Yit Hong **Choo (Kelvin)**

Research Fellow - Operations Analytics

Geelong, Victoria, Australia

kelvinchoo_96@hotmail.com | kelza23.github.io | kelvinchoo-iisri

"Everything you don't know is something you can learn."

Summary

With a robust foundation in Operations Analytics and a Doctor of Philosophy in Engineering, I excel at harnessing data to illuminate the path forward for strategic decision-making and initiative delivery. I have collected, analysed, and synthesised data from diverse data sources to support organisational strategies through evidence-based research. This has not only enriched the strategic initiatives I have led but also enhanced the operational efficiencies of complex systems within transportation networks. I thrive on transforming intricate data sets into compelling narratives that guide internal and external stakeholder decisions, leveraging my comprehensive background in machine learning and optimisation techniques. My research work in machine learning and optimisation algorithms exemplifies my capacity to influence decision-making and evaluate outcomes with precision and creativity. As a speaker at international conferences and a published author, I have refined the art of communicating complex findings to varied audiences, cementing my role as a trusted advisor in the engineering and analytics community. I am eager to explore opportunities that allow me to apply my expertise and drive innovation in the engineering domain.

Education

Institute for Intelligent Systems Research and Innovation (IISRI), Deakin University

Geelong, Australia

Doctor of Philosophy (Engineering) — *Jan. 2020 - Aug. 2023*

- Spearheaded an extensive research project focused on enhancing the efficiency of Integrated Operation Centres (IOCs) within complex transportation networks.
- Pioneered the development of state-of-the-art optimisation algorithms and machine learning models tailored to address real-world challenges in the transportation sector.
- Conducted groundbreaking research in the realm of human-computer teaming, resulting in the creation of a framework that significantly improved the effectiveness of traffic monitoring, scheduling, and maintenance tasks, paving the way for next-generation IOCs.
- Received invaluable financial and industrial support from Rail Manufacturing CRC in PhD research, https://rmcrc.com.au/yit-hong-choo/
- Produced comprehensive reports, authored scientific papers, and successfully published research findings in esteemed journal articles.
- Actively contributed to the academic community by presenting critical analyses and research results at various domestic and international conferences.

UCSI University & Deakin University

Malaysia & Australia

Bachelor of Civil Engineering (Honours) — *May. 2015 - Oct. 2019*

- Completed the prestigious International Degree Programme (IDP) offered by UCSI University, allowing for seamless transfer to Deakin University, Australia.
- Utilised AutoCAD extensively for structure drawing, ensuring precise and accurate representation of engineering designs while complying with industry standards and guidelines.
- Actively collaborated with fellow students in team-based engineering projects, engaging in discussions and problem-solving sessions to ensure project success and alignment with established criteria and standards.
- Distinguished final year project focused on "Water Treatment with Plant-Based Materials," which garnered recognition from the School of Engineering at Deakin University. https://www.deakin.edu.au/engineering/showcase
- Investigated the efficacy of utilising locally available plant materials in Victoria for the removal of heavy metals from water, emphasising the potential for a cost-effective and sustainable water treatment approach.

UCSI University

Malaysia

Foundation of Science (Engineering) — *May. 2015 - Oct. 2019*

- Successfully completed the comprehensive program and acquired a strong academic foundation in the sciences and engineering disciplines.
- Collaborated closely with group mates on various engineering projects, fostering teamwork and ensuring alignment of design and drawings with project criteria and established standards.
-
- Gained practical experience in adhering to industry standards and guidelines, ensuring design accuracy and compliance through the utilisation of AutoCAD software for structure drawing.

Experience

Institute for Intelligent Systems Research and Innovation (IISRI),Deakin University

Geelong, Australia

Research Fellow - Operations Analytics — *Aug. 2023 - Present*

- Engaging collaboratively across disciplines to develop data-driven research projects, directly informing strategic initiatives aimed at enhancing operational efficiencies.
- Initiating, designing, and conducting intra- and inter-disciplinary research collaborations, to enable major breakthroughs in knowledge and understanding and solutions to complex problems.
- Taking charge of initiating, designing, conducting, and leading industry partnerships and collaborations to facilitate groundbreaking solutions that can be translated into real-world impact.
- Supervising HDR students with timely completions and productive, high quality outcomes.

School of Engineering, Deakin University

Geelong, Australia

Research Assistant — *Nov. 2019 - Dec. 2019*

- Extended my final year project research to adopt an established methodology for analysing the ability of plant materials to remove heavy metals from wastewater.
- Discovered and identified new Australia native plant materials with the capabilities to adsorb heavy metals.

City of Greater Geelong

Geelong, Australia

Program Delivery - Student Engineer — *Dec. 2018 - Nov. 2019*

- Developed and implemented engineering solutions that significantly improved infrastructure safety and efficiency, demonstrating a direct impact on operational practices.
- Managed multiple civil construction projects from initial planning to completion, ensuring on-schedule delivery within budget constraints and compliance with quality standards.
- Excelled in stakeholder communication, aligning project objectives with community expectations and municipal regulations.
- Created a tool that helps with selecting the appropriate thickness for maintaining asphalt roads and estimating the associated costs.
- Utilised asphalt road data to develop road maintenance plan and calculate maintenance costs.

Projects

Classification of Inflammatory Gene Expression Patterns with Machine Learning Models

Geelong, Victoria

PhD Student — *Apr. 2023 - Apr. 2023*

- Analysis of inflammatory gene expression patterns in the parietal cortex (PCx) and temporal cortex (TCx) from a human brain RNA-seq data set.
- Aimed to derive insights into underlying mechanisms associated with dementia.
- Used five machine learning and statistical methods to classify inflammatory gene expression patterns associated with dementia.
- Our study revealed better gene expression data classification results using PCx-related gene patterns, as compared with those from the TCx.
- This study is presented at 2023 IEEE The 4TH International Conference on Pattern Recognition and Machine Learning (PRML 2023)

Optimising Network Intrusion Detection Systems with Ensemble Multi-objective Harris' Hawks Optimiser

Geelong, Victoria

PhD Student — *Nov. 2022 - Dec. 2022*

- Trained the network intrusion detection systems with UNSW-NB15 dataset.
- Utilised well-known decision tree classifier to classify the normal network activity and network anomalies.
- Improved the machine learning model with Ensemble Multi-objective Harris' Hawks Optimiser to minimise the number of features and maximise the model accuracy.
- The model is presented at Defence and Security Symposium 2022.

Decision Support Tool for Rollingstock Maintenance

Auburn Maintenance Centre, NSW

PhD Student — *Jan. 2020 - Dec. 2022*

- Led the development of a decision support tool that uses machine learning and optimisation algorithms to improve maintenance operation schedules and enhance efficiency.
- Expertly collected and analysed historical maintenance data to create predictive maintenance models.
- Leveraged Python libraries such as pandas, sklearn, and matplotlib to conduct data analysis, prediction, and visualisation.
- Employed Harris' Hawk Optimisation to enhance predictive models by optimising feature selection and maximising accuracy.
- Successfully predicted brake maintenance durations, contributing to effective maintenance scheduling.
- Conducted regular stakeholder meetings to gather critical information, business rules, constraints, and requirements.
- Formulated mathematical models for multi-objective optimisation of maintenance scheduling tasks.
- Developed a simulation-based optimisation model and utilised What-if scenario analysis to evaluate the schedule.
- Made significant contributions to the improvement of rollingstock maintenance operations, ensuring efficiency and reliability.

Skills

Technical Skills	Optimisation Algorithms, Machine Learning Algorithms, Statistical Analysis, Predictive Analysis
Programming & Typesetting	Python, LaTeX, Markdown, HTML
Data Analysis & Visualisation	Pandas, NumPy, Matplotlib, Seaborn, Tableau, PowerBI
Software & Tools	Scikit-Learn, SciPy, TensorFlow, PyTorch
Microsoft Office Suite	Word, Excel, PowerPoint
Languages	English, Mandarin, Cantonese, Bahasa (Malay)

Writing

Enhancing the Harris' Hawk Optimiser for Single- and Multi-Objective Optimisation

Journal

First and Corresponding Author — *Published - 2023*

- This paper proposes an enhancement to the Harris' Hawks Optimisation (HHO) algorithm to solve single- and multi-objective optimisation problems.
- https://doi.org/10.1007/s00500-023-08952-w

Optimisation of Multi-Objective Rolling Stock Maintenance Scheduling with Harris' Hawk Optimiser

Conference Paper

First and Corresponding Author — *Published - 2023*

- This paper proposes an enhanced multi-objective Harris' Hawk optimiser to devise the maintenance schedules subject to various competing objectives based on information derived from a rolling stock maintenance company.
- http://doi.org/10.1109/IAICT59002.2023.10205863

Enhancing the Whale Optimisation Algorithm for Single- and Multi-objective problem

Journal Paper

Co-author — *Published - 2023*

- This paper proposes a novel enhanced Whale Optimisation Algorithm (EWOA) to solve single- and multi-objective optimisation problems.
- https://doi.org/10.1007/s00500-023-09351-x

Classification of inflammatory gene expression patterns with machine learning models

Conference Paper

Co-Author — *Published - 2023*

- This paper focuses on the analysis of inflammatory gene expression patterns in the parietal cortex (PCx) and temporal cortex (TCx) from a human brain RNA-seq data set using machine learning algorithms.
- https://doi.org/10.1109/PRML59573.2023.10348265

A Clustering-Based Whale Optimisation Algorithm for Multi-Objective Flexible Job Shop Problems

Conference Paper

Co-Author — *Published - 2023*

- This paper introduces the C-MOEWOA, a specialised clustering-based Whale Optimisation Algorithm for tackling Multi-Objective Flexible Job Shop Problem (MOFJSP).
- https://doi.org/10.1109/IoTaIS60147.2023.10346077

Multi-Objective Flexible Job-Shop Scheduling with an Ensemble Optimisation Model

Conference Paper

First and Corresponding Author — *Published - 2022*

- This paper proposes an ensemble-based Harris' Hawk Optimisation (EN-HHO) model to create an efficient scheduling system that can minimise the production cost and maximise machine utilisation in the era of Industry 4.0.
- http://doi.org/10.1109/IEACon55029.2022.9951770

Conversion of Agricultural Wastes into Biochar and Its Characteristics

Book Chapter

Co-author — *2021*

- This book chapter provides an elaboration on the agricultural productivity, resources, and waste management of Asian countries particularly on high-value crops such as rice, corn, pineapple, coconut, sugarcane, and oil palm.
- https://doi.org/10.1007/978-981-16-4059-9_12

Conferences & Talks

Conferences

IEEE International Conference on Industry 4.0, Artificial Intelligence, and Communications Technology (IAICT) — *Presenter*
Bali, Indonesia — *Jul. 2023*

Defence and Security Symposium — *Presenter*
Melbourne, Australia — *Dec. 2022*

IEEE Industrial Electronics and Applications Conference (IEACon) — *Presenter*
Kuala Lumpur, Malaysia — *Oct. 2022*

Horizons Program 4.0 - Shaping the Technical Future of Rail — *Participant*
Melbourne, Australia — *Mar. 2022*

Talks

UCSI University Academic Talk Series — *Speaker*
UCSI University KL Campus, Malaysia — *Feb. 2024*

Unlocking the Dilemma of AI Existence - Challenging Threats or Seizing Opportunities — *Speaker*
Institut Teknologi Telkom Purwokerto, Indonesia — *Dec. 2023*

Intelligent Data Analytics with Artificial Intelligence Models — *Speaker*
Monash University, Malaysia — *Jan. 2023*

Advances and Applications of Artificial Intelligence — *Speaker*
TAR UMT, Malaysia — *Jan. 2023*

Supervision

Zheng Cai

Institute for Intelligent Systems Research and Innovation (IISRI), Deakin University — *Supervision*

Doctor of Philosophy - Engineering — *2020 - Present*

- Thesis topic: *"Integrating Whale Optimisation ALgorithm, Neural Networks, and Bayesian Optimisation for Advanced Black-box and Digital Twins Solutions"*
- Explore the combined potential of WOA, Neural Networks, and Bayesion Optimisation for black-box and digital twins scenarios.
- Design and evaluate a hybrid model to harness the strength of these techniques.

Master of Engineering - IISRI

- Thesis topic: *"Enhanced Whale Optimisation Algorithms and Their Applications to Real-world Problems"*
- A Clustering-based multi-objective enhanced WOA (CMOEWOA) model is proposed to solve real-world problems such as mechanical engineering design problems and scheduling problems.

Honours Project

- Thesis topic: *"An Enhanced Whale Optimisation Algorithm for Real-Life Multi-Objective Scheduling Problems"*
- Developed and evaluated the proposed Enhanced Whale Optimisation Algorithm (EWOA) for multi-objectives scheduling problems.

Internship

- Solving maintenance scheduling problem by developing optimisation algorithms and simulation models.

Extracurricular Activity

Ultimate Victoria
Victoria, Australia

Ulti-mates Coach/Victorian U22 Coach — *Jan. 2021 - Present*

- Recently promoted to the Head Coach position for the Victorian U22 team for 2023, demonstrating leadership and expertise in coaching strategies and player development.
- Fostering sportsmanship, inclusiveness, and enjoyment of Ultimate Frisbee among primary and secondary school children as an Ulti-mates Coach.
- Assisting in preparing the Victorian U22 team for competition by developing and executing training programs, devising game strategies, managing player performance, and ensuring effective team dynamics.
- Providing constructive after-action reviews, feedback, and guidance to players for continuous improvement based on training sessions and game observations.
- Participating in the selection process for the 2022 and 2023 Australian Under-22 "Green and Gold" merit teams, showcasing skills in talent evaluation and team formation.

Geelong Mudlarks Ultimate Frisbee Club
Geelong, Australia

Treasurer/Active player — *Sep. 2017 - Present*

- Managing all financial matters of the club, including budgeting, expenses tracking, and financial reporting.
- Competing in the Australia Ultimate Championship, demonstrating commitment to high-level performance and teamwork.
- Contributing to the club's success as a three-peat champion in 2018, 2021, and 2022, showcasing consistency and dedication to excellence.
- Actively seeking sponsorship opportunities to support the club's growth, enhance its resources, and foster long-term partnerships with local businesses and organisations.

UCSI University Student Council
UCSI University, Malaysia

Sport Director — *May 2015 - Dec. 2016*

- Chaired monthly meetings with club members to collaboratively discuss and strategize the club's future plans, address needs, and set goals for growth and development.
- Organised and executed promotional events to raise awareness of the sports club within the university community.
- Engaged students and staff in club activities and fostered a sense of camaraderie and school spirit.

UCSI Hurricane Ultimate Frisbee Club
UCSI University, Malaysia

President/Founder/Captain — *May 2015 - Dec. 2016*

- Planned and coordinated training sessions for the team and leading the team in tournaments.
- Organised inter-university competition to help club members improve their skills and enhance exposure.
- Chaired meetings with committee members to formulate and strategise the club's future plans.

UCSI Facilitation Program
UCSI University, Malaysia

Facilitator/Committee member — *Jan 2015 - Dec. 2016*

- Engaged with external industries and partners to provide support and sponsorship for our events.
- Planned and distributed tasks among the facilitators for delivering programs.
- Chaired meetings with other members and facilitators to ensure the program runs smoothly before an event.

Memberships

Present	**Graduate Member**, Engineer Australia	*Australia*
Present	**White Card Holder**, WorkSafe Victoria	*Australia*
Present	**Level 2 First Aid**, St John Aumbulance Australia	*Australia*
Present	**UA Level 2 Development Coach**, Ultimate Australia	*Australia*