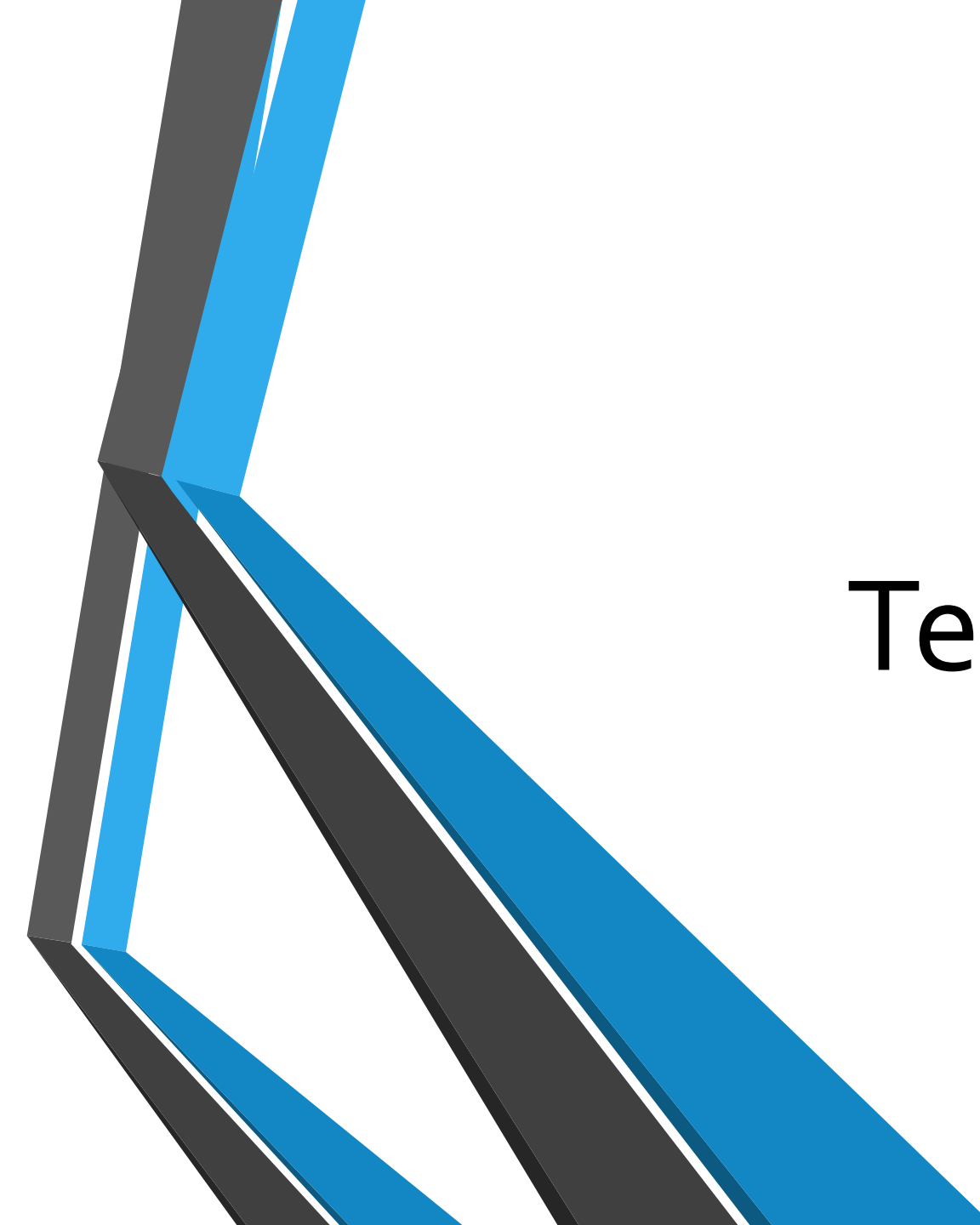




Team 8: RC car drone

ECE 480 Project

Team 8

MICHIGAN STATE
UNIVERSITY

Brandon Briegel

Matt Henry

Jerrod Kempf

Arber Nicaj

Michael Price



Advisor's Name

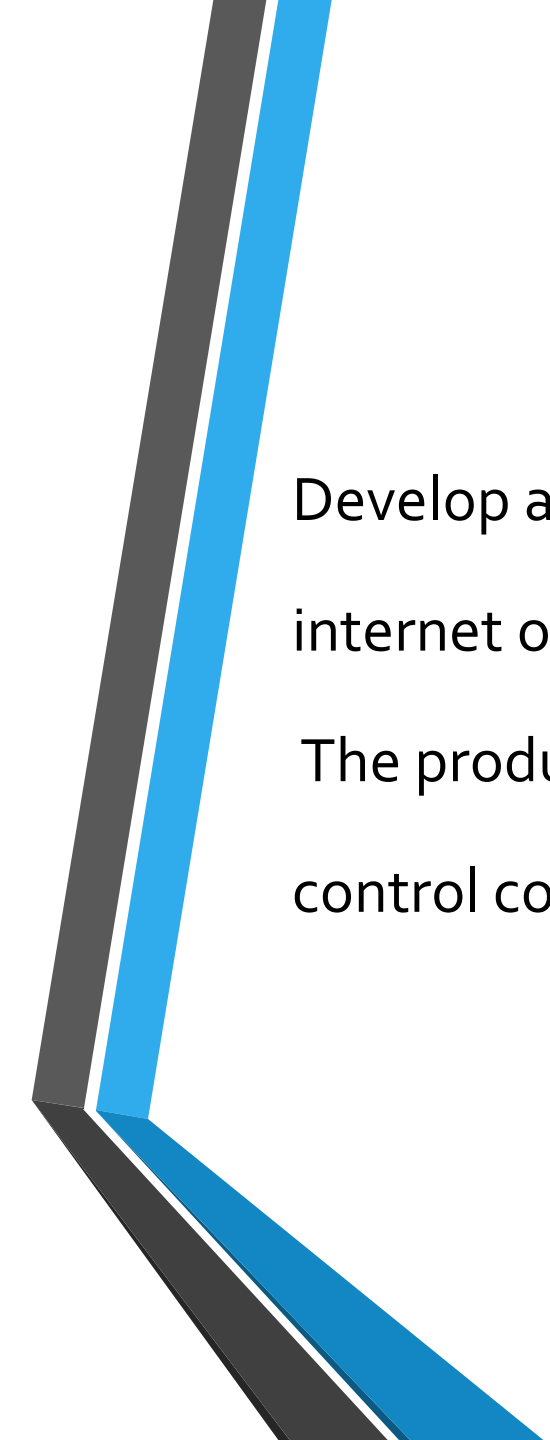
- Tim Adcock
- Zachary Buckley





Overview

- Objectives
- Project Description
- Design Flow
- Conceptual Design
- Budget

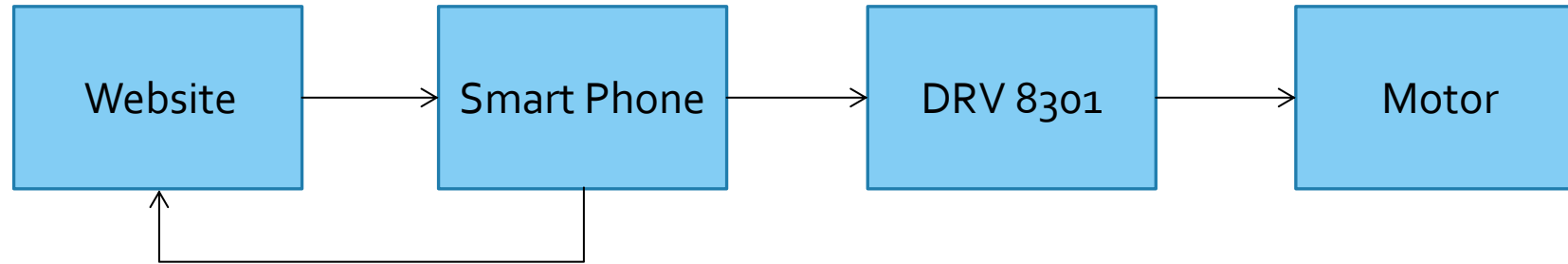


Project Description

Develop a remote controlled Drone Car that can be controlled over the internet or locally via Bluetooth.

The product will demonstrate motor control, servo steering, and allow remote control communication with the vehicle via Wi-Fi or Bluetooth.

Objectives



The final drone will be able to:

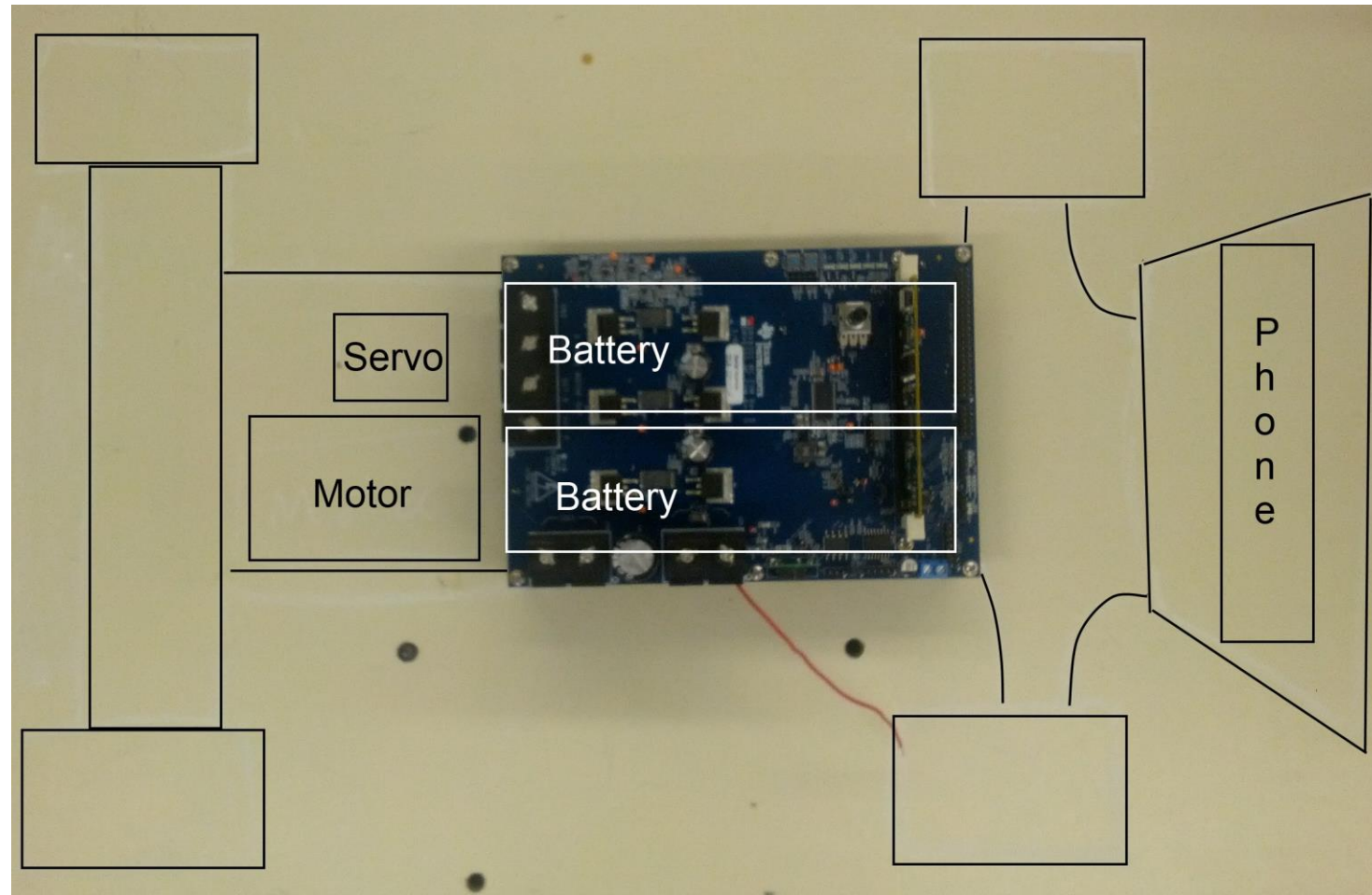
- Steer
- Start/Stop
- Control Speed
- Switch control algorithms:
Preprogrammed or user controlled
- Traverse different types of terrain
- Two way web/drone communication
- Take pictures
- Send data to web server



Design Flow

- Motor Integration
- Phone to Board Communication
- Interface Webpage & Phone
- Collecting Data & GUI Design

Conceptual Design



Conceptual Design

Platform

SWorkz S350 BX-1E 1/8
Sport ARTR Buggy Roller

Specifications:

535 x 308 x 220 mm

70 mm ground clearance

Weight: 3600 grams



Conceptual Design

Motor Specifications:

Brushless DC Motor(BLDC)

Weight (g): 364

Max Voltage (V): 19

Max Current (A): 126

Max Power (W): 2400

Rated Speed (rpm): 2350

Brushless DC Motor



Conceptual Design

Battery



Power Supply

- Voltage (V): 7.4
- Capacity (mAh): 5000
- Constant Discharge(C): 20
- Weight (g): 282

Motor Control

DRV8301 Kit for 3-phase BLDC

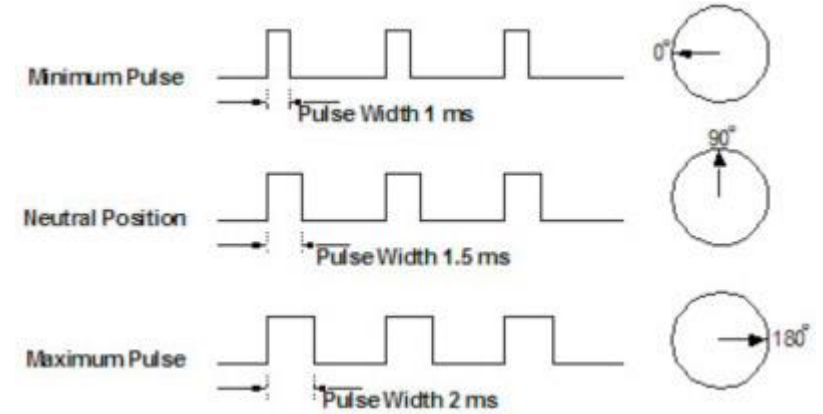
- 12-24V power supply
- Receives PWM and has two way communication with Piccolo
- Outputs 3 phase signal to on-board MOSFETS



Steering Control

Servo controlled through microcontroller

- Used for turning the drone
- Position determined by duty cycle of incoming PWM



Phone to Drone Communication

C2000 Piccolo F28035 MCU controlCARD

- Receives commands from the on drone phone
 - Data sent via Bluetooth and received through GPIO
- Allows C code to be loaded via USB from CCS
- Communicates to Motor control/servo

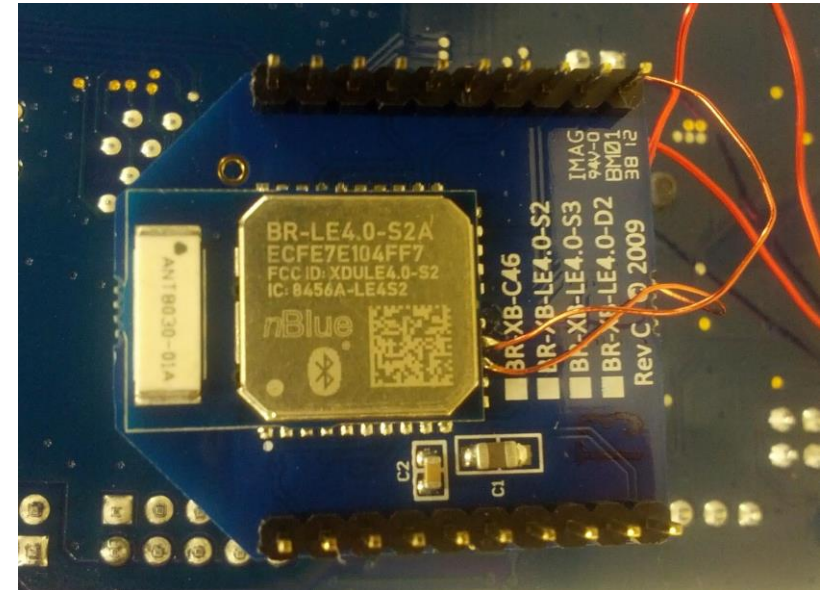


Phone to Control Board

Phone communicates with microcontroller via bluetooth

Bluetooth module communicates with microcontroller via UART pins

Phone will issue commands using BlueTerm



Bluetooth Low Energy v4.0
Single Mode with Antenna

Webpage

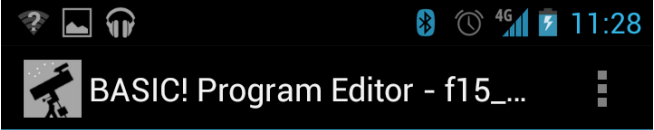
Setup Server/Client application to issue commands remotely

Choice between languages to implement:

- Basic
- JAVA

Basic can be implemented via interpreter app on phone

Android apps typically written in JAVA



```
! Demonstrates the GPS commands

GPS.OPEN
GR.OPEN 255, 255, 255, 255
GR.ORIENTATION 0
GR.SCREEN w, h

sp = h/7
pad = 0.25 * sp
x = 20

loop:

GR.TEXT.SIZE sp - 2*pad
GR.COLOR 255,0,0,0,1

y = 0*sp + sp - pad
GPS.PROVIDER provider$
GR.TEXT.DRAW p, x, y,
"Provider: " + provider$

y = 1*sp + sp - pad
GPS.ACCURACY accuracy
GR.TEXT.DRAW p, x,y, "Accuracy:
" + FORMAT$("##" . accuracy)
```

Sensor Data

Drone needs to transmit location in order to be useful

- GPS location
- Compass
- Visual feedback

Android onboard sensors facilitate data collection

Provider: gps

Accuracy: 15

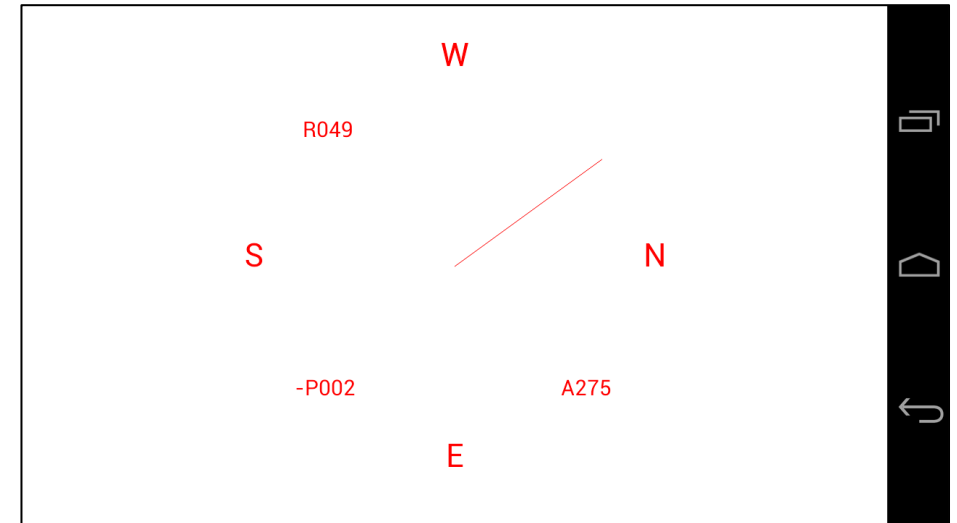
Latitude: 42.69137

Longitude: - 84.50117

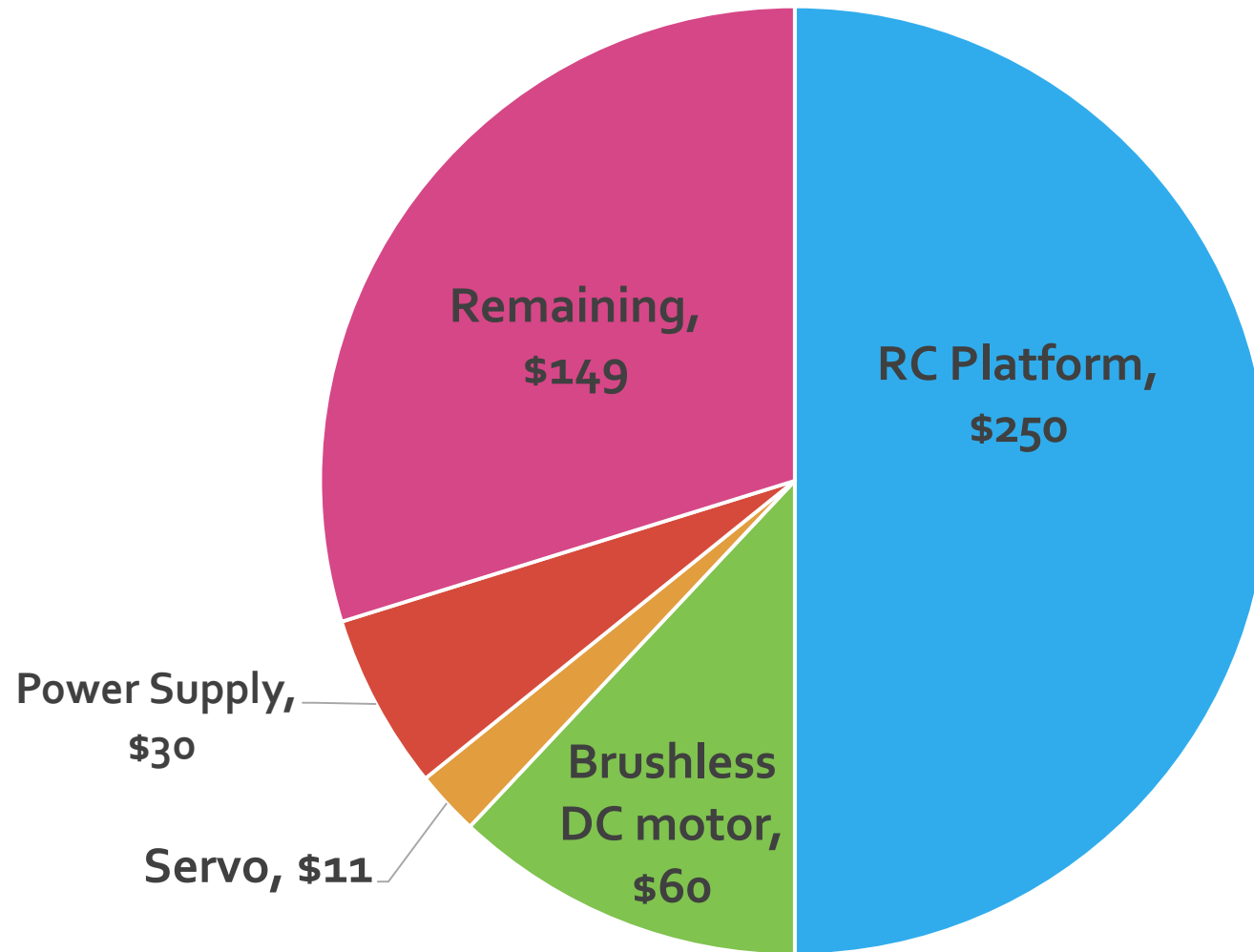
Altitude: 257

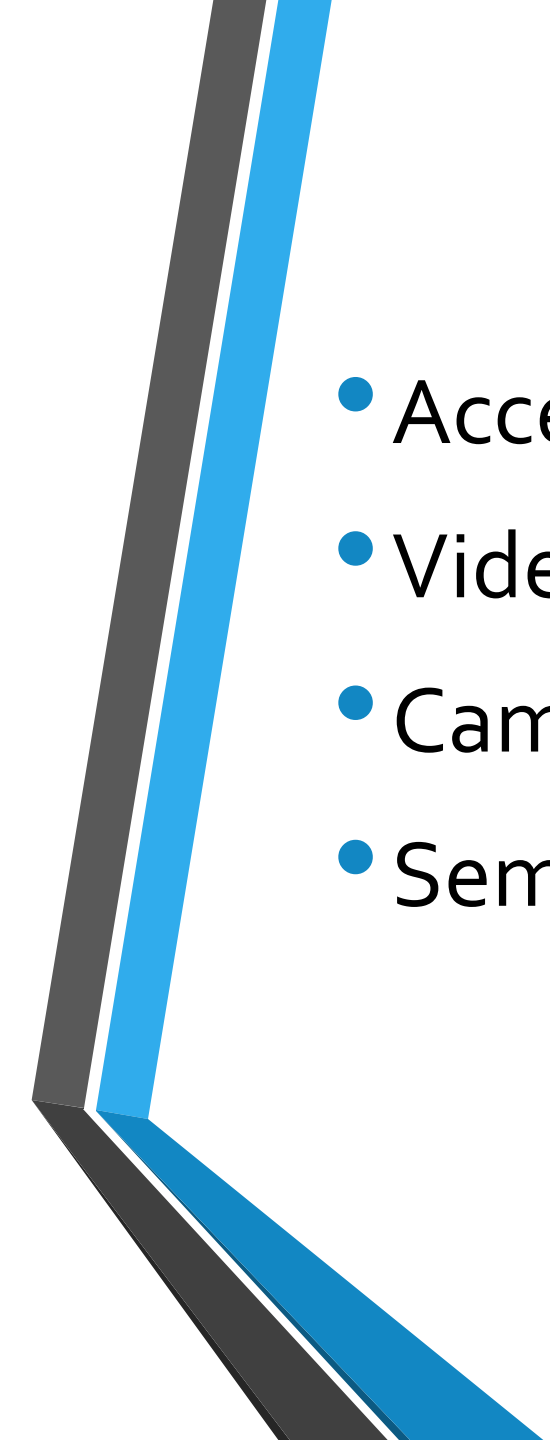
Bearing: 101.16

Speed: 0.06



Budget





Extra Features

- Accelerometer
- Video Streaming
- Camera Panning
- Semi-Autonomous

Questions?

