Labs and previously contributed to national biometric initiatives and AI system design across multiple organisations both in the public and private sector. I continue to advise engineering teams nationally and internationally on robust and responsible deployment of AI in real-world hardware environments.

Education

2019-2023 **PhD, Doctor of Philosophy, The University of Auckland, New Zealand**
Specialization Electrical, Computer & Software Engineering (Biometrics & Computer Vision)

2015-2017 **M Tech, Master of Technology, NMIMS, Mumbai, India**
Specialization Electronics & Telecommunication Engineering, (Telecommunication Systems)

2011-2015 **BE Hons, Bachelor of Engineering, The University of Mumbai, India**
Specialization Electronics & Telecommunication Engineering

Relevant Experience

2021-present **Senior Research Technician**, *Permanent-Full-time*, The University of Auckland

Served as technical lead for the Signal Processing, Radio, and Embedded Systems laboratories, managing day-to-day operations, equipment maintenance, calibration, and specialist instrumentation.

Planned and implemented Health & Safety protocols including laboratory risk assessments, compliance procedures, and training for safe technical operations.

Designed, fabricated, and maintained mechanical and electronic prototypes, including 3D modelling and 3D printing for research and laboratory applications.

Developed hardware and software systems for research in computer vision, biometrics, embedded systems, radio systems, and machine learning, including live demonstration setups.

Prepared detailed technical documentation, test reports, and research supporting materials, contributing to national and international research publications.

Provided expert consultation and hands-on support in LabVIEW, CST Studio Suite, MATLAB, Microchip Studio, CAD tools, and embedded programming environments.

Supervised and mentored undergraduate and postgraduate researchers, managing project design, procurement, budgeting, experimentation, and deployment of ML/AI-based technologies.

Co-supervised Bachelor of Engineering (Hons) Master of Engineering, PhD, and summer research students.

Delivered teaching and technical support across undergraduate and postgraduate courses including Artificial Intelligence & Machine Learning, Embedded Systems, Digital & Analogue Design, Electrical Systems, and Radio Engineering.

Designed course content, assignments, tutorials, lab exercises, examinations, and GTA/TA training and marking rubrics for the new Artificial Intelligence & Machine Learning course.

Led industry-focused technical consultations, deploying and supporting advanced engineering solutions for on-site and off-site partner companies.

Provided technology advisory services to industry partners on emerging protocols, engineering standards, and advanced R&D methodologies

Acted as laboratory manager, conducting technical staff recruitment panels, onboarding, and training programs.

Managed financial planning, resource allocation, and procurement for specialist research laboratories and project operations.

Led multi-disciplinary industry-funded research projects and collaborated with academic and commercial teams to deliver applied engineering solutions.

2024–Present **Senior Engineer**, *Permanent-Part-time*, Restore Lab Limited

Lead and support the integration, testing, and operational deployment of SlimSAR at Merlin Labs, including nominal flight planning, data throughput testing, and the automation of flight operations for airborne synthetic aperture radar (SAR) missions.

Collaborate with internal and external partners including councils, Iwi, Tonkin + Taylor, and Waka Kotahi to identify high-impact applications of SAR and remote sensing data, and to design responsive geospatial workflows and analytics products tailored to end-user needs.

Maintain and oversee the Rongowai Python-based processing and operations pipeline, managing calibration, algorithmic updates, and integration of new data products in coordination with the international CYGNSS and University of Auckland teams.

Contribute to the ongoing development of Level-1 (L1), Level-2 (L2), and higher-order geophysical and derived products, including gridded soil moisture, inundation mapping, and coastal change detection, ensuring scientific accuracy and computational efficiency.

Develop and maintain automated data ingestion, processing, and validation frameworks using Python and cloud-based infrastructure to enhance scalability, traceability, and reproducibility across research and operational pipelines.

Engage in proposal and grant writing, contributing to successful funding bids and research dissemination through peer-reviewed publications and conference presentations at both domestic and international venues.

Collaborate across multidisciplinary teams—including engineers, scientists, and domain experts—to translate satellite and airborne remote-sensing data into actionable environmental insights supporting resilience, sustainability, and disaster-response efforts.

2024–Present **AI Research Consultant**, *Contract-Part-time*, Watchful Ltd

Transitioned from the role of Head of Advanced AI Research to a consulting position, providing strategic and technical guidance on the responsible design, deployment, and governance of AI-driven systems.

Advise executive and engineering teams on the ethical implementation of AI technologies across Watchful's video intelligence and analytics platforms, ensuring compliance with emerging standards in privacy, transparency, and accountability.

Support ongoing R&D initiatives in computer vision, machine learning, and data governance, contributing to AI model evaluation, risk assessment, and explainability frameworks.

Collaborate with internal teams and external partners to shape the company's long-term AI ethics strategy, aligning research outcomes with international best practices and regulatory frameworks.

Provide high-level consultation on AI system validation, fairness auditing, and responsible automation, ensuring Watchful's technologies maintain both technical robustness and social trustworthiness.

2025–present **Director**, *Directorship*, Marafel Ltd

Oversee strategic planning, research direction, and technology development for Marafel Limited, a company specialising in advanced and embedded systems engineering.

Lead innovation and product design initiatives in the areas of embedded electronics, IoT, and intelligent systems integration.

Manage multidisciplinary teams and collaborative partnerships with research institutions and industry stakeholders across New Zealand and abroad.

Provide high-level technical consultation on system architecture, AI-enabled embedded design, and sustainable technology solutions.

Guide company growth strategy, project portfolio development, and client engagement while ensuring alignment with cutting-edge technology trends and standards.

2019-present **Lead Software Technology Consultant**, *Contract-Part-time*, Breeur Solutions, India

Provided strategic software advisory and technical consultancy for early-stage startups and business incubation initiatives.

Led the concept design, architecture planning, and full-cycle software development across multiple platforms and domains.

Supervised and mentored cross-functional development and testing teams, ensuring delivery of high-quality, scalable software solutions.

Supported startup inception, technology roadmap planning, and process optimization to accelerate product-market fit and deployment.

2023–2025 **Professional Teaching Fellow**, *Contract-Part-time*, The University of Auckland

Deliver lectures and coordinate laboratory sessions for ELECTENG 331: Signals and Systems, covering advanced topics in signal analysis, Fourier and Laplace transforms, linear systems, and real-world applications in communication and control systems.

Design, develop, and lecture COMPSYS 721: Advanced Artificial Intelligence, a postgraduate course focusing on cutting-edge AI methodologies including deep learning, generative models, reinforcement learning, and model interpretability. Responsible for designing projects that integrate theory with applied machine learning and ethical AI practices.

Lead lecturing and curriculum development for COMPSYS 306: Artificial Intelligence and Machine Learning, an undergraduate course emphasizing supervised and unsupervised learning, neural networks, and real-world AI system implementation. Developed new laboratory experiments, tutorials, and assessment materials aligned with modern AI frameworks such as TensorFlow and PyTorch.

Contribute to **course modernization and pedagogical innovation** by introducing project-based learning, AI ethics modules, and real-world data-driven assignments to enhance student engagement and industry relevance.

Supervise and mentor undergraduate and postgraduate students in AI-focused projects, supporting research dissemination through publications and conference presentations.

2024-2025 **Head of Advance AI Research**, *Permanent-Full-time*, Watchful Ltd

Lead the end-to-end design, architecture, and deployment of the company's AI-driven Video Management System (VMS), integrating computer vision, deep learning, and IoT-based edge analytics for intelligent surveillance and situational awareness.

Architect and implement scalable cloud–edge hybrid infrastructures using Docker, Kubernetes, and RESTful microservices, enabling distributed AI inference, event synchronization, and high-availability system uptime.

Direct hardware–software co-design of embedded systems incorporating GPU/TPU acceleration, real-time video streaming protocols (RTSP/ONVIF), and custom firmware development for edge camera units.

Oversee AI model development pipelines for object detection, human re-identification, anomaly detection, and scene understanding using TensorFlow, PyTorch, and OpenCV, optimized for low-latency inference on embedded and cloud environments.

Establish Agile DevOps workflows integrating Git, Asana, and CI/CD pipelines with automated testing, containerized builds, and release management aligned with ISO and cybersecurity compliance standards.

Develop and maintain data pipelines for video ingestion, annotation, and model retraining; implement data versioning and monitoring frameworks using tools such as DVC, MLflow, and Prometheus.

Conduct root-cause analysis, performance profiling, and scalability benchmarking, applying quantitative methods to improve inference speed, fault tolerance, and system throughput.

Manage real-time field deployment and diagnostics for AI-enabled camera systems and networked devices, ensuring secure connectivity through VPN, Teltonika RMS, and FTP-based remote monitoring frameworks.

Lead Proof-of-Concept (PoC) development for enterprise and government clients, integrating Watchful's AI stack with third-party platforms and API-based interoperability layers.

Drive R&D in adaptive learning systems and multi-sensor fusion, pioneering approaches for automated identity verification and predictive threat detection.

Oversee preparation of technical documentation, patents, and research publications, ensuring scientific rigor, reproducibility, and protection of the company's intellectual property portfolio.

Represent Watchful Ltd in national and international AI research consortia, presenting findings on applied machine learning, cybersecurity in IoT systems, and ethical AI governance.

Provide technical direction on power systems, solar integration, and embedded electronics, supporting the hardware division in compliance with IEC and AS/NZS standards.

Mentor and upskill engineers and data scientists in AI algorithm design, MLOps, and embedded AI integration, establishing internal training frameworks and knowledge repositories to sustain innovation.

Implement edge-based federated learning frameworks to enable privacy-preserving model training across distributed surveillance systems.

Lead development of automated incident detection and alerting systems using temporal CNNs and transformer-based architectures, integrated with cloud-based event management dashboards.

Introduce predictive maintenance analytics for camera and network devices using time-series modeling and IoT telemetry data, reducing downtime and service costs.

Collaborate with cybersecurity teams to integrate end-to-end encryption, secure firmware updates, and zero-trust network principles within the AI ecosystem.

Establish partnerships with academic institutions and industry consortia to drive innovation in responsible AI, video data ethics, and standardization of intelligent surveillance technologies.

2023–2024 **Research Fellow**, *Contract-Part-time*, The University of Auckland

Served as a technical consultant and research collaborator for the 3D Shape-Shifting Antennas Project under the Science for Technological Innovation (SfTI) National Science Challenge. Contributed to the design, simulation, and prototyping of reconfigurable antenna systems using smart materials and embedded control, enabling dynamic frequency and radiation pattern adaptability. Supported integration of advanced signal processing and embedded electronics for experimental validation and data acquisition.

Acted as a consultant for the Rongowai Science Payload Project, a collaborative initiative between the University of Auckland and NASA's CYGNSS (Cyclone Global Navigation Satellite System) mission. Worked on the design and optimization of payload electronics, communication interfaces, and embedded control for real-time data collection from GNSS-reflectometry systems. Provided expertise in system calibration, signal analysis, and performance validation for spaceborne and airborne remote-sensing experiments.

2022-2024 **Data Scientist-Identity**, *Permanent-Full-time*, Ministry of Business, Innovation and Employment (MBIE), Immigration New Zealand

Supported the Biometrics and Forensics Functional Group in managing day-to-day identity operations for Immigration New Zealand, including data analysis, model development, and identity verification workflows.

Utilized SQL, SAS, and other database management systems to extract, clean, and manipulate large-scale identity and immigration datasets for analytics and operational reporting.

Conducted advanced data wrangling, modelling, and visualization using R and Python, transforming raw operational data into actionable insights for policy and process improvement.

Provided Subject Matter Expertise (SME) in biometrics and digital forensics, advising on complex identity-matching queries from internal and external stakeholders including New Zealand Police, Interpol, and Customs, as well as requests under the Official Information Act (OIA).

Contributed to the design, development, and maintenance of key identity infrastructure systems, including the Application Management System (AMS), Document Management System (DMS), Identification Management System (IDMe), and the Immigration Biometrics Engine.

Led planning and implementation of the Biometric Capability Update initiative for Immigration New Zealand and the Department of Internal Affairs, ensuring alignment with evolving technology standards and data security protocols.

Development and upkeep of AMS- Application management system, DMS- Document Management System, IDMe - Identification management system and immigration biometrics engine

Provided expert technical advice on network design, cybersecurity architecture, and capability upgrades, supporting robust and secure identity system operations.

Designed and developed automated identity-matching engines leveraging statistical and machine learning methods to enhance visa processing, NZeTA validation, and border movement identity mapping.

Developed manual identity-matching rule sets and performance evaluation models to improve decision accuracy and consistency across immigration operations.

Built and deployed interactive visualization dashboards to communicate analytical insights and model results to senior management and policy teams.

Delivered training and mentorship for new team members and analysts, covering database management systems, biometric workflows, R programming, and digital forensics principles to enhance technical capability across the organization.

2022-2024 **Guest Lecturer**, *Contract-Part-time*, The University of Auckland

Deliver lectures and coordinate coursework for CS306: Machine Learning and Artificial Intelligence, covering fundamental and applied aspects of modern AI systems.

Teach CS704: SystemJ and Distributed Computing, focusing on real-time systems, concurrency models, and large-scale distributed architectures

Lead CS721: Model Evaluation and Performance Analysis, emphasizing advanced model assessment, statistical validation, and optimization in AI and machine learning applications.

Contribute to curriculum development, assessment design, and supervision of research-driven student projects in advanced computing domains.

2019-2021 **Research Technician**, *Contract-Part-time*, The University of Auckland

All responsibilities as above excluding the managerial and specialised research duties

2019-2021 **Graduate Teaching Assistant**, *Contract-Part-time*, The University of Auckland

Assisted in teaching and course coordination for multiple undergraduate and postgraduate courses, including: Fundamentals of Computer Engineering, Artificial Intelligence and Machine Learning, Distributed Cyber-Physical Systems Design, Embedded and Advanced Embedded System Design, Analogue and Digital Design, Electrical and Digital Systems, Electrical Engineering Design, and Radio Engineering and Communication Systems.

Contributed to lecturing, course material preparation, and laboratory supervision.

Designed and evaluated assignments, projects, and examinations.

Supported hardware and software system design, simulation, and testing using industry-standard tools and microcontroller platforms.

Collaborated with faculty and research teams to enhance hands-on learning experiences and promote interdisciplinary project work.

2018-2019 **Senior Research Assistant**, *Contract-Part-time*, Centre for Technology Alternatives for Rural Areas (CTARA), IIT Bombay, India

Designed and developed solar panel systems and microcontroller-based control units for the "1 Million SoULs" (Solar Urja Lamp) national research initiative

Contributed to hardware design, testing, and field deployment of solar energy systems for rural electrification.

Assisted in the development and delivery of academic courses on renewable energy technologies and sustainable engineering practices.

Collaborated with cross-functional research teams to optimize energy efficiency, improve system reliability, and promote affordable solar solutions for rural communities.

2016-2019 **Director**, *Directorship*, Marafel Limited, India

Marafel Solutions was incorporated in 2016 as a software and web development company. The company completed multiple projects and was later acquired by Croadz Design and Development in November 2019 for operations in India as part of a merger and acquisition move.

Business consultancy, website, software as an application (SaaS) development

Software Project Management

2016-2017 **Embedded Systems Developer**, *Contract-Full-time*, Croadz Design and Development, India

Firmware development using C, C++, Embedded C, Java, HTML, MATLAB, and Python

Hands-on experience with microcontrollers (AVR, PIC, ARM Cortex-M, ESP32, Raspberry Pi Pico, Arduino)

VHDL / Verilog programming for FPGA-based system design and simulation

RF system testing, debugging, and validation using spectrum analyzers and network analyzers

PCB design and testing (SMT and through-hole) using Altium Designer, KiCad, Eagle

Real-Time Operating Systems (RTOS) experience (FreeRTOS, Zephyr)

Communication protocol integration: SPI, I^2C, UART, CAN, Modbus, RS-485, Ethernet, BLE, Wi-Fi

Embedded Linux development and cross-compilation for ARM platforms

Signal processing and sensor interfacing (ADC/DAC, IMU, RF front-end calibration)

Expertise

Machine Learning	Extensive experience in developing and deploying AI-driven systems for image and video analytics, including computer vision, deep learning, and pattern recognition. Skilled with YOLOv8, GPT, EfficientDet, ResNet, and transformer-based architectures for detection, segmentation, and multimodal learning. Proficient in TensorFlow, PyTorch, ONNX, and OpenCV for model development, optimization, and deployment on cloud and edge devices. Experienced in transfer learning, federated learning, and model compression for real-time inference.
Biometrics	Specialist in identity management, multimodal biometrics, and digital forensics. Expertise in face, iris, and vascular recognition systems, biometric fusion, and identity verification pipelines. Developed and maintained automated identity matching engines and biometric databases. Experienced in ethical AI governance, privacy-by-design, and data compliance for government identity programs.
Data Science	Comprehensive skills in data engineering, statistical modeling, and machine learning workflow automation. Experienced with Python (NumPy, Pandas, Scikit-learn, Matplotlib, Seaborn), R, and SQL for analytical modeling. Skilled in feature engineering, time-series forecasting, and anomaly detection. Proficient in building interactive dashboards using Power BI, Tableau, and Streamlit for operational insights.
Programming Languages	Strong foundation in C, C++, C#, Java, Python, R, PHP, HTML, SQL, and SystemJ. Experienced with Vue.js and JavaScript frameworks for web applications. Skilled in real-time system programming, microcontroller firmware development, and PLC automation. Proficient in version control (Git/GitHub), continuous deployment using Octopus Deploy, and scalable software delivery with Docker and Kubernetes.
Cloud Platforms	Hands-on experience with Google Cloud Platform (GCP), AWS (SageMaker, Bedrock, Lambda), and Microsoft Azure. Expertise in deploying AI/ML workflows on serverless architectures, configuring API endpoints, and managing GPU/TPU-backed training pipelines. Familiar with Kubernetes clusters, load balancing, data orchestration (Airflow, Kubeflow), and model monitoring.
Systems Integration	Expertise in API integration, RESTful design, webhook automation, and IoT network interfacing. Experienced in integrating video management systems (VMS) using ONVIF, RTSP, and MQTT protocols. Skilled in network configuration, VPN tunneling, remote access management, and secure video stream deployment across distributed architectures.
Operating Systems	Proficient in Windows, Linux (Ubuntu, Debian, CentOS), and macOS. Experienced in shell scripting (Bash, PowerShell), system administration, and automated software deployment on embedded and cloud systems. Skilled in container orchestration and environment virtualization.
Hardware & Embedded Design	Extensive experience in PCB design, sensor integration, and embedded firmware development. Skilled with Altium Designer, KiCad, CST Studio Suite, and LTSpice for RF and analog/digital circuit design. Experienced in microcontroller programming (STM32, PIC, ATmega, ESP32), FPGA prototyping using VHDL/Verilog, and hardware interfacing with SPI, UART, I2C, CAN, and Modbus. Proficient in 3D CAD modeling, rapid prototyping, 3D printing, and laser cutting for custom enclosures.
Signal & Communication Systems	Applied experience in RF systems, radar and sonar design, microstrip antennas, and near-infrared imaging. Familiar with GNSS reflectometry (CYGNSS), SAR data processing, and wireless communication protocols. Conducted experimental validation and simulation using CST, MATLAB, and LabVIEW.
AI Operations (MLOps)	Experienced in setting up and managing end-to-end ML pipelines with DVC, MLflow, Kubeflow, and Airflow. Implemented data versioning, model tracking, and automated testing frameworks. Designed CI/CD pipelines for model deployment, monitoring, and performance benchmarking in production environments.
Engineering Methodologies	Proficient in Agile, Scrum, and Lean methodologies. Skilled in sprint planning, backlog prioritization, and CI/CD integration. Experienced in DevOps workflows for collaborative software–hardware development. Knowledgeable in ISO 27001, IEC 61508, and cybersecurity compliance.
Health & Safety	Strong background in risk management, laboratory safety, and technical hazard mitigation. Implemented H&S frameworks for electrical, RF, and laser environments. Experienced in emergency response coordination and compliance with NZ H&S at Work Act standards.
Research & Innovation	Contributed to multiple national and international research projects in AI, embedded systems, and signal processing. Skilled in grant proposal writing, patent drafting, and preparation of journal and conference publications. Familiar with IP protection, ethical review processes, and academic–industry collaborations.
Software Suites	Proficient in collaboration and productivity suites including Microsoft 365, Slack, Trello, Azure DevOps, Discord, Asana, Retool, and Notion. Experienced in workflow automation, documentation, and project management integration.
Languages	Fluent in English, Hindi, and Marathi. Beginner proficiency in Malayalam and Te Reo Māori. Experienced in cross-cultural technical communication and collaborative international projects.

Other Experience

2019–2022 **Exam Supervisor**, *Contract-Part-time*, The University of Auckland

Supervised university examinations across both large and small venues, ensuring academic integrity, compliance with university regulations, and smooth examination logistics.

2020–2022 **Lifeguard & Learn to Swim Instructor**, *Permanent-Part-time*, Auckland Council

Delivered water safety education and swim instruction for diverse age groups under the Auckland Council Learn to Swim programme.

Supported and trained newly inducted lifeguards and instructors to maintain consistent safety and service standards.

Served as Health and Safety Representative and Fire Warden, ensuring compliance with local council safety protocols.

Handled administrative responsibilities within the Learn to Swim department, including scheduling and attendance management.

Represented Auckland Council for Boatsafe New Zealand initiatives and community outreach programmes.

Certified AUSTSWIM Australia Trainer with active teaching licence.

2019–2021 **Accounts Administrator**, *Contract-Part-time*, St Peter's College, Auckland

Managed accounts and financial records during the student admission period, ensuring accurate and timely processing.

Provided technical support for digital accounting and admissions portals, improving process efficiency and data integrity.

Research Publications

1. J Gong, R Luo, E Wang, L Ge, B Li, **F Marattukalam** and W Abdulla,"*Reshaping the Forward-Forward Algorithm with a Similarity-Based Objective* " arXiv:2509.08697, 2025.
2. **Marattukalam, F** and Watchful Ltd,"*Introducing Monica, Watchful's smart AI Co-Pilot* "Talk delivered at New Zealand Artificial Intelligence Research Group Conference, 2024.
3. Anto, K., **Marattukalam F**, Roop, P. S., and Swain, A. K.,"*Securing the Smart Grid: A Review on Digital Twins for Cyber Resilience* " in IEEE International Conference on Energy Technologies for Future Grids (ETFG) (pp. 1-6). IEEE, 2023.
4. Abdulla, W. H., **Marattukalam F**, and Hahn, V. K. ,"*Exploring Human Biometrics: A Focus on Security Concerns and Deep Neural Networks* " in APSIPA Transactions on Signal and Information Processing, 12(1), 2023.
5. **Marattukalam, F.**, Abdulla, W., Cole, D., and Gulati, P. ,"*Deep Learning-Based Wrist Vascular Biometric Recognition* " in Sensors, 23(6), 3132, 2023.
6. Abeysinghe B. N., James J, Watson C, and **Marattukalam F**,"*Visualising Model Training via Vowel Space for Text-To-Speech Systems* " in Proc. Interspeech, 2022.
7. **Marattukalam F** and Waleed H. Abdulla, ,"*Human Biometrics: A Deep Learning Approach: Tutorial* " in APSIPA ASC, 2022.
8. **Marattukalam F**, David Cole, Pranav Gulati and Waleed H. Abdulla, "*On Wrist Vein Recognition For Human Biometrics* " in APSIPA ASC , 2022.
9. Jesin James, **Marattukalam F**, Owen Eng and Aron Jeremiah, "*EmotionGUI: A Tool to Visualise and Annotate Emotions in a Two-dimensional Space for Multi-modal Data* " in APSIPA ASC, 2022.
10. **Marattukalam, F.**, Abdulla, W.H., Swain, A.K., Wanigasekera, C. and James, J. ,"*Palm Vein Recognition using SVM and CNN: A Comparative Performance Investigation* " In: Transactions on Computational Science and Computational Intelligence, Int'l Conf on Image Processing, Computer Vision and Pattern Recognition, 2021.
11. **Marattukalam, F** and Abdulla, W.H. ,"*Convolutional Neural Networks in Vascular Biometrics* "poster presented at New Zealand Artificial Intelligence Research Group Conference, 2021.
12. **Marattukalam, F**, Abdulla, W.H. and Swain, A.K.,"*N-shot Palm Vein Verification Using Siamese Networks.* "2021 International Conference of the Biometrics Special Interest Group (BIOSIG), 2021.
13. **Marattukalam, F** and Abdulla, W.H.,"*Segmentation of palm vein images using U-Net.* "In Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA ASC), 2020.
14. **Marattukalam, F** and Abdulla, W.H.,"*On palm vein as a contactless identification technology.* "In 2019 Australian & New Zealand Control Conference (ANZCC), 2019.
15. **Marattukalam, F** and Sawant D.,"*Efficient microstrip ring resonator antennas for glucose measurement* "International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET), 2017.
16. **Marattukalam, F** and Sawant D.,"*Single Fold Microstrip Ring Resonator Antenna for Glucometer* "in Proc. Asian Journal For Convergence In Technology (AJCT) ISSN-2350-1146, 2017.

17. Lobo, R. and **Marattukalam, F** ,"*External Tongue Drive System Using Hall Effect Sensors For Medical Applications* "International Journal of Emerging Technology and Advanced Engineering, 2017.

Research Grants, Awards & Scholarships

2024 Speaker and Panelist at the *IEEE ANZSCON 2024* held at Auckland University of Technology, representing the University of Auckland in discussions on Artificial Intelligence, Emerging Technologies, and Industry–Academia Collaboration.

2024 Watchful Ltd Grant to participate in the *SelectUSA Investment Summit*, Maryland, USA awarded to represent the company and pitch AI-driven surveillance technologies to international investors and government agencies.

2024 Watchful Ltd Grant to attend *ISC West*, Las Vegas, USA supported international participation in the world's leading security and AI innovation trade show.

2024 Most Valuable Player Award and Grant at Watchful Ltd for outstanding leadership, cross-team collaboration, and contribution to AI system integration and deployment.

2023 Masters of Engineering Fee Grant awarded to pursue a Master's degree in Data Science at a New Zealand tertiary institution in recognition of academic excellence and professional merit.

2023 DataOps Team Award from Immigration New Zealand for exceptional contribution to Data Operations training and capability development in large-scale data systems.

2023 Joint Targeting and Analytics Team Award for innovative application of Data Vault methods in analytics and operational intelligence for identity management systems.

2023 Faculty of Engineering Best Thesis Nomination (PhD) for exceptional research quality and impact in the field of artificial intelligence and signal processing.

2022 Asia Pacific Signal and Information Processing Association Annual Summit Grant to deliver tutorial on Hand Vascular Biometrics at Chiang Mai, Thailand

2022 Faculty of Engineering Excellence Award, University of Auckland recognising outstanding research and technical service contributions to the faculty's strategic projects.

2022 Faculty of Engineering Professional Staff Excellence Award for leadership and innovation in laboratory management, research operations, and academic support.

2021 Employee Excellence Award, Auckland Council, for exemplary service and safety leadership within the Learn to Swim programme at West Wave Henderson, Auckland, New Zealand.

2021 Doctoral Student Fee Support *Human Vascular Biometric Recognition*, from Callaghan Innovation Ltd

2020 Doctoral Student Fee Support *Human Vascular Biometric Recognition*, from Tellen Systems Ltd

2020 Student Project Excellence Award for the research project *Human Vascular Biometric Recognition*, recognising innovation in applied biometrics and AI systems.

2019 Best Student Paper Award in Signal Processing at the *Australian & New Zealand Control Conference (ANZCC)*, for contributions to applied signal processing and biomedical systems.

2018 Grant for *Medical Image Computing: Machine-Learning Methods and Advanced MRI Applications* certification programme, Indian Institute of Technology Bombay (IIT Bombay).

2017 Research Scholarship for Master's Thesis *Microstrip Resonant Antennas for Non-invasive Blood Glucose Concentration Determination*, supporting advanced work in biomedical RF sensing.

2017 M.Tech Academic Excellence Award for securing the top rank in the cohort, Department of Electronics Engineering, NMIMS, India.

2017 Best Paper Award at the *International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET)* for innovative antenna design research.

2015 B.E. PArt IV Project Grant for the development of an *External Tongue Drive System* enabling wheelchair control for physically challenged users.

2014 Centre for Technology Alternatives for Rural Areas (CTARA) Grant, IIT Bombay — supporting training in rural technology innovation and sustainable energy systems.

2013 IEEE Student Chapter Grant for excellence in embedded systems programming and contribution to technical workshops and community outreach.

2013 Airports Authority of India Grant (Air Traffic Control Department) for organising an industrial visit to study radar communications and air traffic management systems in Mumbai.

2012 Academic Excellence Award for top performance in JAVA and C++ programming, recognising strong algorithmic and problem-solving aptitude.

2011 Prime Minister's Scholarship awarded to pursue a Bachelor of Engineering degree, recognising academic distinction at the national level.

2011 National Defence Academy Scholarship for outstanding academic achievement in science and mathematics at pre-university level.

Service

2025 **Consultant, Office of the Privacy Commissioner, New Zealand**
Served as a consultant for the development of the New Zealand Biometric Processing Privacy Code 2025, providing expertise in biometric data governance, privacy protection, and ethical AI compliance.

2023–present **Member, Royal Society Te Apārangi**
Active contributor to artificial intelligence research initiatives, fostering interdisciplinary collaboration and advancing AI applications across New Zealand.

2022–present **Certified Specialist in Computer Vision for Biometrics, International Civil Aviation Organization (ICAO)**
Accredited specialist in biometric recognition and digital identity systems, focusing on computer vision methodologies aligned with ICAO standards and best practices.

2022–present **Member, First Aid New Zealand**
Certified in first aid and emergency response, supporting safety and wellbeing initiatives within academic and professional environments.

2021–present **Reviewer, IEEE INDISCON; APSIPA Transactions; MDPI Journals**
Regular peer reviewer for leading international conferences and journals in signal processing, artificial intelligence, and communications, ensuring rigorous academic and ethical standards in publications.

2021–present **Active Member, New Zealand Artificial Intelligence Research Association (NZAI); IEEE; APSIPA; Digital Identity NZ; European Association for Biometrics (EAB)**
Engaged in AI ethics, biometrics research, and digital identity development across Asia-Pacific and international communities; contributing to initiatives promoting responsible and transparent AI innovation.

2019–2023 **Member, Men for WEN (Women in Engineering Network), University of Auckland, New Zealand**
Mentored early-career engineers and supported initiatives that encourage gender diversity, inclusivity, and leadership development in STEM fields.

2019–2020 **Buddy Leader, University of Auckland**
Guided new international students in academic and cultural integration, promoting peer engagement and a supportive university community.

2016–2020 **Alumni Governing Board Member, St. Francis Institute of Technology, India**
Collaborated with institutional leadership to strengthen alumni engagement, foster industry partnerships, and organize mentoring sessions for undergraduate engineering students.

2017–2019 **Executive Committee Member, Social Action and Community Support, Bombay Catholic Organization**
Organized social outreach and community development initiatives focused on youth education, digital literacy, and social welfare programs in underprivileged communities.

Supervision

2025 **Summer Research**, *Julie Kang, Deep Learning-Based Hand Vascular Biometric Recognition System*, Co-supervisor

2025 **ME(Hons)**, *Charlie Wu, Vision Transformer for Vascular Biometrics*, Co-supervisor

2025 **PhD**, *Jinhui Li, AI-Powered Wildfire Detection: Enhancing Emergency Response through Remote Sensing*, Advisor

2024 **PhD**, *Merlin Steffi Manohar, Hand Vein Vascular Biometric System*, Advisor

2024 **Summer Research**, *Christopher Jensen, Visualising Spectrograms of a Speech Signal*, Co-supervisor

2023 **BE(Hons)**, *Sunny Choi, Let's See Some Emotions – Emotional Speech Visualisation and Annotation*, Co-supervisor

2023 **BE(Hons)**, *Enuri Kolugala, Let's See Some Emotions – Emotional Speech Visualisation and Annotation*, Co-supervisor

2022 **ME(Hons)**, *Binu Abeysinghe, Visualising Model Training via Vowel Space for Text-To-Speech Systems*, Advisor

2022 **MEngSt**, *Siwei Yang, Code-Switching Detection and Tagging System for Te Reo Māori and English*, Advisor

2022 **BE(Hons)**, *Pranav Gulati, Deep Learning Based Contactless Wrist Vascular Biometric Recognition System*, Co-supervisor

2022 **BE(Hons)**, *David Cole, Deep Learning Based Contactless Wrist Vascular Biometric Recognition System*, Co-supervisor

2022 **Summer Research**, *Kaustubh Shukla, Seeing Emotions: Developing and Testing an Emotion Annotation Tool*, Co-supervisor

2021 **BE(Hons)**, *Sky Nguyen, Predicting Human Emotions from Speech via Deep Learning*, Advisor

2021 **BE(Hons)**, *Siwei Yang, Predicting Human Emotions from Speech via Deep Learning*, Advisor

2021 **Summer Research**, *Owen Eng, Seeing Emotions: Developing and Testing an Emotion Annotation Tool*, Co-supervisor

2020 **MEngSt**, *Sabyasachi Roy, Text-to-Speech Synthesizer for New Zealand English*, Advisor

2020 **Summer Research**, *Sabyasachi Roy, "Let's Speak Emotionally": Developing an End-to-End Emotional Speech Synthesis System Using Machine Learning*, Co-Supervisor

2020 **BE(Hons)**, *Binu Abeysinghe, Classifying the Subtle Emotions: Machine-Learning-Based Emotion Classification System for Secondary Emotions*, Advisor

2020 **BE(Hons)**, *Gavin Cao, Classifying the Subtle Emotions: Machine-Learning-Based Emotion Classification System for Secondary Emotions*, Advisor

2020 **BE(Hons)**, *Babra Ajaz, Developing a High-Resolution Palm Vein Image Scanner Using Near-Infrared Camera for Applications in Biometric Systems*, Co-supervisor

2020 **BE(Hons)**, *Muhammad Azizul Islam, Developing a High-Resolution Palm Vein Image Scanner Using Near-Infrared Camera for Applications in Biometric Systems*, Co-Supervisor

Personal Skills

Excellent interpersonal and leadership abilities, with experience mentoring teams, coordinating research groups, and managing multidisciplinary projects across academic, research, and industrial domains.

Strong negotiation and communication skills, enabling effective conflict resolution, stakeholder alignment, and cross-functional collaboration between technical and operational teams.

Proven capability to analyse complex engineering and research problems, define structured methodologies, and establish new processes where no prior frameworks exist.

Highly developed critical thinking and analytical reasoning skills, with a logical and data-driven approach to problem solving and technical decision-making.

Exceptional time management and prioritization, capable of leading concurrent research, teaching, and development projects while maintaining consistent output and quality.

Demonstrated ability to both lead and collaborate effectively within diverse, cross-disciplinary teams under dynamic project and research environments.

Open-minded and receptive to constructive feedback, maintaining professional integrity and adaptability in response to evolving project requirements or challenges.

Strong self-management and initiative, with the ability to independently plan, execute, and deliver outcomes within defined goals and deadlines.

Committed to lifelong learning and continuous professional development, staying current with emerging technologies, research methodologies, and international best practices.

Excellent presentation and technical writing skills, with experience delivering seminars, lectures, and research findings to both expert and non-expert audiences.

Strong mentoring and supervision skills, guiding undergraduate and postgraduate students through research design, experimentation, data analysis, and academic publishing.

Proficient in translating complex technical concepts into accessible communication for diverse audiences, including management, industry stakeholders, and policymakers.

Demonstrated innovation and creativity in research, product design, and problem-solving, driving the development of novel technical solutions and intellectual property.

Experience in multicultural and interdisciplinary work environments, fostering collaboration and inclusivity across international research and engineering teams.

Strong ethical grounding and understanding of responsible research and innovation (RRI), ensuring compliance with data privacy, health and safety, and academic integrity standards.

Capable of strategic thinking and long-term vision planning, aligning technological advancement with institutional and societal goals.

Effective in stakeholder management and partnership development, supporting funding proposals, joint ventures, and academic–industry collaborations.

Resilient under pressure, maintaining composure and focus during high-stakes operations, deadlines, or crisis management situations.

Enthusiastic and passionate about technology-driven innovation, fostering a culture of curiosity, learning, and continuous improvement within teams.

Relevant Information

Work Eligibility: Full rights to work in New Zealand

Drivers Licence: **Class 1 and Class 6** full drivers license with own vehicle

References

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Other Available on request

Links

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