TEXAS STATE

INGRAM SCHOOL OF ENGINEERING

Overview

Our product is a small autonomous,

battery-powered bot designed to

compete in 2 events:

- **Sumo Match**
- Block Pull/Tug-of-War

Requirements

- **Autonomous**
- □ Mass up to 1500g
- □ 15 cm x 17 cm (No height constraint)
- **PCB Component for Chassis**
- Object and Boundary Detection
- **3-Second Stall Detection**
- Perform Competition Objectives

Budget

Materials:	Cost
ESP32-WROOM-32	\$5.33
TCRT5000 IR Sensors	\$3.52
HC-SR04 Ultrasonic Sensor	\$3.90
BMI-160 Inertial Module	\$2.82
TB8812 Motor Driver	\$2.66
12V CD Motor- 100 RPM	\$19.98
18650 mA Battery Pack	\$1.25
Misc Hardware	\$20.44
	TOTAL:
Budget: \$90.00	\$81.52

Acknowledgements

Sponsor: Mr. Fawzi Behmann Faculty Advisor: Mr. Jeffery Stevens D1 Mentee Team: **1.05 Speedy Liners Texas State University**







E2.09 – S.R.N. Robotics

Samuel Winburn, Nadia Al-Shewear, Rogelio Lucio Sponsor: Mr. Fawzi Behmann







Samuel Winburn



Team Members

Nadia **Al-Shewear**



Rogelio Lucio

Tested Power Consumption

Device	Nominal Current	Maximum Current	
Microcontroller:			
SP32-WROOM	135.5 mA	260 mA	
Boundary Detection:			
TCRT5000 (4)	122.2 mA	240 mA	
Object Detection:			
HC-SR04 (3)	10.5 mA	45 mA	
Movement Sensing:			
BMI160	.93 mA	.99 mA	
Other:			
LM2956 (2)	10 mA	20 mA	
Motor Controls:			
TB6612	1000 mA	1200 mA	
2 V Motors (2)	400 mA	500 mA	
TOTAL:	1679.13 mA	2565.99 mA	
Battery Life	2 hours 58 min	1 hour 54 min	

Design Achievements

✓ Integrated Subsystem Designs Together ✓ Implemented PCB and Chassis Design ✓ Resolved Design Flaws, Ordered New PCB ✓ Completed Pull Field Algorithms ✓ Optimized Pull and Pull Strength ✓ Completed Sumo Algorithm **Implemented Stall Detection for Pull** ✓ Implemented PID Controller for Pull ✓ Implemented Pull Recorrect Algorithm ✓ Tested and Validated Functionality