

Victor Ma Chun Tak

Mechanical Engineering (Beng)

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A passionate Mechanical Engineering student currently studying at Swansea University who has actively engaged in various projects to satiate curiosity and enhance skills ranging from building a race car to researching optimal bolt configurations for a universal TV mount. I am eager to grow as an engineer and am committed to delivering high-quality work. Looking forward to starting a career in the dynamic field of engineering while contributing to the success of the company.

Education

Mechanical Engineering (Beng), Swansea University

Sep 2020 - Jun 2024

Course module includes Material Engineering, Fluid Mechanics, Thermodynamics, Manufacturing Technology, Engineering Analysis, Control System, Critical Logic, Engineering Mechanics, Strength of Materials, Robotics, Control System, Dynamics, Stress Analysis, Circuit Analysis, Heat Transfer, ...
2.1* Class average as of now

Hong Kong Baptist University Affiliated School Wong Kam Fai Secondary School

Sep 2014 - Jun 2020

- A-levels: Maths(A), Chemistry(C), Physics(D)
- IELTS (English as second language): Listening(9), Reading(8), Writing(7), Speaking(7)

Position of Responsibility

Powertrain Researcher (Formula Team of Swansea University)

Sep 2022 - Jun 2023

Nominated to be part of the formula team required me to work with the team under stressful competition conditions. Building a race car also gave me insight to the practical side of engineering. To do extra research while dealing with the workload of engineering course helped me develop time management skills and be a more efficient learner.

Academic Support (Hong Kong Baptist University Affiliated School)

Sep 2018 - Jun 2019

As a teaching ambassador academic tutoring is the objective, our team consist of 4 are entrusted to mentor a classroom full of junior students during study periods after school. Coaching students help me become more understanding and kinder.

Master Librarian (Hong Kong Baptist University Affiliated School)

Sep 2017 - Jun 2018

Retaining order in the school library is a major responsibility as a librarian. We are also tasked with organising the books and cataloguing library resources for 4 hours a week, overseeing six other librarians in my team as the master librarian helped me become more critical in decision making and a more impactful communicator. While being a librarian, work ethic was crucial as it was taking up my free time. I also learned how to be patient and compassionate when dealing with troublemakers in the library.

Interest

- Joined the St John Ambulance cadet in 2016 and went on multiple competitions with the team, this enriching experience has driven me to be a better collaborator and a compliant worker. Additionally, having took the first aid course in 2017 and **Qualified as an Emergency First Aider**. As a St John Cadet, **volunteering in hospitals and elderly homes** has made me more empathetic.
- **ABRSM-certified level 5 pianist** with merit in level 5 musical theory,
- As a consistent **gym enthusiast**, monitoring the gym progress regularly helped instil a healthy and persistent mindset.

Relevant Experience

Being part of the Formula Team of Swansea University. The intake manifold is optimized to make it more efficient. This research required extensive knowledge of fluid mechanics, engineering mechanics/analysis, calculus, 3D modelling and MATLAB coding.

- Tailored Mass conservation and energy balance equation is used to find the flow velocity and induced pressure throughout the manifold.
- Solved Colebrook equation alongside Picard-Lindelof theorem for the friction factor as well as head loss.
- Developed practical experiment consisting of a hair dryer on the intake valve and a vane meter on the runners to measure experimental mass flow rate.
- Optimised internal volume using the difference between experimental and theoretical air flow velocity while drag is reduced by utilising a shape with lower drag coefficient. New volume is 0.00353 m² with half the drag.
- Based off flow simulations on the new design, deploying Poiseuille Law the deduced flow improvement is about 0.33%.
- Developed MATLAB and excel coding to streamline design process.
- Utilised SolidWorks for 3D model final design and Stress analysis to obtain safety factor, which is a healthy 16 units.

My dissertation for Mechanical engineering (BEng) is to reimagine the *Tilt-Rotor Technology on Quadrotor Drones for Omnidirectional Stability*. Basic understanding of Control System, Rotor-dynamics, Fluid-Mechanics, Robotics, Single-Variable Calculus and MATLAB is required.

- SolidWorks is used for 3D Modelling of the initial design of the drone, this provides basic geometric parameters.
- Actuator Disk Theory and Blade Element Theory for rotor design and flight data.
- Single-variable calculus is applied to derive thrust from joint configuration.
- Inverse Kinematics created with thrust equilibrium analysis is used to generate a Motor Mixing Algorithm.
- PID and MRAC are investigated to optimise the stabilisation system.
- Develop a Trajectory Algorithm using MATLAB, the trajectory algorithm is used to test the control accuracy of the Kinematics.
- Final result analysis shows that the drone is capable of Levelled Flight, but shows angular inaccuracies when performing rotational manoeuvres.
- Developed an Arduino-based Robot simulating the control system, ensuring sub-50 ms response time for joint configurations from joystick controller input.

Reference

Academic Mentor

Swansea University

Professor Augustine Egwebe, PhD, MIET, FHEA

Programme Director, Engineering Foundation Programme

Faculty of Science and Engineering

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