CHRISTOPHER SHIAO

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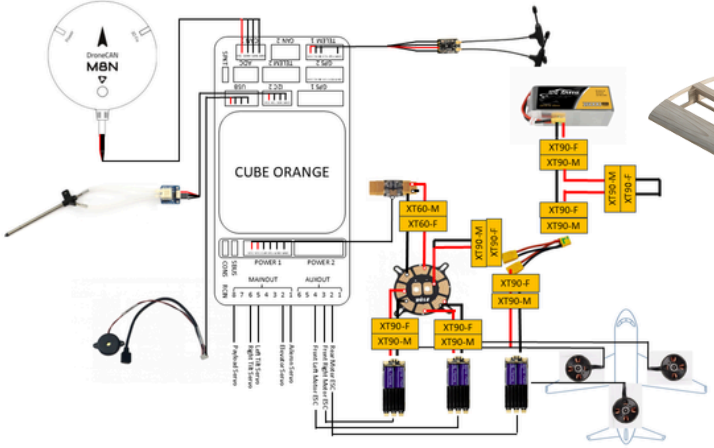
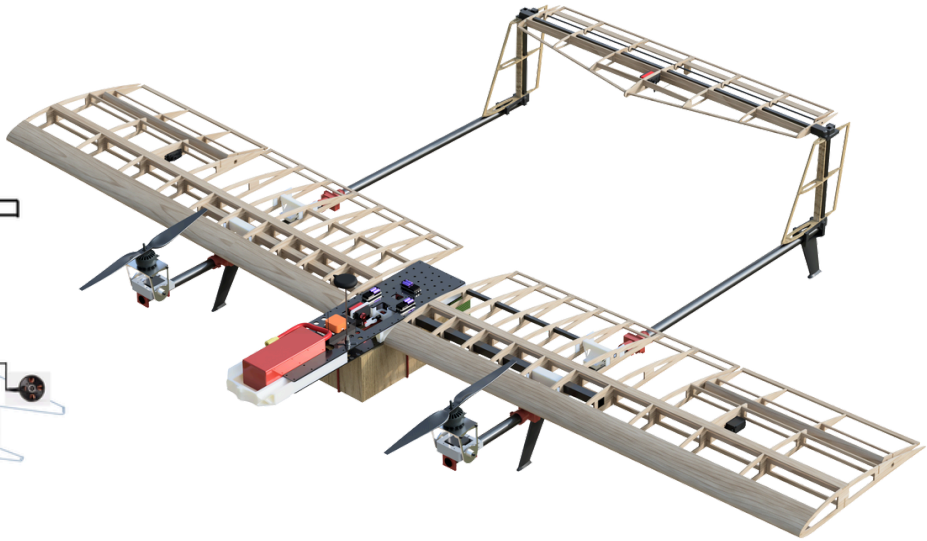
VERTICAL TAKE-OFF AND LANDING (VTOL) AIRCRAFT - UCL TEAM NOVA



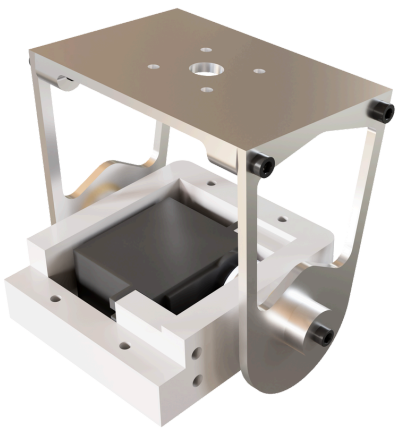


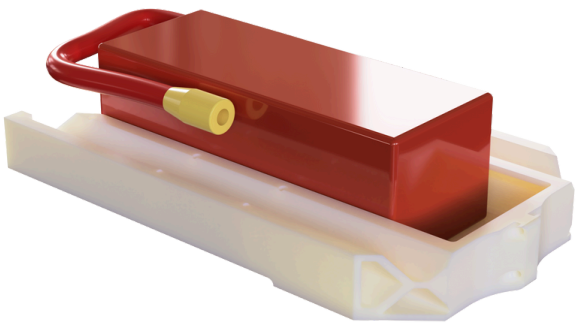
What?

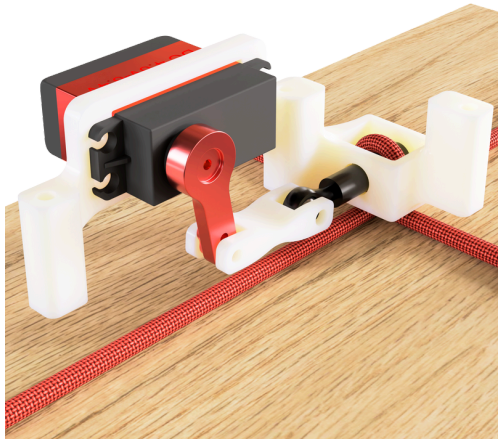
Develop the flight controls & electronics for a VTOL aircraft capable of autonomous take-off and landing, flight, navigation, and payload delivery.

How?

- **3D printed** battery housing using PAHT-CF
- Created **CNC toolpaths** to machine the aluminium propulsion mounts of the front two motors
- Programmed differential thrust for yaw control
- Manufactured a **test rig** to evaluate propulsion mount performance under a maximum thrust load of 46N, supported by a detailed indoor test **risk assessment**
- Designed a servo-actuated payload release system with 3D printed mechanical linkage connecting a pull rod to the servo horn
- Implemented a digital BDShot protocol to achieve higher baud rates, reduce communication noise, and improve aircraft responsiveness
- Performed real-time and post-flight analysis of logged flight data using **MATLAB**







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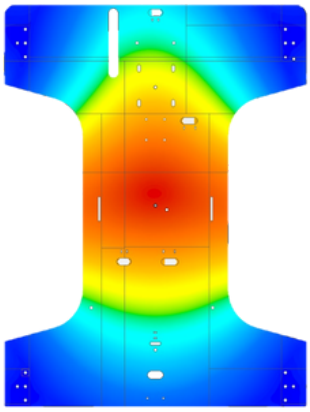
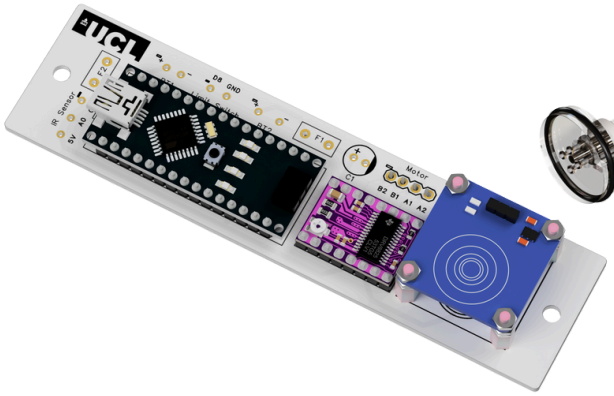
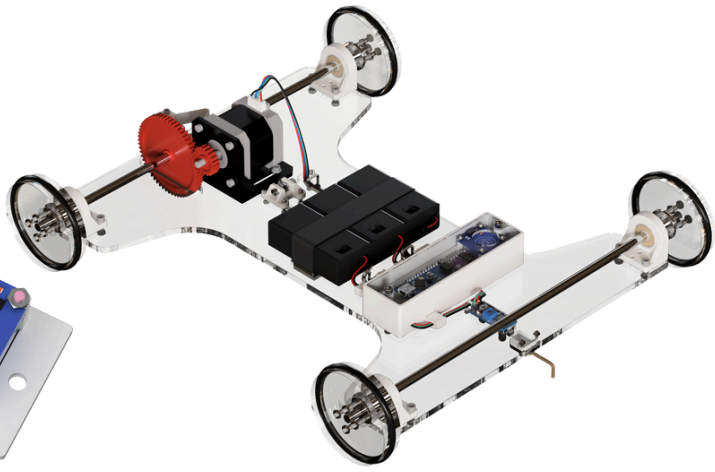
REPEATABLE VEHICLE - IMECHE DESIGN CHALLENGE (2024)







What?

Design a repeatable vehicle capable of precise and accurate target detection and parking

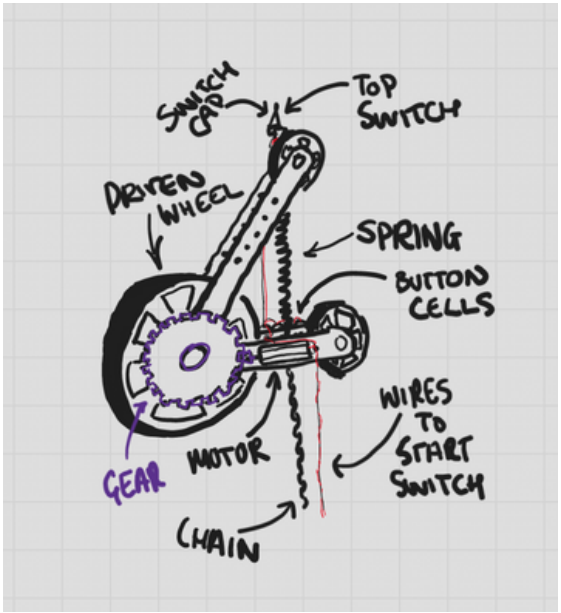
How?

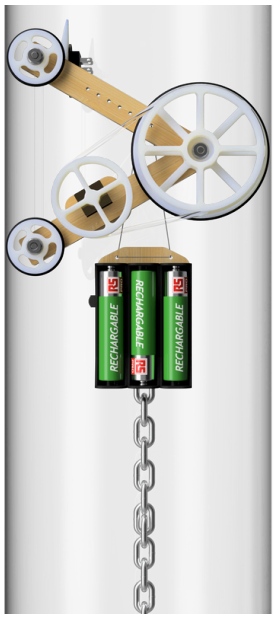
- Defined vehicle geometry using **MATLAB** model
- Nested laser cutting with acrylic sheets
- **PCB Design** using **EasyEDA**
- Modelled chassis deflections using **FEA** in **Ansys Mechanical**

Results

- 25% cost reduction
- 30% material waste reduction
- 95% accuracy, thereby winning nationals

INTERNAL PIPE CLIMBER - IMECHE DESIGN CHALLENGE (2023)





What?

Design and manufacture a self-contained pipe climbing robot that can travel up and down a vertical distance of 2.2m while carrying a 2.5m long chain

How?

- **Laser-cut** plywood structural frame
- **3D Printed** Wheels & Pulley Gear System
- Nitrile O-rings for optimal grip
- DPDT switch reverses motor

Results

47-second run-time, placing 3rd in overall competition at UCL