Yit Hong **Choo (Kelvin)**

RESEARCH FELLOW - OPERATIONS ANALYTICS

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

Summary

I am an engineering professional with a strong interest in decision support systems, optimisation, and machine learning. I have experience in solving complex problems related to transportation networks and currently work as a Research Fellow in Operations Analytics at the Institute for Intelligent Systems Research and Innovation (IISRI) in Deakin University. My area of expertise involves utilising optimization and machine learning techniques to address complex, real-world problems, with the ultimate goal of enhancing human decision-making processes. I hold a Doctor of Philosophy (Engineering) degree from Deakin University, with a research focus on optimising complex transportation networks. Going forward, I am excited to explore decision support systems for improving human performance, using my experience and passion to drive engineering advancements.

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.
- 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 at UCSI University.
- Acquired a strong academic foundation in the sciences and engineering disciplines.
- This program has provided me with essential knowledge and skills for my academic and professional pursuits.

Experience

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

RESEARCH FELLOW - OPERATIONS ANALYTICS *Aug. 2023 - Present*

- Engaging collaboratively to develop novel and high-quality research or creative activities.
- 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*

- Undertook engineering related projects involving formulation, generation and assessment of solutions.
- Investigated and liaised with members of the community for solving problems related to infrastructure.
- Prepared cost estimation and concise work instructions and guidelines for effective problem-solving.
- 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*

- Spearheaded the development of a comprehensive decision support tool for rollingstock maintenance scheduling.
- 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.

Conferences

INTERNATIONAL

| 2023 | **Presenter/Participant**, 2023 IEEE International Conference on Industry 4.0, Artificial Intelligence, and Communications Technology (IAICT 2023) | *Bali, Indonesia* |
| 2022 | **Presenter/Participant**, 2022 IEEE Industrial Electronics and Applications Conference (IEACon 2022) | *Kuala Lumpur, Malaysia* |

DOMESTIC

| 2022 | **Presenter/Participant**, Defence and Security Symposium | *Melbourne, Australia* |
| 2022 | **Participant**, Horizons Program 4.0 - Shaping the Technical Future of Rail | *Melbourne, Australia* |

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

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 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.

Skills

Programming & Typesetting	Python, Java, LaTeX, Markdown
Data Analysis & Visualisation	Pandas, NumPy, Matplotlib, Seaborn, Tableau
Machine Learning	Scikit-Learn, TensorFlow, Keras, PyTorch
Microsoft Office Suite	Word, Excel, PowerPoint
Languages	English, Mandarin, Cantonese, Bahasa (Malay)

Memberships

Present	**Graduate Member**, Engineer Australia	*Australia*
Present	**White Card Holder**, WorkSafe Victoria	*Australia*
2016	**Trainee**, Construction Industry Development Board (CIDB) Malaysia	*Malaysia*