

TRACK 2: UAV

“DEVELOPMENT OF FIXED-WING VERTICAL TAKEOFF AND LANDING UNMANNED AERIAL VEHICLE MODEL”

BY

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ABSTRACT

Research and development of vertical take-off and landing (VTOL) unmanned aerial vehicles (UAV) have been significantly increasing over the past decade as more industries are taking advantage of these technologies for various commercial applications. This work aims to develop a fixed-wing VTOL UAV model to solve the challenges of conventional multirotor aircraft having limited flight time and range, and conventional fixed-wing aircraft requiring runways for take-off and landing. The aircraft configuration employs the use of canards with two forward tilting rotors and a fixed rear rotor for both vertical and horizontal flight. To prove the feasibility of the design, the initial design has undergone computational fluid dynamics optimizations and a 1:7 scaled skeletal model was built for wind tunnel and stability testing. The next phase involves the further aerodynamics and structural optimizations of the initial design and the manufacturing of a scaled working model with the implementation of a flight control system for actual flight testing. The design methodology will be discussed extensively to indicate the flight performance and characteristics of the model. This new design of the fixed-wing VTOL UAV has huge potential to spark the development of commercial air vehicles which can revolutionize the aviation industry.

BIOGRAPHY OF SPEAKERS



LIM Kin Yip, Shawn developed an early interest in aerospace engineering that spurred him to study a course in Aerospace Technology at Ngee Ann Polytechnic. After completing his diploma, his interest and curiosity grew which led him to study a bachelor's degree in aerospace engineering at Nanyang Technology University where he is currently a student in his final year. His aspiration is to become an aerospace engineer as it has been his passion to be in the field of aviation. He is a highly driven and self-motivated individual with strong desires to achieve excellence in the areas he endeavors to do. He was an intern at A*STAR-ARTC and DSTA where he worked on projects involving aircraft manufacturing and design. He enjoys taking on challenging and rewarding projects that promote his professional growth and to utilize his knowledge, skills and innate interest in designing and innovating to discover new technologies.



FOO En Kyi is a final year student studying Aerospace Engineering at Nanyang Technological University (NTU). En Kyi also attended Delft University of Technology for a semester in her penultimate year. She was an intern at DSTA in the Simulation and Testing department, where she gained experience in numerical modelling and developing modelling methodologies in various threat scenarios. This sparked her interest in the usage of simulation tools, and she aims to further her knowledge in this field. For this project, she will be focused on the optimization aspect of the VTOL. In her spare time, she enjoys exploring new places, travelling and playing softball.

BREAKOUT SESSION



LEE Wen Jie, Alvin is currently a Year 4 undergraduate pursuing B.Eng. in Aerospace Engineering at Nanyang Technological University (NTU), working on the development of a flight control system for the fixed-wing VTOL UAV, as part of his Final Year Project. Alvin was an intern at Singapore Aero Engine Services Limited (SAESL) for his Year 3 Professional Internship, where he worked closely with the Repair Capability Acquisitions Team in implementing smart manufacturing technologies to advance SAESL's Maintenance, Repair and Overhaul (MRO) business. Beyond work and academics, Alvin devotes his waking hours to family, friends, rock climbing, breakdancing, practicing Brazilian jiu-jitsu, playing floorball, et cetera, et cetera, and spends his sleeping hours thinking about what else to do next. Always open to new experiences and forever eager to learn, Alvin looks forward to what the future of engineering would hold.

CO-AUTHORS

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