

E1.10 - Sumo Bot Team D

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Project Description

Our project is an autonomous robo-car designed for sumo bot style competitions. The product is to traverse a playing ring in search of opponents, avoid the outside boundaries of the ring, and engage opponents once they are found.

Motivation

Demand for autonomous robots is increasing. Developments in technology, growing populations, and events such as the COVID-19 virus have sparked interest in autonomous robotics. The team is proud to present a product that provides hands on experience for this growing field.

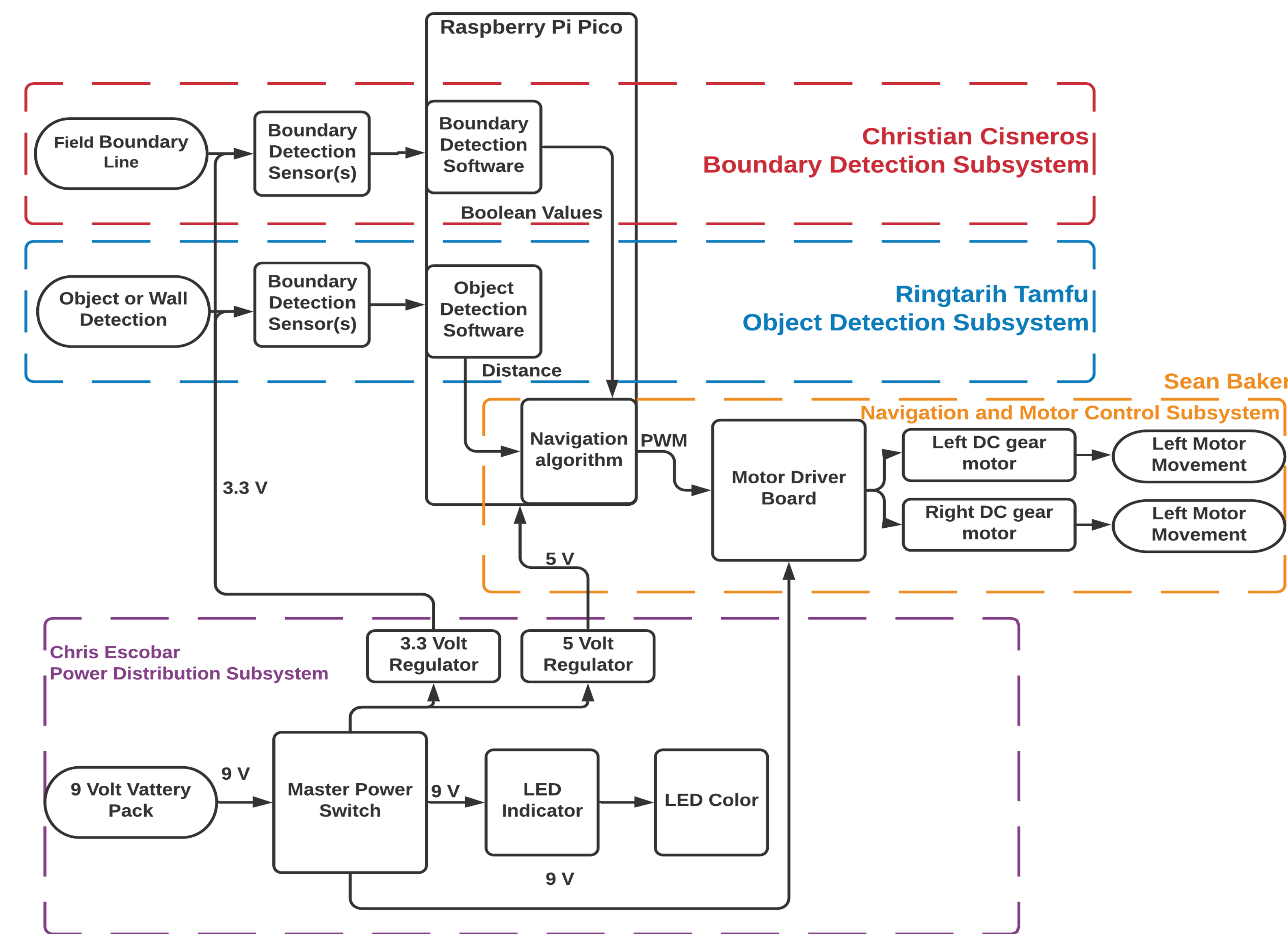
Requirements

- 17.0 x 24.0 cm
- 2000 g
- Battery Powered
- Must be able to Push an Object out of the ring
- Must be able to traverse a hallway in Ingram

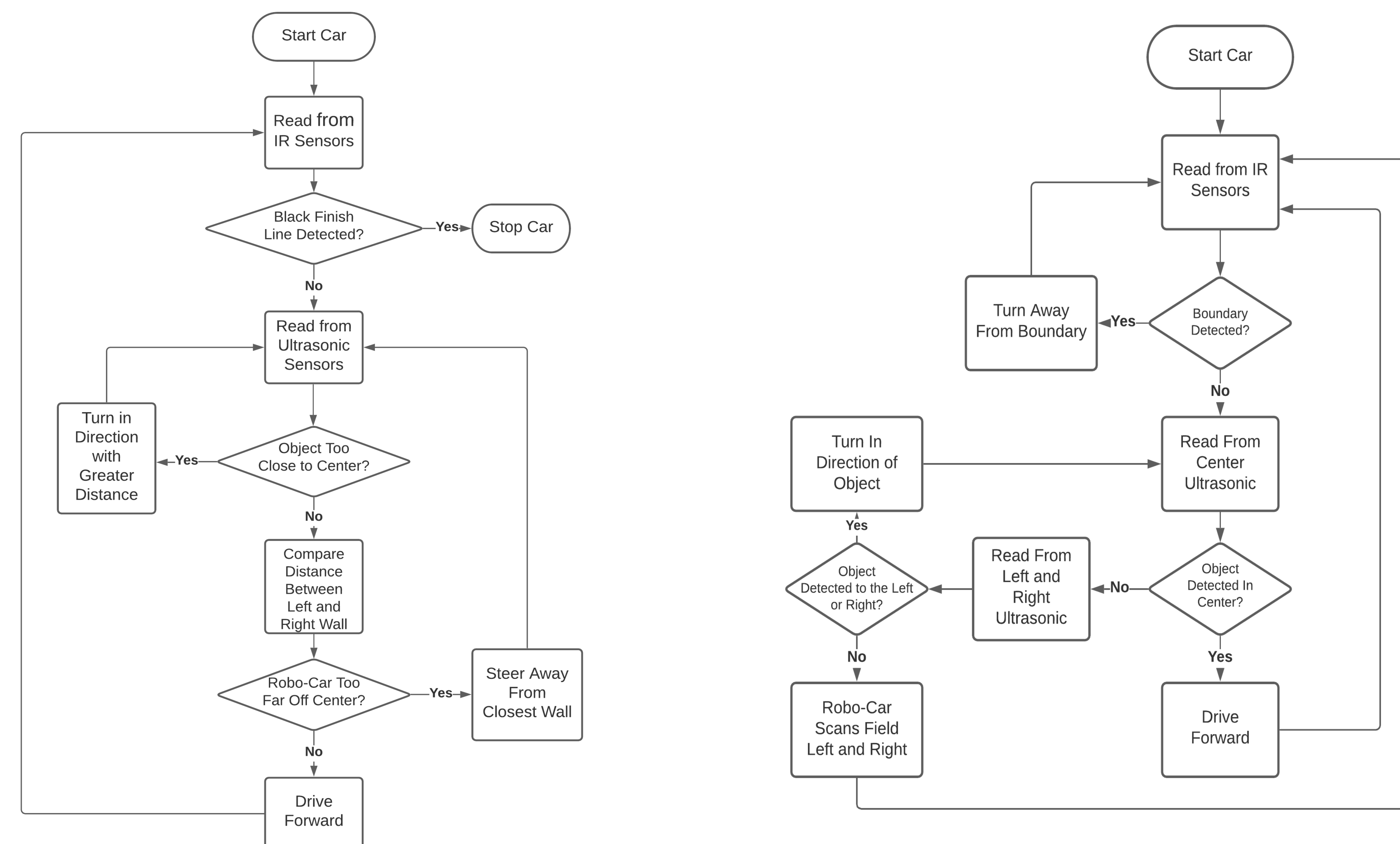
Approach

- Raspberry Pi Pico – Microcontroller selected based off base processing speed of 125 MHz
- L298N Motor Driver Board – interface motors with microcontroller and battery pack
- HC-SR04 Sensors (x3) – Object detection
- FC-51 IR Sensors (x4) – Boundary awareness
- C Programming Language – Primary programming language selected
- 3-D printing – Components such as bumpers and mounts are 3-D printed to improve stability

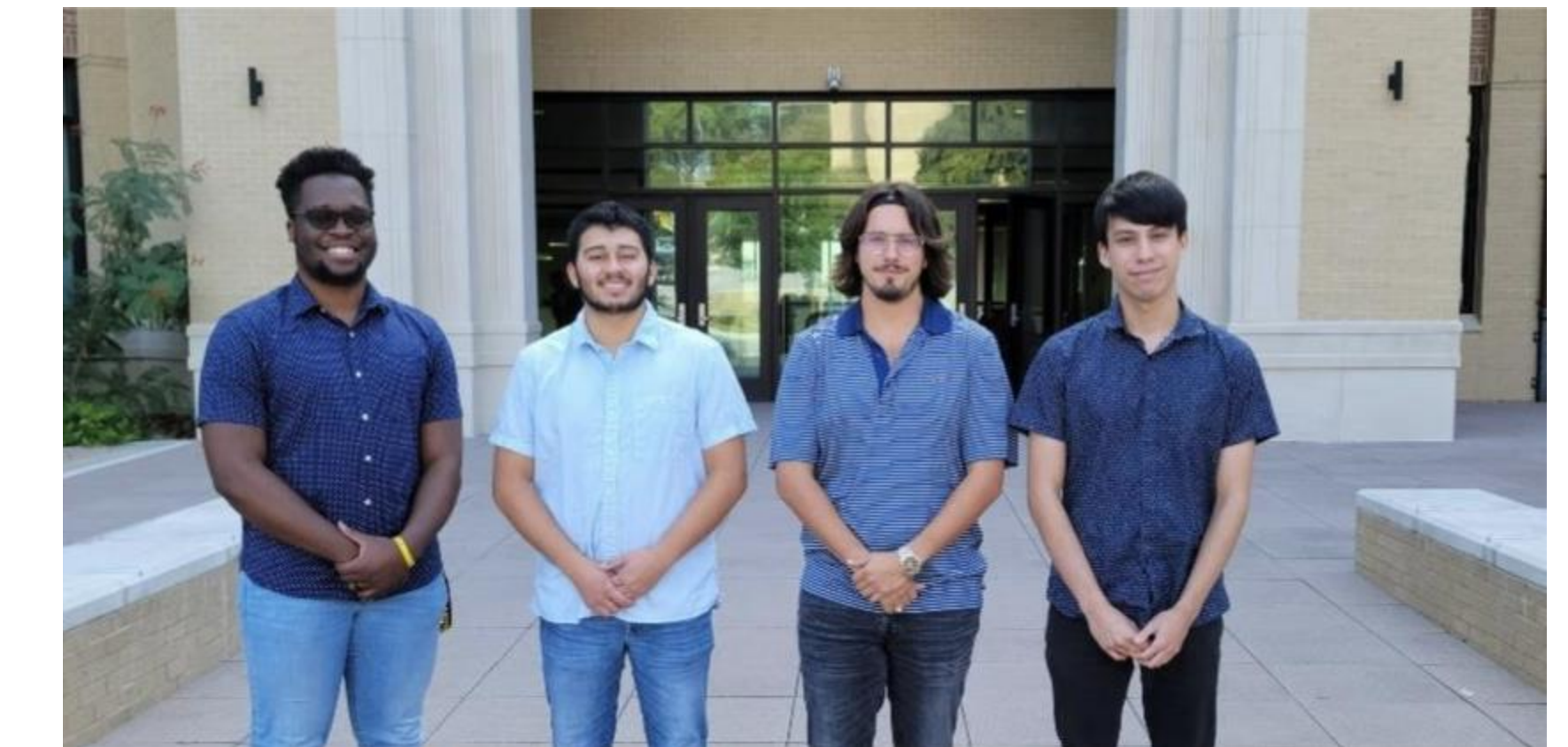
Hardware Block Diagram



Software Flowcharts



Team



Ringtarh, Christian, Chris, Sean

Power Calculations

Component	Operating Voltage (volts)	Current Draw (milli-amperes)	Power (watts)
FC-51 Infrared (x4)	3.27 V	~23 mA	.07521 W
HC-SR04 Ultrasonic (x3)	3.28 V	~15 mA	.0492 W
Raspberry Pi Pico (x1)	4.98 V	~100 mA	.498 W
DC motors (x2)	0-5.67 V	~160 mA	.9072 W

D2 Plans

- Utilize wheel encoders
- Implement 3.3-volt regulator
- Research linear vs switching regulators
- Develop sumo battle algorithms
- Determine actual power draw
- Implement dual core parallel program on Pico

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