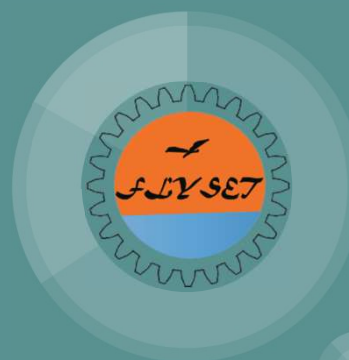


2018 FLYSET FTC Workshop - 2 Wheel Geared Drive

(9/3/2018)



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I started out in Jr. FLL 7 years ago, went into FLL for 3 years, and last year to FTC with our rookie team Quantum X. I am a builder on the team. Currently I am in 8th grade at Rice Middle School.

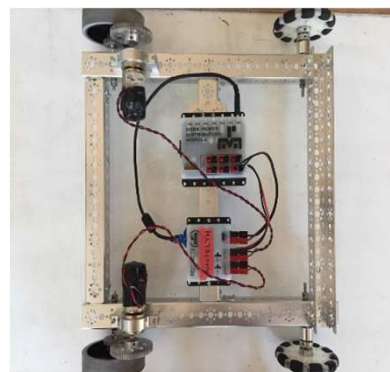
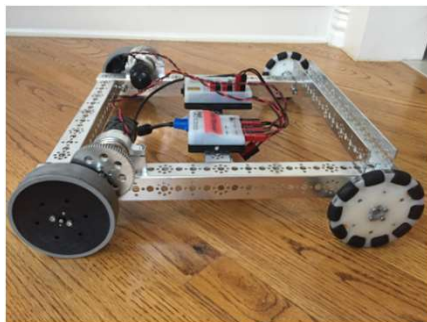


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Chassis Specification

2 Wheel Geared Drive



Weight: 7.4 lbs

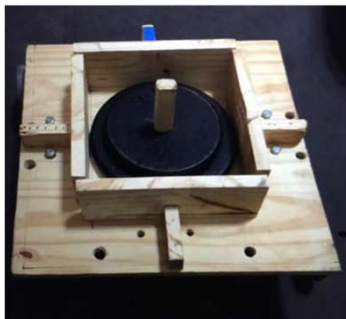


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2 Wheel Geared Drive



12.4 lbs



27.4 lbs



42.4 lbs.

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2 Wheel Geared Drive

- Tetrix based chassis
- Two NeveRest 40 motors
- Two wheel geared drive (gearing up ratio 1:2)
- Gear ratio from motor to wheel: 20:1
- Consists of one pair of drive wheels and one pair of omni wheels
- Modern Robotics motor controller
- Base chassis weight: 7.4 lbs

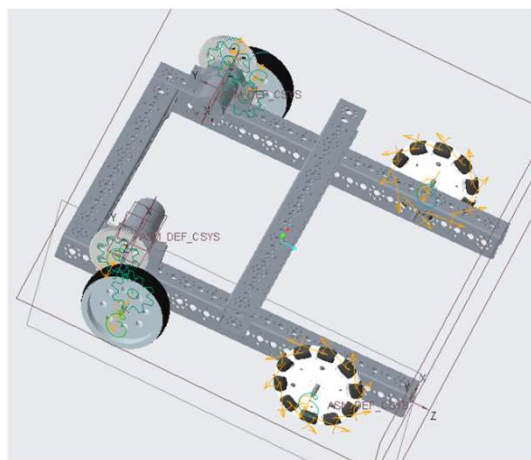


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Chassis CAD Design

2 Wheel Geared Drive in Design Phase



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2 wheel geared drive CAD Notes

- Missing component error
 - Everytime I would have to click “retrieve missing component” for the model to appear
 - Using Windchill workspace can avoid this error (see CAD Tips and Tricks session)



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2 wheel geared drive CAD Model Simulation



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2 Wheel Geared Drive Build Notes

- Front channel's L-brackets were blocking axles
 - rotated front channel, switched position of L-brackets
- Hard time finding where to mount electronics
 - used middle channel, zip tied phone and battery
- Gears were not aligned reliably
 - motor position had to be adjusted, motor mount tightened
- Drive wheels slanted inwards
 - added crossbody channel on top to close the 'U' shape





Test 1: Forward Speed Test

- This chassis had a huge difference of distance between no load and 30 lbs load

	No load	15 lb load	30 lb load
Distance traveled	8.1 m	7.03 m	5.53 m



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Test 2: Three Second Turn Test

- Chassis had a lot of speed but very little torque
- Could not turn w/ 15 lbs or 30 lbs.

	No load	15 lb load	30 lb load
Degree turned	576.7	N/A	N/A



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Test 3: Driving up/down a ramp

- Consistent w/ not a lot of weight on it
- Not enough power to do 30 lbs.

	No load	15 lb load	30 lb load
Up ramp	1	1	0
Down ramp	1	1	0



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Test 4: Balance Stone Balancing Ability

- 2 wheel drive does not allow for the robot to go onto the balancing stone.

	No load	15 lb load	30 lb load
Go on the stone?	0	0	0
How long on the stone? (forever is settled on the stone)	0	0	0



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Test 5: Pull Strength Test

- Again, lots of speed but no power, so could not pull anything

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



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Test 6: Autonomous Straight Line Drift Test (Optional)

- More load = more drift

	No load	15 lb load	30 lb load
Horizontal drift	2 cm	13 cm	32.7 cm



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2 Wheel Geared Drive Summary

- Gearing up with a ratio of **1:2**
- Very fast but very little torque
 - could not complete pull tests
 - not enough power to turn with weight on top of it
- Gears in geared drive must be reliable
- Chassis is too flimsy with a "U" shape



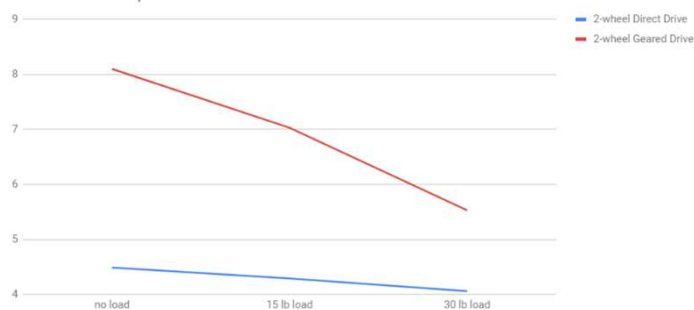
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Direct Drive vs. Geared Drive Test Performance Comparison

Test 1: Forward Speed Test

Test 1: Forward Speed Test



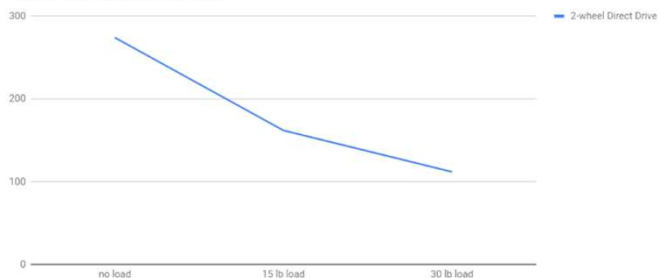
The direct drive chassis was a lot slower but was not affected by the weights as much as the geared up chassis, which had more speed but was not very steady.



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Test 2: Three Second Turn Test

Test 2: Three second turn test



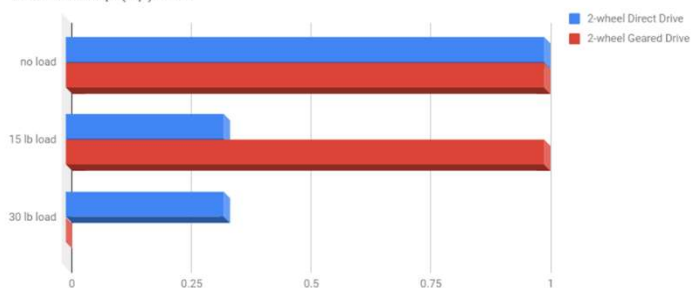
The direct drive chassis could not turn very much but at least was able to turn with load weight. The geared up drive chassis was not able to turn under 15 or 30 lbs. of load weight.



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Test 3: Driving up/down a ramp

Test 4: Ramp (Up) Test



The ramp test is also based on driver skill, not just only the chassis. The geared up drive chassis was more consistent under no load and 15 lbs than the direct drive chassis, but could not go up the ramp under 30 lbs.



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Test 4: Balance Stone Balancing Ability

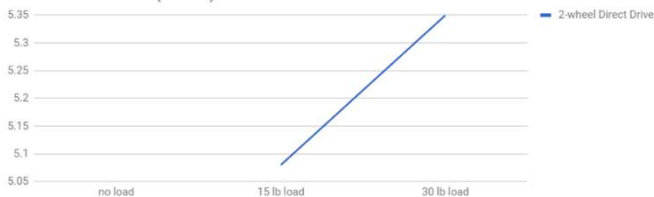
- Neither chassis could get onto the balance stone



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Test 5: Pull Strength Test

Test 5.1: Pull Test (10 lbs)



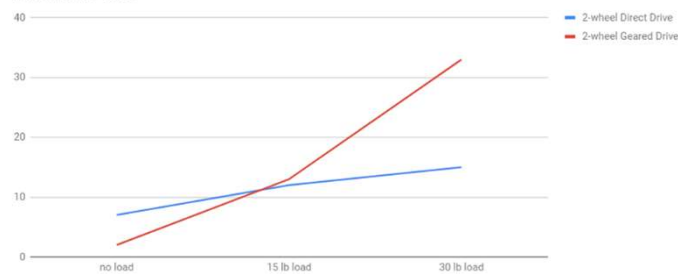
The direct drive chassis could pull very minimal weight. The geared chassis could not complete any pull tests.



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Test 6: Autonomous Straight Line Drift Test (Optional)

Test 6: Drift Test



Under no load condition, the direct drive chassis drifted more than geared chassis, but was not affected by the load weights as much as the geared drive chassis was.



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