E1.11 Dojo Drive

TEXAS STATE UNIVERSITY
Ingram School of Engineering

Jade Maldonado, Edwin Paniagua, Zachary Shannon

Sponsor: Dr. Behmann

Project Overview

Autonomous battery-powered robot designed to compete in Sumo/Tug-of-War competitions.

Design Requirements

- Fully autonomous operation
- Max size: 13cm x 13cm
- Weight Limit (Push Event):1000g
- Weight Limit (Pull Event):1500g
- Budget: $75
- Battery Powered, ≤12VDC
- Minimum 2-wheel drive (no tracks)
- Must detect boundaries and objects/bots
- Shuts off motors if unable to move object for 3 seconds
- Start button with 5-sec countdown delay

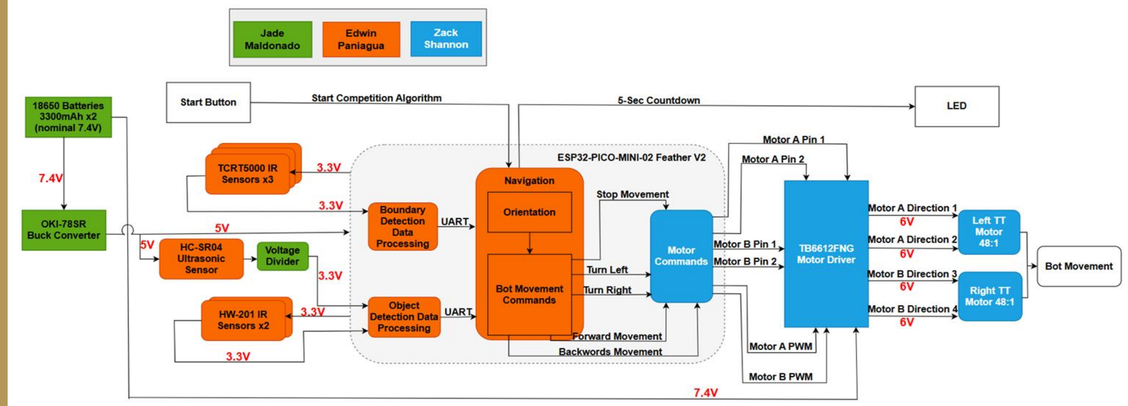
Cost & Budget

Component	Quantity	Price Each	Subtotal Cost
ESP32-PICO-MINI-02 Feather V2	1	$19.95	$19.95
TCRT5000 IR Sensors	3	$1.38	$4.14
HC-SR04 Ultrasonic Sensor	1	$1.79	$1.79
18650 Lithium Batteries 3.7V 3300mAh	2	$4.83	$9.66
Gearbox TT Motors 48:1	2	$2.95	$5.90
HW-201 IR Sensor	2	$5.05	$10.10
TB6612FNG Motor Driver	1	$7.83	$7.83
OKI-78SR-5/1.5-W36-C Buck Converter	1	$5.92	$5.92
Misc. Hardware	~	~	$3.37
		Total Unit Cost	$68.66

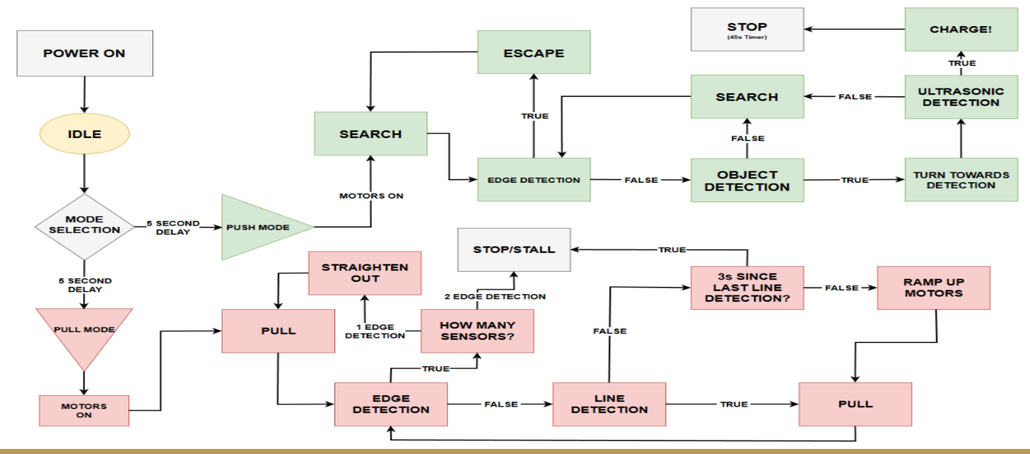
Design 1 Accomplishments

- Full functionality of subsystems
- Demonstrates boundary/object detection
- Fully capable of pulling/pushing 1000g block
- Initial chassis design completed
- Initial PCB design completed

Top Level Diagram



Navigation Algorithm

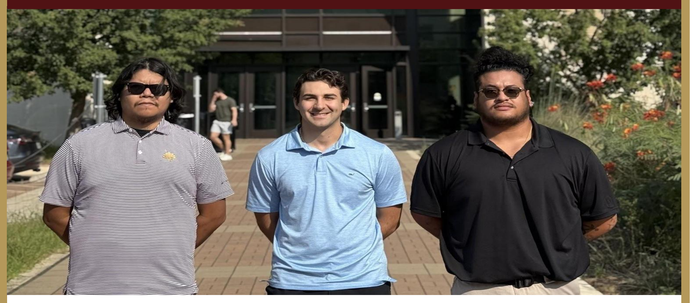


Chassis Design

Design 2 Goal

- PCB Fabrication
- Chassis Completion
- Sumo/Tug-o-War Logic Implemented
- System Testing
- Weight Optimization
- Final Documentation
- Final Competition Readiness

Meet the Team

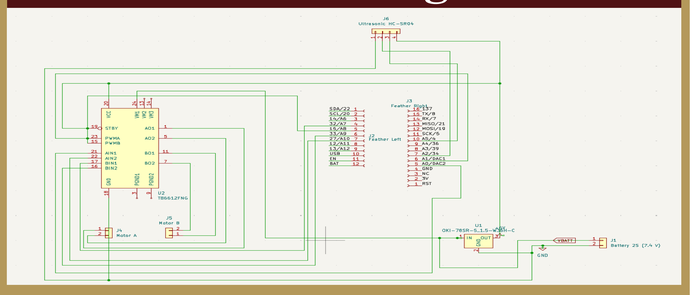


Edwin
- Object/Boundary Detection
- Navigation
- Orientation

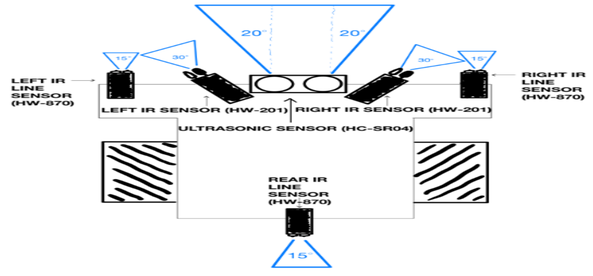
Zack
- Motor Control
- Chassis Design

Jade
- Power
- PCB Design

PCB Design



Sensor Layout



Acknowledgements

Sponsor: Dr. Fawzi Behmann
Faculty Advisor: Dr. Larry Larson