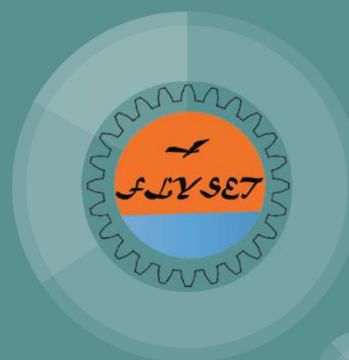


# 2018 FLYSET FTC Workshop - Big Wheel

(9/3/2018)



## Iron Reign - Arjun and Karina

- Arjun is a freshman and a new member of Iron Reign
- Karina is a junior and has been a member of Iron Reign for 1 year (Imperial Robotics 1 year)





# Chassis Specification

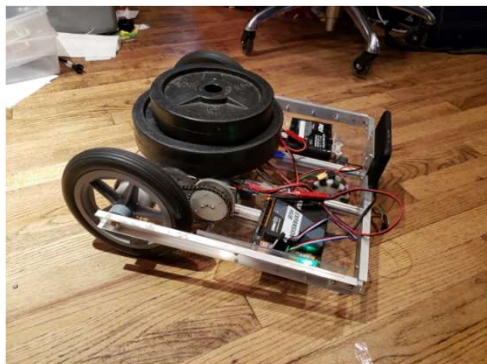
## Big Wheel



Weight: 11.8 lbs (5.35 kg)



## Big Wheel



15lb load



30lb load



## Big Wheel

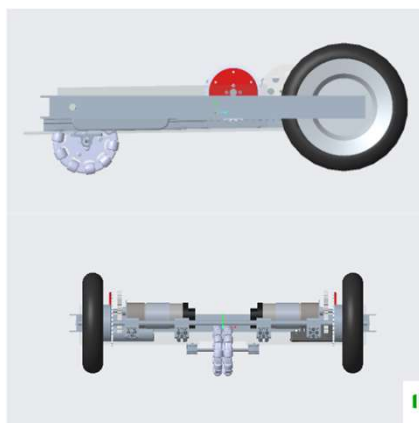
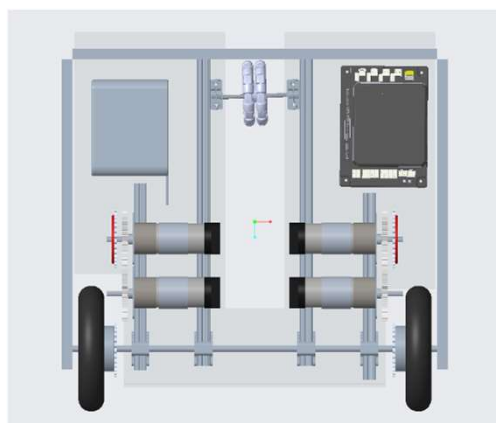
- REV/COTS/Polycarb based chassis
- Four NeveRest 60 motors in 2 pairs
- Two wheel independent chain drive with gears syncing motors
- Gear ratio from motor to wheel: **24:16**
- REV expansion hub is horizontally mounted on the robot chassis
- Base chassis weight: 5.35 KG



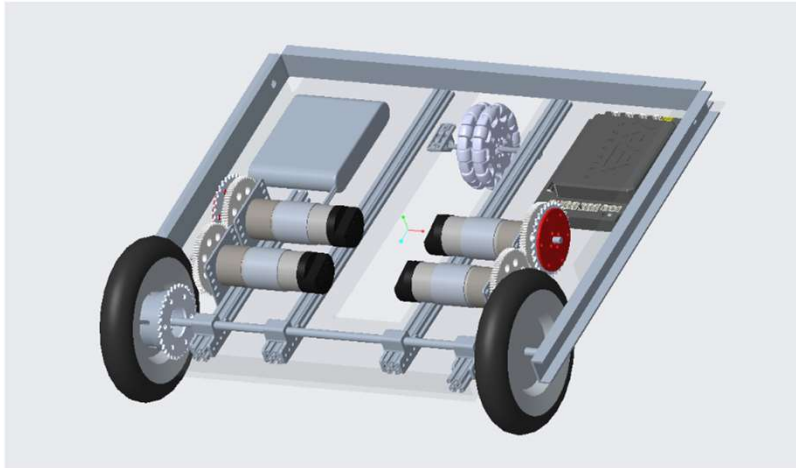


# Chassis CAD Design

## Big Wheel CAD



## Big Wheel CAD



## Big Wheel CAD Notes

- REV hub model created problems with constraints, which push parts around in the assembly
- Individual parts like the axle mounts and sprocket adapters were modelled ahead of time because we actually had to print the parts
- We did not model the whole assembly before-hand. Our CAD was meant to document and not design. We decided to “design with our hands” on this first iteration.
- Should we decide to pursue this approach after kickoff, we will re-do the model from scratch and then build fresh





## Big Wheel Build Notes

- We had issues with the strength of our 3D printed parts because we upgraded the slicer when our printer had to be repaired and the default profiles for nylon changed to lower printing temps. This caused inter-layer weakness and failing parts. Created new printing profiles based on our old notes and problem resolved.
- Have ongoing issues with our chain alignment and tension. Need to adjust the way our motors mount.
- Plan to change from Neverest 60s to orbital 20s with a smaller sprocket for more speed.





## Test 1: Forward Speed Test

- No deviations from test protocol
- There was enough torque to keep the speed constant at all loads

	No load	15 lb load	30 lb load
Distance traveled	~4.9 m	~4.9 m	~4.9 m



## Test 2: Three Second Turn Test

- No deviations
- Large swept area due to non-centered turning axis
- Could not test with weight - weights could not be secured

	No load	15 lb load	30 lb load
Degree turned	560	NA	NA





## Test 3: Driving up/down a ramp

- No deviations
- Only troubles had more to do with securing the load

	No load	15 lb load	30 lb load
Up ramp	Yes	Yes	No
Down ramp	Yes	Yes	Yes



## Test 4: Balance Stone Balancing Ability

- No deviation
- unremarkable

	No load	15 lb load	30 lb load
Go on the stone?	Yes	Yes	NA
How long on the stone? (forever is settled on the stone)	forever	forever	NA







## Test 5: Pull Strength Test

- No deviations
- With no load the wheels would spin out at 10lb pull

	No load	15 lb load	30 lb load
10 lb pull weight	No	1.5	N/A
20 lb pull weight	N/A	2.8	N/A
30 lb pull weight	N/A	No	N/A



# Special Features



## Special Features

- Larger wheels than typical FTC Robots
  - Inherent and obvious change to gearing - greater speed, less torque
  - Ability to surmount larger vertical challenges
    - 8" wheel with good grip can mount 3.5" hard changes in elevation
- Offset center of turn
  - Center of turn is only 4" from edge of robot
  - Large sweep in center turn could cause issues
  - Large sweep in center turn can be advantageous - far side gets lateral positioning
  - Problem: requires COG offset to axle so that traction is maintained

