⌈ARJIT SETH⌋

http://godot-bloggy.tech/

Email: aseth@ust.hk

EDUCATION

Hong Kong University of Science and Technology — Clear Water Bay, Hong Kong
Master of Philosophy (MPhil) - Mechanical Engineering (Aerospace); CGA: 3.75/4.3 — *Sep. 2018 – Sep. 2020*

Manipal Institute of Technology — Manipal, Karnataka, India
Bachelor of Technology (B.Tech.) - Aerospace Engineering; CGPA: 7.59/10.00 — *Aug. 2014 – May 2018*

Symbiosis International School — Pune, Maharashtra, India
International Baccalaureate - Diploma Programme; Results: 37/45 — *Aug. 2011 – May. 2013*

PUBLICATIONS

[1] Madhusudanan, Vinay, **Seth, Arjit**, and G. Sudhakara. **2019a**. "Descending Endomorphisms of Groups". In: *4th Alterman Conference-cum-Workshop on Computational & Geometric Algebra, and Workshop on Kähler Calculus*.

[2] **Seth, Arjit** and Liem, Rhea. **2019b**. "Hydrofoil Conceptual Design and Optimization Framework for Amphibious Aircraft". In: *AIAA Aviation 2019 Forum*, p. 3552.

[3] **Seth, Arjit** and Liem, Rhea. **2018**. "Takeoff analysis of amphibious aircraft with implementation of a hydrofoil". In: *Structures18 - The 2018 Structures Congress*. Incheon, Korea.

SOFTWARE AND PROGRAMMING KNOWLEDGE

Software: OpenFOAM, MATLAB, ANSYS, CATIA, SolidWorks, XFOIL, OpenMDAO, DAFoam

Languages: C++, Fortran, Python, Julia, Haskell, Lua, Bash, LaTeX

EXPERIENCE

OCTAD Lab, Hong Kong University of Science and Technology — Clear Water Bay, Hong Kong
M.Phil Candidate Researcher under Professor Rhea LIEM, Ph.D — *Sep. 2018 - Sep. 2020*

Amphibious Aircraft Design Framework:

- Developing a conceptual design and sizing framework for amphibious aircraft using OpenMDAO.
- Investigating and optimising aircraft stability in the water-takeoff regime.
- Minimising hull drag during water-takeoffs with the use of hydrofoils.
- Generating surrogate models for hydrofoils via CFD analyses in OpenFOAM.

Studentship of HKD 410,000 awarded for the programme.

Hong Kong University of Science and Technology — Clear Water Bay, Hong Kong
Visiting Research Intern under Professor Rhea LIEM, Ph.D — *Feb. 2018 - Jun. 2018*

Investigation of Hydrofoils for Amphibious Aircraft:

- Developed code for water-takeoff analysis in Python.
- Automated meshing and CFD analyses of airfoils and hydrofoils in ANSYS using Python.
- Performed aerostructural analyses of a wing for an amphibious aircraft.

Centre for Avionics, Manipal Academy of Higher Education — Manipal, India
Research and Development Intern – Aircraft Design Lead — *Aug. 2016 - Dec. 2017*

VTOL-Hybrid Aircraft Design: Responsible for technical design of Micro Air Vehicles (MAVs) to match specific and complex requirements for government-funded projects. Responsibilities:

- Designed and manufactured an autonomous, high-endurance, long-range radio-controlled multirotor fixed-wing hybrid aircraft for vertical (VTOL) and cruise flight.
- Developed code in MATLAB to retrieve aircraft performance characteristics from automated radio-controlled flights using autopilots such as Pixhawk.
- Generated CAD models in CATIA and performed CFD analyses using ANSYS Fluent and structural analyses using ANSYS Mechanical for prototyping.

AeroMIT - Aeromodelling Team, Manipal Institute of Technology Manipal, India
Head of Aerodynamics *Apr. 2016 - Apr. 2017*

SAE Aero Design (Micro Class), international competition sponsored by Lockheed Martin: Development of a radio-controlled aircraft that fits into a cylinder of 6 inches in diameter. Scoring is based on maximising payload fraction in flight, minimising cylinder length, and a technical report and presentation.

Responsibilities:

- Preparing a technical design report and presentation on the developed aircraft.
- Aircraft Design – Weight estimation, sizing, configuration, performance, payload optimisation.
- Computational fluid dynamics analyses on high-lift airfoils/wings.
- Teaching aerodynamics, flight dynamics, aircraft design and CFD to juniors of the team.

2018 East Results: Rank 1 in Design and Rank 3 in Technical Presentation.
2017 West Results: Rank 1 in Highest Payload Lifted, Rank 2 in Highest Payload Fraction, Rank 4 Overall.
2016 East Results: Rank 3 in Highest Payload Lifted, Rank 4 in Highest Payload Fraction, Rank 5 Overall.

TATA Protean UAV Challenge 2016-17: This national competition's aim is to develop a multi-rotor drone able to switch between quad, hex and octo configurations while midair with stability.

- Developed the mathematical model to ensure stability between configurations using MATLAB and Simulink.
- Performed computational structural analyses to ensure rigidity and minimise vibrations.

Results: Awarded 1st position with prize money.

PROJECTS

Aircraft Design Optimisation: Investigations into aerodynamic shape optimisation.

- Performed multipoint gradient-based aerodynamic shape optimisation of a low-speed UAV wing via the discrete adjoint approach using the MACH: MDO of Aircraft Configurations with High fidelity framework developed by the MDO Lab at the University of Michigan.

Computational Fluid Dynamics: Personal research into CFD techniques with various applications.

- Automated CFD routines in Python using various solvers for generation of surrogate models to obtain aerodynamic coefficients for airfoils with varying angles of attack and Reynolds numbers.
- Automated meshing routines in Python to generate high-quality O-grid and C-grid meshes in 2D and 3D for airfoils and wings using ANSYS ICEM CFD: `http://godot-bloggy.tech/post/o-grid-c-grid-comparison/`
- Performed flow analyses over various airfoils, and complex wing geometries with aerodynamic devices such as winglets and flaps, including cavitation studies using ANSYS ICEM CFD, ANSYS Mesh, Fluent and OpenFOAM.
- Programming CFD codes by using and independently developing Prof. Lorena Barba's '12 Steps to Navier-Stokes' CFDPython course as a reference: `http://godot-bloggy.tech/post/cfd-python/`
- Implementation of the constant-strength doublet-source panel method for potential flows over airfoils in Julia.

Dubby Pendy: A double pendulum simulator programmed in Lua using the LÖVE 2D framework for graphics to analyse phase spaces and develop an understanding of dynamical systems.

Bloggy: A technical blog to post personal project developments and academic discoveries. Research topics include mathematics, physics, aerodynamics, and music. Some notable posts:

- Calculus of Variations – Induced Drag Over a Wing
- Academics – Physics and Mathematics
- Investigation – The Roots of Unity

Workshop on XFLR5 and Aerodynamics, IE Aerospace:

- Demonstrated the use of XFLR5 in elementary aerodynamic analyses such as airfoil and wing design to freshman engineering students.
- Taught introductory aerodynamics and introduced computational fluid dynamics as a tool for aerodynamic analysis using ANSYS Fluent.