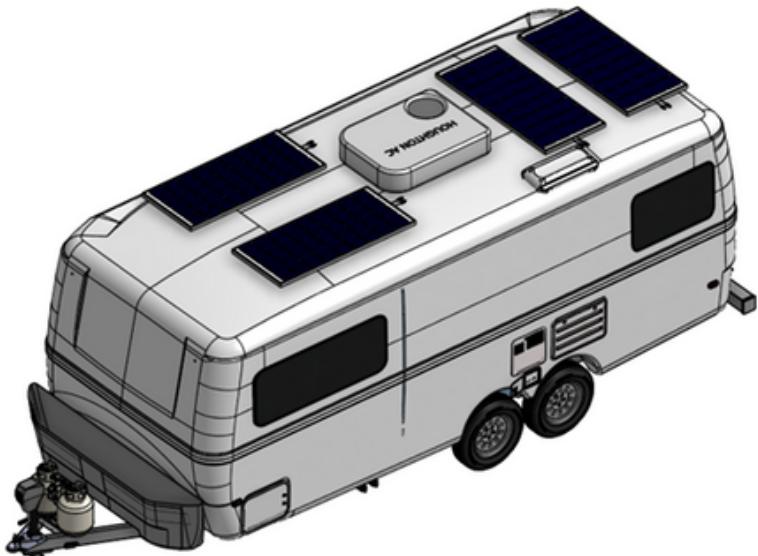
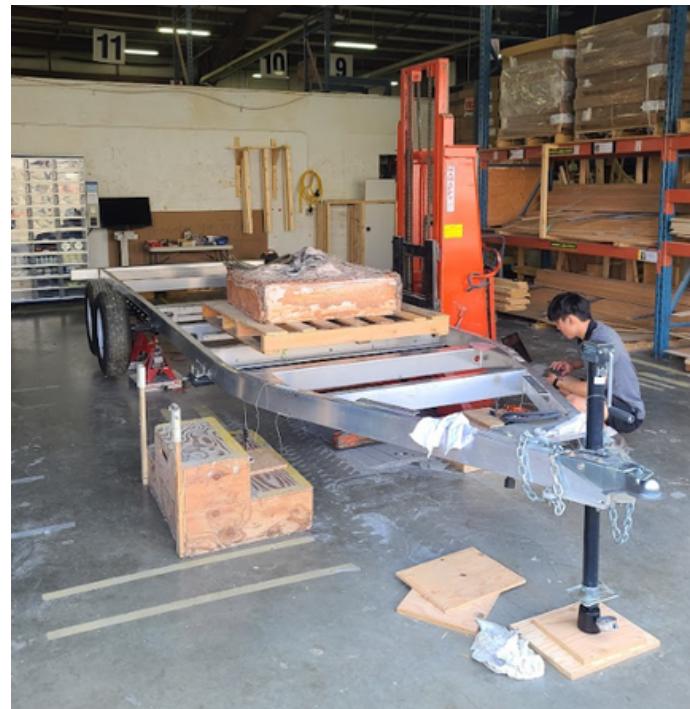


Benjamin Lee

Project Portfolio

MECHANICAL ENGINEERING AT THE UNIVERSITY OF BRITISH COLUMBIA

Escape 23 Trailer



What?

- Contributed to the successful launch of a new product line (Escape 23)
- Brought project from concept sketches all the way to full-scale production for consumers.

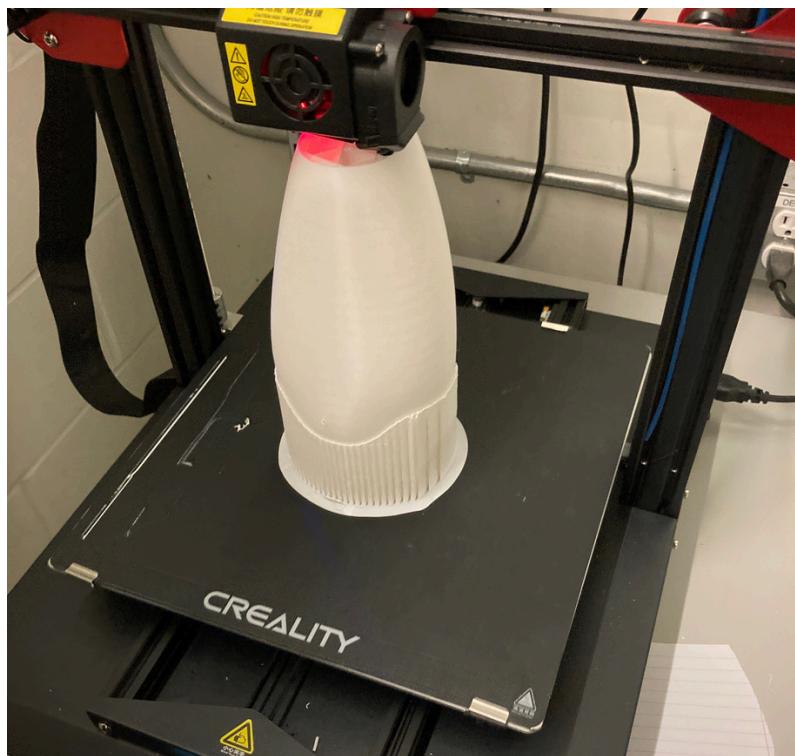
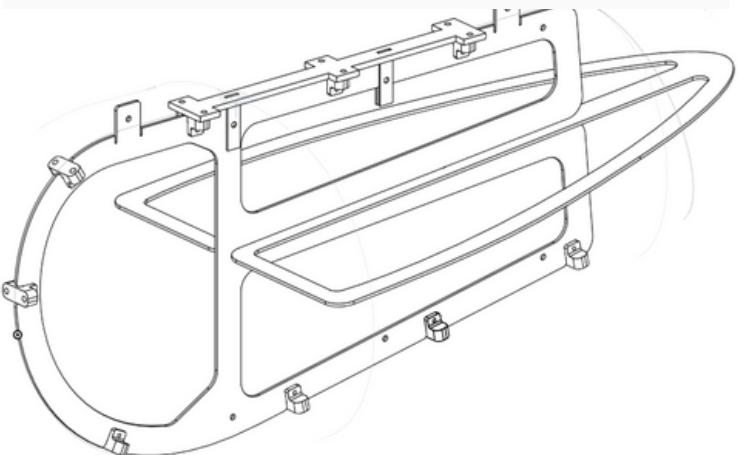
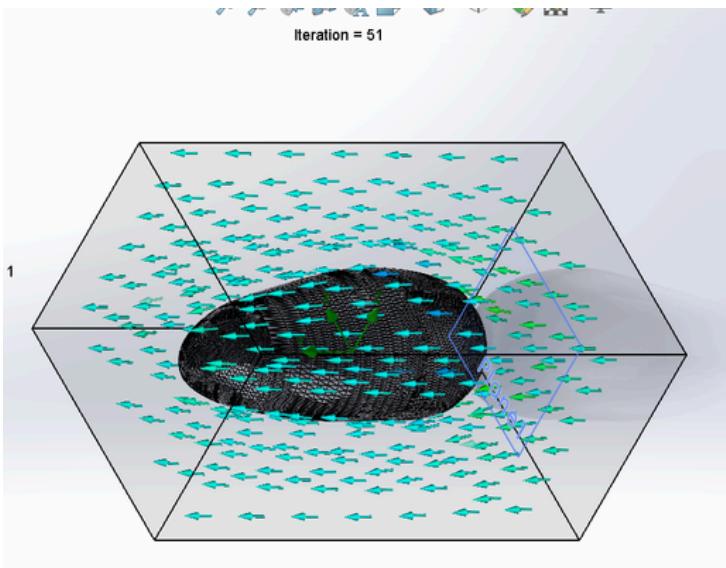
How?

- Designed layout with **CAD** software (**OnShape/SolidWorks**),
- Rapid prototyping with CNC Machinery, and 3D printing
- FEA** and Strain Gauge Testing for Chassis Structure
- Implemented **Lean Six Sigma** Principles to reduce material waste.
- Introduced **CNC manufacturing** into production line for E23 and other products.

Results

- Brought reduced initial production cycle time down 60%
- Increased CNC machinery machine uptime rate by 50%
- Reduced defect rates by 25% and reduced material waste by 66%
- Generated \$1.2M in product presales.

UBC UAS Human Concept Airbus



What?

- Annual AEAC Competition Barbie Transport Vehicle piloted autonomously.
- Worked on cabin/fuselage that seats 4 Barbie Dolls and Cargo safely while being lightweight

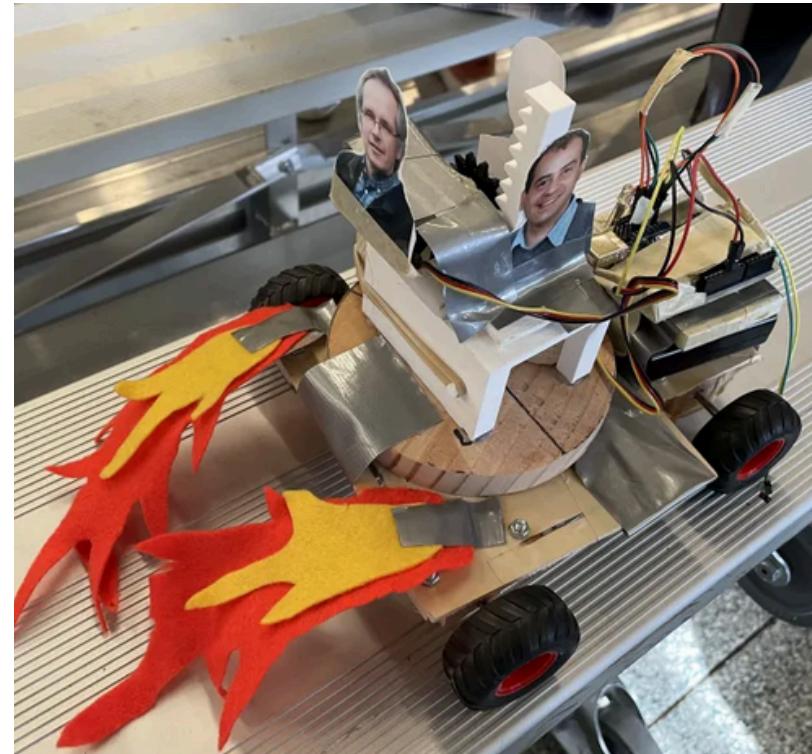
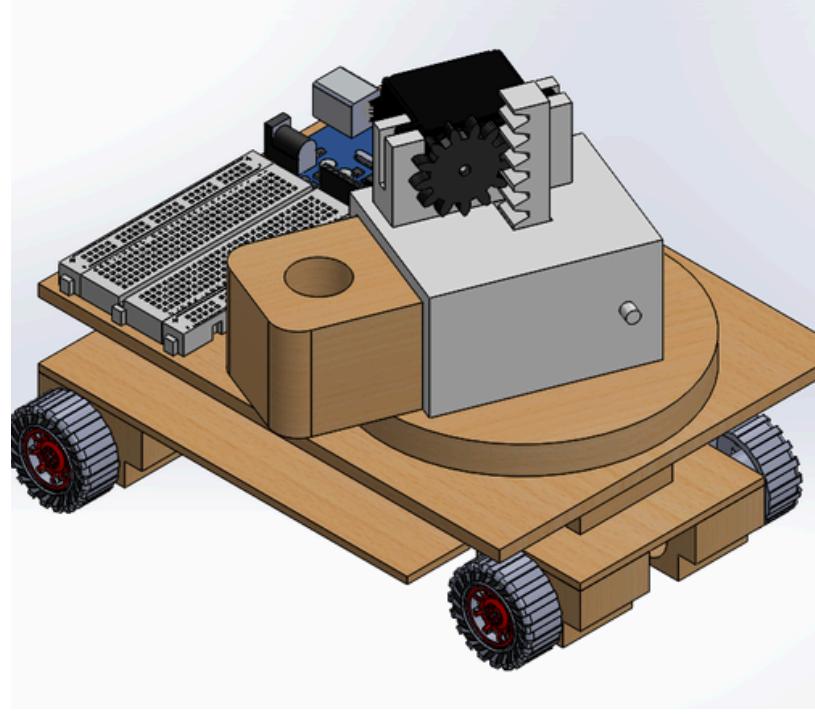
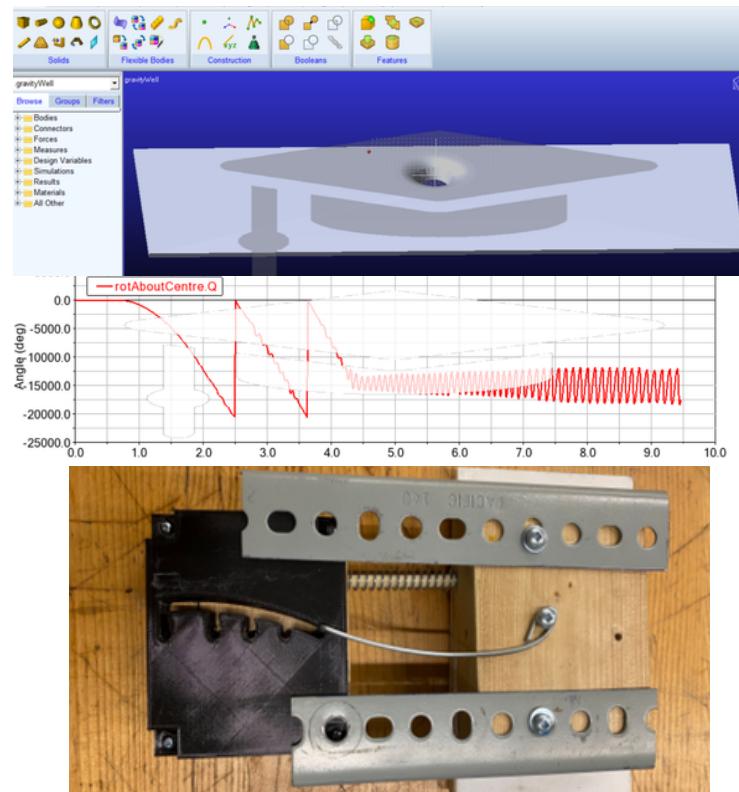
How?

- Used **SolidWorks/OnShape** to CAD cabin components, test mounts, and carbon fiber layup molds.
- Did **FEA** and **CFD** analysis to optimize cabin structure and aerodynamics
- Rapid prototyping using 3D printing, waterjet cutting, and laser cutting.

Results

- Reduced aircraft fuselage internal structure weight by 20%.
- Reduced layup mold material by 67% and exterior weight by 30%.
- Reduced part count by 20%

Titan Endurance Launcher & Orbiter



What?

- Potential energy launcher that sends a projectile into a funnel and achieves maximum spirals before reaching the bottom
- Goal:** Launch a sphere of unknown mass into a funnel and achieve maximum spirals before reaching the bottom

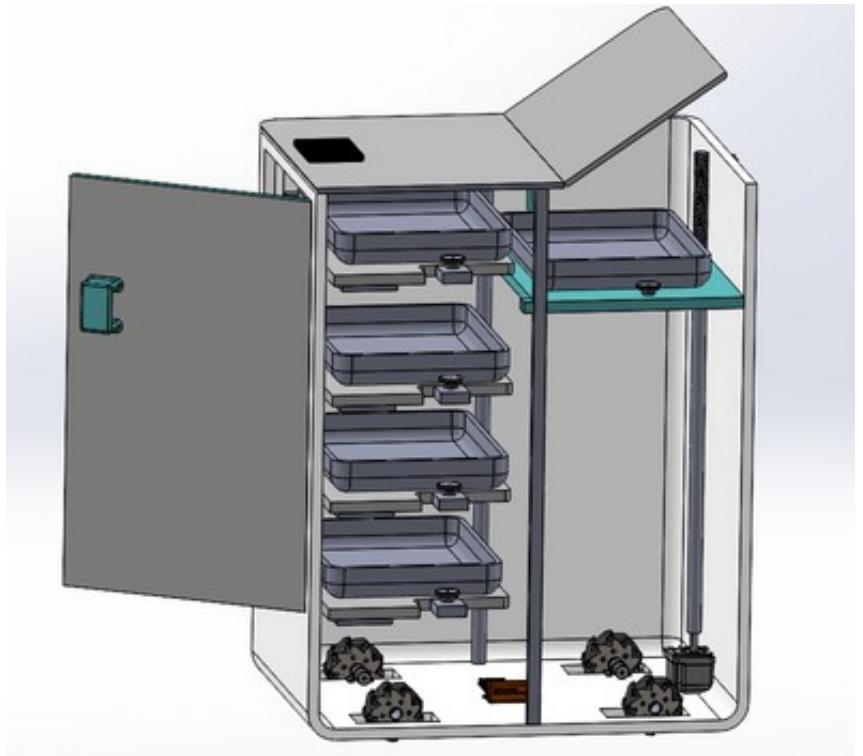
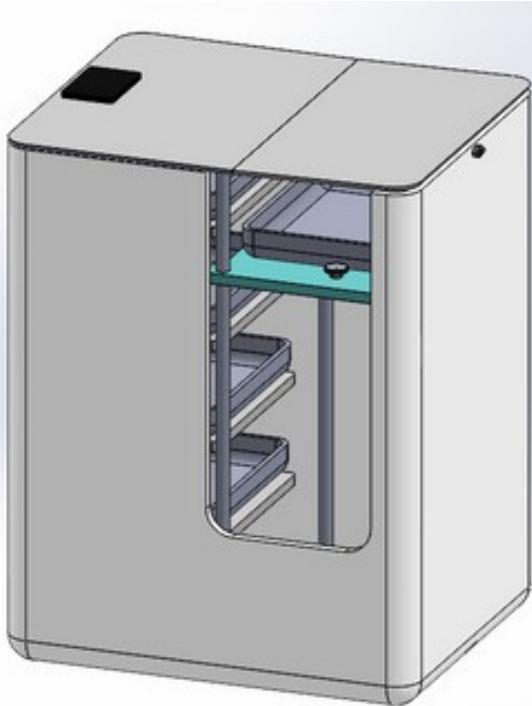
How?

- Optimized ball launch velocities by using **MSC ADAMS** to simulate and predict launch trajectories
- Used **SolidWorks** to CAD cabin prototype builds
- Led a team of 6 members to design, manufacture, and present engineered solutions to stakeholders
- Manufactured parts using 3D printing, waterjet cutting, and laser cutting.

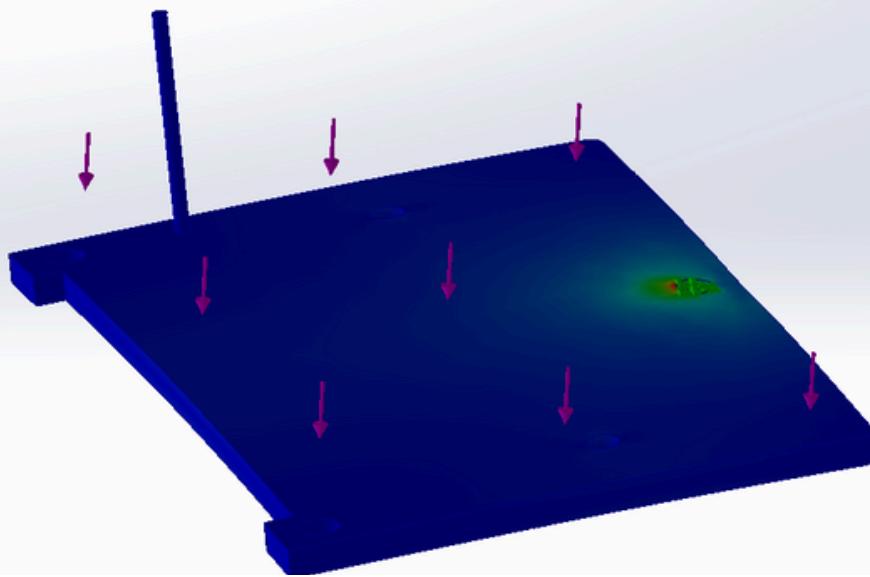
Results

- Gained design validation and testing experience
- Gained project management and technical documentation experience
- Successfully hit the target and achieved a spiral time of 56 seconds

Kitchen Robot Server



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What?

- Designed a restaurant robot that automatically delivers food to customers
- Relies on sensors and motors to transport food from the kitchen to the customers

How?

- Use **SolidWorks** to CAD and **FEA** to ensure structural rigidity
- Sourced electronics components necessary to function robot (Microcontroller, motors, actuators)

Results

- Formally presented concept to a group of judges and received design feedback
- Strengthened skills in electromechanical design, FEA, and part modelling

POSTURE-INO Posture Corrector



```
Postureino_Code
7 Serial.begin(9600);           // sets the serial port to 960
8 }
9
10 void loop()
11 {
12     x = analogRead(0);        // read analog input pin 0
13     y = analogRead(1);        // read analog input pin 1
14     z = analogRead(2);        // read analog input pin 1
15     /*Serial.print("accelerations are x, y, z: ");
16     Serial.print(x, DEC);    // print the acceleration in t
17     Serial.print(" ");        // prints a space between the
18     Serial.print(y, DEC);    // print the acceleration in t
19     Serial.print(" ");
20     Serial.println(z, DEC);  // print the acceleration in t
21     delay(100);              // wait 100ms for next reading
22     int ydeg = (y, DEC);
23     Serial.print("Your sitting angle is ");
24     Serial.print(abs(360 - y));
25     Serial.println();
26     Serial.println();
27     //detect slouching
28     if (y < 375){
29         tone(buzzer, 1000);
30         Serial.println("SIT UP STRAIGHT! YOU'RE SLOUCHING");
31     }
32     else {
33         //nothing
34 }
```



What?

- Electronic posture corrector that alerts of poor sitting posture and tracks sitting data
- Made with minimum waste and recycled materials

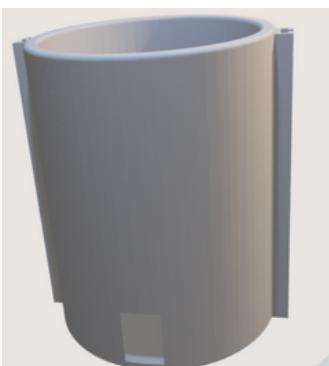
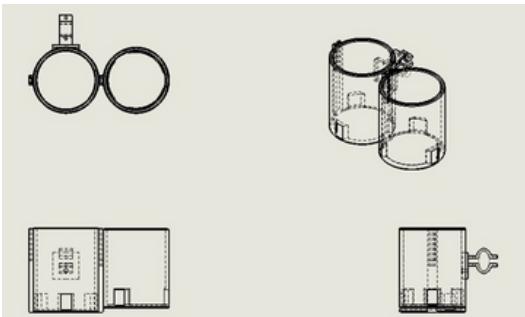
How?

- Used prototyping boards and **Arduino** hardware to create circuitry
- Programmed data collection and feedback delivery features in **C++**

Results

- Posture-ino recorded data and alerted 14 students of their poor sitting posture
- Experience writing engineering reports and presenting to stakeholders

Baby Stroller Cupholder



What?

- Custom-designed dual beverage cup holder that mounts onto a baby stroller
- Affordable and practical solutions resolve the lack of beverage holders for this specific problem

How?

- Connected with stakeholders to understand requirements and determine design constraints
- Produced 3D **CAD** models and detailed 2D engineering drawings for assembly using **SolidWorks**

Results

- Gained experience in **SolidWorks**, **3D printing**, and technical documentation and presentation
- Client daily uses product with good feedback