

ENGINEERING PORTFOLIO

Jethro B. Sante

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ABOUT ME



JETHRO B. SANTE

Fresh graduate with a **B.S. in Robotics Engineering** from Ateneo de Davao University. This portfolio supplements my resume with selected projects from my undergraduate studies. Hands-on work are one of the most valuable parts of my education, across different difficulty and skill area. Each project includes an overview and documentation. Feel free to reach out by email if you have any questions.

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INTERNSHIPS

3D Printing & Prototyping Intern

June 2024 – July 2024

Davao Medical School Foundation Inc. (DMSF)

- Designed and 3D printed functional medical tools, including forceps, using Print-In-Place and FDM technology, providing medical students with hands-on educational models.
 - Scanned, modeled, and 3D printed a human arm using 3D scanning technology and Blender, producing a detailed anatomical reference for students.
 - 3D printed a scaled human brain model using SLA technology, delivering a clear visual aid for classroom demonstrations.
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Agricultural Drone Technician Intern

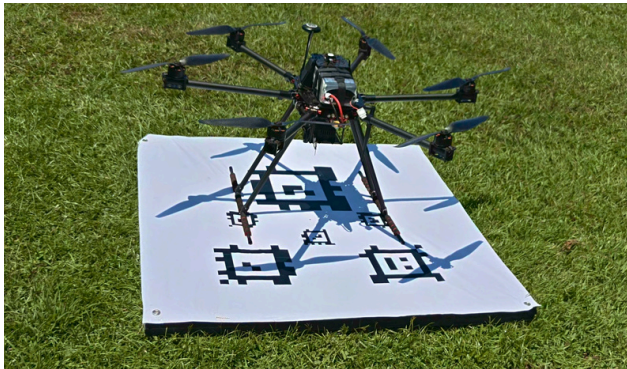
June 2024

AgriDOM Solutions Corporation

- Encoded aerial drone spray reports into the company's online system, maintaining data logs for field teams.
- Repaired, calibrated, and maintained agricultural drones and gasoline generators for field operations.
- Conducted flight testing and activation of new and repaired drones (DJI T30, DJI T40, XAG P100) for operational readiness before deployment.

DRONE-BASED BIRD DETERRENCE SYSTEM

A smart, automated deterrence system: A ground camera spots incoming bird flocks, calculates their exact location, and dispatches a drone to scatter them safely.



Role: Sole Researcher & Developer

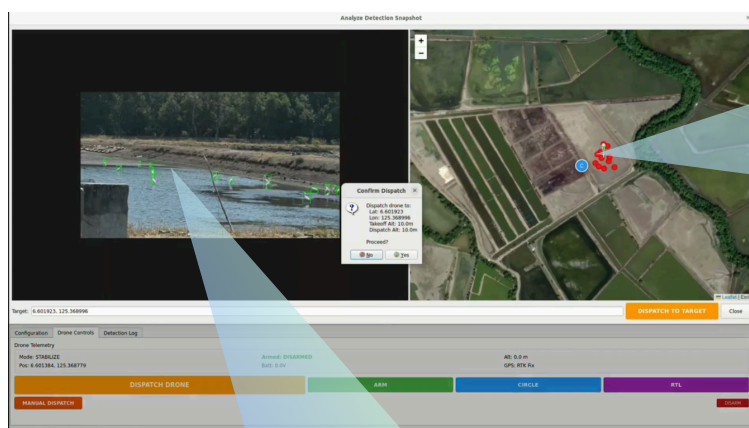


The Challenge: Predatory birds (egrets & terns) cause heavy financial losses in milkfish ponds by eating stock and disrupting feeding.

Keywords: ArduPilot, ROS2, Object Detection, Computer Vision

HOW IT WORKS?

It displays **AI detections**, calculates flock centroids, and forwards MAVLink dispatch waypoints to the drone **at the click of a button**.



It detects small, distant birds across **1-hectare water surfaces** without requiring manual image labeling.



When an incoming flock is spotted, the system projects their exact location on the pond, allowing the drone to execute **a targeted low-altitude sweep**.

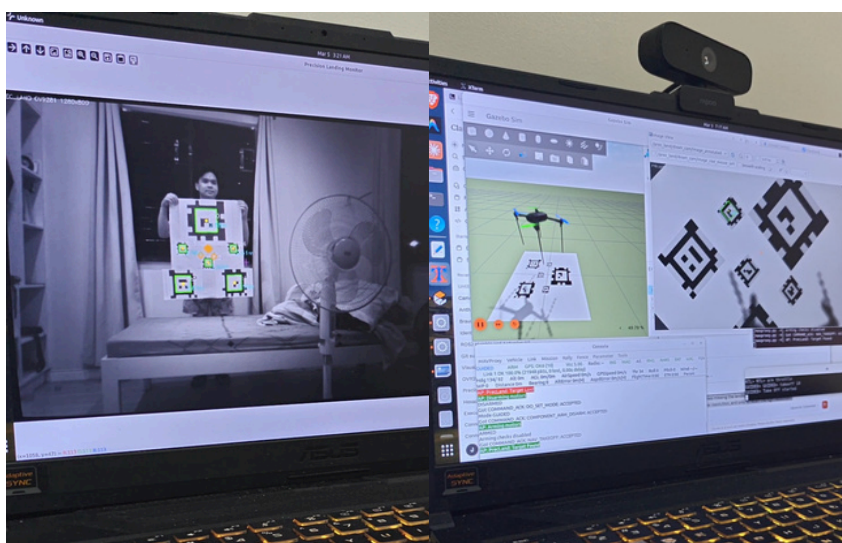
PRECISION LANDING

Can it land on its own?

Absolutely.



Engineered a 6-marker AprilTag landing pad, achieving **11 cm landing precision**.

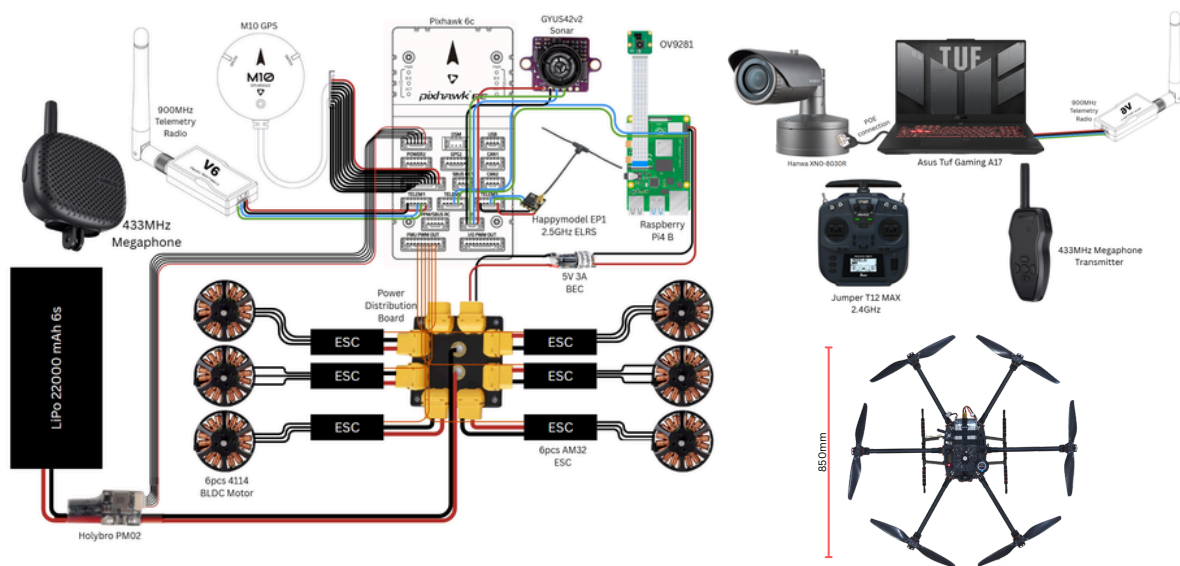


Validated autonomous flight and precision landing in a ROS2 Humble, Gazebo Harmonic, and ArduPilot SITL before hardware deployment.

HARDWARE AND RESULTS

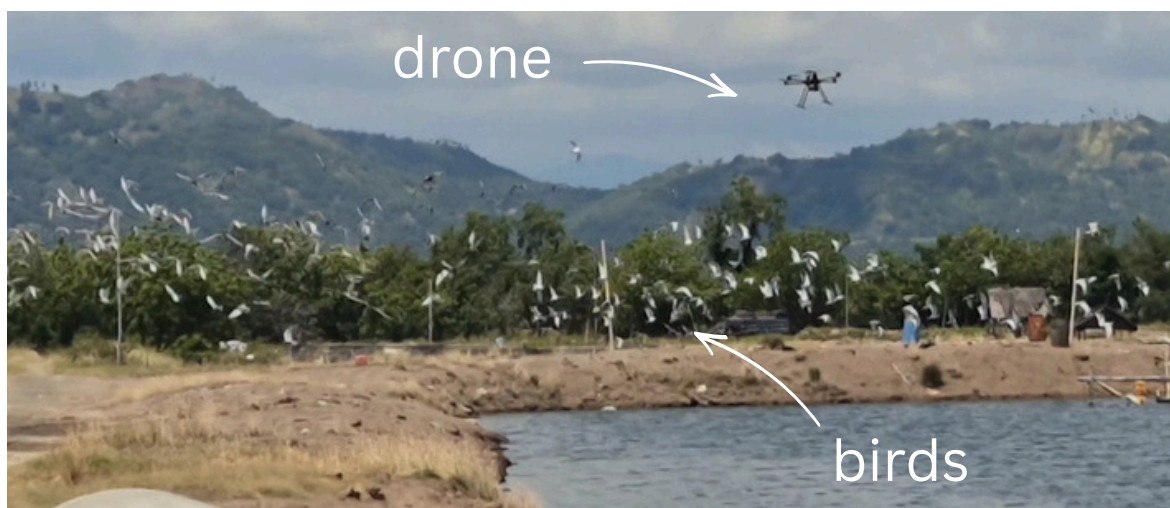
Drone Hardware Specs:

- Frame & Power: Hexacopter | 22,000 mAh LiPo Battery
- Flight Endurance: Up to 40 minutes hover / 25 minutes active flight

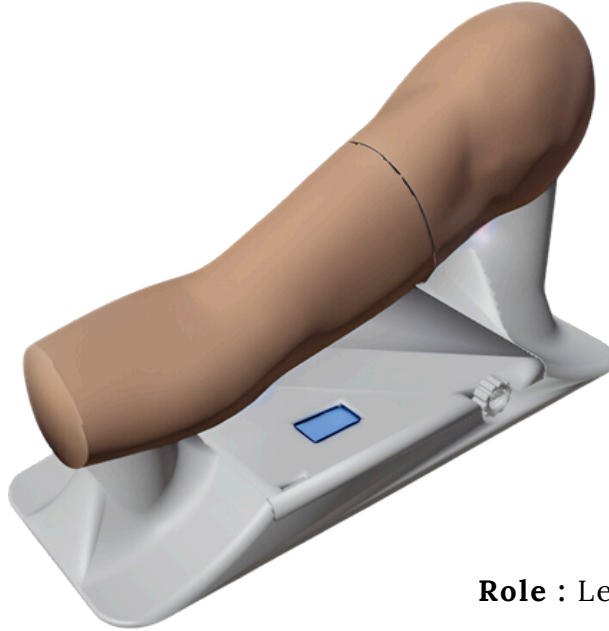


Field Results :

- **94% Reduction in Flock Duration:** Decreased average bird stay from 35 minutes down to just 2 minutes.
- **75% Drop in Bird Count:** Reduced median flock sizes from 75 birds down to 18.



BLOOD PRESSURE APPARATUS TRAINER



Role : Lead Engineer /CAD Designer

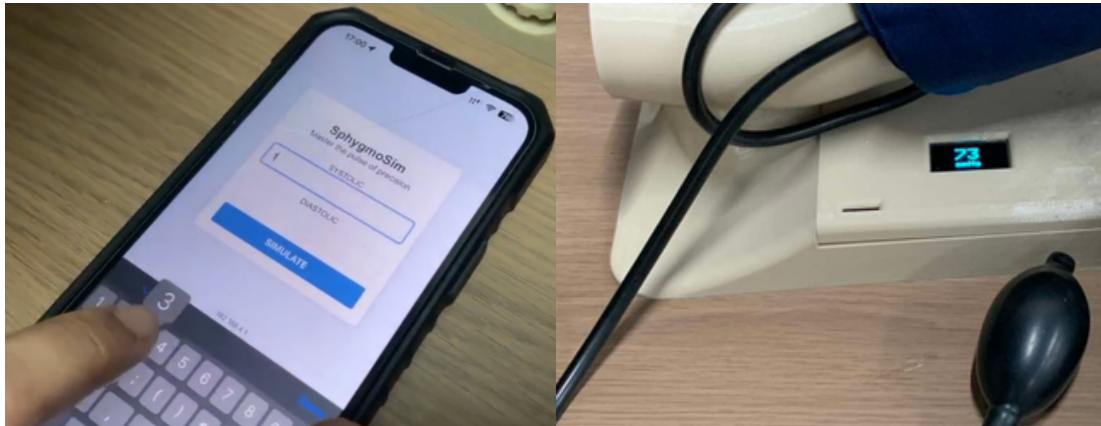
A training device that lets medical students practice reading blood pressure on a realistic, responsive arm model, without needing a real patient.



The Challenge: Medical students need more hands on practice with varied, realistic cases. This simulates normal, high, and low blood pressure scenarios for repeatable, risk free training.

Keywords: 3D Printing, Solidworks, Blender, IoT

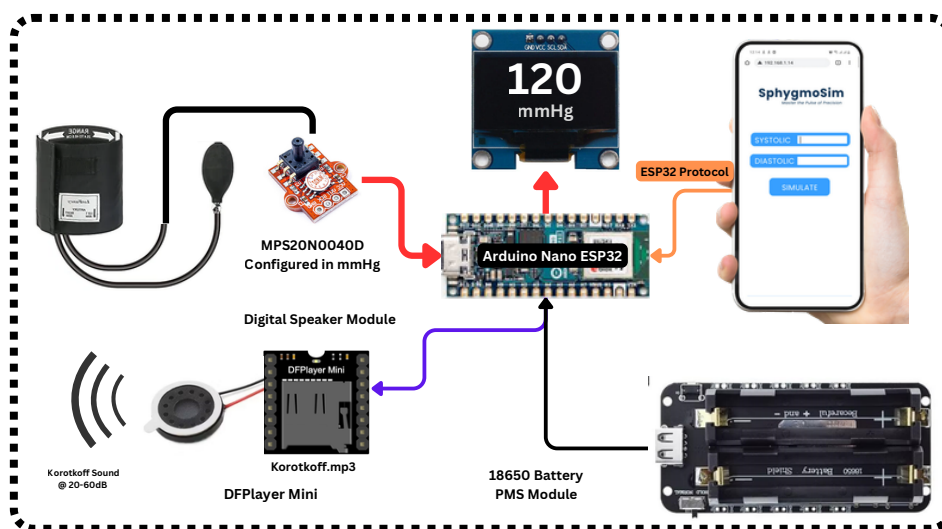
HOW IT WORKS?



An instructor sets the target blood pressure values wirelessly through a simple web interface. The device reproduces real Korotkoff sounds through a stethoscope on a 3D scanned, arm model.



The student inflates the cuff, listens for the pulse, and reads the result, just like a real exam.



This is its overall system.

ACHIEVEMENT



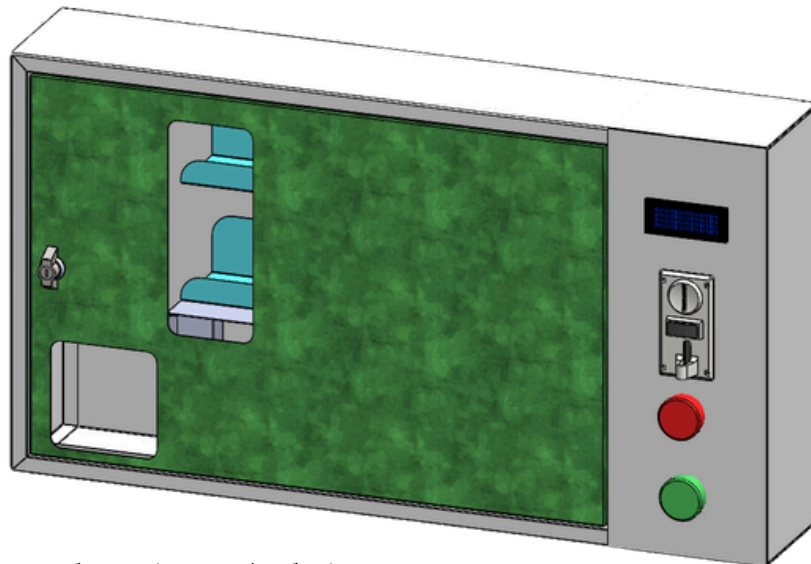
1st place

in the Industrial/Functional Category at **Winnovation TechFest**, part of the **Asian Conference on Advanced Manufacturing**, held at Solaire Resort, Parañaque, Metro Manila, on October 23, 2025.



ECOBAG VENDING MACHINE

A coin-operated vending machine that dispenses reusable ecobags to help enforce Ateneo de Davao University's ban on single-use plastics.



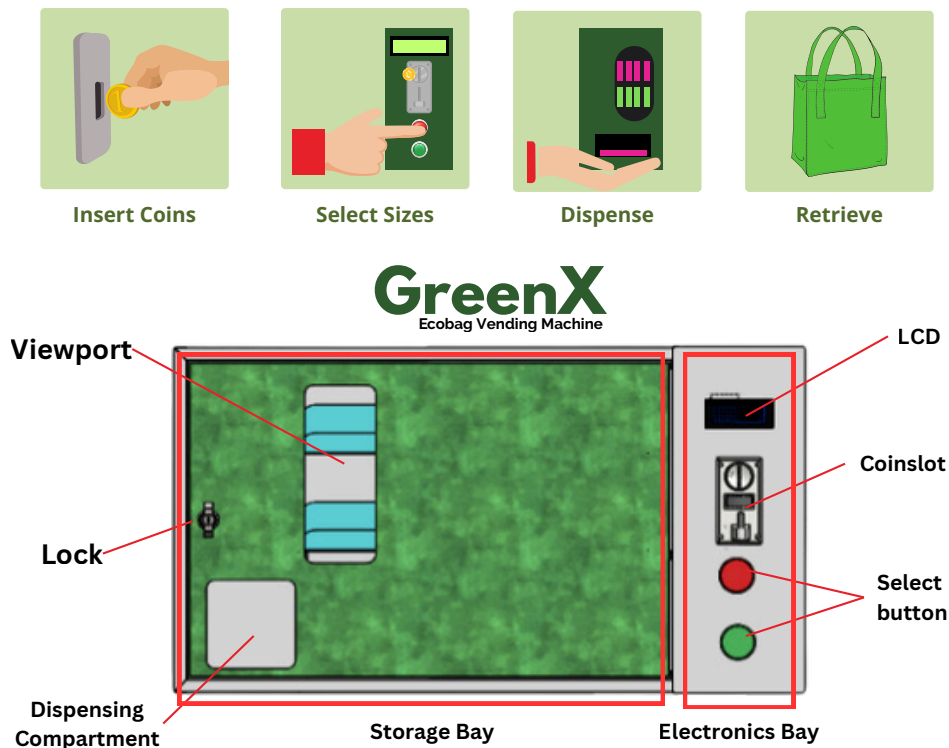
Role: Lead Engineer/Fabricator



The Challenge: Ateneo de Davao University does not allow single-use plastics inside its campus. Faculty members often forget to bring an ecobag when they carry items wrapped in cellophane, leaving them with no compliant way to bring their belongings inside.

Keywords: Sheet Metal, IoT, Solidworks

HOW IT WORKS?

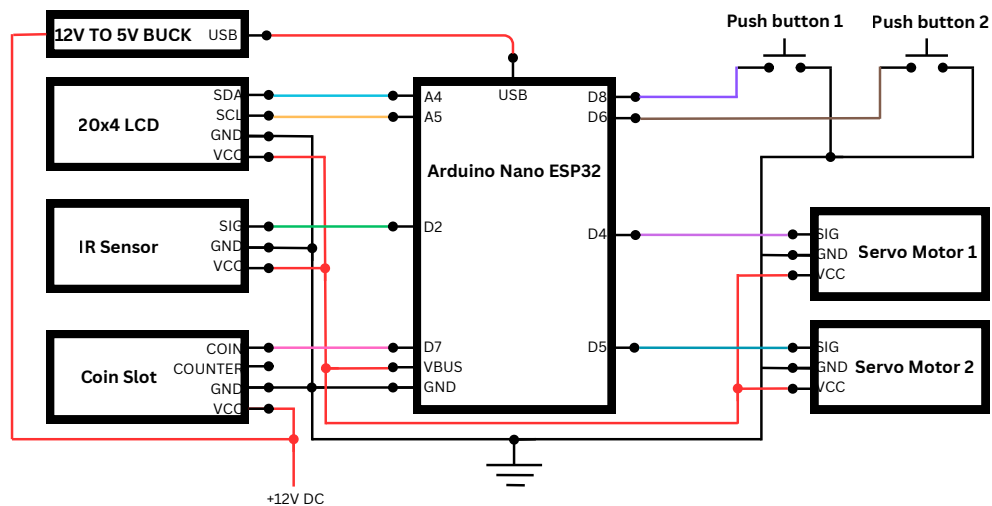


Insert a five-peso coin, then press a button to choose a small or large bag. The machine reads the selection and activates its dispensing mechanism.



The chosen ecobag drops into the collection bin, ready for pickup. Faculty simply grab their bag and continue on their way, plastic free.

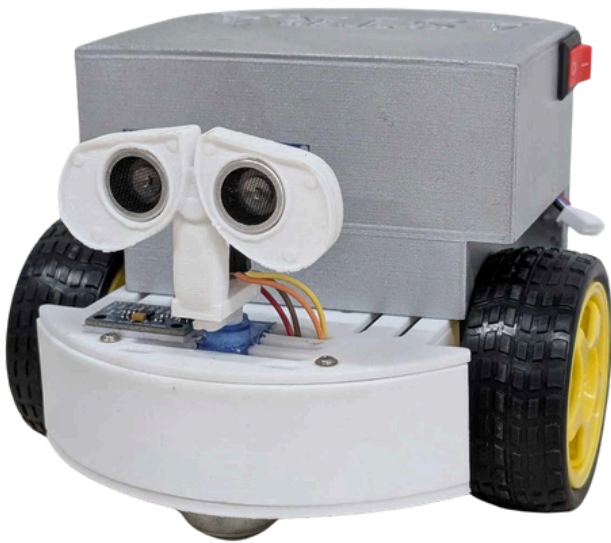
THE BUILD



The vending machine's enclosure was first designed in SolidWorks using the sheet metal feature. It was then fabricated by hand out of G.I. sheet, using spot weld machine and power tools to cut, bend, and assemble the structure.

COLLABORATIVE MULTI-ROBOT NAVIGATION SYSTEM

A pair of autonomous robots where one robot explores and maps a path through obstacles, then shares that path with a second robot so it can navigate the same space without exploring on its own.



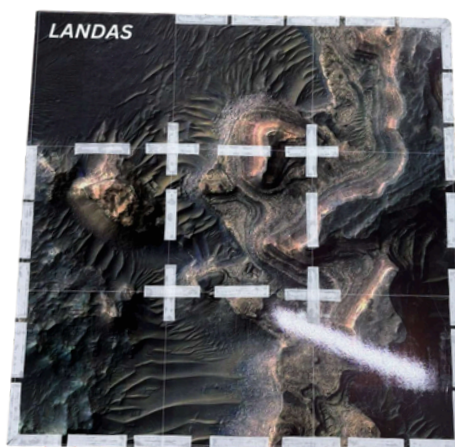
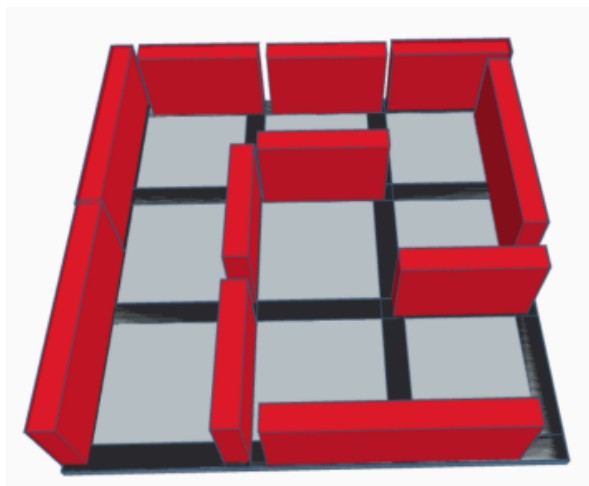
Role: Lead Engineer/ CAD Designer



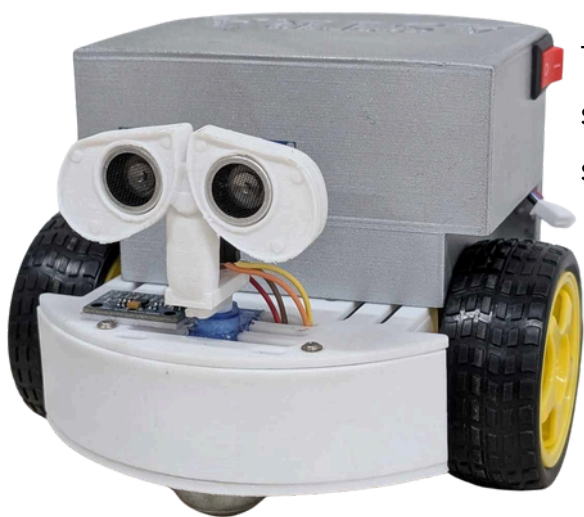
The Challenge: Autonomous robots typically re-explore the same space independently, even when another robot has already mapped a path through it. This repeated exploration wastes time and computing power in tasks where multiple robots must operate together.

Keywords: Solidworks, Control Systems

HOW IT WORKS?



Each robot runs on an Arduino Uno with ToF and Sonar sensors to detect obstacles. When blocked, it scans left and right, picks a clear direction, and moves forward, recording each step along the way.

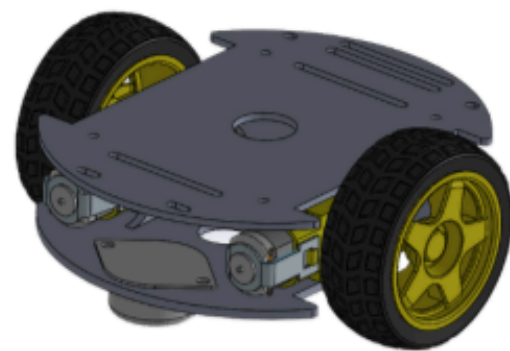
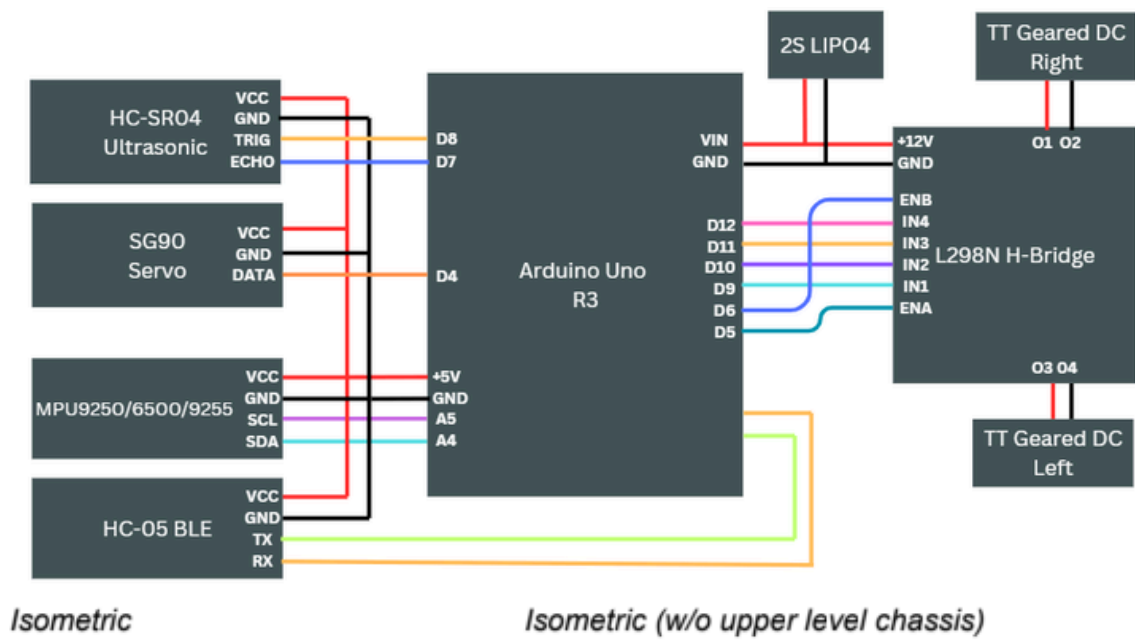


The first robot, **Astra**, explores the space and records its path as a sequence of moves and turns. .

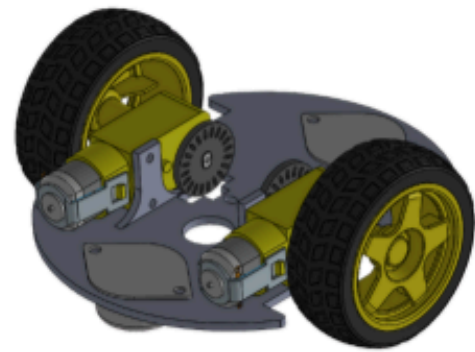
It sends this path to the second robot, **Navi**, over Bluetooth, letting Navi retrace the route without exploring on its own



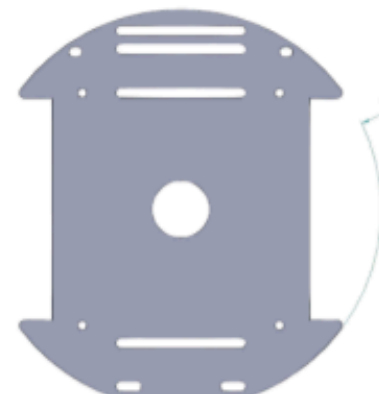
THE BUILD



Bottom Chassis



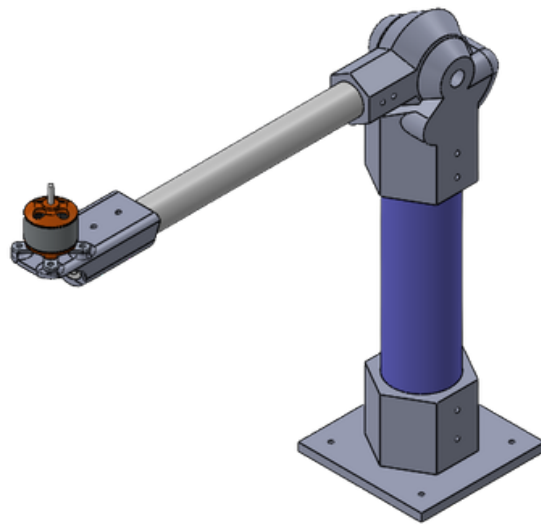
Upper Chassis



3D modelled the full chassis for both robots and independently programmed Astra's navigation and path-recording system. Both chassis were 3D printed in PETG.

BLDC MOTOR THRUST TESTING STAND

An apparatus that measures real time thrust, power consumption, and mechanical efficiency of brushless DC motor and propeller configurations. It serves as a platform to evaluate and validate the performance of custom 3D printed propellers.



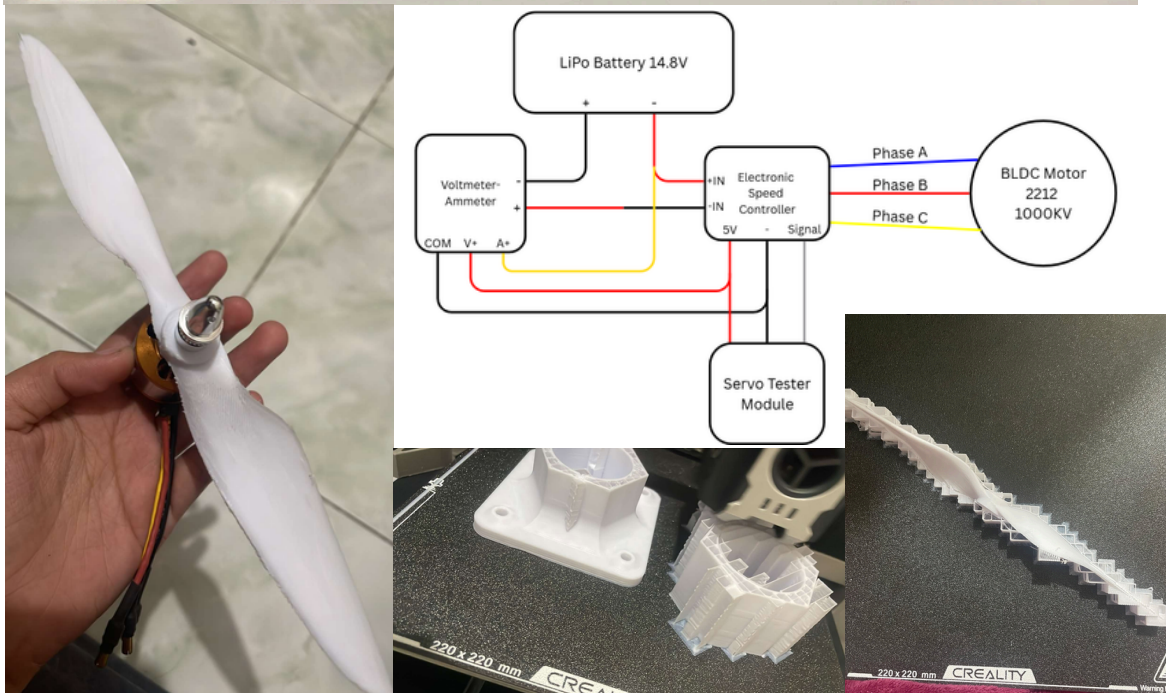
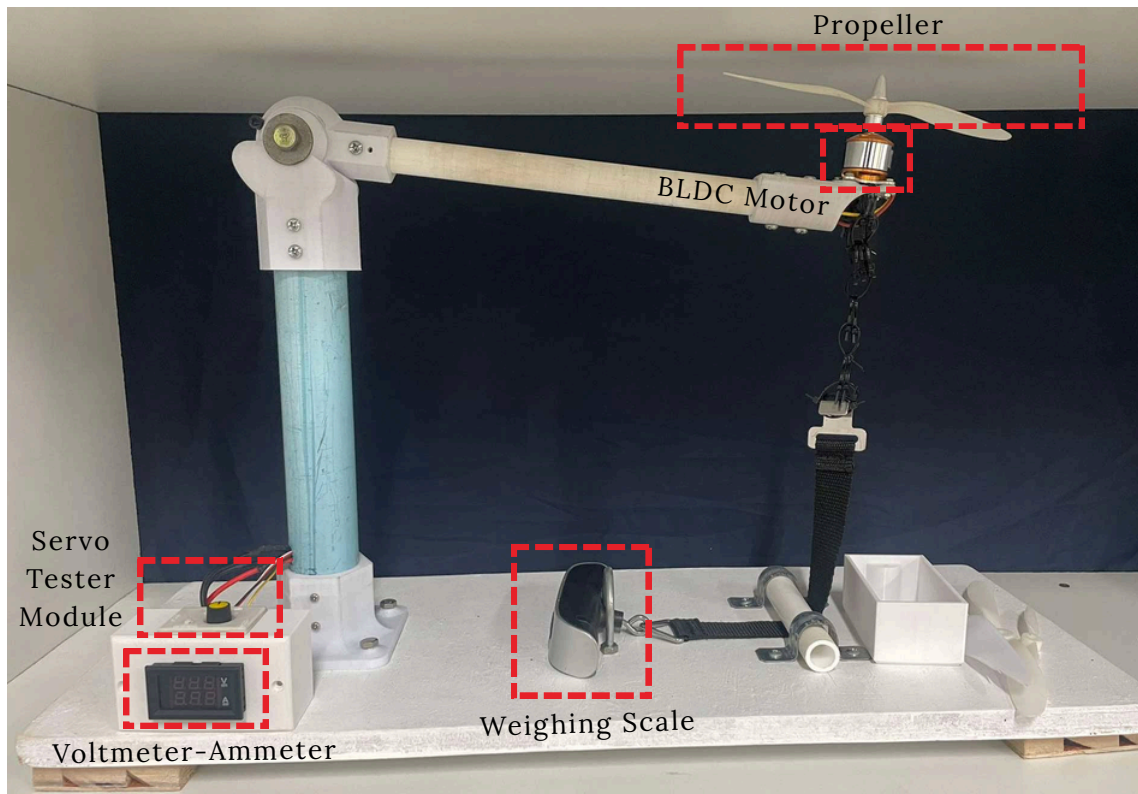
Role: Lead Engineer/ CAD Designer



The Challenge: Custom 3D printed drone propellers lack documented performance and durability data required to verify flight readiness. Additionally, testing these custom components requires dedicated, reliable data verification to determine true thrust output and ensure safe motor propeller matching.

Keywords: 3D Printing, Blender, Solidworks, Mechanical Design

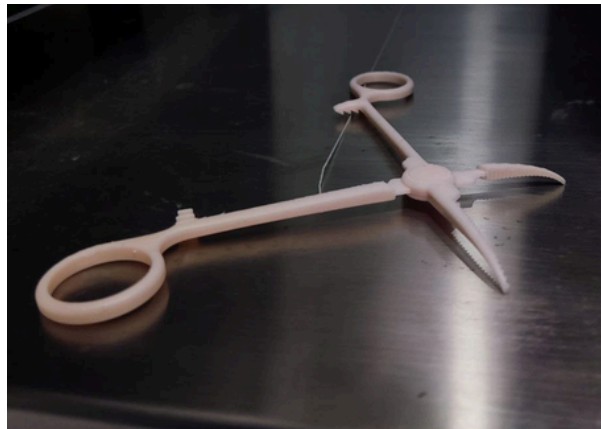
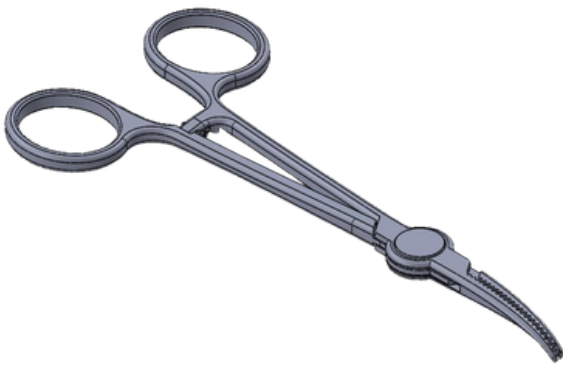
THE BUILD



A wooden platform and tubing arm hold a 3D printed motor mount and propeller against a digital scale, with an ESC, LiPo battery, and voltmeter ammeter housed in custom 3D printed enclosure for thrust and power monitoring. As project lead, **I modeled every component** in CAD and assembled the complete system by hand.

3D PRINTED MEDICAL FORCEPS

3D printed, ready to use forceps design that lets medical students practice gently on cadavers, no assembly required.



Role: CAD Designer



The Challenge: During cadaver dissections, medical students often mishandle rigid stainless-steel forceps, accidentally damaging delicate tissue. Schools needed a gentler alternative that could withstand repeated student use without compromising cadaver specimens.

Keywords: 3D Printing, Mechanical Design, Solidworks

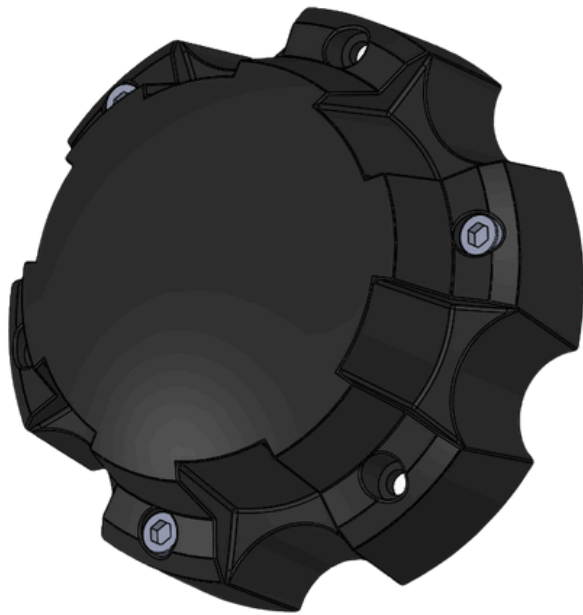
MY ROLE



Sole designer and fabricator — reverse-engineered the geometry using a flatbed 2D scanner, modeled it in SolidWorks, and 3D printed the forceps on a FlashForge Creator 4. The medical forceps are were 3D printed in ABS.

3D PRINTED WHEEL HUB CAP REPLICA

A full 3D printed replica of a discontinued wheel hub cap, modeled entirely from manual measurements and reproduced to match its original curved, layered geometry.



The Challenge: Only a caliper and paper for tracing could be used. The task was to build an accurate, symmetrical 3D model from manual measurements alone, then produce a working replacement through 3D printing.

Keywords: Solidworks, CAD Reverse Engineering

CERTIFICATES



TESDA NCII EIM



BOSH SO2



3D Modelling Workshop