Kaustav Mukherjee

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I'm a third year mechanical engineering student at NUS who has gained a wide skillset through a variety of internships and projects. As a part of the NUS Overseas Colleges Silicon Valley program, I am now looking for an internship at a startup in the San Francisco Bay Area where I can apply my skills, learn new things, and help your company move forward in the process.

EDUCATION

National University of Singapore
B. Eng. (Hons) in Mechanical Engineering, **CAP 4.72,** August 2020 - Present, Graduation in May 2024

- 2nd Major in Innovation and Design
- Aeronautics Specialization

Relevant Courses:

- **EG2310 –** Collaborated in a team of 5 to design, build, and program a Turtlebot3 Burger using ROS to be capable of aiming and firing ping pong balls at an IR target and autonomously navigate and map a maze. Was responsible for CAD, manufacturing, and assisted with electronics.
- **EG3301R** - Working in a team of 3 to design and build a land vehicle to autonomously replant tree seeds in post-wildfire forests for CAL FIRE. Currently prototyping various functionalities.

WORK

F-Drones
UAS Systems Engineering Intern | May 2022 - Present

- Setup SITL (Simulation-in-the-Loop) with custom ArduPilot builds.
- Created RealFlight models using Solidworks and 3DS Max, and edited ArduPilot parameters to enable proper SITL functionality.
- Diagnosed errors with geofences and ArduPilot bugs and helped determine solutions using SITL.
- Defined key SOP for creating new SITL models, adjusting parameters, and using SITL systems for future testing and safety measures.
- Researched, purchased, and tested various analog and digital communication modules for long range video and telemetry. Designed various electrical harnesses and testing platforms.
- Planned and coordinated with colleagues to perform ground and flight tests of communication modules, and analyzed test results to improve on the systems.
- Liaised with partner companies to setup and integrate 4G communication modules, directly enabling more consistent deliveries.
- Created Lua scripts and modified Ardupilot code for additional autopilot functionality.
- Created mapping tool with Google Maps API to track network strength for various 4G providers across operational areas in Singapore.

SciFie Robotics
Robotics Intern | March 2021 - August 2021

- Conducted R&D, prototyping, and design for a magnetically-mounted robot for surface preparation, paint application, and NDT of large metal structures with a team of 6.
- Developed engineering sizing spreadsheets based on specifications of robot modules.
- Used FEMM, a magnetic simulation software, to optimize its magnetic mounting.
- Designed and modelled a magnetic mounting bracket, NDT mounting and couplant delivery assembly, and hydroblasting arm capable of sustaining 10’000 PSI water pressure using Solidworks.
- Created engineering drawings in Solidworks and performed GD&T.
- Collaborated with various manufacturers to create parts for the robot and coordinated with suppliers such as Olympus, T&T Salvage, and Klenco to source components.
- Improved a WAGO PLC control system and interface for movement and controls of the robot arm.
- Wrote first draft of a business plan and designed a website with Wix.

EXPERIENCE

AeroNUS UAV Competition Team
Chief Engineer | July 2021 - April 2022

- Led a team of 10 students to develop an Unmanned Aerial Vehicle (UAV) for the American Institute of Aeronautics and Astronautics' Design Build Fly (AIAA DBF) 2022 competition.
  - We achieved the highest report ranking in NUS history, at 14th place out of 110 universities.
- Used XFLR5 and AVL to analyze airfoils, wing and empennage configurations, and determine key stability values and trim conditions.
- Designed wings, tail, and fuselage using Solidworks, managed full CAD model for final plane.
- Performed Solidworks static and topology FEA simulations using nonuniform force distributions to minimize the weight of our wings.
- Wrote a Multi-Disciplinary Design Optimization (MDO) program using MATLAB to determine plane sizing for our prototype and final planes.
- Developed python scripts to write G-Code for precise foam CNC manufacturing of lifting bodies.
- Manufactured planes using foam hot wire CNC, carbon fiber prepreg and molding, CNC milling, laser cutting, and 3D printing, along with hand manufacturing with various glues, foams, and wood.
- Designed and manufactured the controls circuit and wrote and implemented an Arduino program to sequentially deploy payloads.
- Organized the team, planned the overall schedule and key deadlines, coordinated meetings, and helped resolve disputes.

Mentor | May 2022 - Present

- Overhauled advertising and recruitment process, bringing in over 55 signups, improving on last year's 30 signups.
- Planned and hosted the AeroNUS bootcamp, a hybrid, month-long introductory course for new students interested in joining the team for over 40 participants.
- Am currently in the process of mentoring the new team of 20 in creating their first plane.

iDP (Innovation and Design Programme) Students' Club
Professional Development Head | January 2021 - November 2021

- Previously led a team of 5 in the Professional Development Committee to run an internship program for iDP students, having sourced over 60 internships by working with over 20 companies and various NUS parties.
- Organized an industry talk with Apple and contacted judges and sponsors for the IDEATE 2021 hackathon and spearheaded logistics for the judging procedure with 11 judges and 150 students.

Vice President, External | December 2021 - Present

- Influenced club direction to focus on improving network with alumni and founders.
- Assisted subcommittees with logistics, external liaising, and planning for various events, such as the IDEATE 2022 hackathon, UTR Design Fest, and Summer Internship Program.
- Directly involved in planning and logistics of iDP Carnival, attracting over 100 students, and a brand new iDP Freshman Orientation Programme.

Invigilo AI
Research Project | August 2021 - November 2021

- Implemented various CV models using Pytorch for helmet detection in construction sites under guidance of startup Invigilo AI. Counted as UROPS (EG2605).

OTHER

- **Certified Solidworks Professional (CSWP)**
- Proficient in English, with DELF B1 Certificate in French. Conversational fluency in Bengali.

SKILLS

Mechanical Design	Design Thinking	Proficient
	Sizing and Optimization	Proficient
	Design for Manufacturing	Proficient
CAD	Solidworks	CSWP Certified
	Autodesk Inventor and Fusion 360	Proficient
CFD	ANSYS Fluent	Basic
Manufacturing	CNC Milling	Proficient
	Laser Cutting	Proficient
	Soldering	Proficient
	Wood	Proficient
	3D Printing	Intermediate
	Traditional Manufacturing (Metal)	Intermediate
	Carbon Fiber	Intermediate
Aeronautics	X-Foil, XFLR5, AVL	Proficient
	Wing and Tail Design	Proficient
	Aircraft Sizing	Proficient
Unmanned Aerial Systems	Ardupilot Software and Scripting	Proficient
	Mission Planner	Proficient
	SITL Simulation	Proficient
	Communication Systems	Intermediate
Electronics	Circuit Design	Intermediate
Controls	Arduino	Proficient
	Raspberry Pi	Intermediate
	Jetson	Basic
	PLC Programming	Basic
Software	Matlab	Proficient
	Python	Proficient
	Machine Learning with Python	Intermediate
	ROS	Intermediate
	Java	Intermediate
	C++	Basic
	Lua	Basic
	Git	Intermediate
Web Design	JS	Proficient
	HTML	Proficient
	CSS	Intermediate
	Wix. Website Editor	Proficient
	React	Basic
	Search Engine Optimization	Basic
Office Productivity	Word, Powerpoint, & Excel	Proficient
Creative Suite	Canva	Proficient
	Adobe Photoshop and GIMP	Intermediate
	3DS Max	Basic
Soft Skills	Leadership and Collaboration	Proficient
	Project Planning and Event Management	Proficient
	Public Speaking and Emceeing	Proficient

Kaustav Mukherjee
Portfolio

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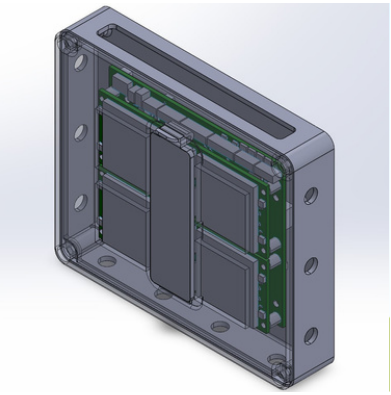
From all of my engineering experiences, I've done a variety of projects that cannot be conveyed solely by text on my resume or displayed easily online. Here, you'll find more details of how exactly I apply my skills.

Elsight Halo External Mounting | F-Drones

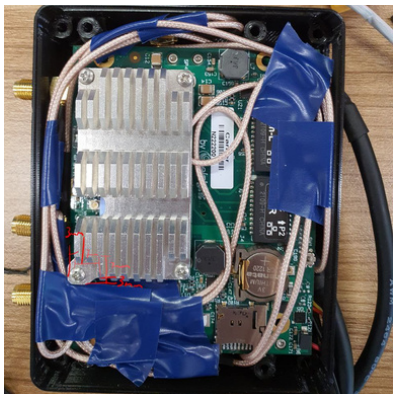
- Responsible for the software and hardware integration of the Elsight Halo onto our existing drones.
- Had to design and create a mounting, cooling system, and electronics integration.
- This mounting is now being used permanently until the next iteration of the drone.

Skills: Solidworks, FDM 3D Printing, Soldering & Electronics Integration



CAD model using component files for reference.

After mounting and integration, with antennas mounted for initial testing.

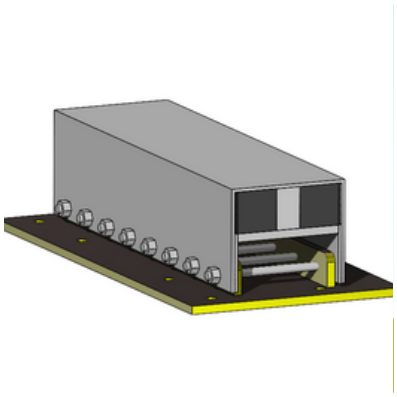


Wire management issues in first prototype which were later fixed in the final design.

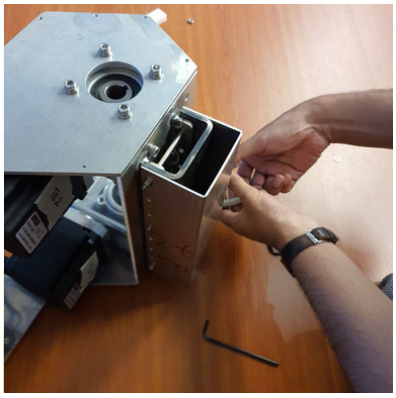
Magnetic Mounting Bracket | SciFie Robotics

- Design and manufacture a bracket to hold magnets at a certain distance from the driving surface.
- Upgraded the initial design, removing the issue of magnets sticking to the driving surface.

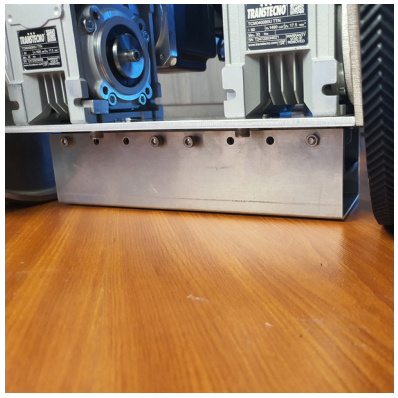
Skills: FEMM 2D, Solidworks, GD&T.



CAD Model



Assembly onto our robot.



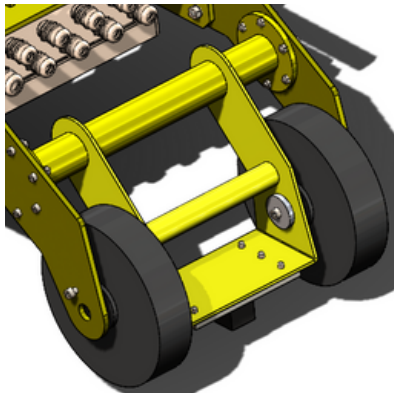
Slight gap between floor and mounting to prevent friction.

Back Wheel Bracket | SciFie Robotics

- Redesign back wheel assembly to improve grip and reduce weight.
- Replaced omni-wheels with trolley wheels and simplified back magnet mounting.

Skills: Solidworks, GD&T, Component Selection

CAD model integrated with full CAD. Wheels modelled based of purchased components.

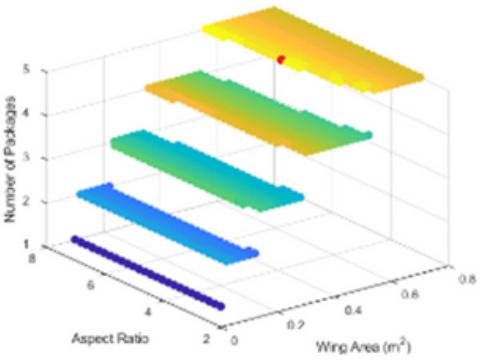


Final product integrated onto the robot with purchased trolley wheel. Unfortunately I never took a better picture!

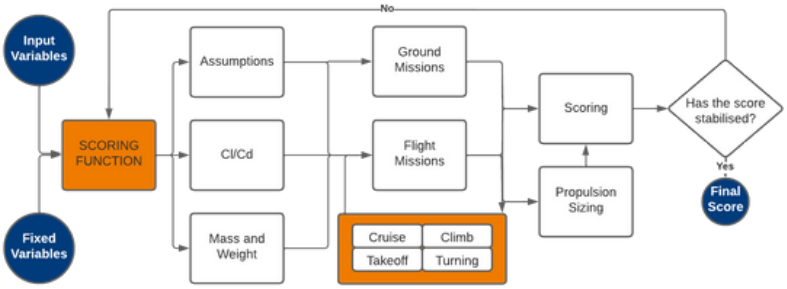
AeroSIM | AeroNUS

- I needed to create a program to determine key sizing parameters for our plane.
- Created a MDO (Multi-Disciplinary-Optimization) program on Matlab that optimized wing area, aspect ratio, and payload capacity based on mission scoring equations from competition rules.

Skills: Matlab, Plane Sizing



5D output graph with 3 axes, color, and size. Best output is highlighted red.

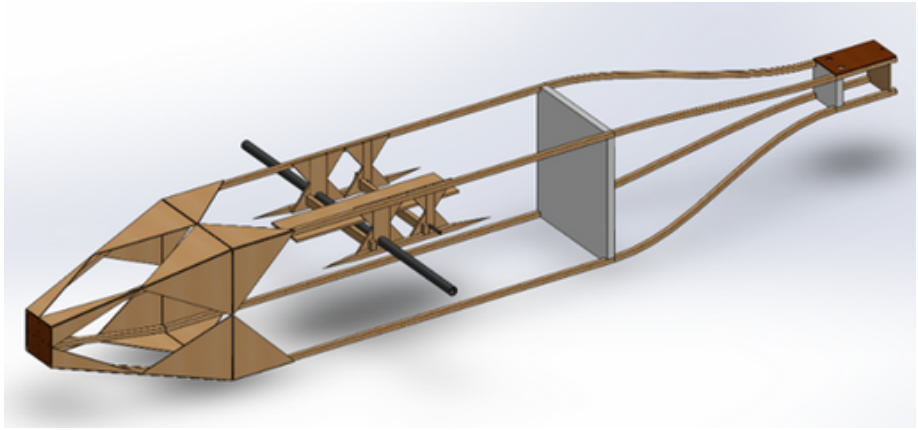


Block diagram detailing overall program functionality.

FUSELAGE | AERONUS

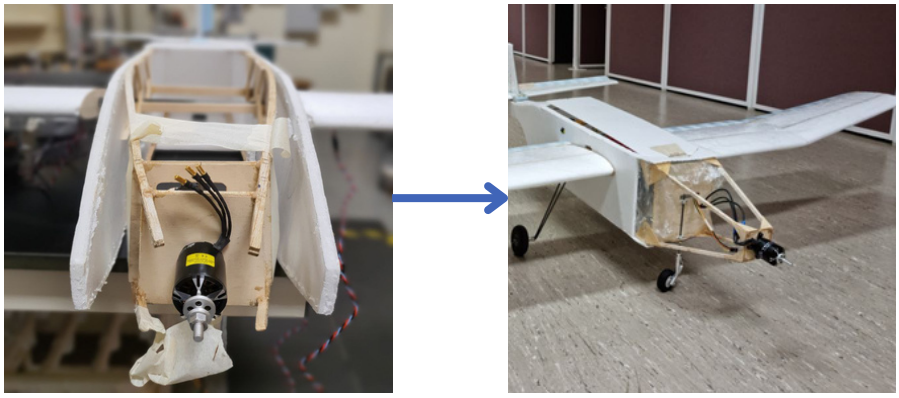
- Design fuselage that integrates wing and tail mounts, landing gear, has space for payload, and is separable into three parts for transport to the US, and balances CG for positive static stability.
- Sized, designed, and led manufacturing of our prototype and final plane fuselages. Made various changes from the first to the final design based on manufacturing and testing results.

Skills: Sizing, Material Selection, Solidworks, Manufacturing (Adhesives, CNC, Laser Cutting)

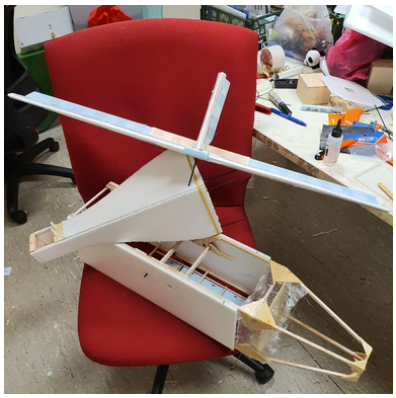


CAD model of final fuselage frame, isolated from the rest of the plane.

Fully assembled fuselage.



Our prototype fuselage nose was curved for aerodynamics but difficult to manufacture, taking a week. The final fuselage's nose was simplified, taking only one day to build and being easily repairable from crashes.



Fuselage split apart for transport to the US.