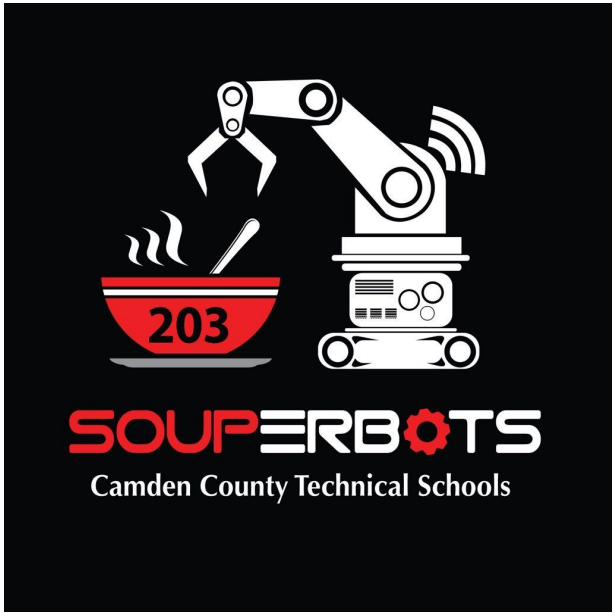
FRC Power Up 2018 Season



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DESCRIPTION

The 2018 FRC game, Power Up, is the most unique first robotics game to date. Unlike any other game, in a Power Up match, points are scored according to time rather than if one alliance has more cubes in the scored than the other alliance.

To score points, the teams may either own the scale in the center of the field, own their switch located closest to their alliance station, or their opponents switch located on the other end of the field.

To own the scale or switches, alliances must place power cubes on their end of the scale and switches. However, points will not be given because an alliance has more cubes than the other alliances on the scale and switches. Points will be awarded to the team who owns the field element at that time. For example, the red alliance may have two cubes on the switch and the blue alliance may only have one. Due to the blue alliance placement of their cube, they may own the switch over the red alliance. Think of a first class lever, or a see saw. Two people who are the same size who sit the same distance from each other will not have fun on the see saw because it will not move. However, if one of them moves slightly from the fulcrum, they are now able to go up and down on the seesaw. This is how the scale and switches work. The alliance that is able to make the field element go down in their favor and turn the light on will score points until the other alliance takes the scale or switch.

At the start of a Power Up match, the plates of the scale and switches are randomized. Due to this, teams will have to change their strategy from match to match. Strategy is very is crucial this year in FRC and not having a well thought out strategy that can stretch from match to match can be very detrimental.

STRATEGY

Like stated before, at the start of each Power Up match, the plates of the switches and scales are randomized. Stated below are several strategy that we have created over the build season. The strategies below are strategies for driving during the tele-op period.

Strategy #1

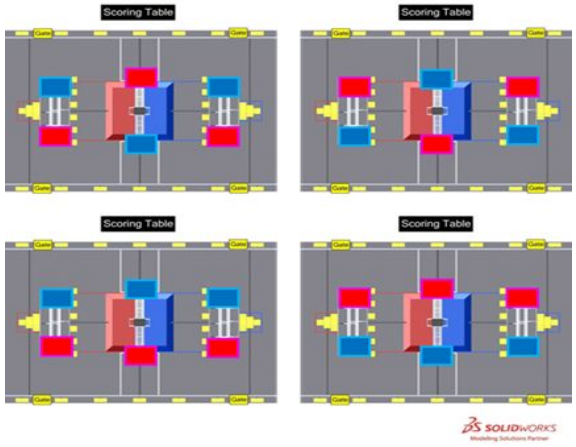
- Main goal is to gain control of the scale
- Defend the switch
- Go for boost power up

Strategy #2

- If a robot cannot climb, the levitate power up should be the first priority
- Take control of the opponents switch while defending our own
- Go for the boost power up

Strategy #3

- If we do not have ownership of either the switches or scale, the force power up should be used
- While the force power up is being used, an effort should be made to retain that ownership after the power is all used up.



Strategy #4

- When the match looks like the bottom two pictures to the left, one robot out of the alliance should make an effort to prevent the other alliance from scoring. It is easy to forget about the other alliance when the match is set up this way.

Source: FIRST POWER UP Game Manual

CHASSIS

Group Lead:Adrianna Ruggiero
Research Lead:Abigaile Smallets

U/A-Shaped Chassis Design

- Game elements would not be able to get caught up within the chassis
- Ability to move through the smaller sections of the field
- Individual motor for each omni wheel

Wheels

4 high traction rubber wheels and 2 omni wheels in the front of the chassis

Motor

- CIM motors

Shifter

- 2 CIM Ball Shifter

Speeds per Gear Ratio

Calculations done for 8 in.

Standard 12-tooth Pinion (40:12)

Speed for...	No 3rd Stage Gearing	3rd Stage Option 1 (50:34)	3rd Stage Option 2 (54:30)	3rd Stage Option 3 (60:24)	3rd Stage Option 4 (64:20)
High Gear Outputs	41.10 ft/s	27.95 ft/s	22.83 ft/s	16.44 ft/s	12.84 ft/s
Low Gear Outputs	18.08 ft/s	12.30 ft/s	10.05 ft/s	7.23 ft/s	5.65 ft/s

Speeds per Gear Ratio

Calculations done for 6 in.

*current

	Drivetrain Free-Speed	Drivetrain “Real Life” Speed	“Pushing” Current Draw per Gearbox	Overall Ratio
High Gear Outputs	21.14 ft/s	17.13 ft/s	262.00 Amps	6.60: 1
Low Gear Outputs	9.30 ft/s	7.54 ft/s	118.61 Amps	15.00 : 1

CUBE INTAKE

Group Leaders: Emma Barr and Victoria Hong
Research Lead: Dylan Ritch

- Belt Driven Flywheel System
- 3D Printed Pulleys
- 6 4" Compliant Wheels

Materials for Intake Mechanism

- 4 ½” hex shafts
- 8 ½” hex bearings lip
- Aluminum Plating ⅛ “ Thick
- 2 hinges
- 2 belts
- 4 pulleys
- 10 ½”shaft collars

LIFT/CLIMB

Group Lead: Emma Barr, Victoria Hong, and Jared Yost
Research Lead: Alycia Lipscomb and Dylan Ritch

- 48” By 17 ¾ ” Elevator Lift, Made out of the 80-20 Option
- Pulley System
- Hook used to grab bar of the scale for climbing

➔ Metal Pieces
  - 1X2 80-20 or Square Stock
    - For the stationary side rails
  - 1X2 L stock
    - For the cap of the stationary side rails to make sure the lift does not detach.

CIM

Free Speed (RPM)	Stall Torque (N*m)	Stall Current (amp)	Free Current (amp)
5330	2.41	131	2.7

Gearbox

# Motors per Gearbox	Gearbox Efficiency	Travel Distance (in.)	Applied Load (lb.)	Pulley Diameter (in.)
1	80%	12 in.	160 lbs.	2 in.

Driving Gear	Driven Gear
1	5
1	7
1	1
1	1

Overall Ratio: 35:1

Elevator Linear Speed	Arm Time to move Travel Distance
15.9 in/s	0.75 sec
11.7 in/s	1.03 sec

Current Draw per Motor (loaded)	Stall Load
30.20 amps	597.22 lbs

FIELD SUPPORT

Group Leader: Connor Bird

Research Lead: Asha Wiggins

Our Field Support group was used to build our 2018 Power Up Practice Field. For the Switch we used plywood to make it along with the portal and the exchange. For the Scale, we used steel to connect to the wood so it can be a balanced lever. We measured out the field to how the competition field would be to help us predict how we would perform in the competition. Along with that the team has been designing our new pit look, battery cart, and robot cart that will debut at one point this season/offseason.

PROGRAMMING/ELECTRONICS

Group Leader:Daniel Boehm
Reseach Lead:Vanessa Mento

ACCOMPLISHMENTS

- FRC Team 203 Scouting app
  - Available on the team website and will be available soon to the Google Play Store
- New Members learned C++, Python, Java
  - Made the scouting app using these languages and applied new knowledge to a homemade tele operative program.
- Autonomous and Tele-Op Coding on our 2018 Robot
  - We have a total of 10 different Autonomous routines as of our first FRC Competition.
  - For Tele-Op it was designed around a 2 Joystick Arcade drive.
- Notable Electrical Components
  - LIDAR- Lasers for distance, very accurate for distance, helpful during autonomous.
  - Replaced Sparks with Victor SPX motor controllers for robustness and wiring efficiency.