Project Summary

Design Problem:

The original design problem was to build a mini-sumo bot that could push other robots/objects out of a circular rink autonomously. In addition to building the bot, the system had to follow certain requirements. First, the robot should be able to push an object out of the rink successfully 90% of the time without needing help from human intervention. Second, the team would be able to read the values of each sensor (IR, motors, battery, etc) in real time while competing in a match. Third, the robot needed to weigh at least 95% of the maximum weight of 500 grams. Fourth, the wiring must be organized and secured to the chassis and no cardboard or tape will be visible. Fifth, the robot will be able to be overridden to be manually controlled remotely. Finally, the robot will be able to let the user know when they have won by using a speaker to play a sound.
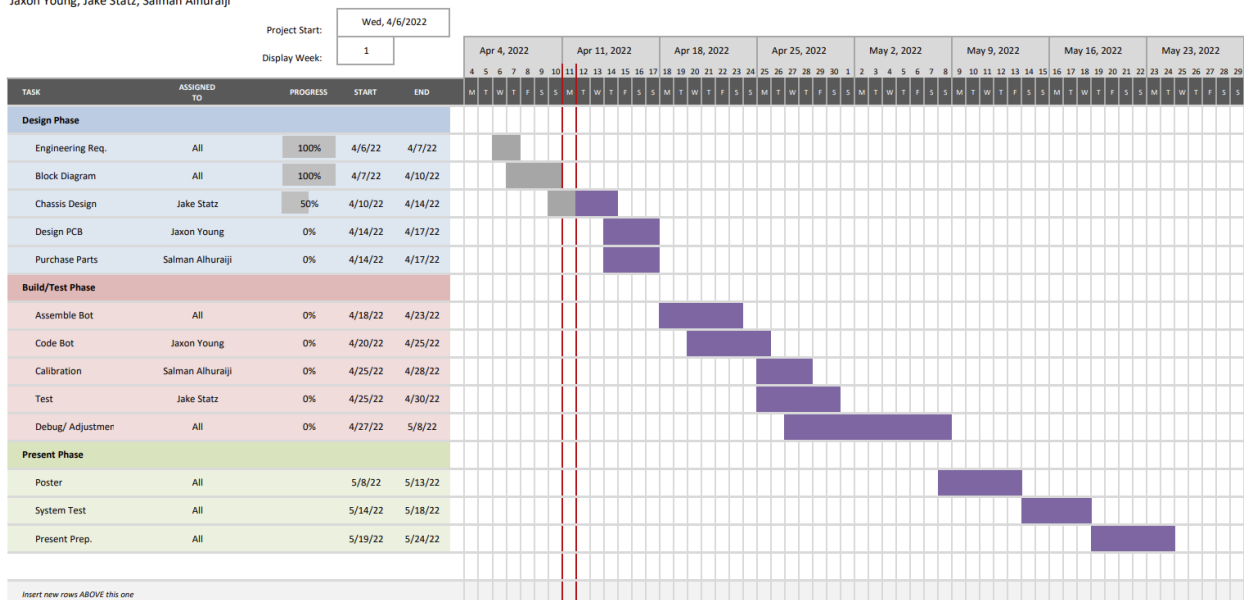
Approach:

As a team, we first started by brainstorming the components we were thinking of using and prioritizing the torque of the motors to make the robot as strong as possible when in battle. After a week of researching parts, we started to order them piece by piece. By knowing which parts we were going to use, we drafted a design for the enclosure that fit the dimensions of our components. At the same time, the design for the PCB was being drafted. There reached a point where we had all our necessary parts and the enclosure built; however, we were waiting for our PCB to be built and delivered. During this in between, we used breadboards to test each component to make sure it was functioning as intended without any parts being defective. As soon as the PCB arrived, it was time to start assembling the bot. With the bot finally assembled, all remaining was to program the bot and debug to ensure proper function.

Project Timeline:

Sumo Project Timeline

Jaxon Young, Jake Statz, Salman Alhuraiji

Project Start: Wed, 4/6/2022

Display Week: 1

TASK	ASSIGNED TO	PROGRESS	START	END
Design Phase				
Engineering Req.	All	100%	4/6/22	4/7/22
Block Diagram	All	100%	4/7/22	4/10/22
Chassis Design	Jake Statz	50%	4/10/22	4/14/22
Design PCB	Jaxon Young	0%	4/14/22	4/17/22
Purchase Parts	Salman Alhuraiji	0%	4/14/22	4/17/22
Build/Test Phase				
Assemble Bot	All	0%	4/18/22	4/23/22
Code Bot	Jaxon Young	0%	4/20/22	4/25/22
Calibration	Salman Alhuraiji	0%	4/25/22	4/28/22
Test	Jake Statz	0%	4/25/22	4/30/22
Debug/ Adjustmen	All	0%	4/27/22	5/8/22
Present Phase				
Poster	All		5/8/22	5/13/22
System Test	All		5/14/22	5/18/22
Present Prep.	All		5/19/22	5/24/22

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Key Lessons Learned:

- The use of regular Bluetooth is much more efficient and simpler to implement with our system rather than using Bluetooth Low Energy on our Arduino Nano 33 BLE
- ARM processors are low energy and it is preferable to use an ATmega328 processor that can handle more power and the uploading of code is much quicker.