SDSU San Diego State University

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Aztec Baja Active Suspension System

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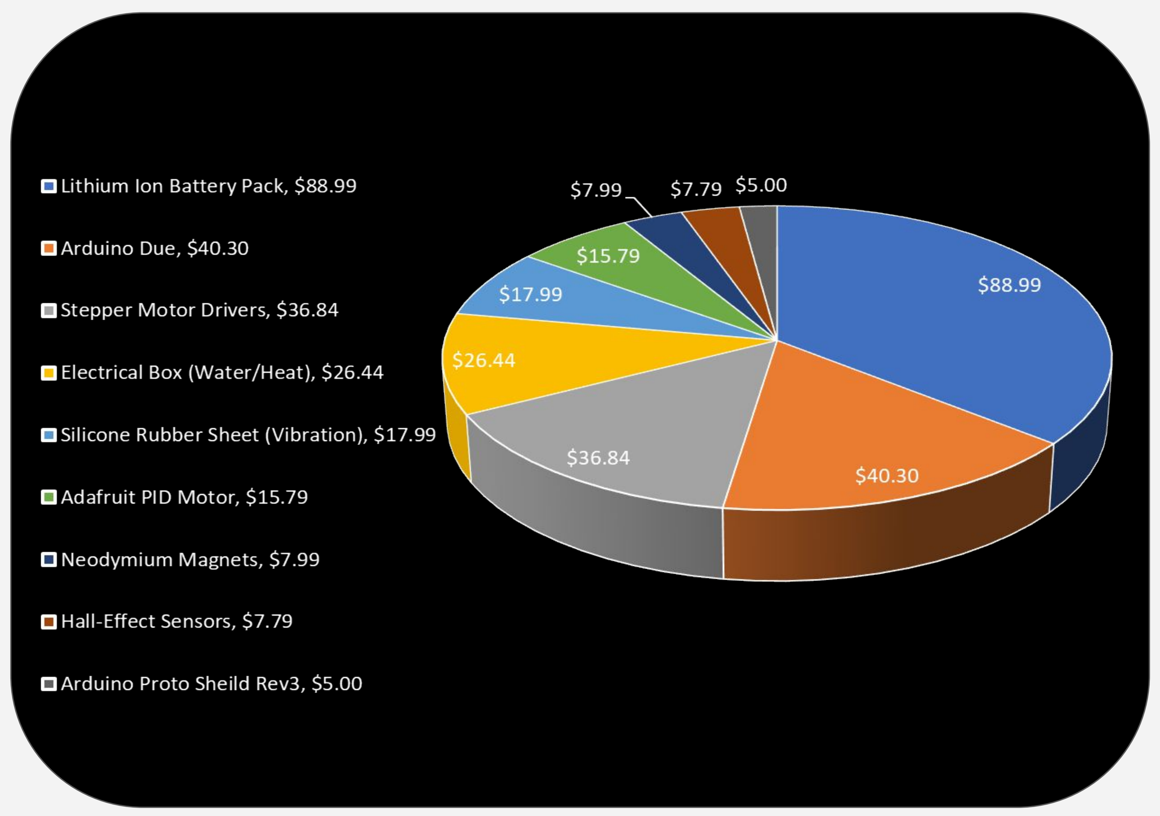
ABASS Team

Background

The Aztec Baja SAE team requested a smart system that controls the rigidity of their car's suspensions autonomously. The system has 4 modes: soft, medium, hard, and active, but the crutch of the project is the active mode. The active mode adjusts the suspensions in real-time, reacting to the terrain of the race around it in order to give maximum comfort to the driver as they go through a grueling multi hour race.

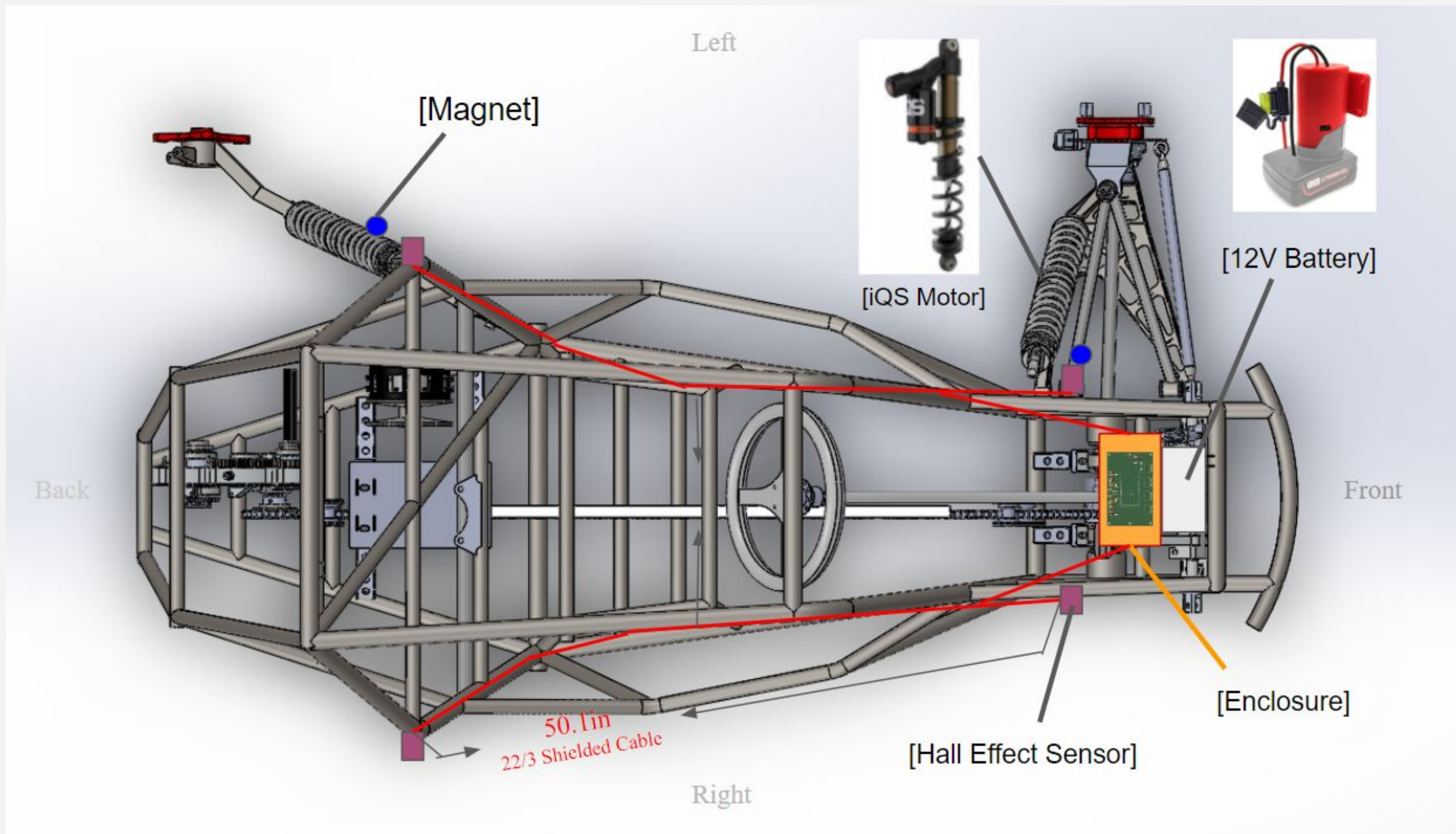
Cost

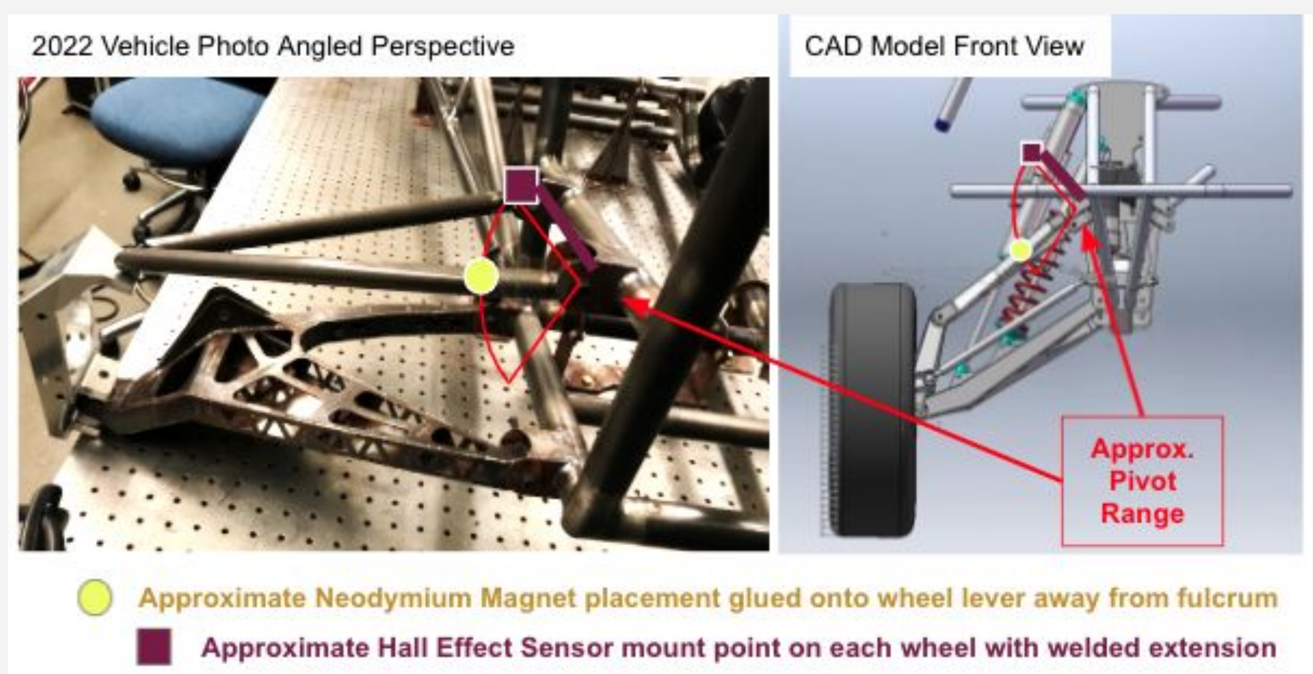


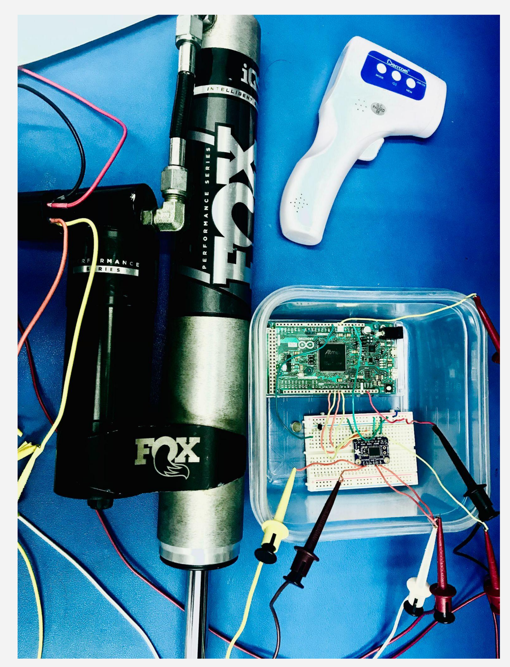
Project Requirements

- Must integrate with four iQS Stepper Motors/Suspension System received from FOX
- Four Modes: Soft, Medium, Hard, Active
- Must connect to external Data Logger (Baja Subsystem)
- All computing must be done locally on the vehicle.
- Must be suitable for racing environment.
- Power supply must allow the device to run continuously for a minimum of 5 hours, race has 1 intermission if needed.
- Noticeable improvement in driver performance.
- Budget: $250 + may used club budget ($1200) only with itemized approval.

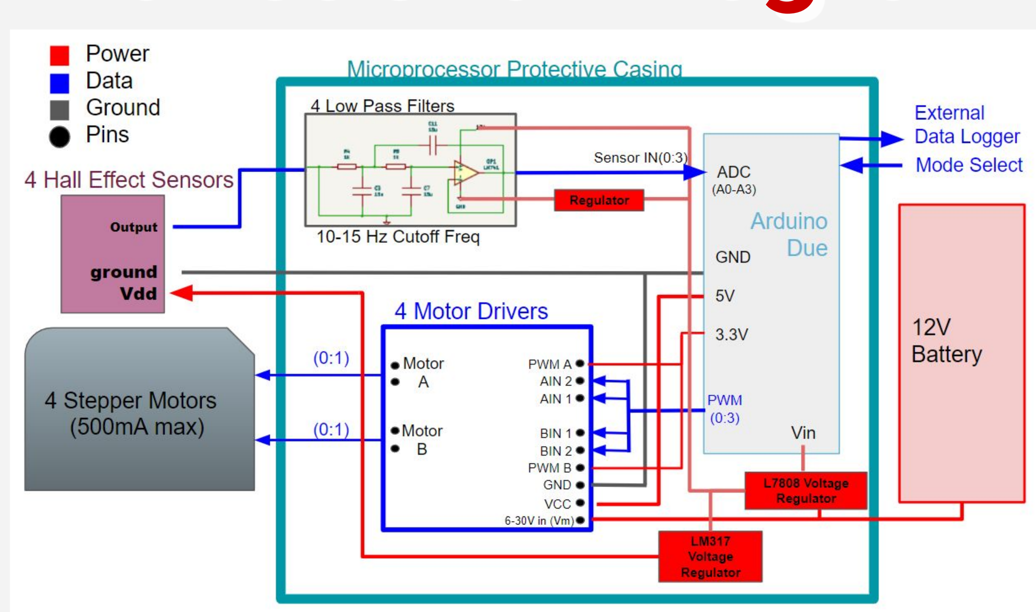
System Diagram



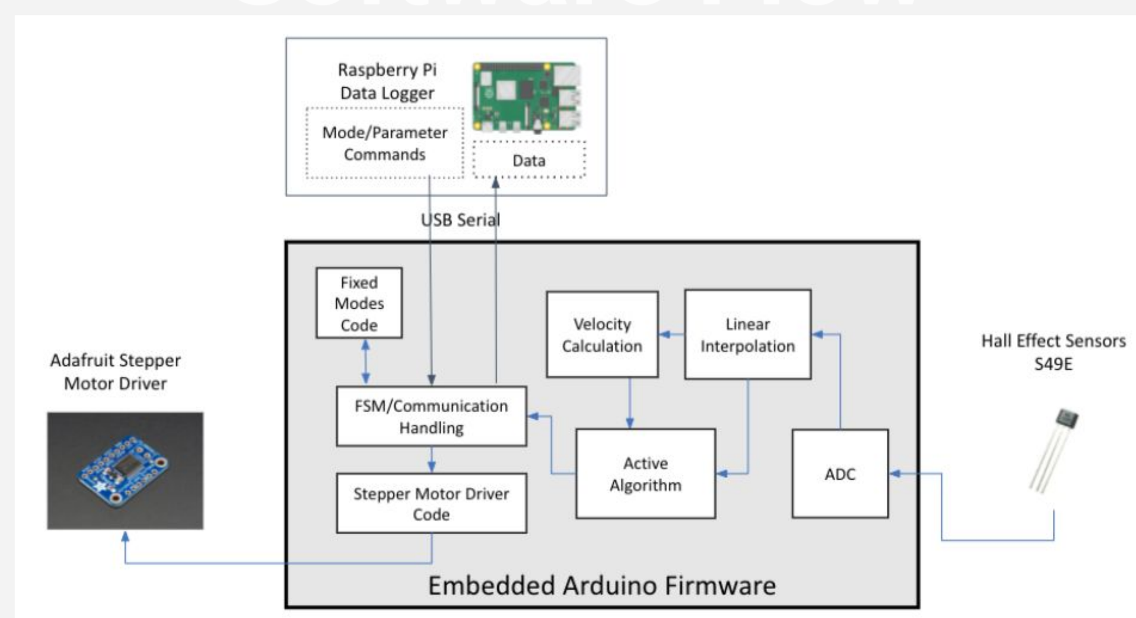




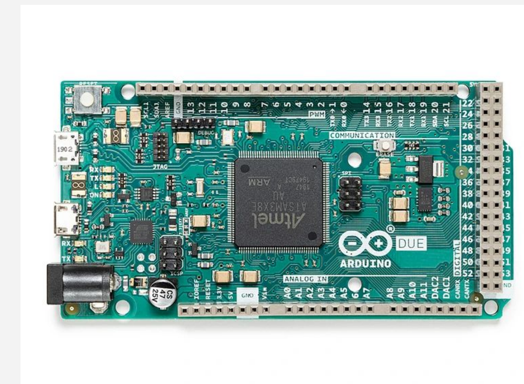
Functional Diagram



Software Flow

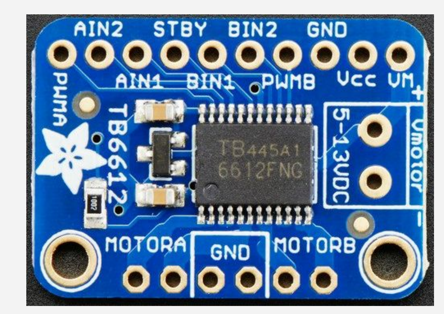


Hardware/Key Components



Arduino Due

The brains of the project. Receives input from Hall Effect sensors and sends control signals to stepper motor drivers with onboard PWM pins.



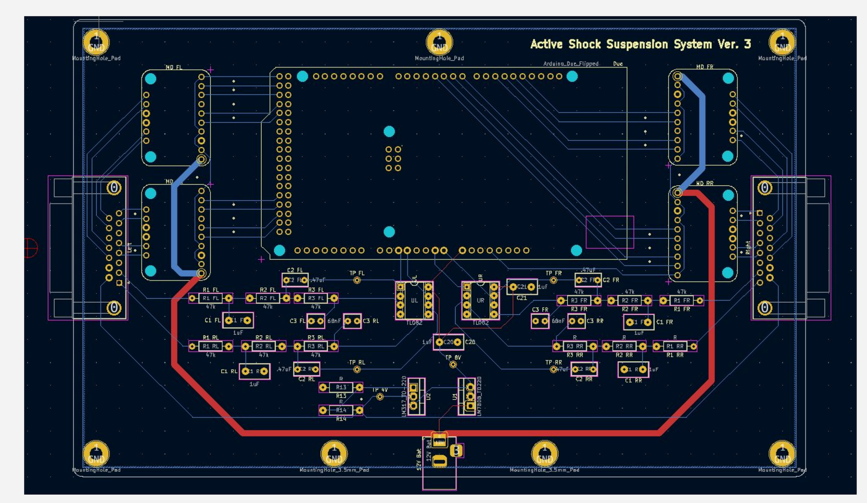
Stepper Motor Drivers

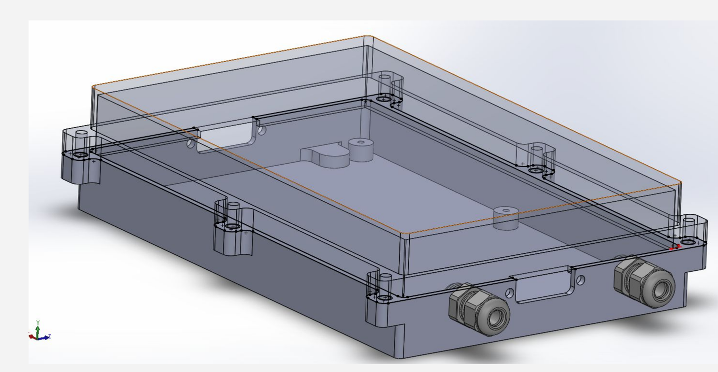
4 in total. Each driver controls one suspension stepper motor. Receives 4 control signals, each one corresponding to one coil in the motor.

Hall Effect Sensors

Attached to each suspension is one Hall Effect sensor and a magnet. As the suspension moves, the magnet will get closer or farther to the Hall Effect sensor, which outputs a voltage relative to the strength of the magnetic field around it.

PCB Design & Enclosure





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