Albert 2.0 Smart Mini-Hovercraft

Team 11

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What is Albert 2.0?

Lift Fan

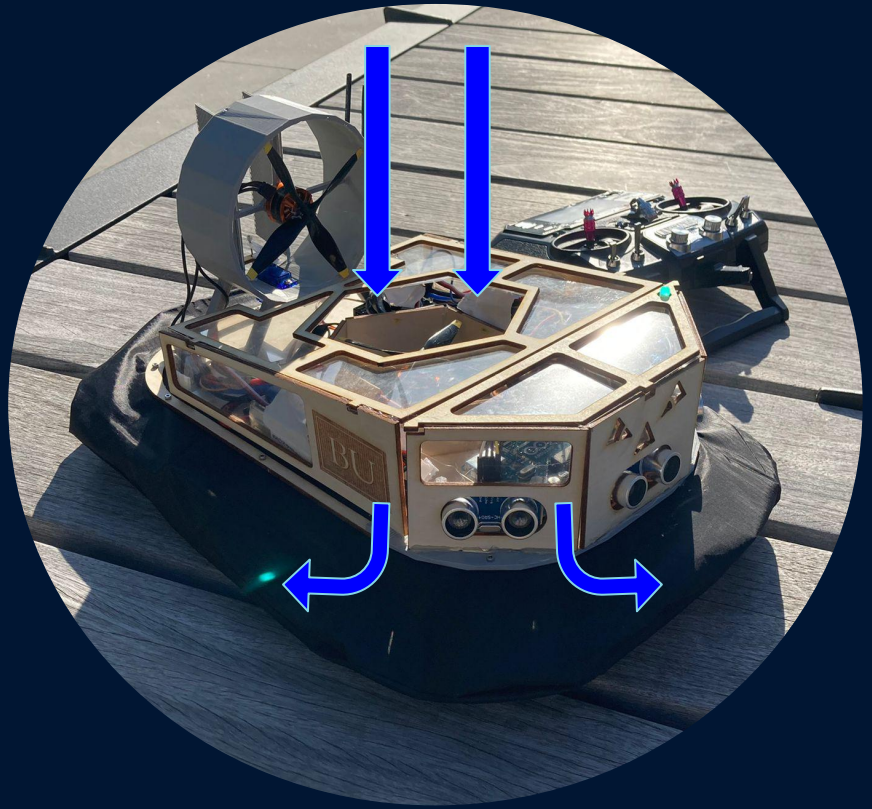
Propulsion Fan

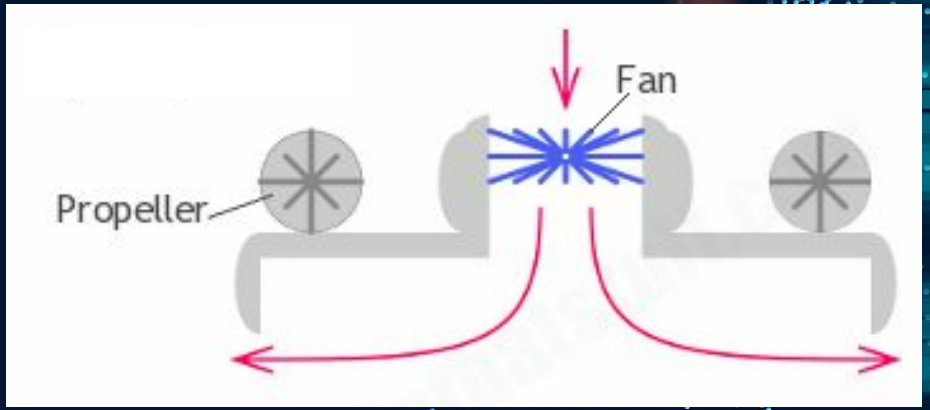
RC Controller

Skirt

Collision Avoidance System

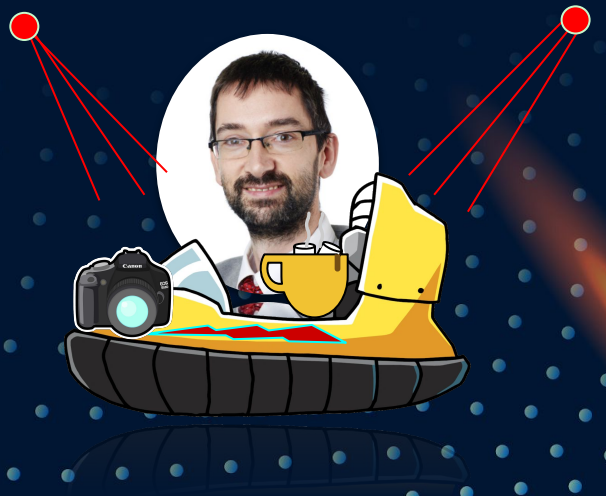
What is a hovercraft?





Design a platform that can achieve increased operation time and dynamics with a simple, durable design

—Professor Tron



Motivation

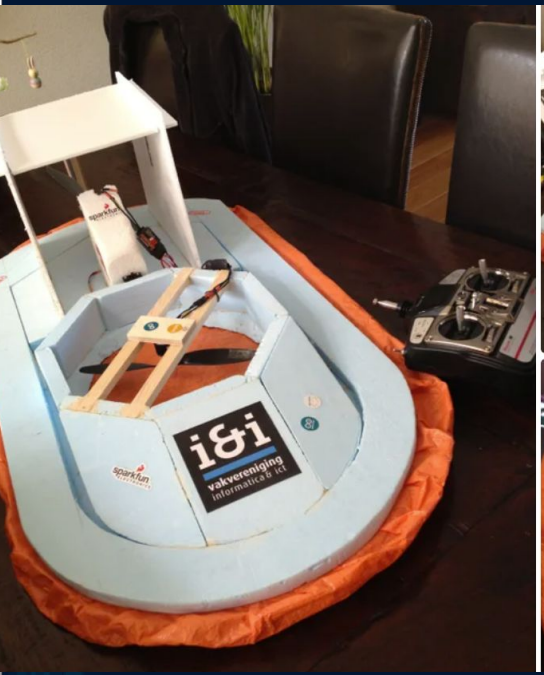
Quadcopters

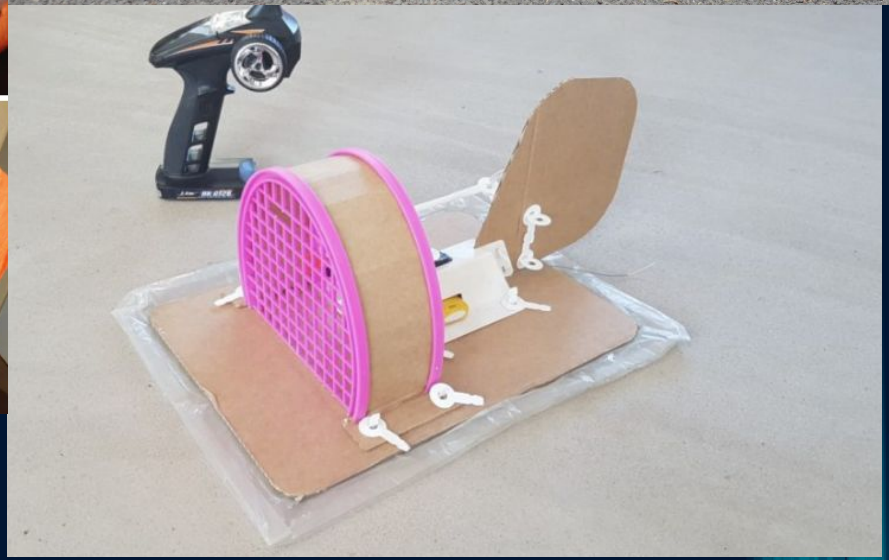
- Complex dynamics
- High costs
- Sensitive to damage
- Short Battery Life

RC Cars

- Do not reflect realistic vehicle behavior
- Inertial effects are negligible

Existing Designs





Project Overview

Project Description

The Smart Mini-Hovercraft Project was aimed at

- increased operation time
- complex dynamics
- form of autonomous control

Critical

Reproducible
support 500g
> 20 min battery life
RC control
Hover and Travel

Desired

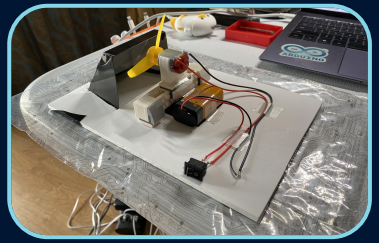
onboard computer
onboard camera
Integrate in motion capture arena

Reach

onboard sensors

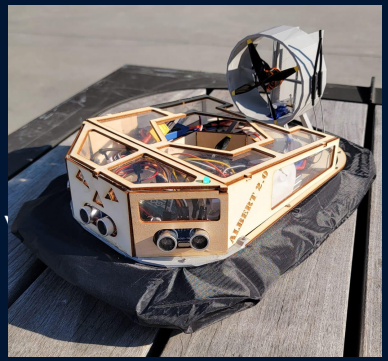
How did we build Albert 2.0?

Proof of Concept



Feasibility Prototype

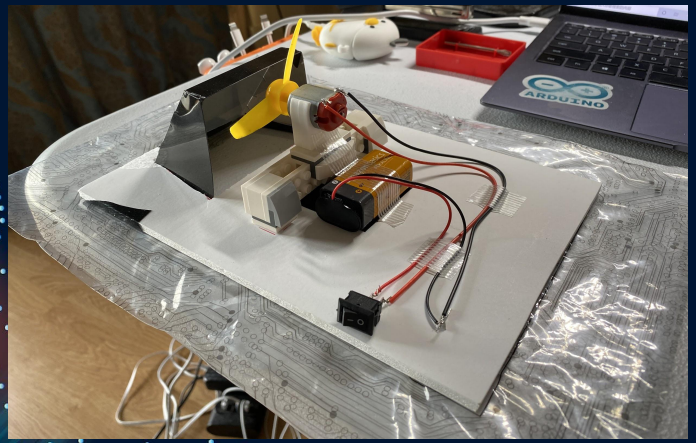
Albert 1.0

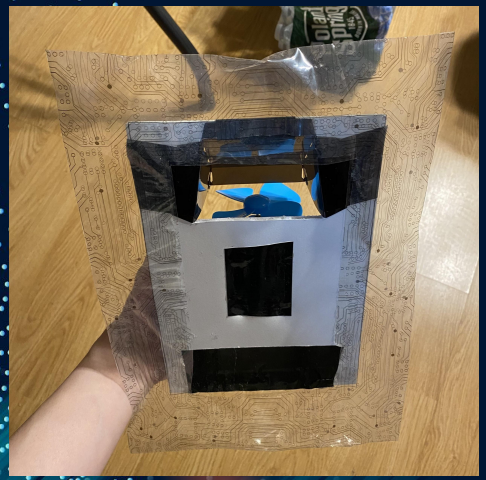


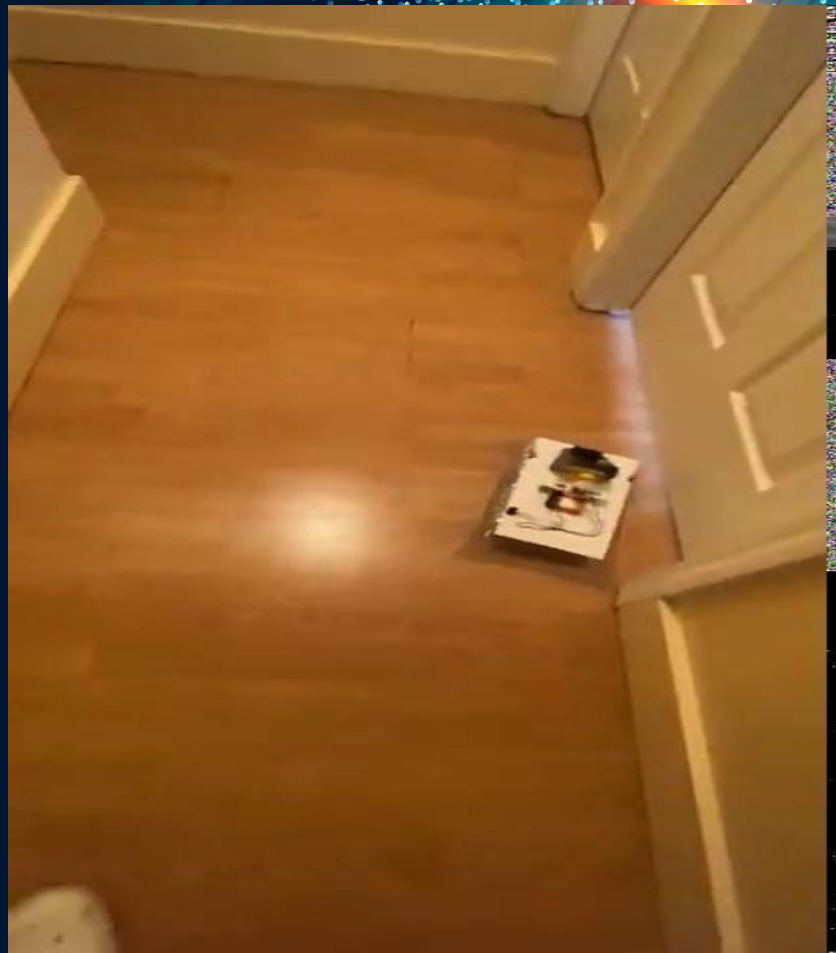
Albert 2.0

Lift Demonstration

Propulsion + Lift Demonstration







From POC to Albert 1.0

Power

DC brushless motors + LiPo Battery

Balance

Weight Distribution

RC Device

ESC + Control of Propulsion and Lift

Propulsion

Bought Propeller

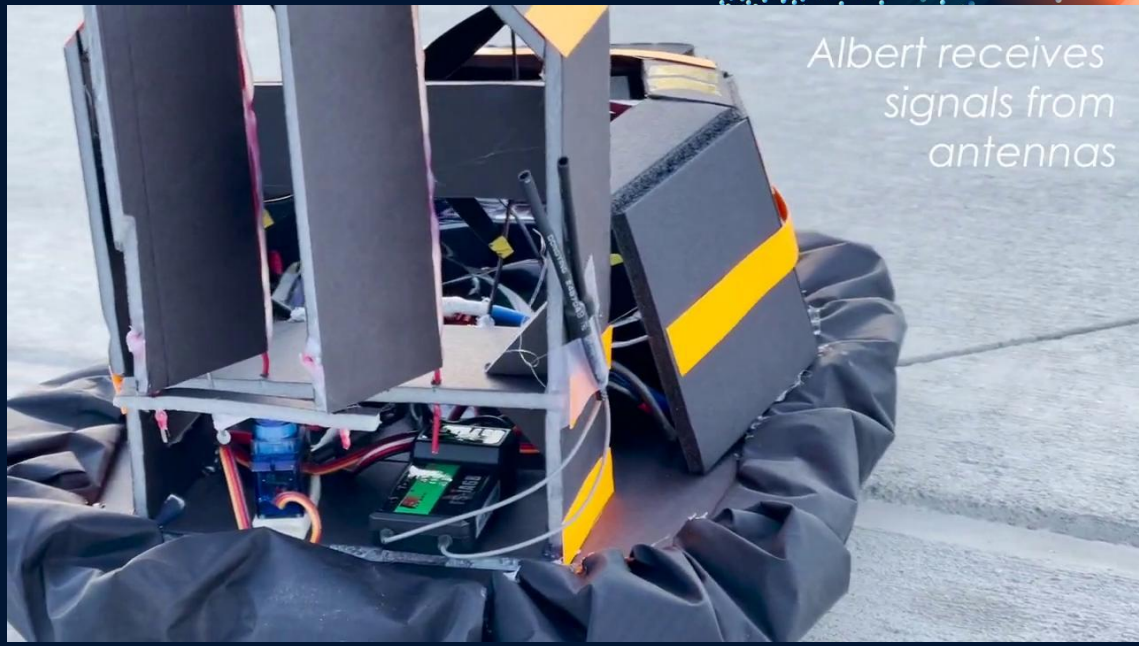
Rudders

Skirt

Ripstop Nylon (Parachute Material)

Body Material

Foam Board



Problems with Albert 1.0

Weight Distribution
Leans Forward

Foam Board
Hard to manufacture

Battery Life
Too Short

Rudders
Slow Response

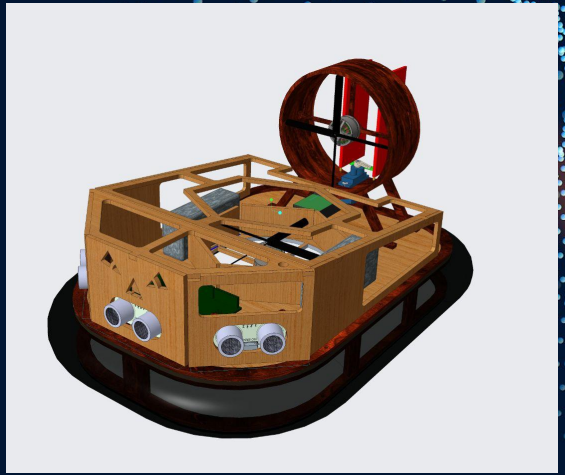
Skirt
Tedious design/install

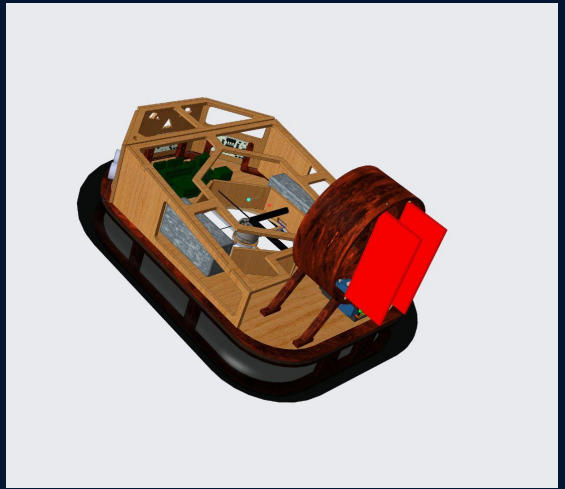
Albert 2.0

Final Prototype

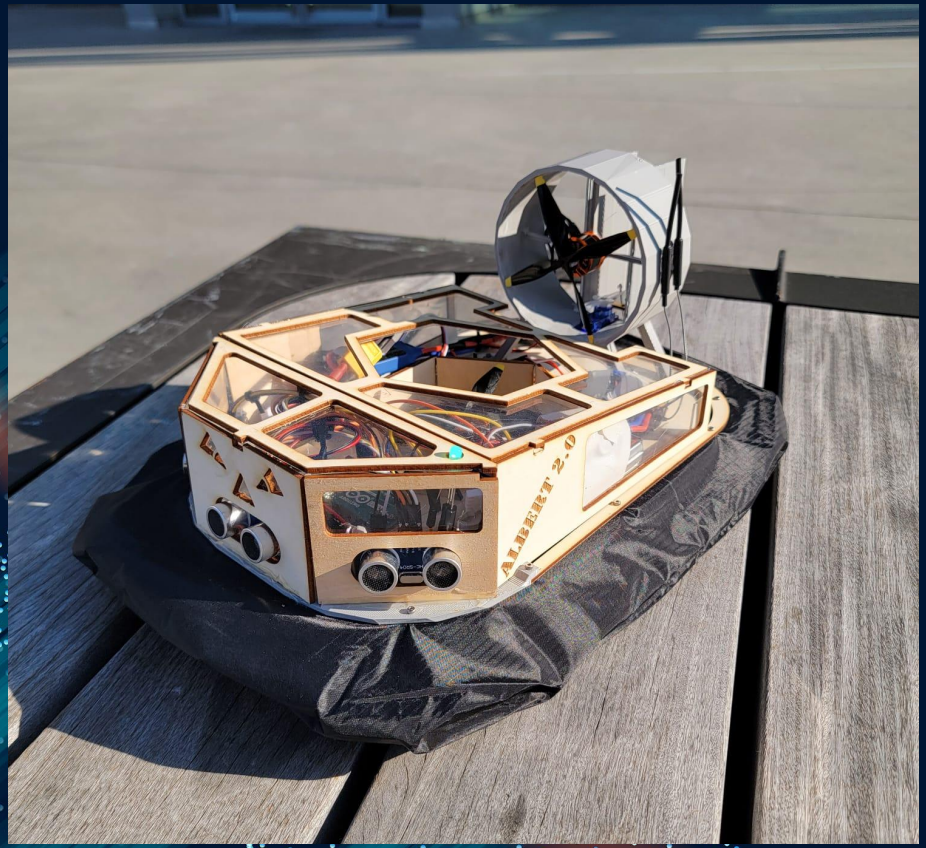
Changes from Albert 1.0 to Albert 2.0

- Replaced tape
- balsa wood and lightweight plastic sheeting
- Slightly larger geometry
- Battery Capacity increased
- Skirt assembly improved
- Rear propulsion motor and servo mount redesigned
- Collision Avoidance System





We did it!



- [x] Optimized Design
- [x] Supports 500g
- [x] 45-min battery life

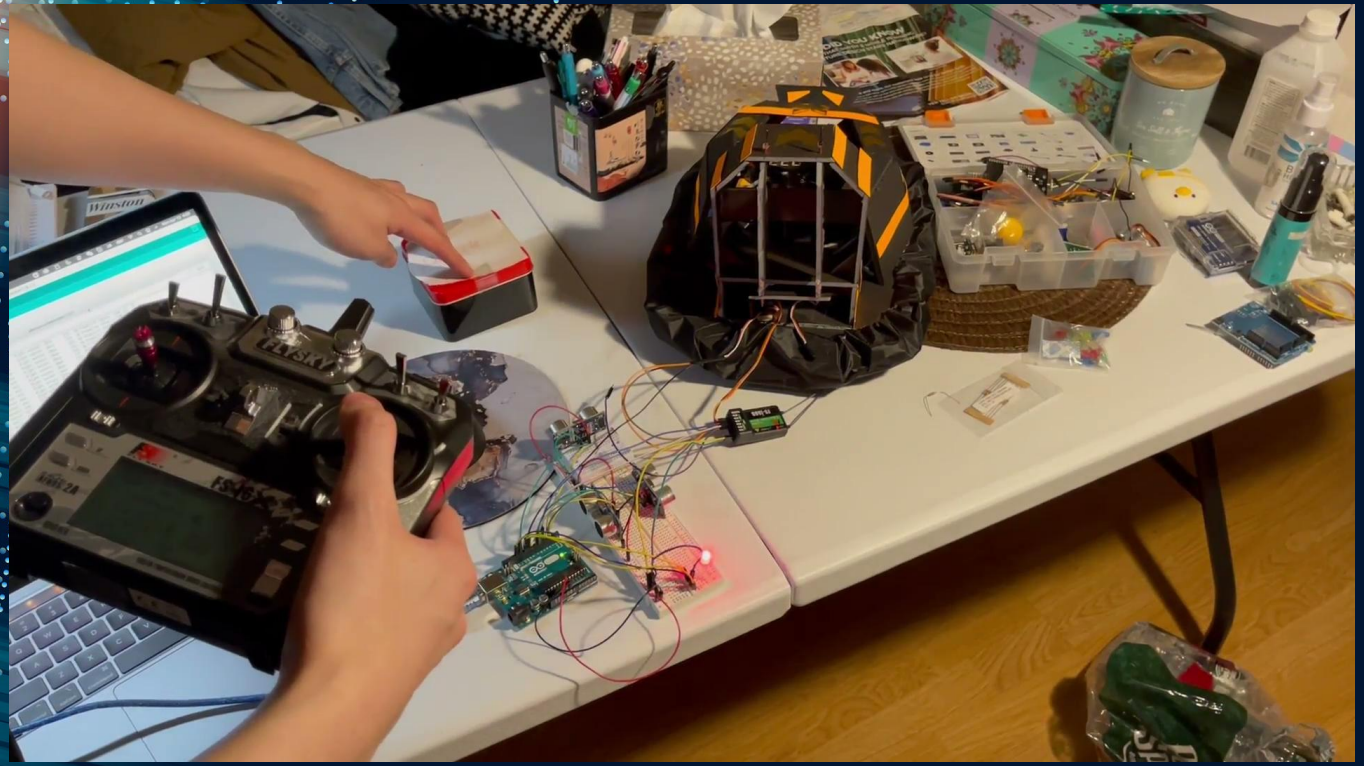
- [x] **Level 1**

Autonomous Driving

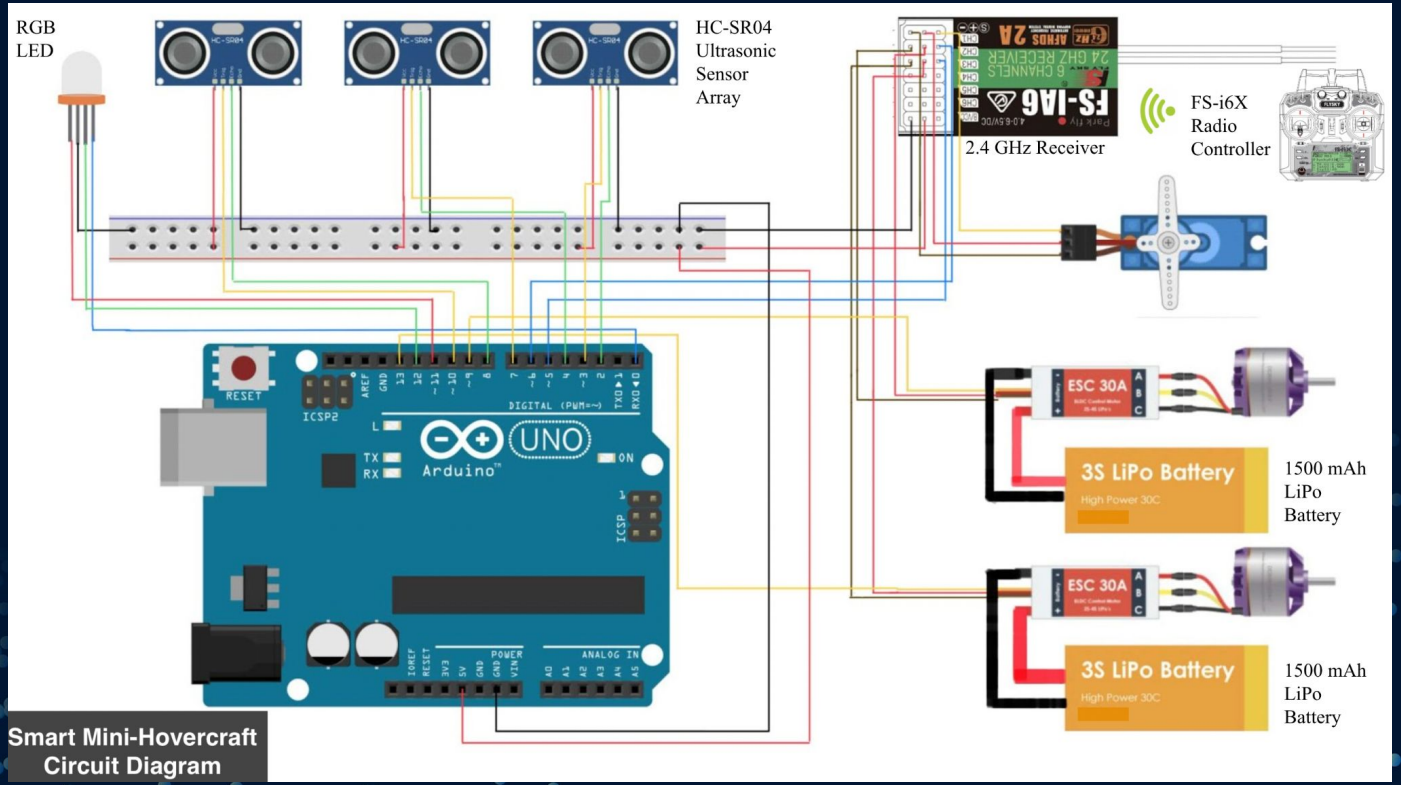
Thank You!

Special thanks to Professor Tron, Gutierrez and Hauser for all your help and support over the course of this project!

Ultrasonic Sensor works



Circuit Diagram



Function Decomposition