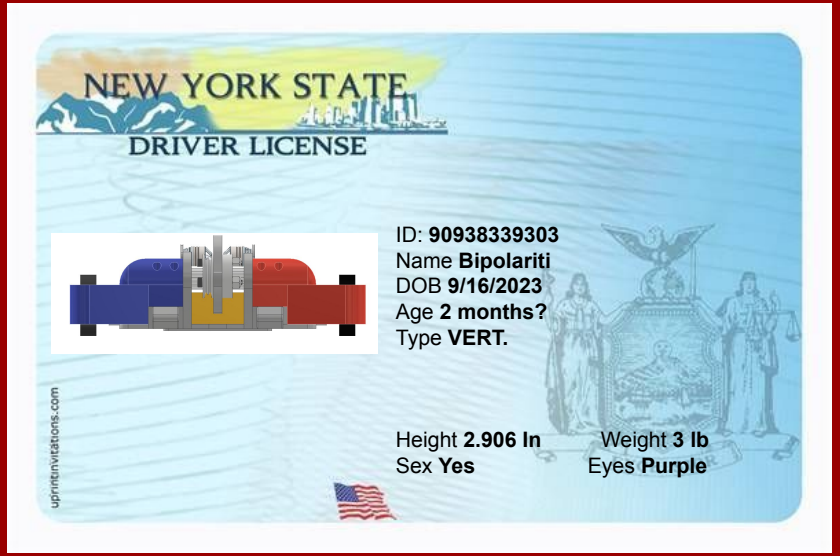
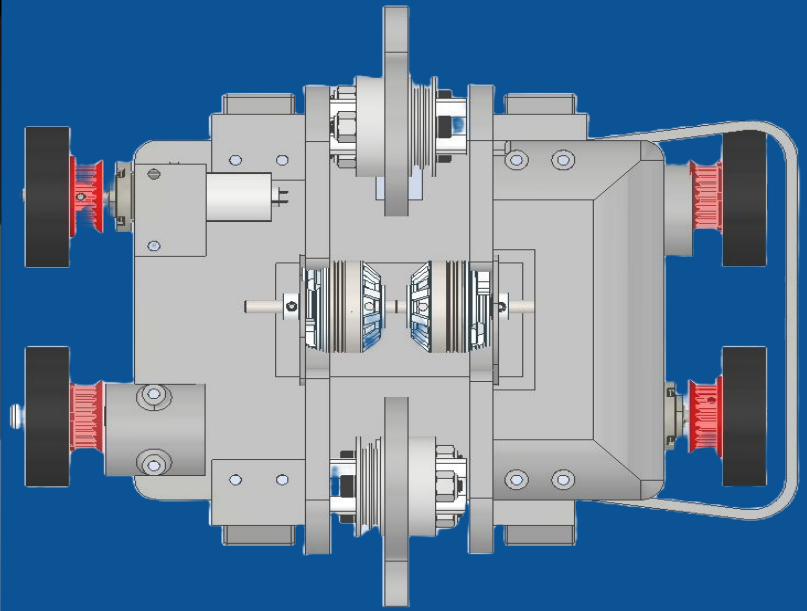
Bipolariti

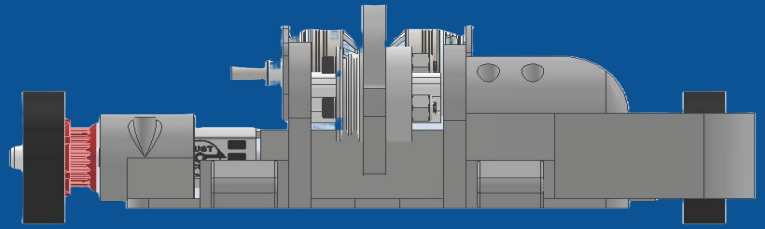
Introduction

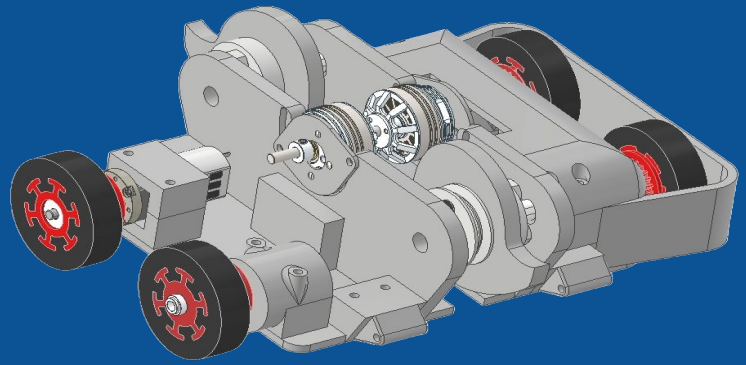
- Who is Bipolariti?
  - Bipolariti is a vertical spinner with two equal and opposite spinners on each side of the bot, with a bulbous shape to deflect opponents and protect itself.
  - While unique, Bipolariti *does* fit the parameters of the competition and is feasible to manufacture



Rendered Views



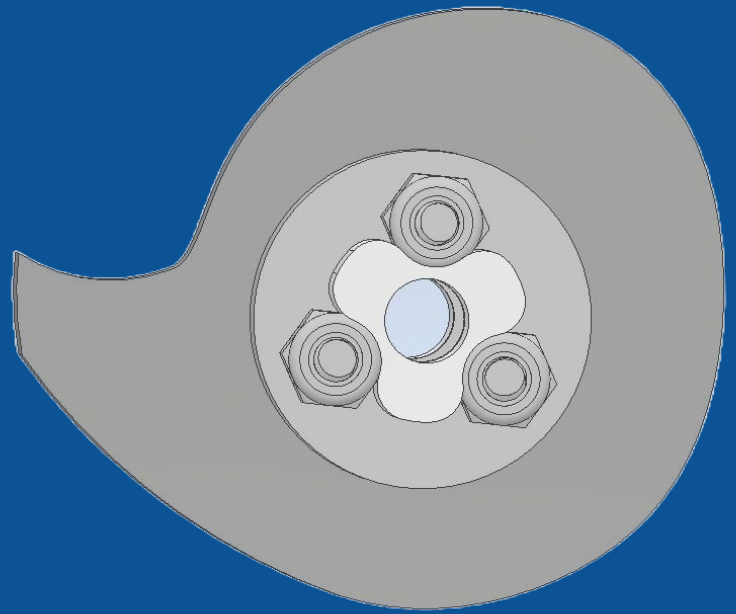




Weapon Assembly

List of Parts:

- Weapon Material: AR500 Steel
- Fastener types: 8-32 screws and a 5/16” shoulder bolt
- Belts: 2PJ246 V-Belt
- Bearings: Needle bearings
- Motors: BadAss 2305-1440kV
- Mounting System: Uprights built into the main chassis rails



General Robot Stats

Stat	Value	Unit
Total Weight	3.125	lb
Weapon Assembly Weight	0.238 (per disk)	lb
Dedicated Armor Weight	108	g
Weight of Frame	1.5	lb

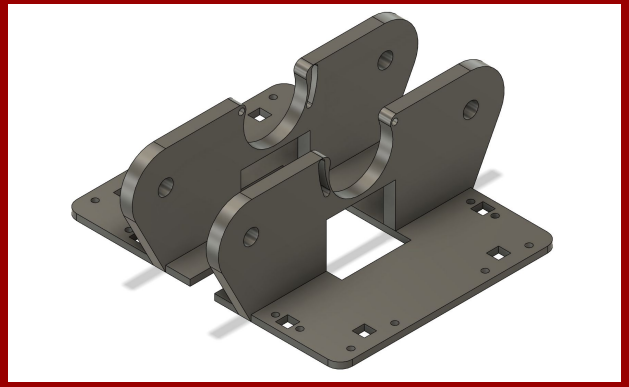
Weapon Stats

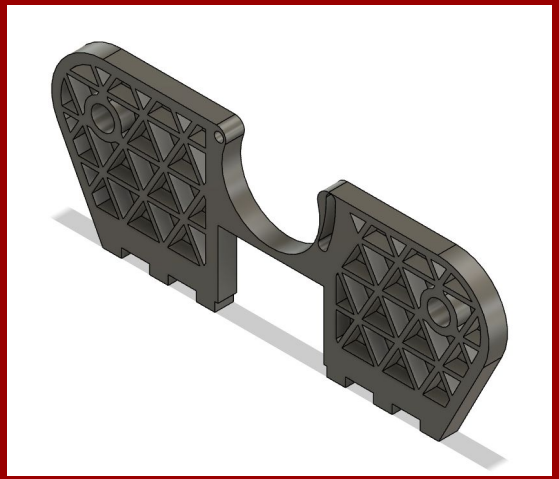
Stat	Value	Unit
Weapon to Motor Ratio	1.146:1	
Weapon Assembly MOI	0.000054431 (per disk)	kg/m^2
Max RPM	9662	RPM
Max Kinetic Energy	.028	kJ
Spin Up Time	.07(95%)	seconds

Chassis

Specifications:

- ⅛” Alu. Bottom Plate
- ¼” Alu. Pocketed Uprights
- TPU armor
- Box Joints and 4-40 Screws
- Weight of 1.5 lbs





Electronics

- Battery : GNB 3s 930mAh Battery
  - Dedicated battery cover
- Drive Motor: Dragon Dart Box ~1500 rpm
- Weapon Motor: BadAss 2305-1040Kv
- Switches: FingerTech
- ESCs: 15A dual brushed ESC
- SEC: FLYCOLOR 50A Brushless (Green Boxes)
  - WILL be cutting BEC wires (love you Jacques <3)

Drive Train

- Drive Transmission S3M Timing Belt w/ matching pulley
- Mounting System:
  - Clamps for drive motors
  - Face mounting for weapon motors
- Wheels: SSP Drive Wheels
  - with 4mm Bore twist Hub
  - ¼” Ground Clearance

Using similar drive to SSP kit

- Calculations:

Wheel radius = 1.75 in

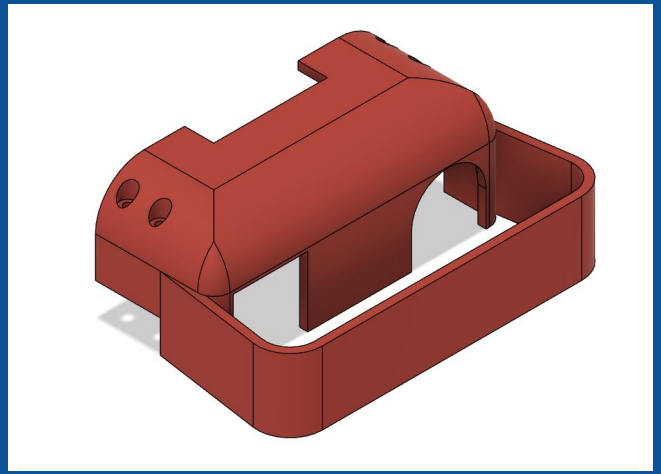
Ideal speed: 10 mph = 4.4704 m/s -> angular speed = 234.6 radius/s

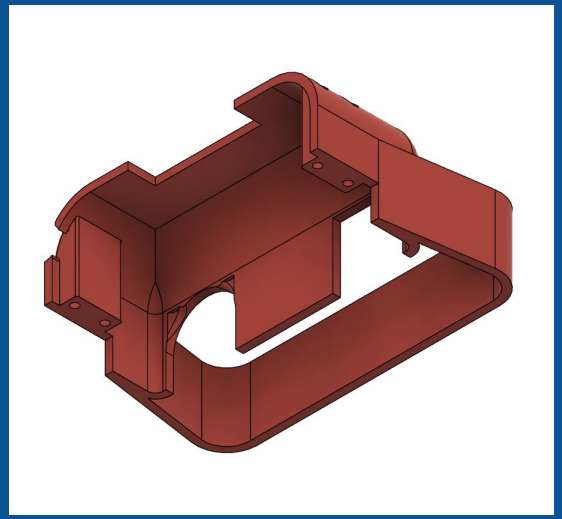
RPM of drive motor = 1500 rpm

Armor

Specifications:

- 95A TPU
- 0.25 in thick
  - Low Infill
  - High Wall Count
- Box Joints and 4-40 Screws
- Weight of 54g each
- 2 solid pieces





Current BOM

Vendor	Part Number	Component	Category	Quantity	Unit Cost	Price	Link
						$0.00	
just cuz robotics		dartbox v2 drive- Viper 6mm	Motors	2	$41.50	$83.00	https://justcuzrobotics
Badass power		BadAss 2305-1050Kv Brushless Mot	Motors	2	$30.00	$60.00	https://badasspower.c
just cuz robotics		Badass Rebel V2 lite series brushles	Electrica	2	$17.00	$34.00	https://badasspower.c
just cuz robotics		S3M timing belt 74T, 4mm	Mechani	2	$3.25	$42.84	https://justcuzrobotics
In shop		GNB 3s 930mAh Battery	Electrica			$0.00	
just cuz robotics		Budget 15A dual brushed ESC	Electrica	1	$25.00	$25.00	https://justcuzrobotics
just cuz robotics		SSP Wheels 1.75x.5 inch with integra	Mechani	2	$18.00	$36.00	https://justcuzrobotics
		TPU				$0.00	
		.25 in Aluminum				$0.00	
		.125 in Aluminum				$0.00	

Future Plans

- Need to get another attachment method for the armor on to the bottom plate.
- Armor goes into the support plates a little.
- To lighten the robot, pocketed weapon uprights and potentially a thinner bottom plate (¼” to ⅛”) will be designed
- More mounting for the armor
- Channels for battery wiring
- More work on self righting hoop
- Weight reduction on base plate
- Front/Rear end attachments

Questions to Consider

Physical:

- Accounting for wires, fasteners, belts, and armor configurations, is your robot within weight limit?
- What is your weapon's ground clearance?
- How are wires/motors mounted inside your robot? Are wires separated from rotating motor components?

Mechanical:

- How are each of your belts tensioned?
- Are the fasteners sized reasonably given the thickness of your plates?
- Are all the parts on your robot machinable (e.g. CMA tools, CNC, Welding, 3D Printing, etc.)?
- Are all the parts on your robot assemblable?
- Are parts filleted and chamfered to help with fits and prevent fractures?
- What type of bearings are you using? Why use these bearings?
- Are slots, pockets, and other milled features in the design makeable via a standard size End mill or will a new one have to be ordered?

Fasteners:

- Are all the fastener holes accessible when assembled? Demonstrating an exploded view animation can help identify/diagnose these issues.
- Are the fasteners for motors properly chosen? Make sure fasteners don't go too far into the motor.
- Did you standardize all the fasteners to Metric or SAE? Did you minimize fastener types as much as possible?

Questions to Consider cont.

Fasteners cont.:

- Is the quantity of the screws in shear minimized?
- Do all threads have a screw engagement length 1.5x the diameter (steel) or 2x the diameter (aluminum)?
- Are the centers of important holes (screw holes, clearance holes, etc.) at least 1x the diameter or more away from edges?

Electrical:

- Are your drive ESCs capable of running your motors bidirectionally (or do you know how to adjust them if not)?
- Are your switch and battery easily accessible?
- On what basis did you select your battery capacity (i.e. why do you think it should be so high/low)?
- How are you planning to manage connections between electrical components? Relays? Ring connectors? Soldered joints?

As we continue our transition to competitive combat robotics with more iterative designs:

- Have you considered different robot configurations when going against different types of robots?
- Have you performed a potential failure mode analysis for major systems?
- Do you intend on using a minibot when there is a weight bonus allocation? When there isn't a weight bonus allocation?
- Are you implementing a wedge? If so, do you have different types of wedge configurations?