TEAM 3794: WINT

WinT 3794 Newest FRC Robot

2021 Season

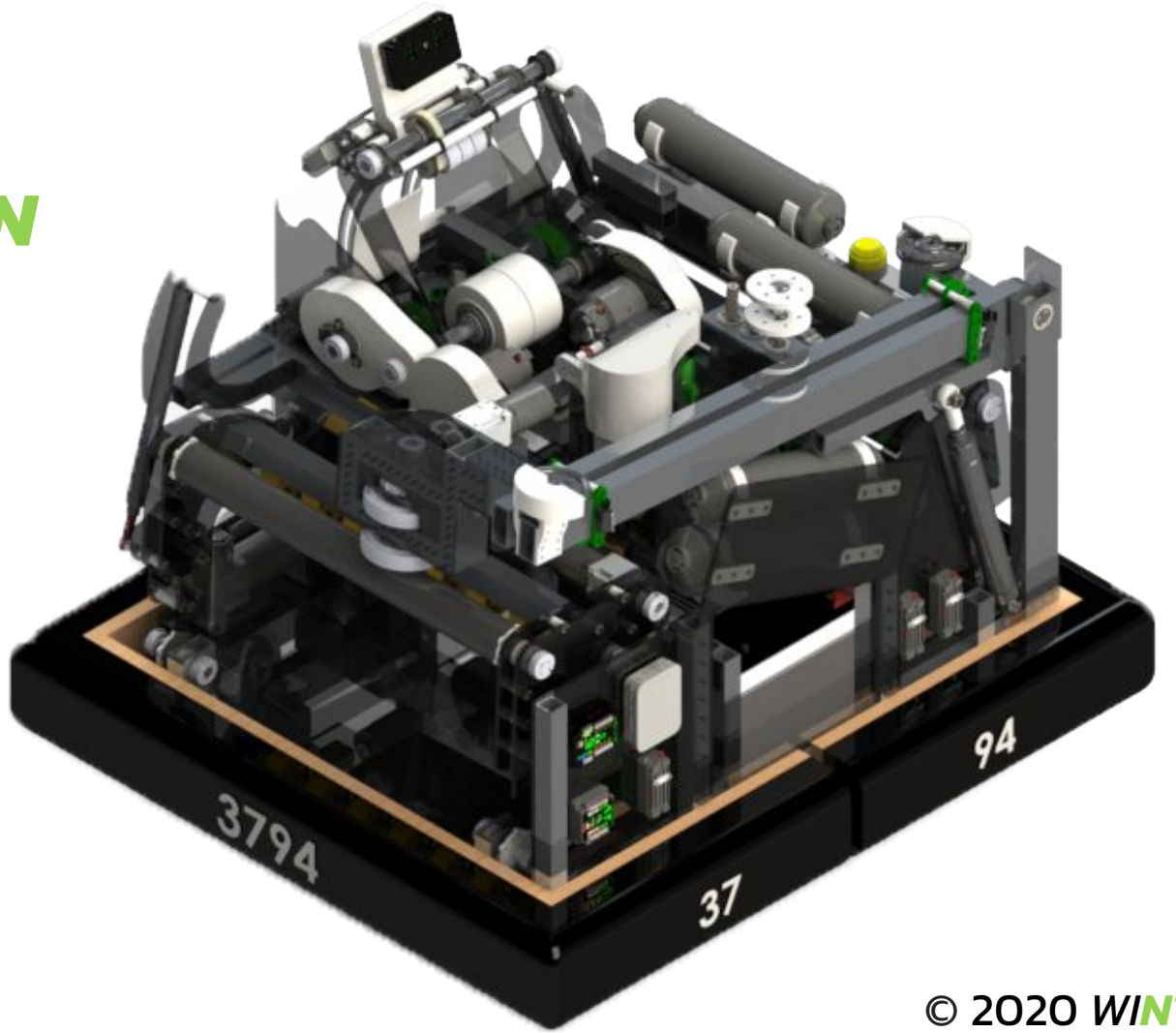
WINT XI

STARTING CONFIGURATION

Intakes start inside the robot.

Climbing mechanism folds down to keep robot profile low.

The turret and angle start in a specific configuration to stay within the frame perimeter.



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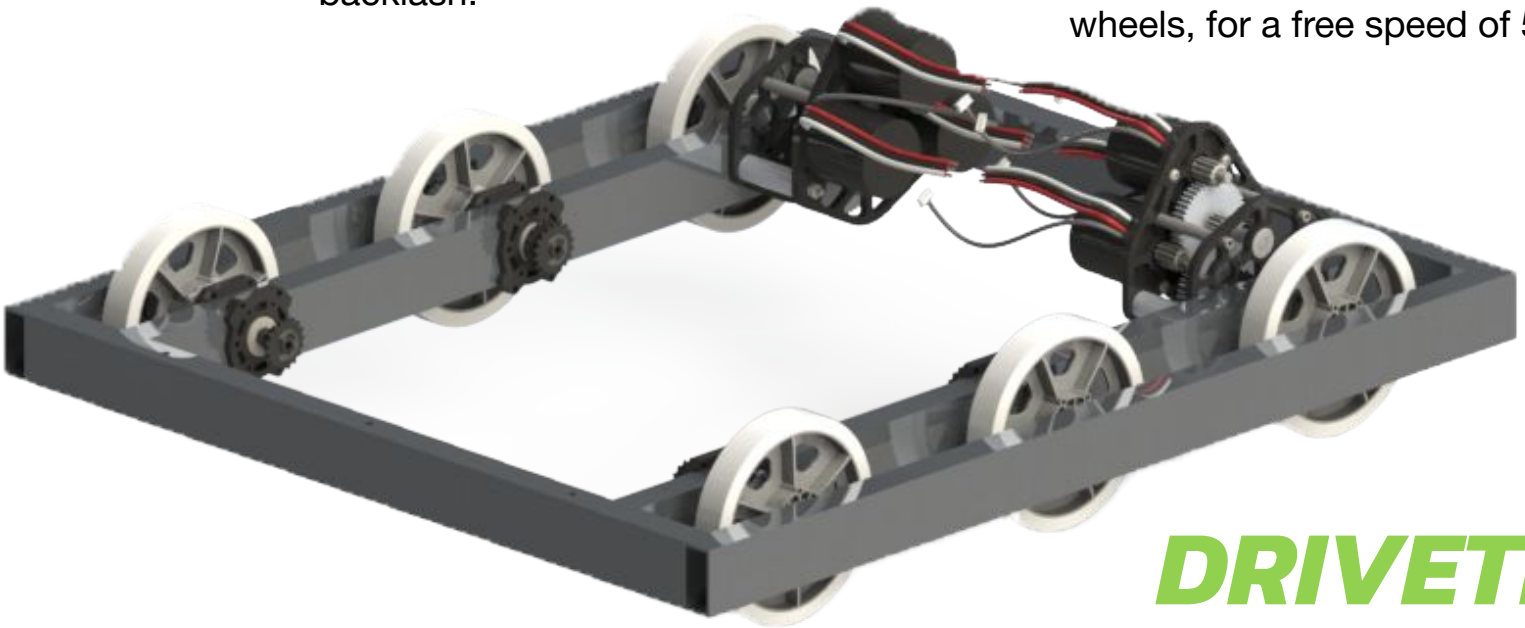
REV through bore encoders give real feedback from each side of the robot and are located in the last Wheel, this encoder is used instead of Neo integrated encoders to avoid false readings and readings before backlash.

6x Neo motors geared 8.6:1 to 6” HiGrip wheels, for a free speed of 5.223m/s.

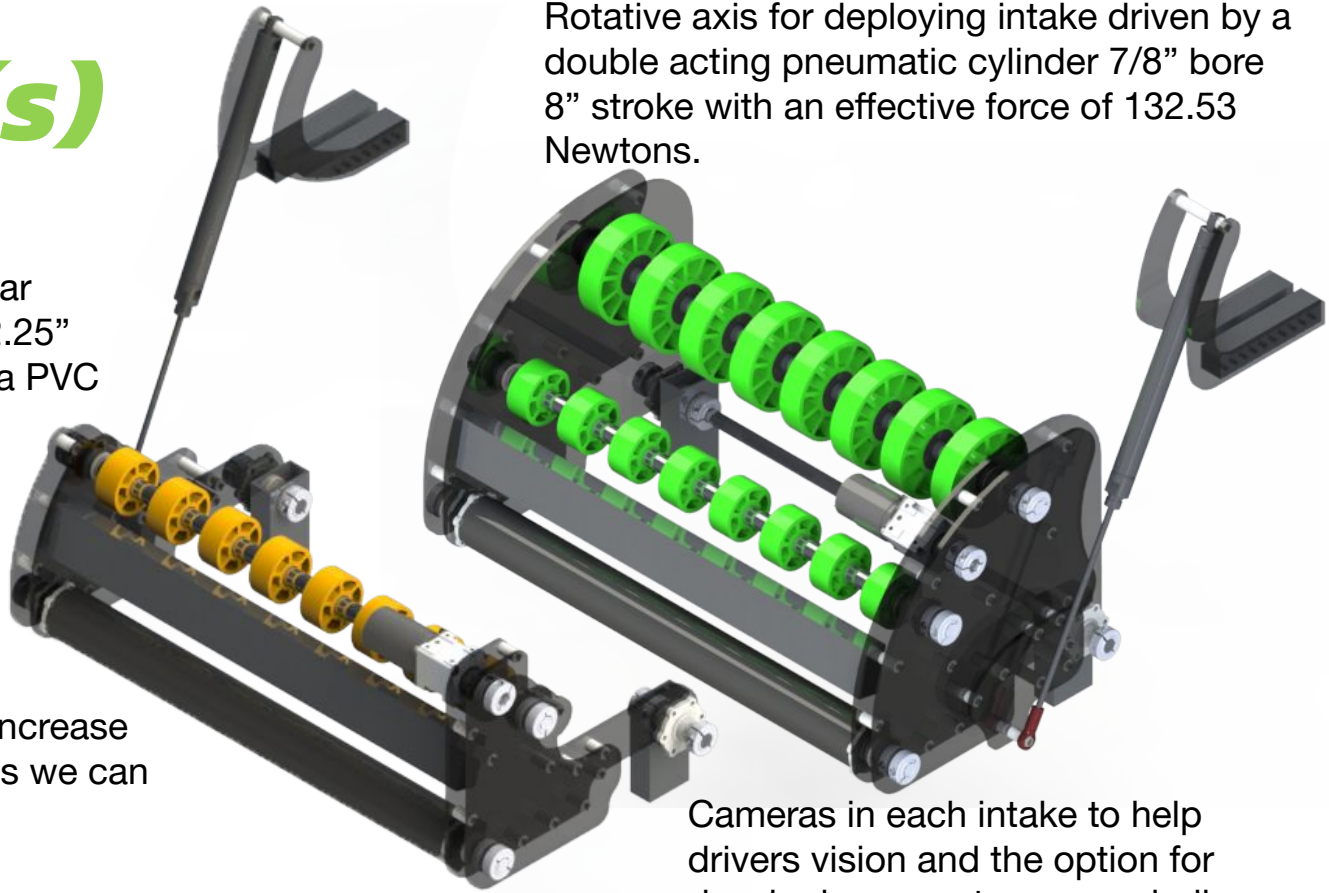


DRIVETRAIN

INTAKE (s)

Rollers: 775Pro with a 10:1 gear reduction, driving a series of 2.25” and 4” compliant wheels and a PVC roller.

Rotative axis for deploying intake driven by a double acting pneumatic cylinder 7/8” bore 8” stroke with an effective force of 132.53 Newtons.



Robot full width intake to increase the number of game pieces we can collect at once.

Cameras in each intake to help drivers vision and the option for developing an autonomous ball tracking system.

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INDEXER

Uses one 775pro 10:1 reduction to move balls inside the shooter.

2.25” and 3” compliant wheels are positioned 1mm over the policarbonate to slightly contact and direct the balls.

Mecanum wheels center the balls once they enter the shooter.

An extra 1:3 reduction is given to mecanum and compliant wheels on the shooter to have three times the speed and mantain acceleration for a longer time, this will cause a better shot.

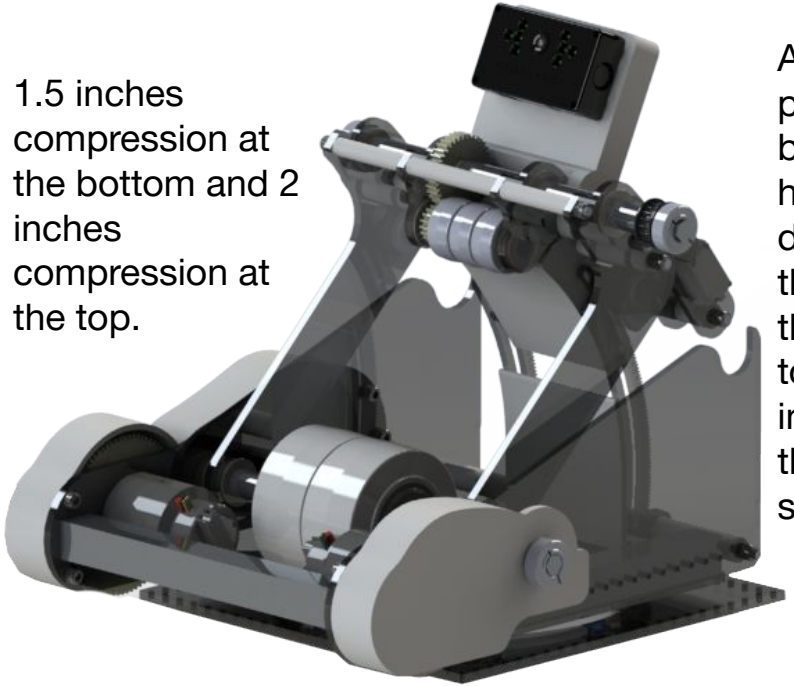
Uses 2 Falcon 500 motors geared 1:2 driving 2 Colson 4” x 2” wheels, wheels spin up to 12760rpm with a torque of 2.345 N-m and 3 Colson 1.625” x 0.875” wheels are driven by pulleys and an extra gear reduction, these wheels allow the balls to be contacted from both sides before each shot, this will produce a more linear shot.

Big gears and pulleys are connected to falcon motors, these big aluminium and Steel bodies will help maintain inertia and have constant firing.

Shooter adjustable angle, allows shooting in every position of ¾ the field.

Turret is driven by a 775pro geared 600:1 with a built-in Versa encoder for more reliable movements, 4 hall effect sensors are placed in different locations to get feedback in faster movements.

1.5 inches compression at the bottom and 2 inches compression at the top.



Angle powered by 2 high-speed servos that allow the angle to travel in less than 0.7 seconds.

SHOOTER AND TURRET

120teeth sprocket allows turret to rotate 360 degrees

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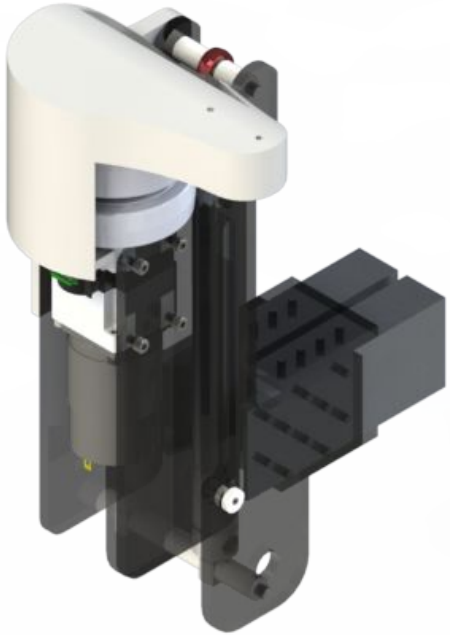
Extensive Theoretical prototyping was performed to affirm the effectiveness of this shooting configuration.

COLOR WHEEL MECHANISM



¾ bore 6” double acting pneumatic cylinder pushes color wheel mechanism up and down to be able going down trench.

775pro motor geared 10:1 drives 2 Colson 3” wheels.

Wheels contact both sides of the color wheel for more traction.

3D printed part covers wheels and support color sensor.

REV color sensor V3 detects color on color wheel.

Versa built-in encoder helps detect rotations given to color wheel.

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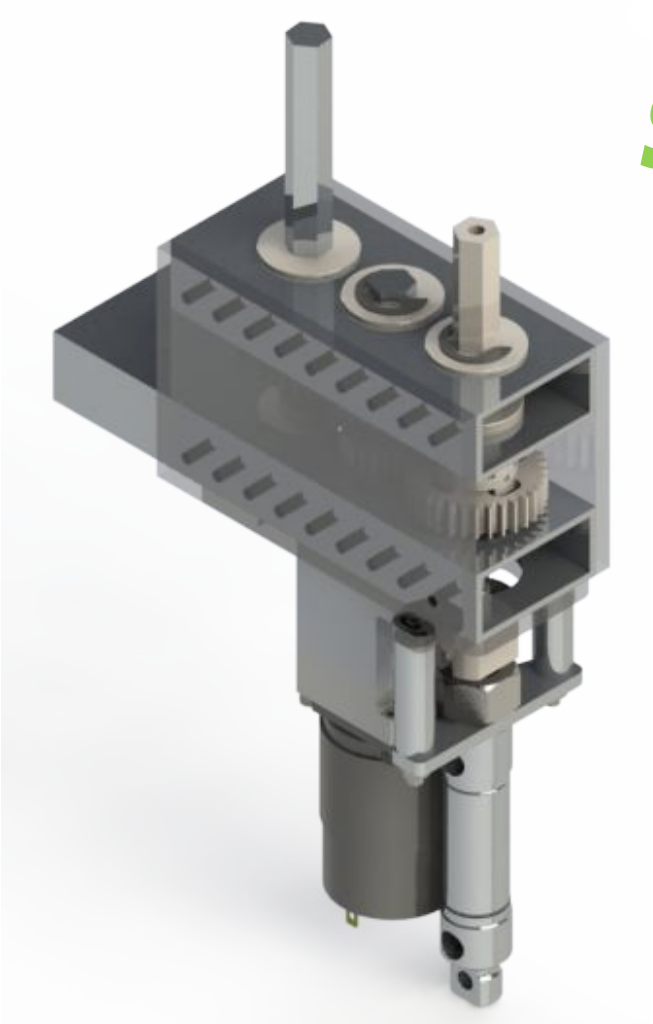
ShifterLock

3/4” bore 1/2” stroke double acting penumatic cylinder activate or deactivate a shaft with an effective locking force of 118 Newtons.

775pro motor drives elevator through a 120:1 gearbox.

It can lift 1 robot 60cm up in less than 4 seconds.

Pneumatic cylinder activates the ratchet that locks the motor to ensure climb.



In case of driver errors, pneumatic cylinder can unlock the ratchet allowing for climbing again.

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ARM AND ELEVATOR

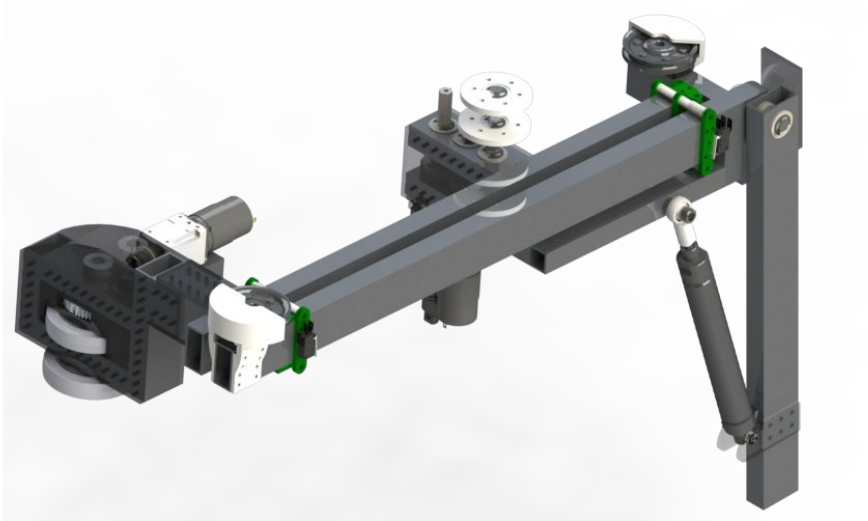
1 1/4” bore 7” stroke double acting penumatic cylinder deploys arm with an effective force of 314 Newtons.

ShiterLock drives elevator to reach 190cm.

775pro geared 277.77:1 drives 2 Colson 4” x 0.875” wheels on top of the elevator for balancing while climbing.

Limit switches located on top and bottom of elevator to prevent drivers errors.

Elevator is driven by pulleys.



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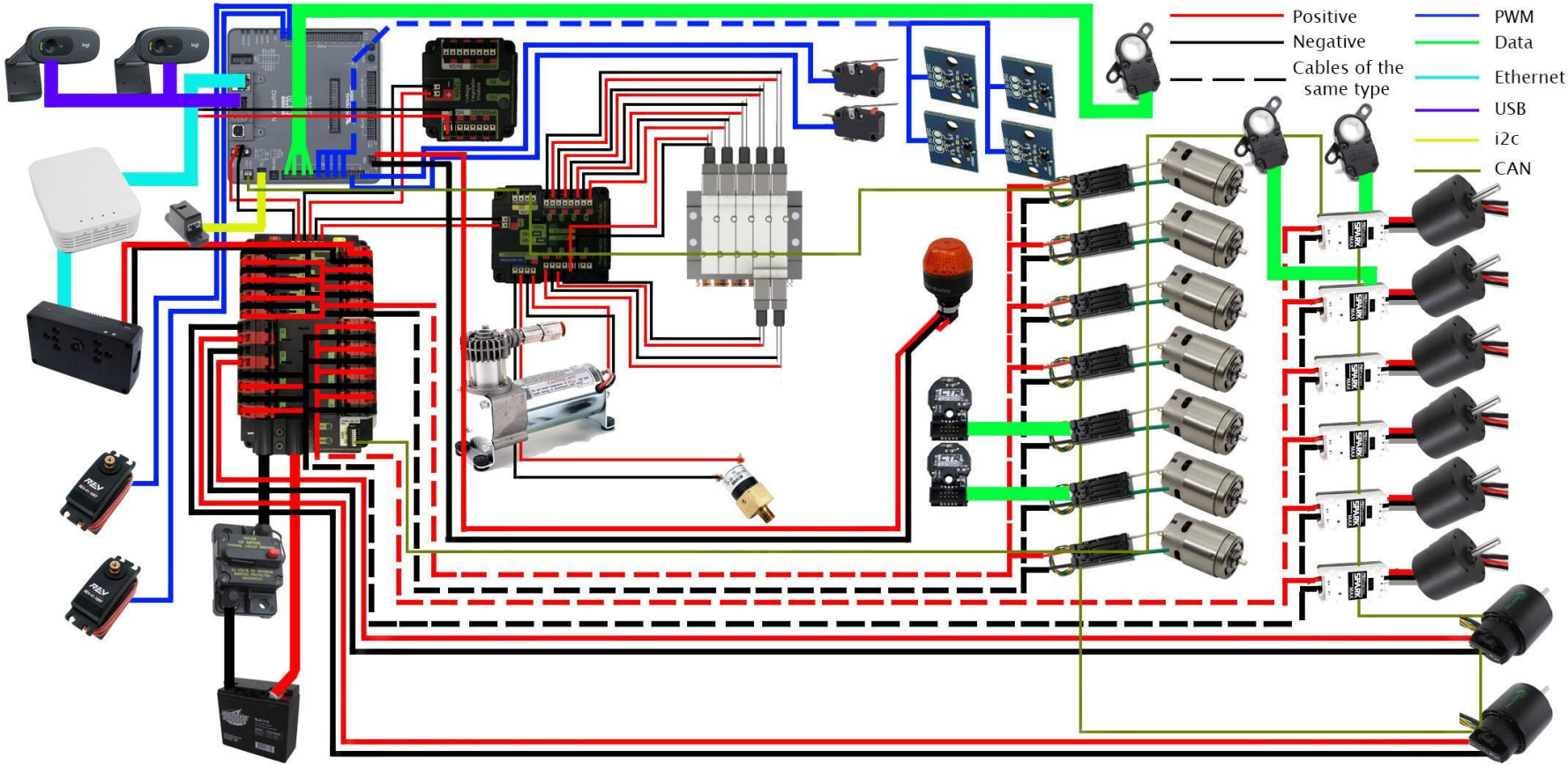
Electrical Diagram



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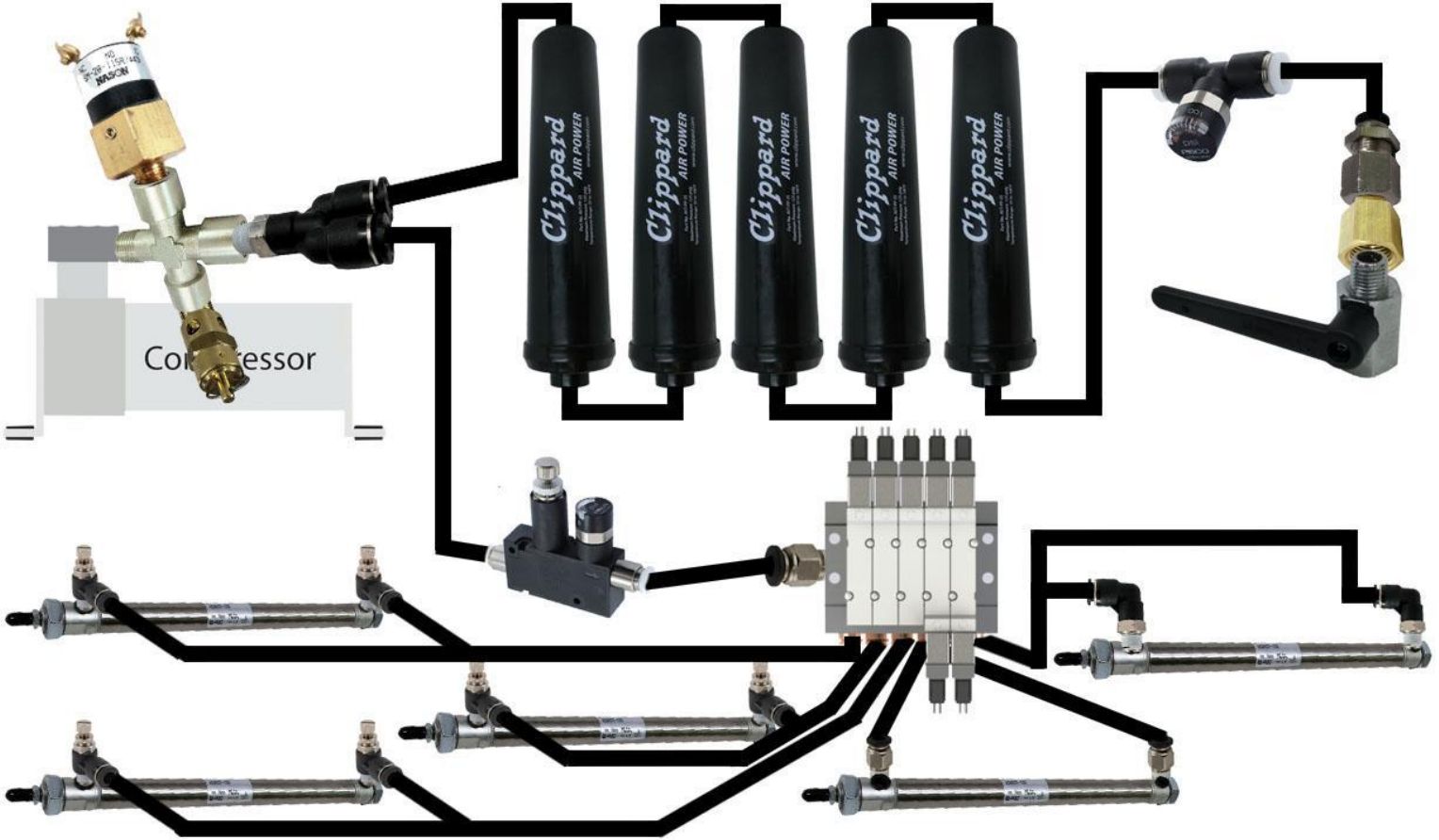
Pneumatic Diagram



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This robot stole 31 days of my life.

– Paolo Reyes