

Blue Bears Engineering Notebook 2021-2022



Quick Reference Code Page

Copy + Paste the Black if stuck! (Updated 12-8-2021)

Drive

drive(amount in degrees, steering, power)

#Example: drive(300, 0, 50)

driveStraightForSeconds(power, timeInSeconds)

#Example:

driveStraightForSeconds(30,2)

Attachment

moveRake(upOrDown, rakeTime, power)

#Example: moveRake('up', 2, 50)

Wait

wait()

#Wait for a button push

Gyro Turns

turnRightForward(end angle, power)

#Example turnRightForward(90, 25)

turnLeftForward(end angle, power)

#Example: turnLeftForward(90, 25)

turnRightBack(end angle, power)

#Example: turnRightBack(90, 25)

turnLeftBack(end angle, power)

#Example: turnLeftBack(90, 25)

turnRightTank(end angle, power)

#Example: turnRightTank(90, 15)

turnLeftTank(end angle, power)

#Example: turnLeftTank(90, 15)

Lines

findBlackSteering(steering, power, light intensity, light sensor) #Example:

findBlackSteering (99,1 0, 35, rightSensor)

findBlack(power, light intensity, light sensor)

#Example: findBlack(50, 25, leftSensor)

alignWithLine()

#Aligns the robot with a line

timeFollower1(lightSensor, driveTime, speed, direction) #Example:

timeFollower1(rightSensor, 0.5, 20, 'outside')

Make sure to stop: driveMotors.stop()

followLineForTime(lightSensor, driveTime, direction, chooseStop)

#Example:

followLineForTime(rightSensor, 5, 'inside', 'brake')

followLineUntillNextLine(lightSensor,, direction, chooseStop)

#Example

followLineUntilNextLine(leftSensor,'outside', 'brake')

Motor/Sensor Names

driveMotors = B+C motors

leftAttachment = A motor

rightAttachment = D motor

leftDrive = B motor

rightDrive = C motor

leftSensor = E sensor

rightSensor = F sensor

hub = PrimeHub

Quick Reference Code Page

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turnRightGyroForward(end angle, power)

#Example turnRightGyroForward(90, 25)

turnLeftGyroForward(end angle, power)

#Example: turnLeftGyroForward(90, 25)

turnRightGyroBack(end angle, power)

#Example: turnRightGyroBack(90, 25)

turnLeftGyroBack(end angle, power)

#Example: turnLeftGyroBack(90, 25)

turnRightInPlace(end angle, power)

#Example: turnRightInPlace(90, 15)

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turnLeftGyroForward(end angle, power)

#Example: turnLeftGyroForward(90, 25)

turnRightGyroBack(end angle, power)

#Example: turnRightGyroBack(90, 25)

turnLeftGyroBack(end angle, power)

#Example: turnLeftGyroBack(90, 25)

turnRightInPlace(end angle, power)

#Example: turnRightGyroInPlace(90, 15)

turnLeftInPlace(end angle, power)

#Example: turnLeftGyroInPlace(90, 15)

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hub = PrimeHub

Team Meeting

8-17-2021

What we did:

- Built mission models and dual locked for:
 - Platooning trucks
 - Switch engine
 - Unused capacity (hinged blue container)
 - Large delivery
 - Unload cargo plane
 - Accident avoidance
 - Transportation journey
 - Air drop

What we still need to do:

- Build mission models for:
 - Sorting center
 - Bridge
 - Load cargo
 - Unload cargo ship
 - Train tracks
 - Home delivery
 - Innovation Project



What we learned:

- What the missions look like and that the *Robot Game Rulebook* has which missions go with which bags

Team Meeting

8-23-2021

What we did:

- Built or nearly finished building mission models for:
 - Sorting center
 - Bridge
 - Load cargo
 - Unload cargo ship
 - Train tracks
 - Home delivery
 - Innovation Project
- Created a mission matrix (spreadsheet) and decided to record for each mission:
 - How the mission works
 - How many points it can be vs may be worth
 - Each mission's complexity
 - Each missions distance
 - Difficulty
 - Gut Feeling
 - Drop something off, Bring Back something, Both, or Neither

What we still need to do:

- Finish filling out our mission matrix and prioritize the missions
- Do some mission mapping and say which missions we're most excited to work on

What we learned:

- There is no touch penalty the first time you touch the robot
- The names of most of the missions and how they work
- The containers have a lot of choices and could be worth a lot of points

Team Meeting

8-23-2021

	A	B	C	D	E	F	G	H	I	J	K	L
1	Mission Name		Point Options	Real Points	Max Points	Is It Worth Time	Complexity	Distance	Gut Feeling	Difficulty	Drop something off?	Total
2	0	Inspection Bonus										
3	1	Innovation project										
4	2	Unused Capacity										
5	3	Cargo Plane										
6	4	Transport Journey										
7	5	Switch Engine										
8	6	Accident Avoidance										
9	7	Unload Cargo										
10	8	Air Drop										
11	9	Train Tracks										
12	10	Sorting Center										
13	11	Home Delivery										
14	12	Large Delivery										
15	13	Platooning Trucks										
16	14	Bridge										
17	15	Load Cargo										
18	16	CARGO CONNECT										
19	17	Precision Tokens										



Team Meeting

8-30-2021

What we did:

- Finished building or fixed mission models that were started but unfinished
- Discussed our Core Values
- Filled out our mission matrix (spreadsheet) for:
 - How the mission works
 - How many points it can be vs may be worth
 - Each mission's complexity
 - Each missions distance

What we still need to do:

- Fill out our mission matrix and prioritize the missions
- Do some mission mapping and say which missions we're most excited to work on

What we learned:

- Which missions are probably the most points per second (M00, M02, etc...)
- We may want to make a rack and pinion forklift

Team Meeting

8-30-2021

	A	B	C	D	E	F	G	H	I	J	K	L
1	Mission Name		Point Options	Real Points	Max Points	Is It Worth Time	Complexity	Distance	Gut Feeling	Difficulty	Drop something off?	Total
2	0	Inspection Bonus		50	50							
3	1	Innovation project		30	30	yes						
4	2	Unused Capacity		20	20	yes						
5	3	Cargo Plane		30	30	yes						
6	4	Transport Journey	N	30	30	yes						
7	5	Switch Engine		30	30							
8	6	Accident Avoidance		20	20	yes						
9	7	Unload Cargo		20	20							
10	8	Air Drop										
11	9	Train Tracks										
12	10	Sorting Center										
13	11	Home Delivery										
14	12	Large Delivery										
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16	14	Bridge										
17	15	Load Cargo										
18	16	CARGO CONNECT										
19	16	CARGO CONNECT										
20	17	Precision Tokens										



Team Meeting

9-8-2021

What we did:

- Finished filling out our mission matrix for:
 - Difficulty
 - Gut Feeling
 - Drop something off, Bring Back something, Both, or Neither
- Looked at which missions might be the least worthwhile
- Decided try for mission 12 and 09 if the others are working
- Made some mission maps and decided which missions to group into one robot run
- Said who was most interested in which mission

What we still need to do:

- Decide when we will have small groups to work on the missions
- Start working on the missions

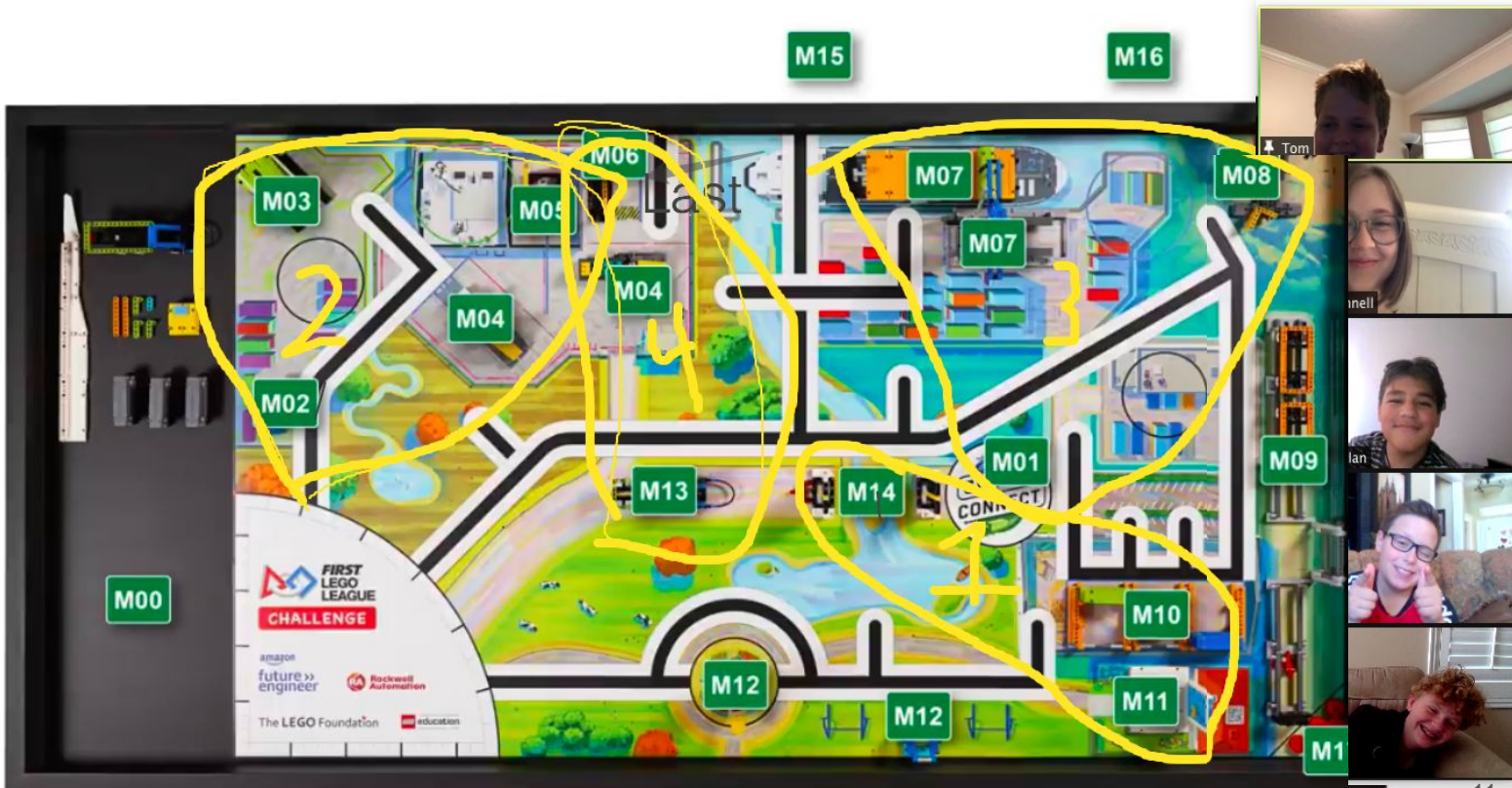
What we learned:

- Which missions make the most sense to do first
- How to mark up a shared screen on zoom

Team Meeting

9-8-2021

	A	B	C	D	E	F	G	H	I	J	K	L
1	Mission #	Mission Name	Point Options	Real Points	Max Points	Is It Worth Time	Complexity	Distance	Gut Feeling	Difficulty	Drop something off?	Total
2	17	Precision Tokens		50	50		6	0	6	7		19
3	2	Unused Capacity		30	30	yes	5	4	5	7	DB	21
4	0	Inspection Bonus		20	20	yes	7	4	4	9	N	24
5	4	Transport Journey		30	30	yes	10	8	4	10	N	32
6	3	Cargo Plane	N	30	30	yes	10	8	6	9	N	33
7	13	Platooning Trucks		30	30		9	9	2	13	D	33
8	1	Innovation project		20	20	yes	6	14	7	8	D	35
9	14	Bridge		20	20		7	10	8	10	N	35
10	7	Unload Cargo		30	30		5	16	8	10	N	39
11	5	Switch Engine		20	20	yes	11	8	9	12	N	40
12	8	Air Drop		20	40		6	20	7	7	N	40
13	6	Accident Avoidance		30	30	yes	12	10	5	17	N	44
14	11	Home Delivery		30	30		11	15	8	15	D	49
15	12	Large Delivery		30	40		14	10	5	22	D	51
16	9	Train Tracks		40	40		15	20	5	18	N	58
17	15	Load Cargo		60	60		17	16	10	21	D	64
18	16	CARGO CONNECT		140	140		18	18	6	23	D	65
19	10	Sorting Center		20	20		18	16	14	21	B	69



Nando & Sage

9-10-2021

What we did:

- We built concepts for the platooning truck, accident avoidance and transportation journey.
- We had an idea for transportation journey
 - First we tried driving forward into transportation journey (not so great)
 - Then we tried driving the wheel up onto it and it didn't get past the blue line
 - Then we accidentally onto the back of the robot and it worked great.
 - We tried many different speeds and found that 90 power worked best.
 - We tried different heights for the back of the robot with 15 tests of 3 different heights and found the one lower worked the best.
 - We found that 200 degrees worked best
- We built a concept to do transportation journey and it works most of the time.
- We came up with a concept to deliver the platooning trucks

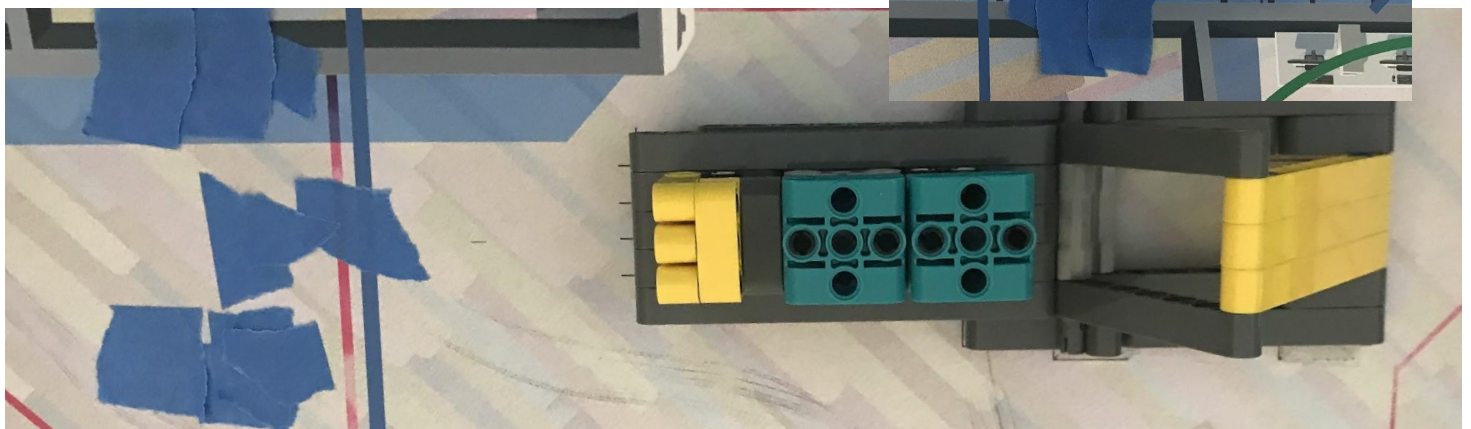
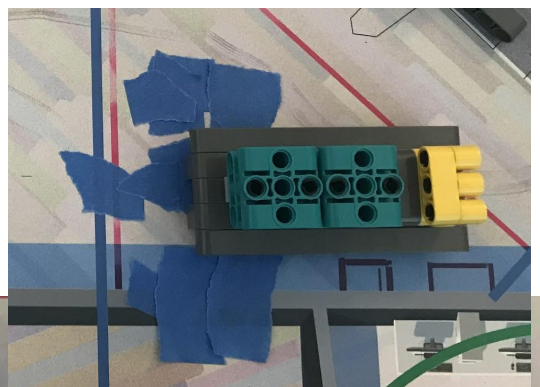
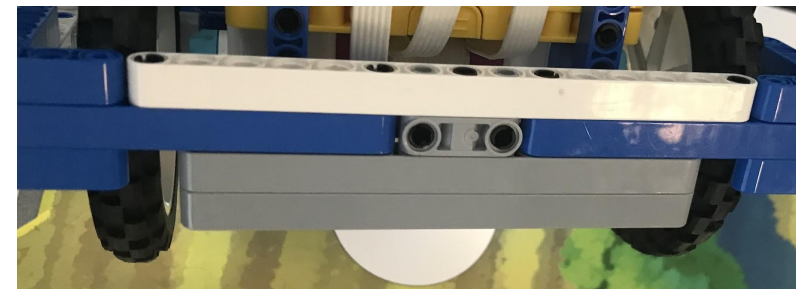
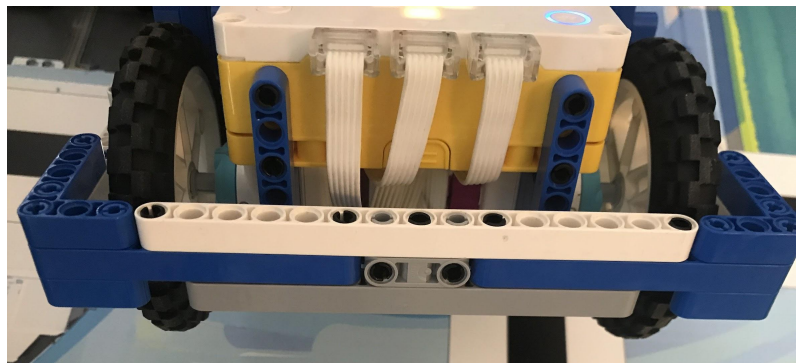
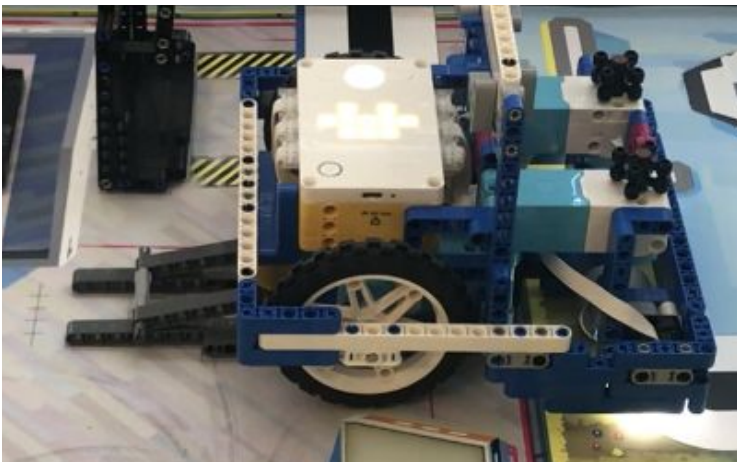
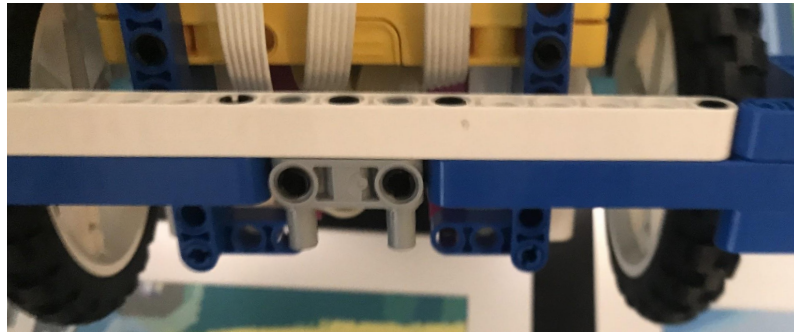
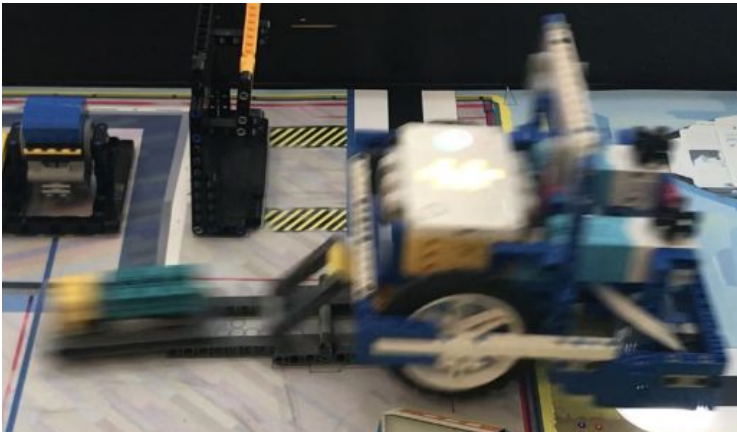
What we still need to do:

- Take our concepts and build them so that they can be used on the robot
- Program and test

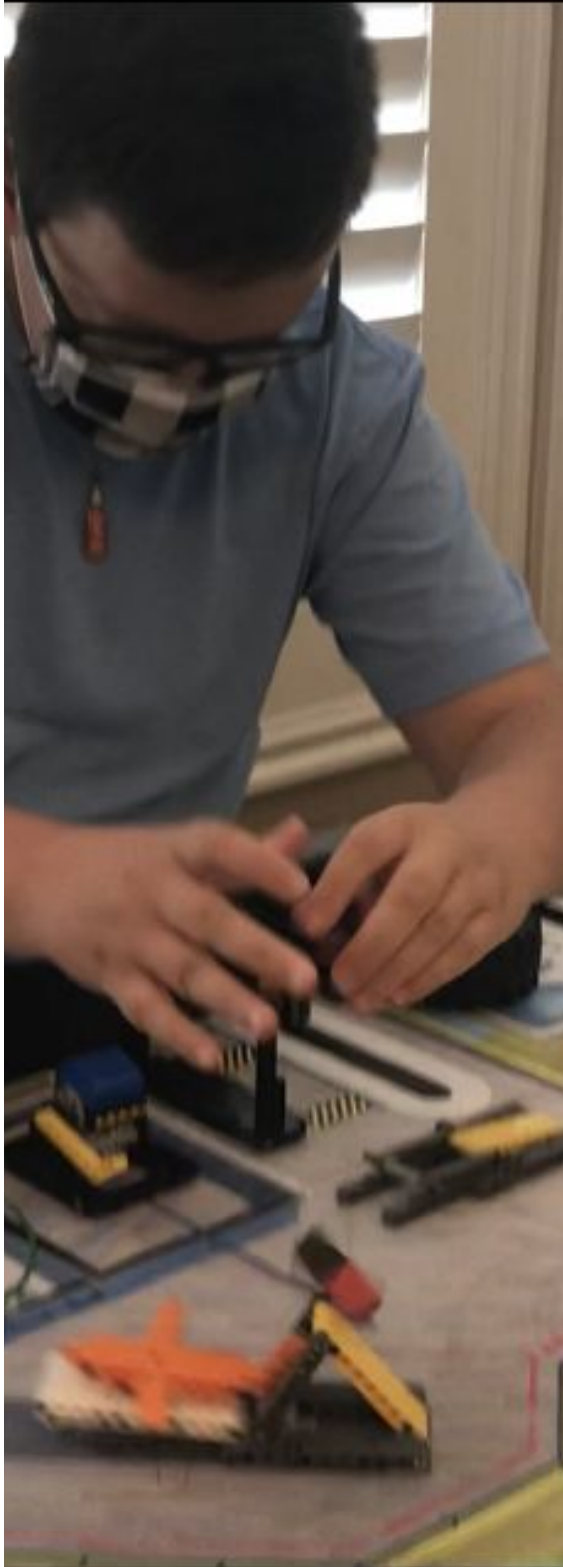
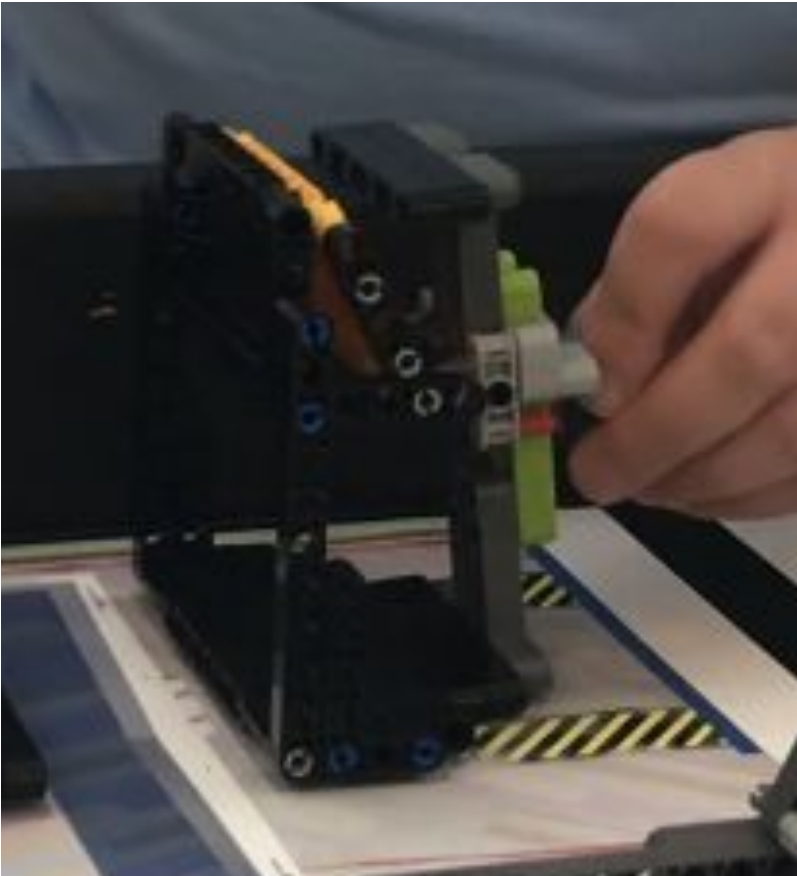
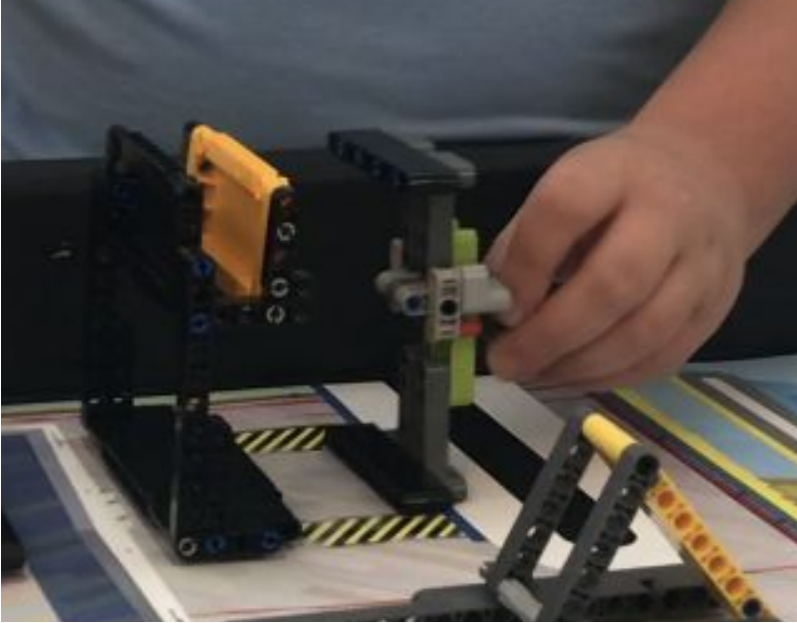
What we learned:

- The robot spins out its wheels at 100 speed and goes faster at 90 speed.
- Sometimes accidents finds the best way to do something
- We can drive all the way on top of accident avoidance if it only helped.

Sage & Nando Pictures 9-10-2021



Sage & Nando Pictures 9-10-2021



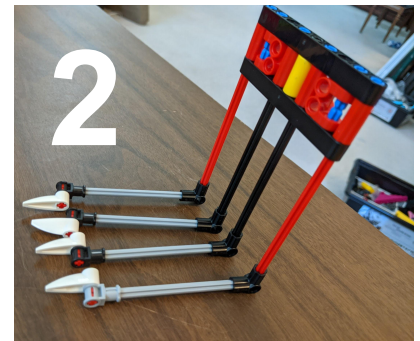
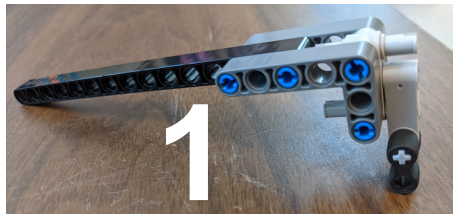
Nes'et & Tom

9-10-2021



What we did:

- We discussed on what missions we are going to do
- We discussed which missions that would be on robot run 1
- We built a concept to retrieve blue and green containers from the sorting center
 - The first one (1) went underneath but didn't work very well
 - The second (2) raked the containers but sometimes the container got stuck
 - Then we looked for something to stick something under the container to lift them and eventually (3) found the lego brick separator worked very well
- We discussed ways to do the home delivery - we are considering a ramp

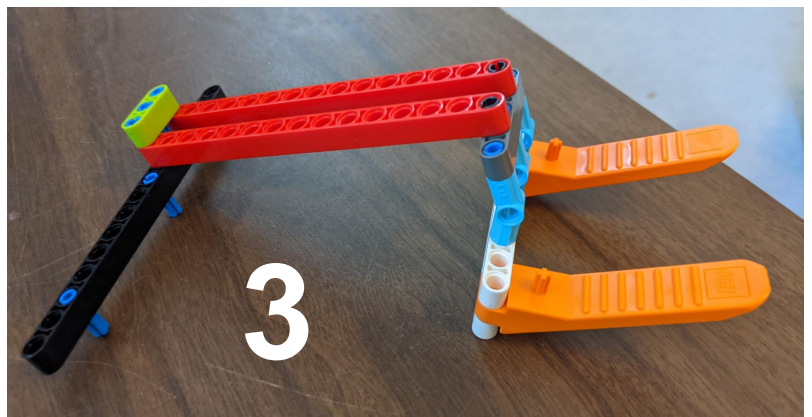


What we still need to do:

- Improve upon the attachment for the sorting center so that it can pick up two containers at the same time, even in different positions.
- Start working on the Innovation Project, and the Home Delivery
- Program the missions so that it can go back and forth and do the missions

What we learned:

- There is no one way to do something
- You can wear an earring holder for earrings on your ear



Tom & Sage

9-13-2021

What we did:

- We talked about missions and in which order to figure that out we ran the robot run with our hands to see what would make the most sense.
 - We talked about how to do the plane and how we want to launch it
 - We talked about how to unload the cargo plane first we had the robot in front of the cargo plane and the cargo would come at the robot. We had the robot on the side and it worked fine.
 - We talked about how we are going to deliver the green block to the circle.
 - At first we decided to place the block and then do the switch engine but then we saw that the block got in the way. So we decided to do the switch engine and then place the block, and that would work the best.
 - We talked about how we are going to flip the switch engine.
- We talked about attachments and how we are going to use them.

What we still need to do:

- We need to test our ideas
- We need to build our attachments
- We need to program the robot
- We need to test how we're going to flip the switch

What we learned:

- We learned about how we are going to do the missions.

Nes'et & Kaitlyn

9-13-2021

What we did:

- We discussed all of the missions and decided on a non-modular robot
- We started building on a new robot with a built-in Rack & Pinion
 - At first we built it up high but we decided it would be better if we build it lower so we had to take apart the frame of the robot
- We ate chips & salsa and airheads

What we still need to do:

- We need to finish the built-in Rack & Pinion with some more structural integrity
- We need to duplicate the robot

What we learned:

- Sometimes depending on the map, a modular robot is better, and sometimes it's not.

Nes'et & Kaitlyn

9-20-2021

What we did:

- We changed the attachment location for our new attachments
- Strengthened the attachment where it connects to the handle
- Celebrated Nes'ets birthday
- Ate chips and salsa, ice cream sandwiches, and ran into each other with inflatable ball suits

What we still need to do:

- Reinforce the handle
- Duplicate the robot with our new spike prime
- Add an arm that goes up and down on the other side

What we learned:

- Today is Nes'ets birthday

Tom & Sage

9-26-2021

What we did:

- We continued to build what Nes'et and Kaitlyn already started building.

What we still need to do:

- We need to work on the other attachments
- We need a handle for the rack and pinion
- Start building for our mission

What we learned:

- This small group loves music

N E S E T & K A I T L Y N

9/29/2021



What we did:

- Stabilized the rack and pinion
- Added the arm attachment point
- Built an attachment for the arm
- Tried multiple axle lengths and different angles on the arm attachment
- Built the attachment for the back of the robot to deliver the crates in the circles

What we still need to do:

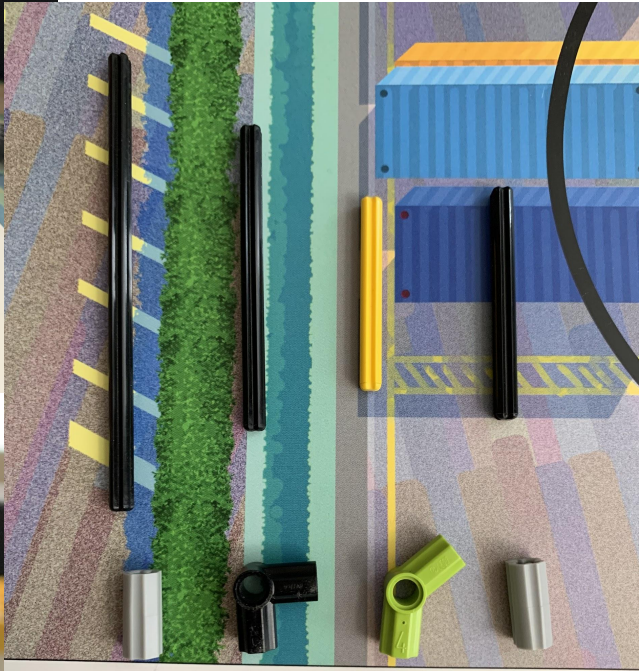
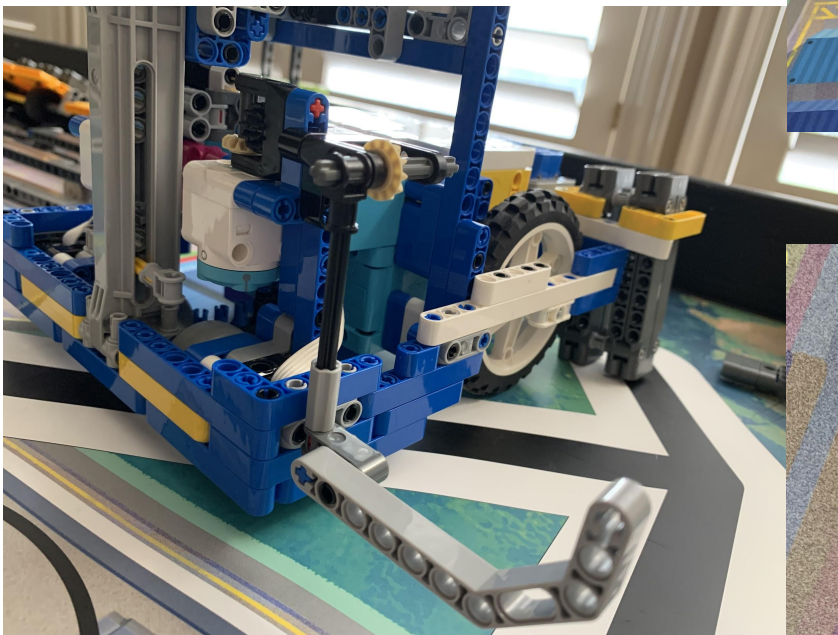
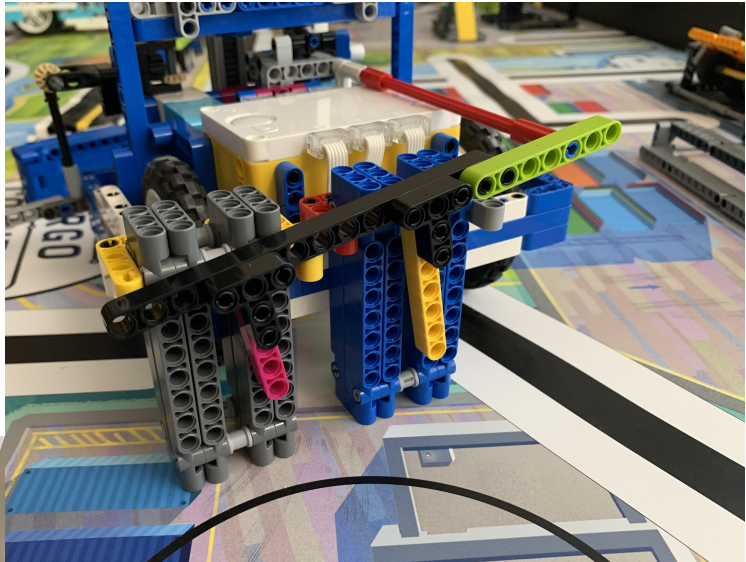
- Build the forklift attachment to deliver the crates to the deck
- Securely attach the arm attachment to the robot

What we learned:

- That Nes'et thinks target is better than walmart

Small & Group Pictures

9-29-2021



Nando & Sage

10-1-2021

What we did:

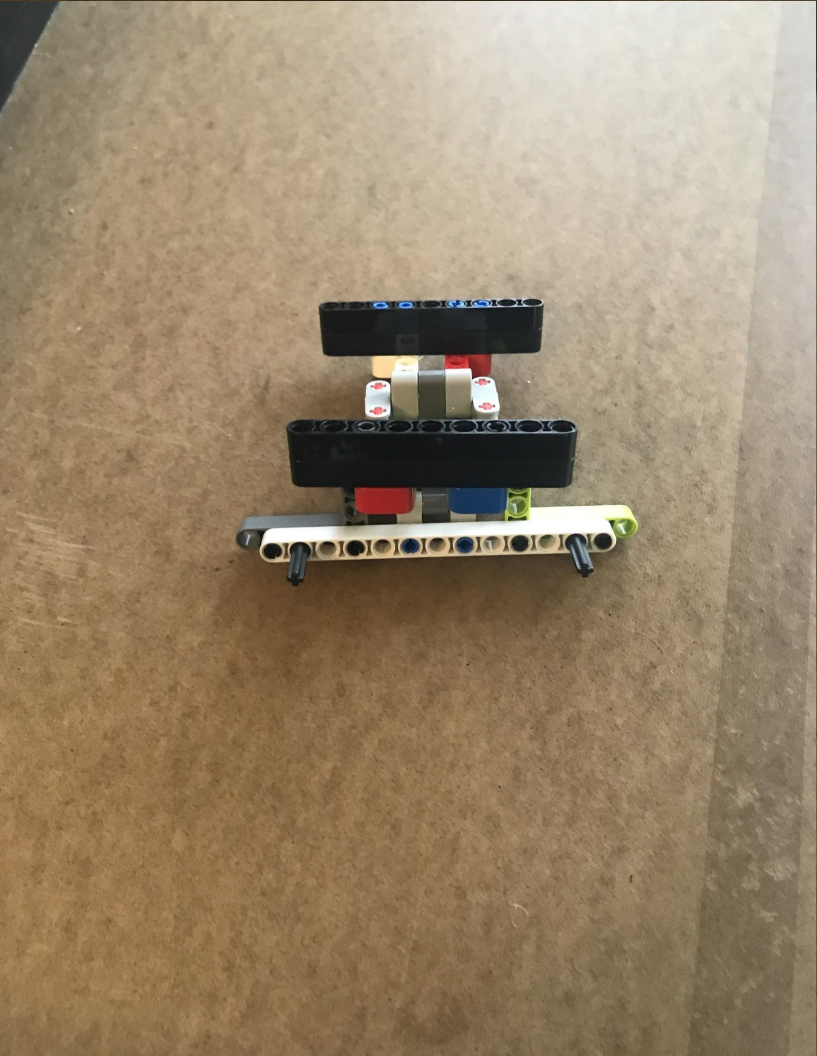
- We worked on the attachments for Platooning Trucks
- There's one on a forklift that goes down and holds the truck from home in place.
- The other holds the platooning truck from home in place from below
- We made the accident avoidance attachment quick release
- It was too high so we shortened it

What we still need to do:

- We make the second platooning truck attachment quick release
- We need to make further guards on the platooning truck so it can't go side to side.
- We need to make sure accident avoidance works with other robot missions in the same robot run
- Make the accident avoidance attachment more efficient

What we learned:

- That holding the platooning truck with a beam further into it very helpful.
- That this process to make attachments takes way longer and lots more changes and time than we would have guessed.



Nes'et & Thomas

What we did:

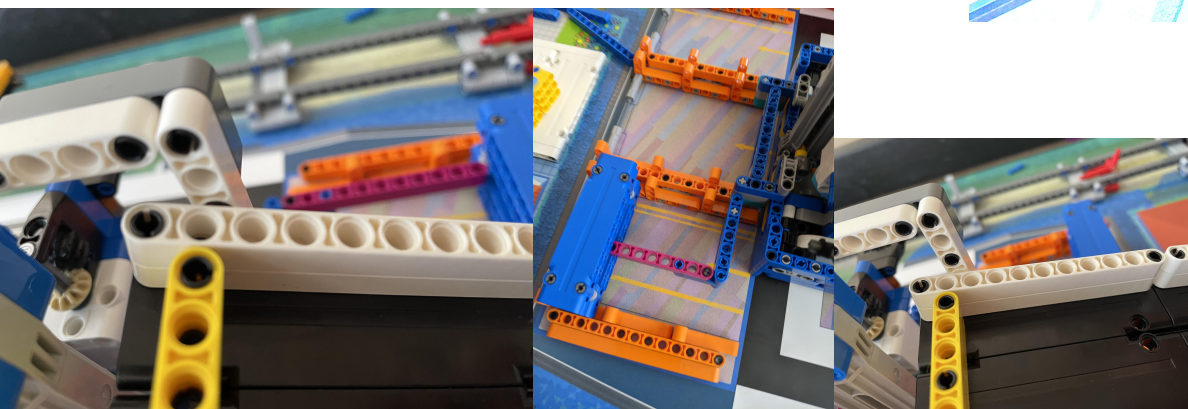
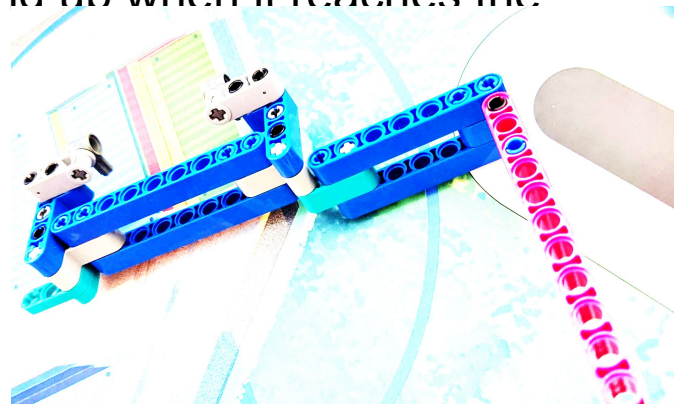
- We made a ramp to deliver the package to the doorstep
- We tried different places to see which place was the best for the ramp.
- We made the third version attachment for the sorting center

What we still need to do:

- Make the ramp a quick release
- Still need to program

What we learned:

- We learned that the package can stand up when it reaches the bottom and on the doorstep.



Sage & Thomas

10-4-21

What we did

- We builded an arm for the unload cargo mission.
- We talked about how we are going to build the arm.

What we still need to do.

- We need to test the arm on the mission.
- We need to build more attachments for the other missions.
- We need to PROGRAM.

What we learned:

- We learned that when we were working on our arm attachment, it affected another small groups attachment.

N E S E T & K A I T L Y N

10/6/2021



What we did:

- We worked on improving both of our attachments, which does the forklift for the cargo ship mission, and which drops off blocks in the circles
- Created a place holder peg to hold gears when they aren't in use

What we still need to do:

- Begin programming our mission
- Refine our attachments further
- Attach two weighted blocks at the bottom of the robot chassis, because the Spike Prime is too light.
- Replace the bottom skid wheels with new ones, that are smoother and drive better.

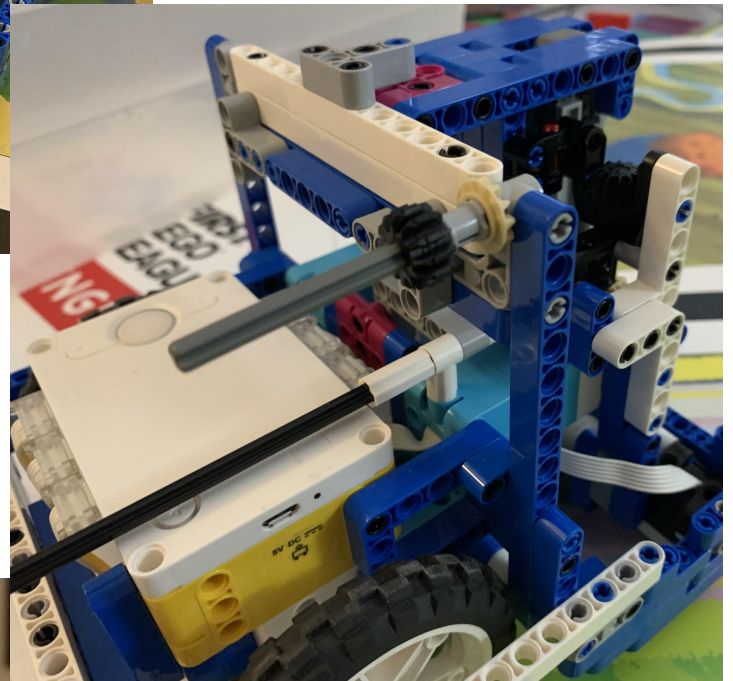
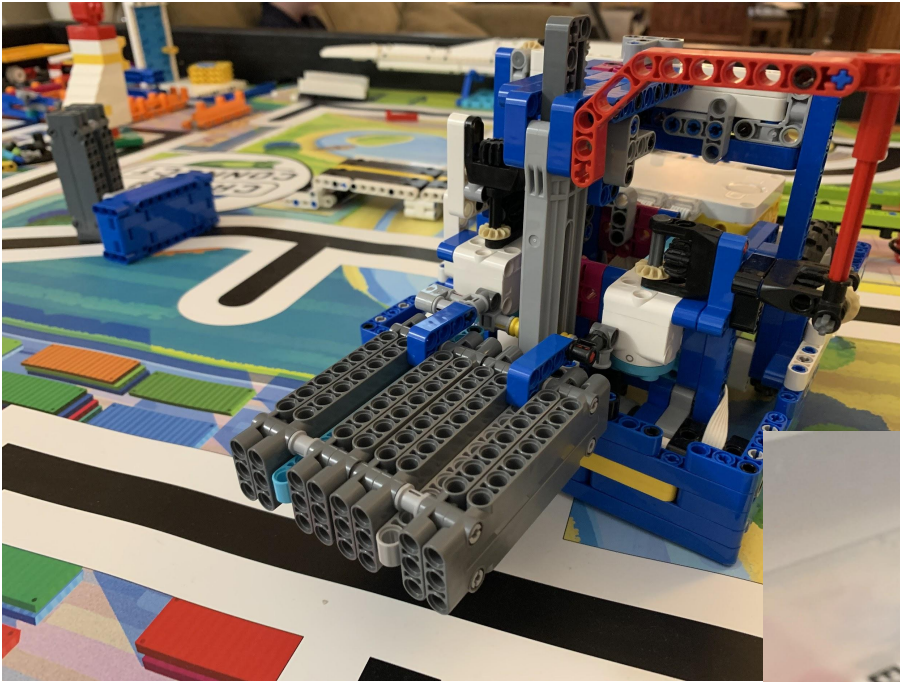
What we learned:

- Legos are sometimes mean and don't have even numbered beams

N E S E T & K A I T L Y N

10/6/2021

PICTURES!



Nando & Sage

10-8-2021

What we did:

- We replaced Nando's idea for Accident Avoidance with another attachment (don't worry, his feelings weren't hurt.)
- We built it in one day and it was perfect
- We improved the attachment that holds the platooning truck from the bottom and from the fork lift so that they don't spin out of position.

What we still need to do:

- Program the robot for the new attachment for Accident Avoidance, Platooning Trucks, and the Truck from Transportation Journey.

What we learned:

- Starting from scratch is sometimes better than modifying your current design

Nes'et & Thomas

10-8-2021

What we did:

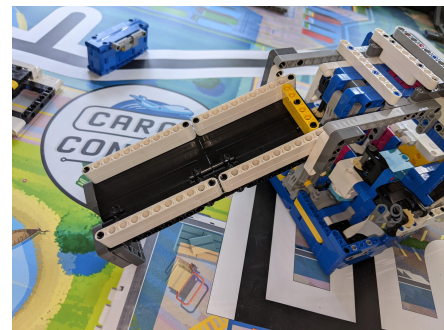
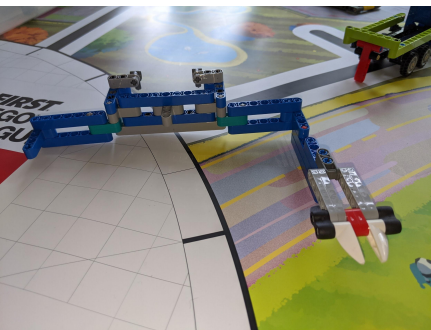
- We improved (a lot) on the ramp for the home delivery. It has a quick release system and it has improved structural integrity, as it is a very bulky attachment and structural integrity is very important.
- We also improved the sorting center attachment, making it modular so that we can pick the side, we improved the grabber to hold on stronger

What we still need to do:

- WE NEED TO PROGRAM
- We need to make a way for the ramp to drop as the forklift goes down.

What we learned:

- We learned that coaches can build stuff it does not break a lego rules.
- We learned to double check that we are not building backwards.



Sage & Tom

10-11-21

What we did:

- We made the SIMPLEST ATTACHMENT!!!!
- We made an attachment that looks like a claw

What we still need to do:

- We need to program the robot
- We need to make sure the attachments are consistent

What we learned:

- Some missions are really simple and require 2 lego pieces to do it

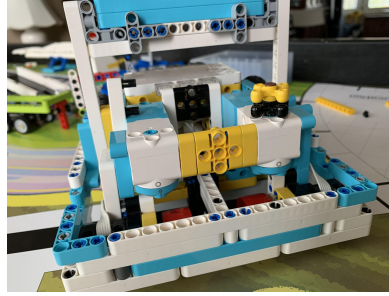


NESET & KAITLYN

10/13/2021



What we did:



- The attachment that drops off the blocks in the circles (now aptly named “Fishhook” is now more structurally sound, and also is restructured to be more efficient.
- Connected the hooks that hold the crates in place
- Connected the prongs of the forklift
 - Realized that when they were attached together they were too far from the rotating plate
- Started to fix the prongs so that they are the right distance



What we still need to do:

- Begin programming our mission
- Refine our attachments further
- Recolor the fishhook, and further sturdify it
- Finish the adjustments to the prongs

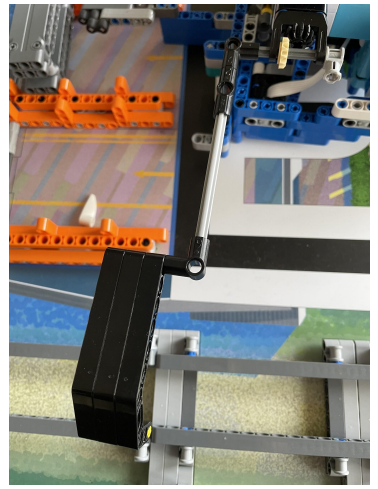
What we learned:

- Form follows function, you shouldn't start with a design, you should start with how to solve a problem.
- We learned that urchin means, “a mischievous young child, especially one who is poorly or raggedly dressed.”



Nes'et & Thomas

10-15-2021



What we did:

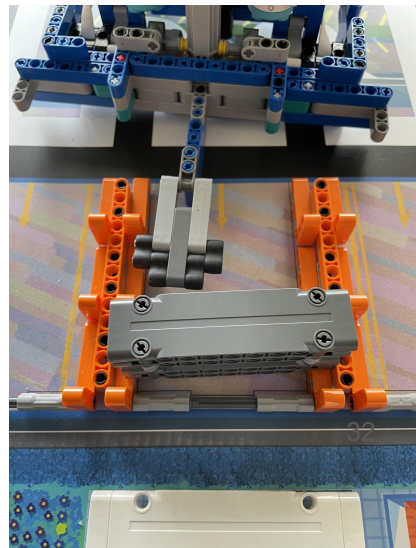
- We improved the ramp by changing the beams on the top and made a easy way for the ramp to come up by hinging it in a different place.
- We made a claw (built from Sage's claw) for the train track to come back on the tracks.
- We improved the sorting center attachment, making it shorter, both on the attachment and the removable lifter-upper

What we still need to do:

- STILL NEED TO PROGRAM
- The sorting center attachment needs to be more stable, as it can get stuck
- Still test and have a good prototype of the claw.

What we learned:

- To check if we are building it right the first time.



NESET & KAITLYN

10/20/2021



What we did:

- Finished the prong attachment adjustments
- Programmed the robot to drive forward and deliver the blocks on the cargo platform!
- Added a weight block to the bottom of the robot to keep more weight on the wheels
- Unboxed the new spike prime

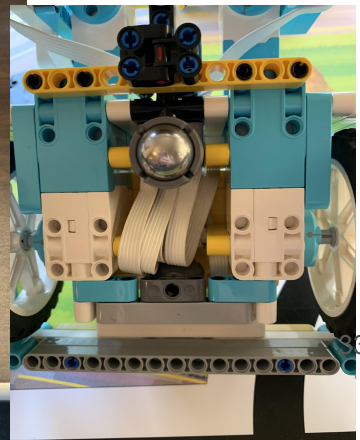
What we still need to do:

- Begin programming our mission
- Refine our attachments further
- Duplicate the robot

What we learned:

- It is hard to program when you haven't done it in a while
- Putting the gears back in place is hard and requires partly destroying the robot

```
535 rightAttachment.stop()
536
537
538 #
539 #
540 #
541 #
542 #
543 #
544
545 #robot run 2
546 def rakeForklift():
547     drive(400, 0, 50)
548     moveRake('up', 1)
549     drive(-200, 0, 50)
550
551 rakeForklift()
552 moveRake('down', 0.6)
553
```



Entity & Tomas

11-1-21

Luv this cat



What we did:

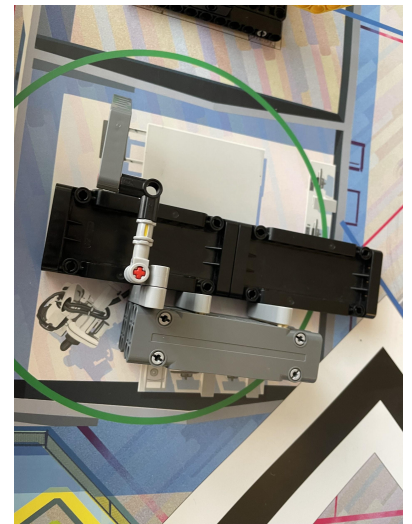
- We created an attachment to use for the switch engine. And to get a block into the circle.
- We created a bendy tube that can pull down the lever for the unload cargo plane mission.

What we still need to do:

- We need to program our missions to the robot
- We need to figure out how to attach the attachment for the switch engine.
- Figure out which lego I'm going to use for opening the cargo plane.

What we learned:

- We learned how to not really attach the block to the attachment.




```
553 drive(1000, 0, 50)
554 drive(-1000, 0, 50)
555 drive(1000, 0, 50)
556 drive(-1000, 0, 50)
557 drive(1000, 0, 50)
558 drive(-1000, 0, 50)
559 drive(1000, 0, 50)
560 drive(-1000, 0, 50)
```

Nando's Program

N E S E T & **K A I T L Y N**

11/3/2021



What we did:

- We built most of the new robot, adding the framing around and the framing for the middle attachment piece. Hopefully there will only be one more meeting until the new robot is finished.
- We made a new function for moving the rake for degrees and added power to the move rake function
- We updated the documentation
- We finished both of the attachments

What we still need to do:

- Finish the new robot
- Begin programming

What we learned:

- Sometimes the solution might be simpler than you originally think
- There is something called an overscore that is the opposite of an underscore.

Underscore: _

Overscore: ¯



Tom & Sage

11/8/21

What we did:

- We sorted legos
- We created 2 liner uppers a roll up liner upper, but we realized that it can't be in home. The 2nd liner upper is made out of lego plates it's really sturdy, the color scheme is red and black.
- We looked at where the robot needed to line up so it can drive straight for mission 3.
- We discussed about how to attach the attachment for switch engine.

What we still need to do:

- We program
- We need to finish the other robot chassis
- We need to make a flip-down attachment for the switch engine.

What we learned:

- We learned some different ways to make a liner upper. (There is a song called Fixer-upper).

N E S E T & **K A I T L Y N**

11/10/21



What we did:

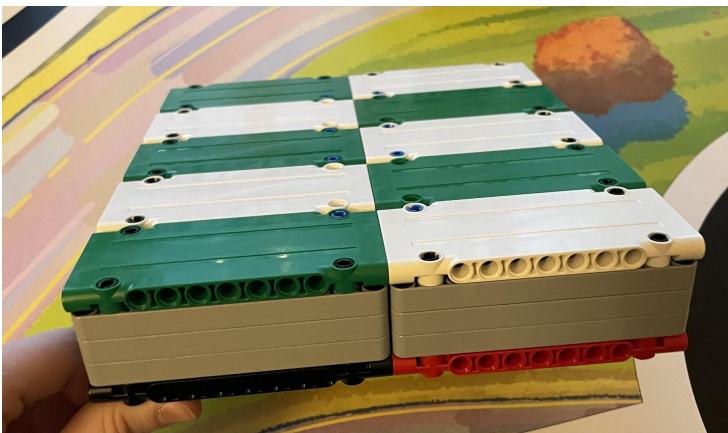
- Continued to duplicate the robot
- Labeled the colorful Legos
- Built a starting block

What we still need to do:

- Begin Programing our mission
- Fully finish the robot (we are so close)

What we learned:

- Cable managing is hard
- How to use a label maker
- We have a lot of yellow pieces



Nando & Enti

11-12-2021



What we did:

- Tada! Today Nando made a program called Acc_Avoid. It says in the name, as you can see, it is for Accident Avoidance. We have a picture of it running the program, so here it is!
- Enti fixed the mole claws

```
562 def acc_avoid():
563     driveStraightForSeconds(-30,1)
564     drive(50, 0, 20)
565     turnRightInPlace(82, 15)
566     driveStraightForSeconds(20,2)
567
```

What we still need to do:

```
568
569 acc_avoid()
```

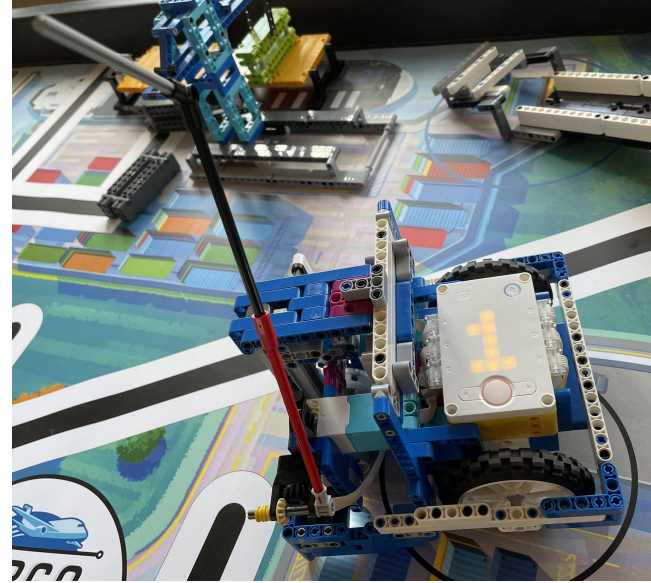
- Program the robot for the new attachment for Accident Avoidance, Platooning Trucks, and the Truck from Transportation Journey.
- Work on the launching truck & airplane thing

What we learned:

- Yay! Woohoo!
- We learned about driving forward with time instead of degrees.
- We learned about different kinds of turning like turn forward, turn backward, turn in place. I now know how to program the different types of turns.
- Moleclaws are amazing

Thomas & Nes'et

11/12/21



What we did:

- Tom changed the attachment for the train that is called the claw.
- Nes'et finished building the new robot.
- While Nes'et was building the new robot Tom worked on coding the mission and got the claw to go down with programming it.

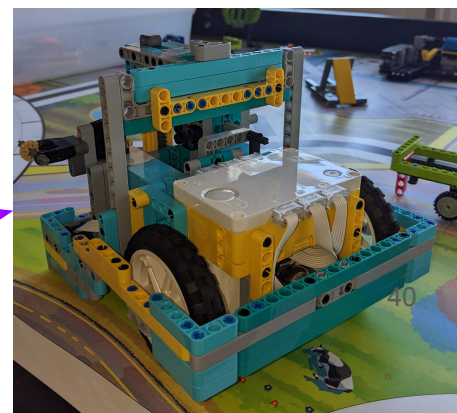
What we still need to do:

- Finish programming
- Fix up some of our attachments

What we learned:

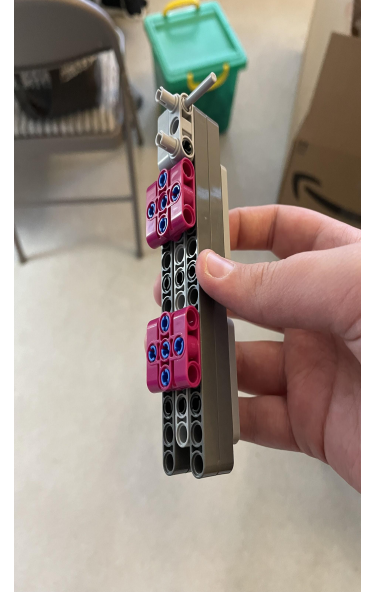
- Dogs like drinking smoothies
- Sometimes if you put off a task it becomes more difficult. For example, today we had to take off and reattach quite a bit of the robots pieces because we saved the bottom of the robot for last

New Robot WOW!!!



Tom & Dakota

11/15/21



What we did:

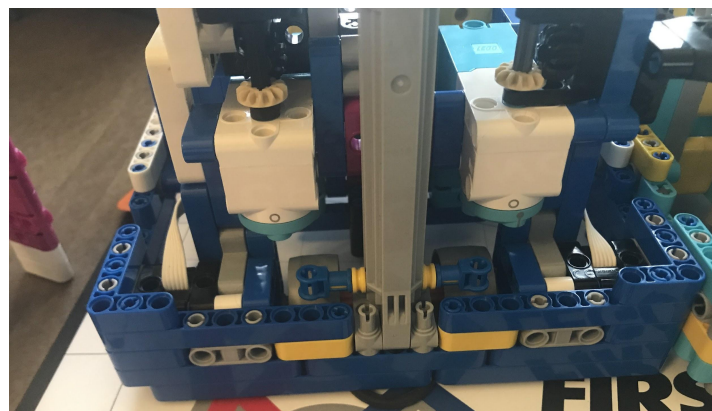
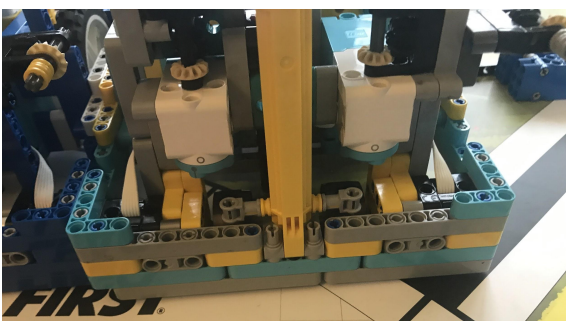
- Changed the robot so that an attachment can go in to the front of the robot and then get left on the board
- Started building a new attachment for switch engine and cargo delivery.

What we still need to do:

- We need to write our program
- Finish the switch engine and cargo attachment
- Make sure the attachment for the cargo plane works every time

What we learned:

- We learned that there's this peg that has a really skinny part and works well for holding onto the robot while it's going forward and then letting go when it backs up.
- We learned that Lego's don't taste like popcorn, but they don't taste terrible.



Kaitlyn

11/17/21

What I did:

- Cleaned the Mat
- Refined the forklift attachments
- Updated the new robot
- Began to program a little bit
- Moved the program to the other laptop

What I still need to do:

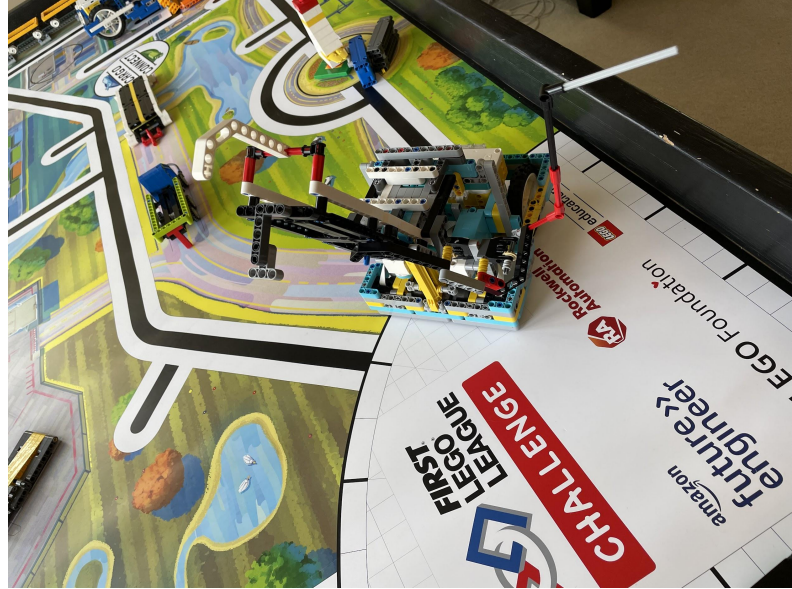
- Continue to program the robot run

What I learned:

- The original forklift attachment blocked the movement of the rack and pinion
- The Laptop doesn't have a USB port (thanks apple)

Tom & Nes'et

11/26/21



What we did:

- Tom built an attachment that does the train tracks, and the home delivery all at once.
- Nes'et has almost finished his attachment like 90% finished.
- Tom cleaned the wheels and cleaned the mat.
- Tom programmed the new attachment that has been made to work and has a video of it.

What we still need to do:

- Try to program Nes'et's attachment to combine it for the mission.
- Have Nes'et finish his attachment by moving all of the connections down 1 for the sorting center.

What we learned:

- Tom learned on how to remove weight but have it the same purpose.

N E S E T & K A I T L Y N

11/29/21



What we did:

- Programmed from base, to the cargo connect circle and then to the cargo ship
- Finished the innovation project (it looks very nice)
- Refined attachments
 - finished the attachment for the sorting center (now the cargo containers turn so they won't fall off)
 - Made a space to push out the airdrop package with the innovative architecture and a cargo container (but it keeps falling off the side of the robot 😞😬😓)

What we still need to do:

- Finish the attachment that holds a crate and the innovation project so that it doesn't fall out while driving
- Refine the program so it gets to the cargo ship every time and then program the rest of the mission

What we learned:

- Pixel art is fun
- Legos are sometimes mean and don't quite work how you want them to



Thomas & Nes'et

12/3/21



What we did:

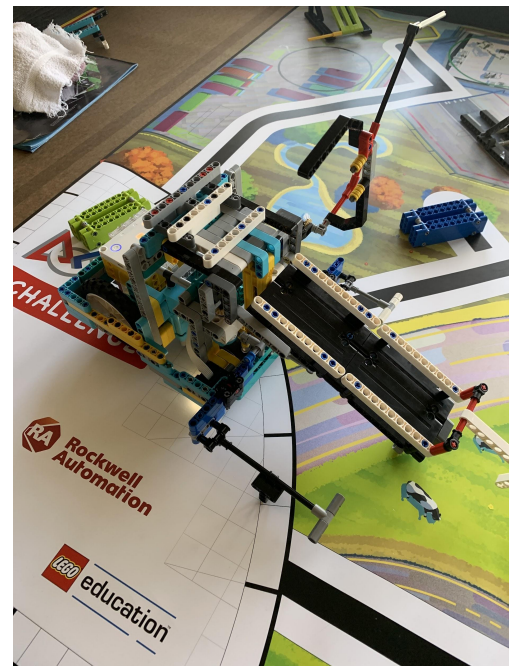
- We continued our programming for our run
- We named our attachment Big Boy jr
- We worked on the attachments for our mission.

What we still need to do:

- We need to finish our programming, and get it consistent.
- We need to finish iterating the attachments, as they get stuck in each other and need to be finished

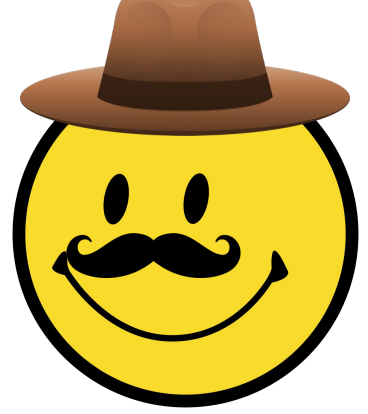
What we learned:

- We learned that the mat and the tires need regular cleaning.



N E S E T & **K A I T L Y N**

12/10/21



What we did:

- Refined attachments even more, and completely rebuilt the attachment that goes on the Cargo Connect symbol
- Refined our program and have had it go out pretty consistently

What we still need to do:

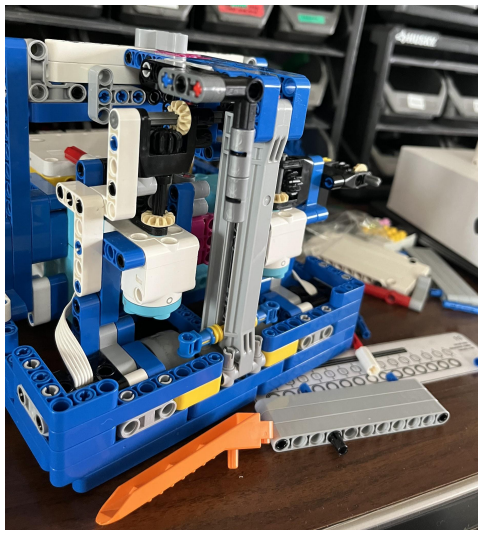
- Finish the programming so that it can come back and complete all of the missions

What we learned:

- Find and replace can make jobs very easy
- Annie's nephew has the coolest D'n'D setup of all time



Nando
12-7-21



What I did:

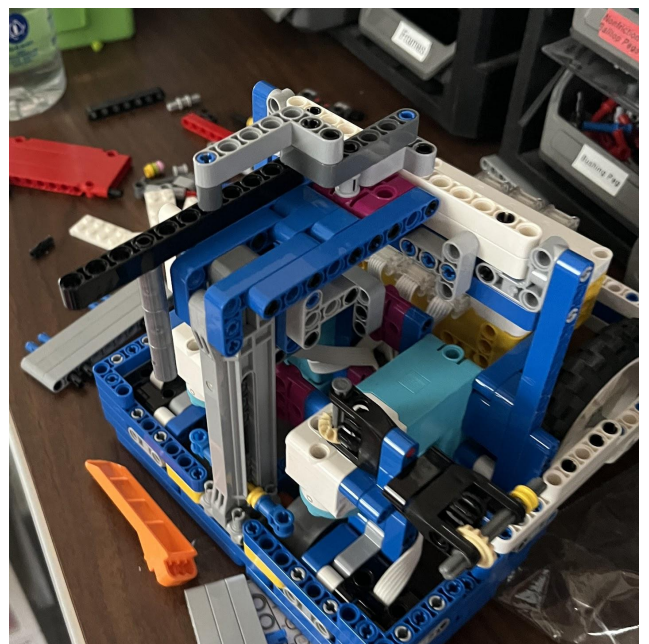
- I made a new attachment to Accident Avoidance and nearly completed a robot run.
- The missions we got are: Accident Avoidance, Platooning Trucks and Transportation Journey.

What I still need to do:

- Add Platooning Trucks to the robot run.
- Make the Robot Run more consistent

What I learned:

- Sometimes, programing can be very annoying, but just keep on pushing through.



Nando 12-9-2021

What we did:

- We made an imperfect program for Platooning Trucks.we
- We made a snowman for our break.

What we still need to do:

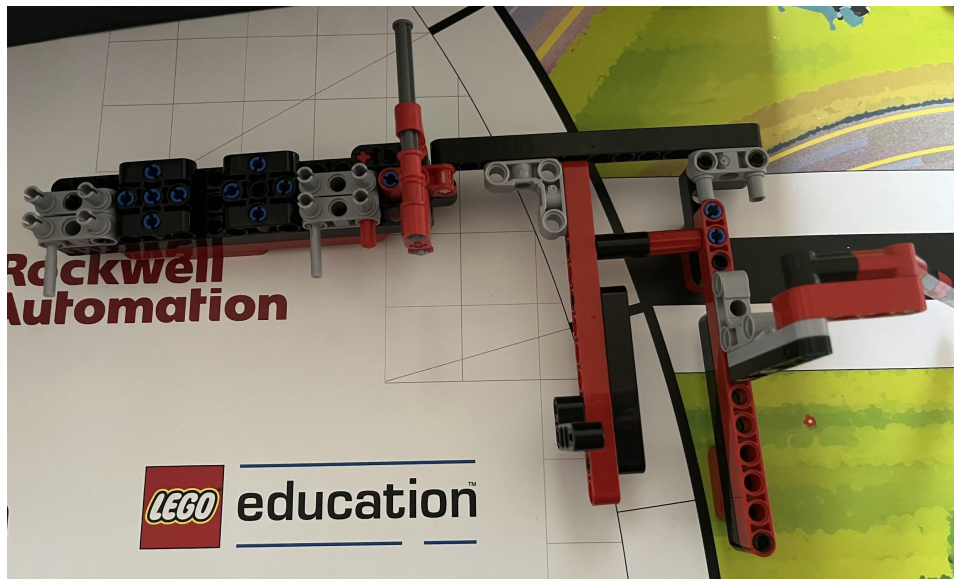
- Perfect the program for Platooning Trucks.
- Finish the snowman.
- Connect the program to the rest of the robot run.

What we learned:

- The Platooning Truck can't twist or it will lead the rest of the robot angling away.
- Snowmen are awesome.

Sage & Tom

12/14/2021



What we did:

- We colored schemed our 3 attachments. One funny thing is that the missions we do are lime green colored. It's funny because we colored schemed our 3 attachments red and black. When our missions are lime green.

What we still need to do:

- We need to start programing the attachments

What we learned:

- Everybody loves Pentatonix
- We need more 2 axles. (This means that we need to lego sort).



Kaitlyn

11/17/21

What I did:

- Recolored the 2nd robot run attachments to yellow and magenta
- Recolored the 1st robot run attachments to lime green and blue
- Finished recoloring the 4th robot run (Green and Magenta)

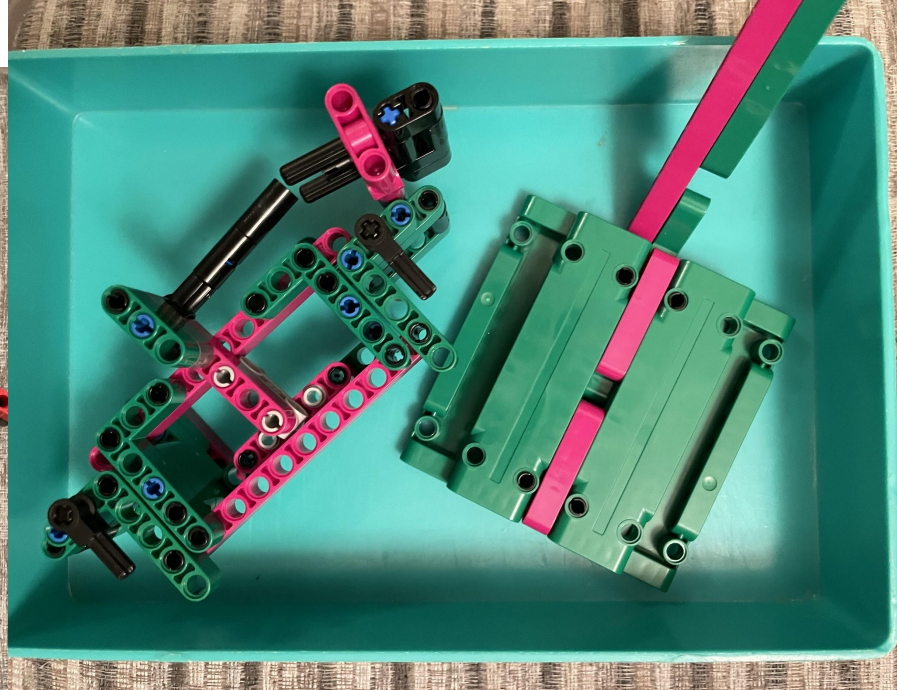
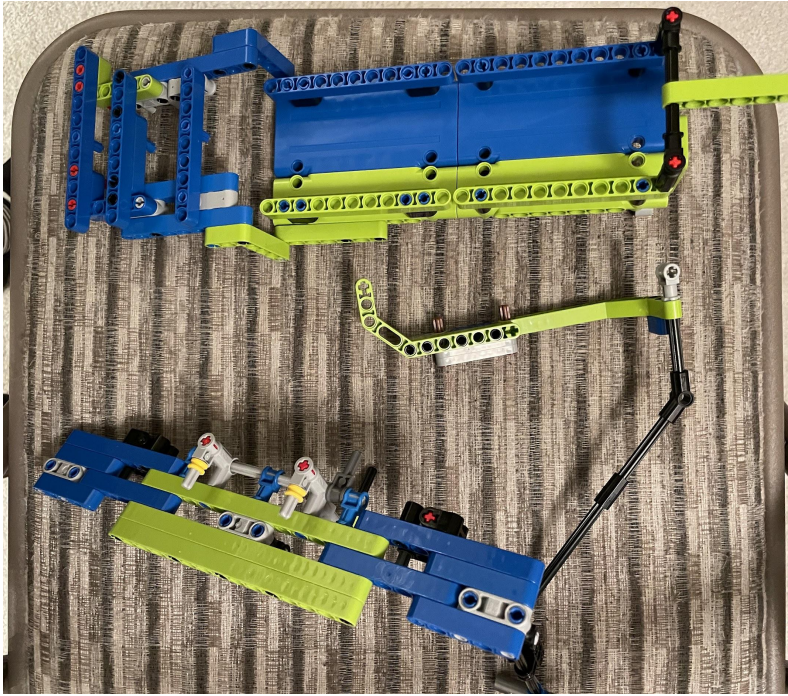
What I still need to do:

- Program the second robot run

What I learned:

- High friction pegs are really hard to get out
- Our attachments look even more beautiful now

Pictures!!!



Thomas & Nes'et

12/16/21

What we did:

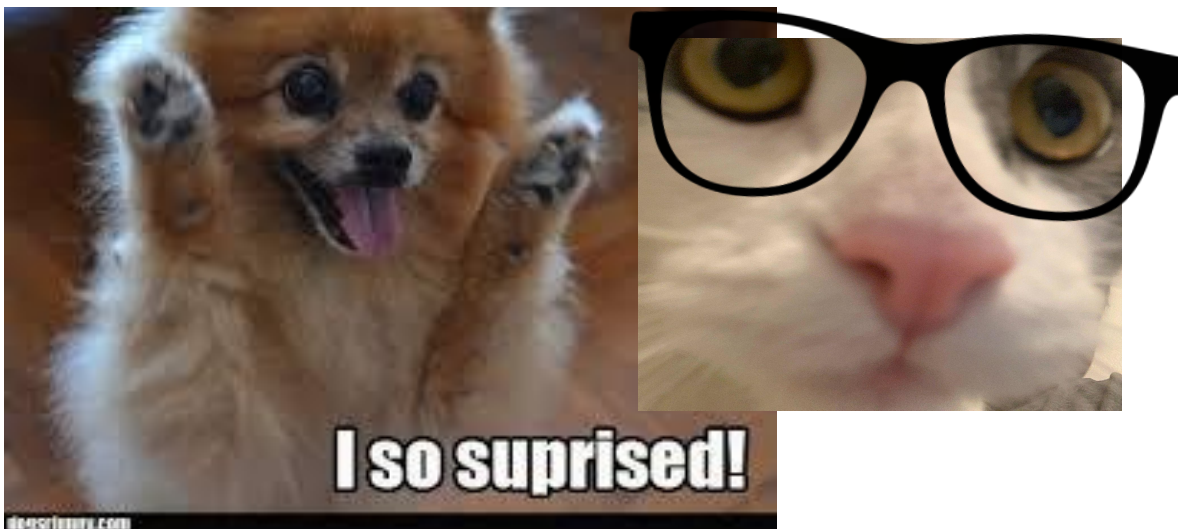
- We fixed the slide attachment, as it had been changed during the recoloring
- We modified our attachments so that it could drop off the innovative architecture and a grey block to the Cargo Connect circle
- We programmed some more, adding the extra drop-off
- We replaced the dark blue robots wheel axles with nails

What we still need to do:

- Finish programming, so that it does the mission consistently

What we learned:

- Cleaning the tires is very important for consistency



Tom & Nes'et

12/17/2021

What we did:

- We changed our attachment for home delivery so it is not above 12 inches.
- We realized the robot was slipping a lot because it didn't have enough weight on the wheels, so we added weight blocks.
- We had a successful run with everything except going back to home base.
- We fixed each line of code so it wouldn't hit into anything except the right side of the bridge.
- We programmed the robot to come back to home base.

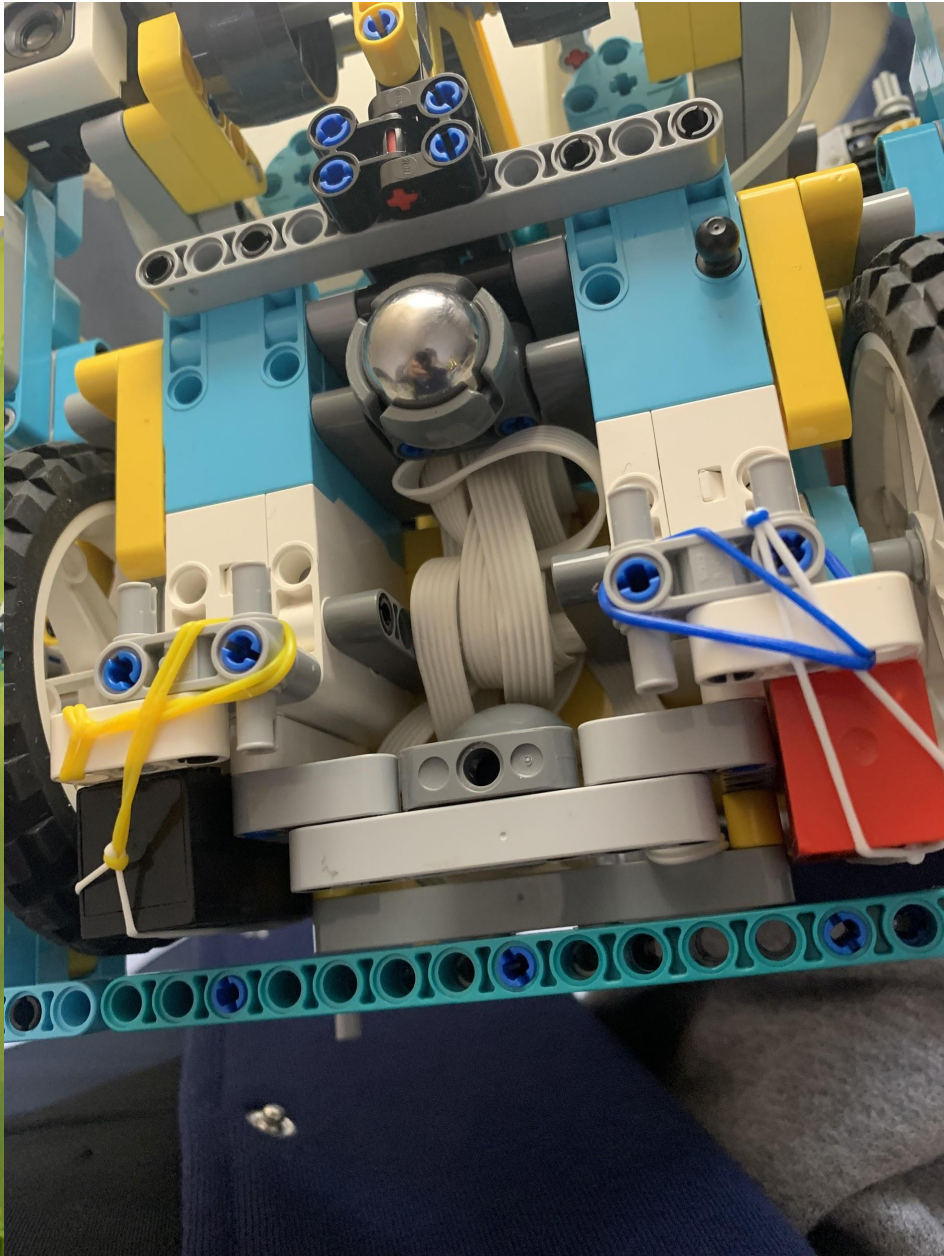
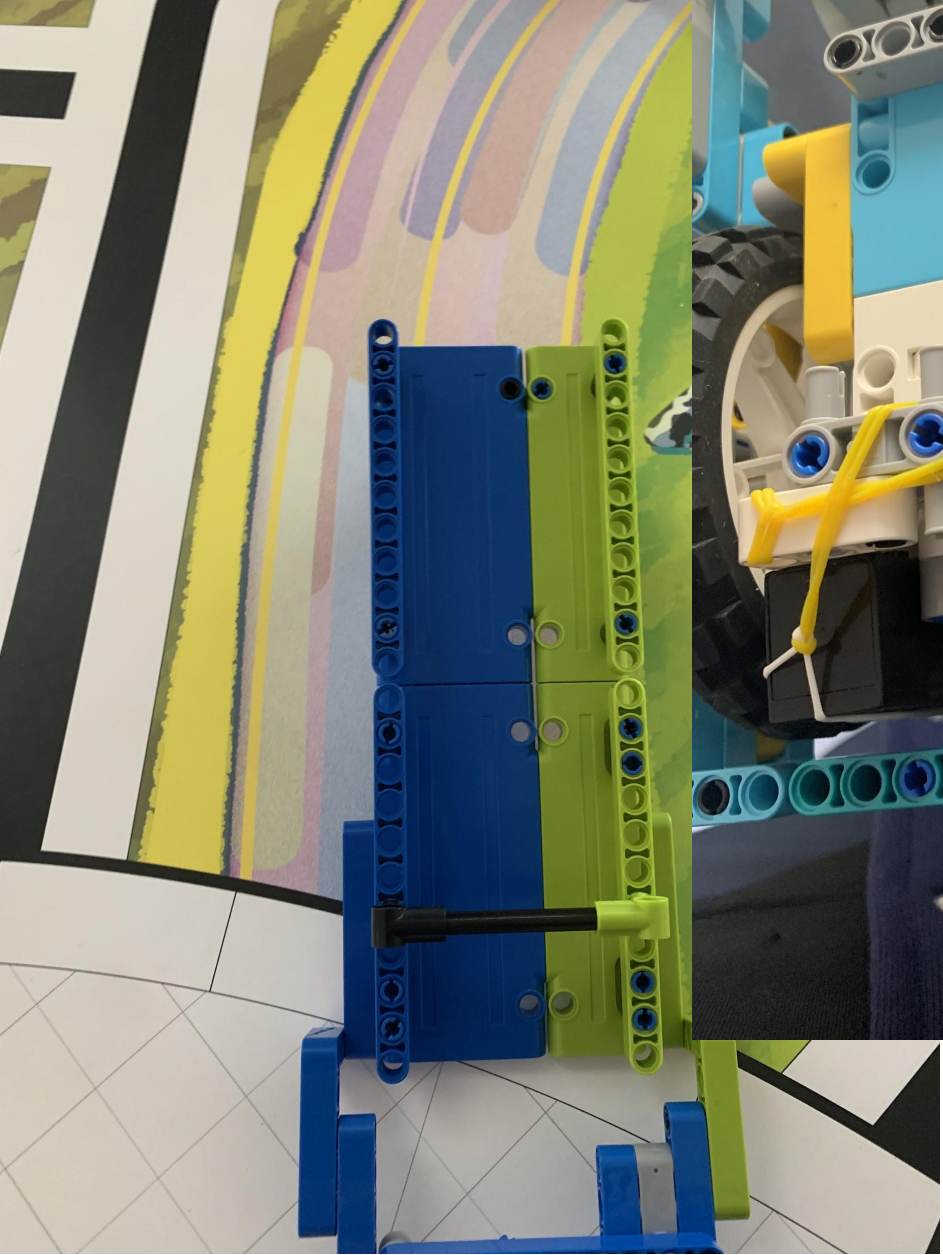
What we still need to do:

- We need to fix the sketchiness of the robot coming back to base. And the turn and drive right before the sorting center
- Get the home delivery package to stay on the doorstep.

What we learned:

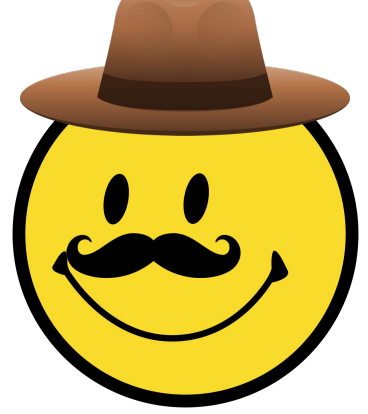
- We learned that we worked better after lunch.

Tom & Nes'et pictures!
12/17/2021



N E S E T & **K A I T L Y N**

12/20/21



What we did:

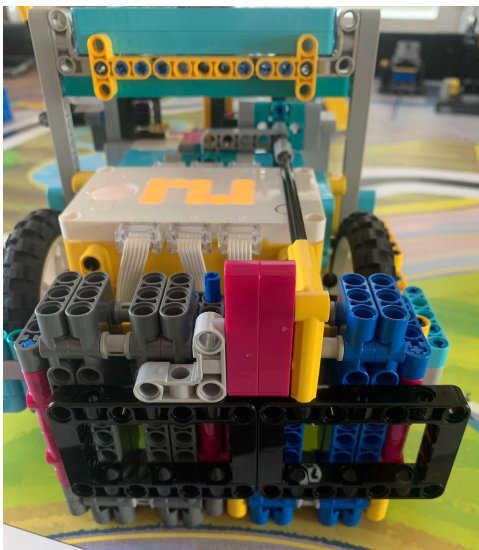
- Programmed the robot some more, so that it does not go to the Cargo Connect circle, and also fine-tuned the drop-off of the blocks.
- Adjusted some of the attachments so that they would work better.

What we still need to do:

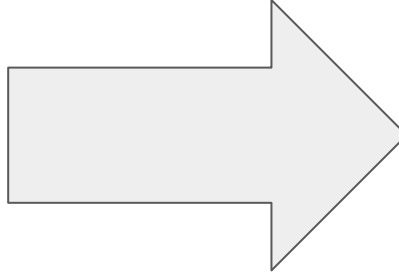
- Get to both of the block drop-off circles, the helicopter, the train, and come back. Also do all of those missions.
- Move over the cargo in the back so the blue cargo can come out.

What we learned:

- The placement at the cargo ship isn't very wide, so we had to adjust the drives a bit more.



Motivation



Sage & Tom

12/28/2021



What we did:

- We did lots of coding for the switch engine and the cargo ship
- We coded the switch engine to be flawless for the most part. As well delivering the green block is flawless.

What we still need to do:

- We need to finish coding the cargo ship to have it pull the lever all the way down, and go back to home.
- We need to change the attachment for putting down the cargo ship handle so it isn't ribbed.

What we learned:

- We learned that for the cargo ship handle the attachment for it needs to be strong and long enough, but not a axle.
- Tom learned many coding usings for the code that is used for cargo ship and the switch engine.

Nando and Koda



What we did:

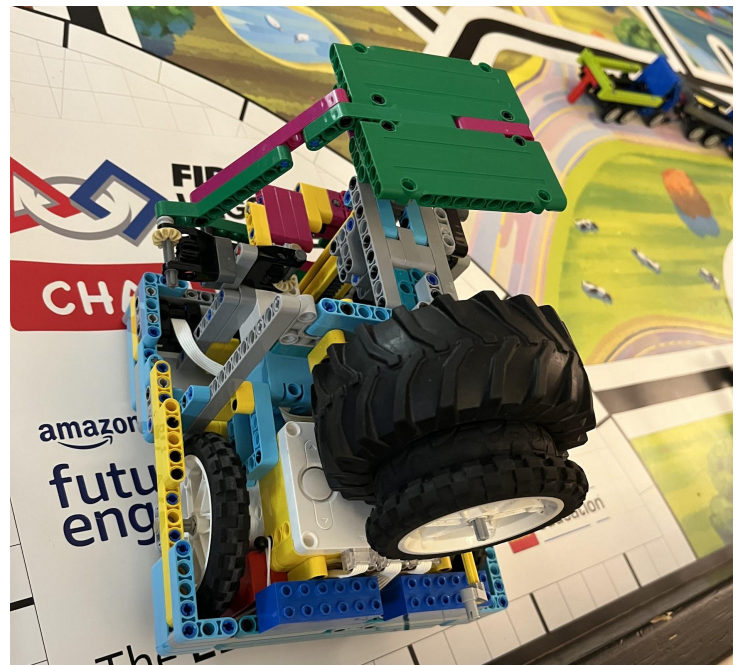
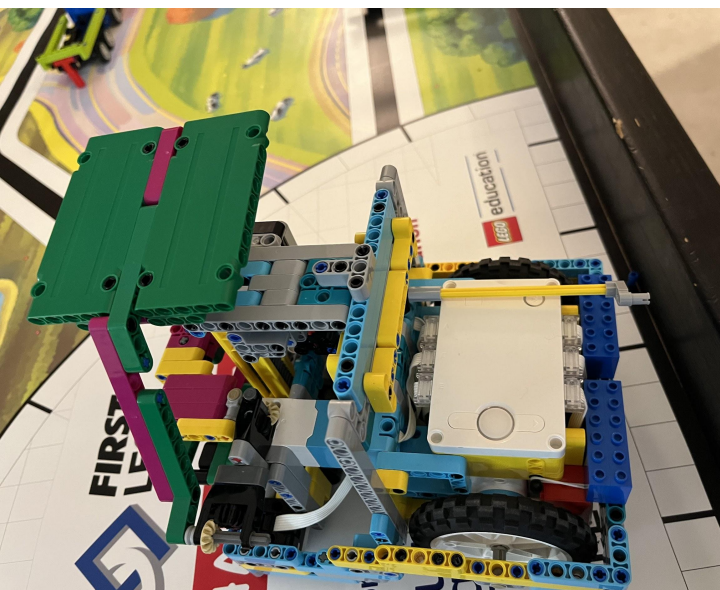
- We programmed and perfected one of our programs. It works almost every time!
- We tested out adding weighted blocks and tires to prevent it from slipping on the mat.

What we still need to do:

- Program the rest of the robot run
- Create a more permanent solution for slipping & stuff.

What we learned:

- We learned that going slower and adding more weight prevents you from slipping as much. And if you do enough of that, you won't slip at all!



N E S E T & **K A I T L Y N**

12/20/21



What we did:

- Kaitlyn created a game that goes along with our project!
<https://scratch.mit.edu/projects/626797518>
- Continued to program/refine robot run
 - Changed the turn left forward to a turn left tank
 - Added find line before it turns and drives to load cargo on the balance deck.

What we still need to do:

- Finish programing and refining our robot run so that it is more consistent
- Refine and make any changes to our scratch game

What we learned:

- The robot needed to have a wait in between turning and driving when dropping off the crates to be more consistr



Tom & Nes'et

1/14/22 (New year new me!)



What we did:

- More weight was added to the underneath of the robot, in the form of ball wheels
- We have it delivering the cargo connect in the right spot
- We changed it so that it turns to avoid the crane, and then turns left to get to sorting center
- We adjusted how far the angle of the turn and how far out it goes to get to the right spot and pick up the blue and green cargo.
- We changed the train-pusher-downer to be farther back

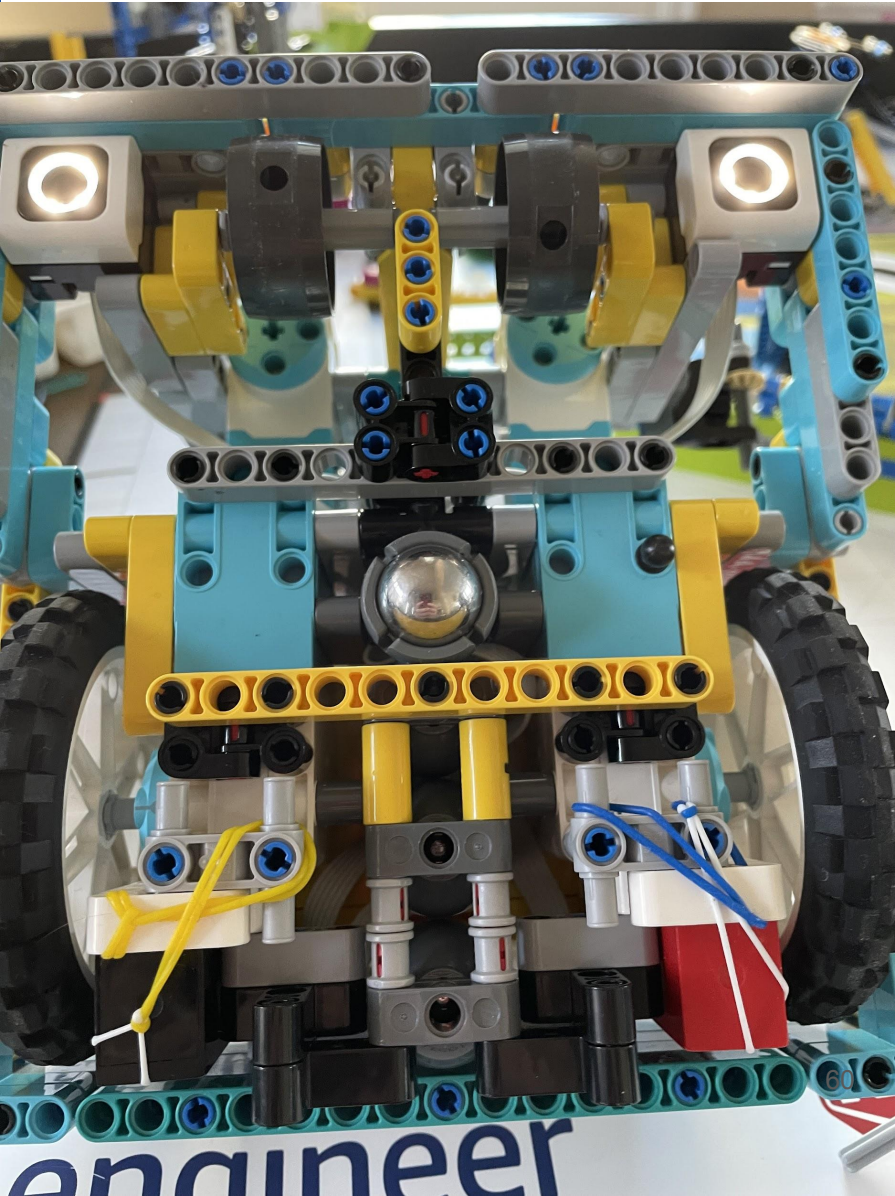
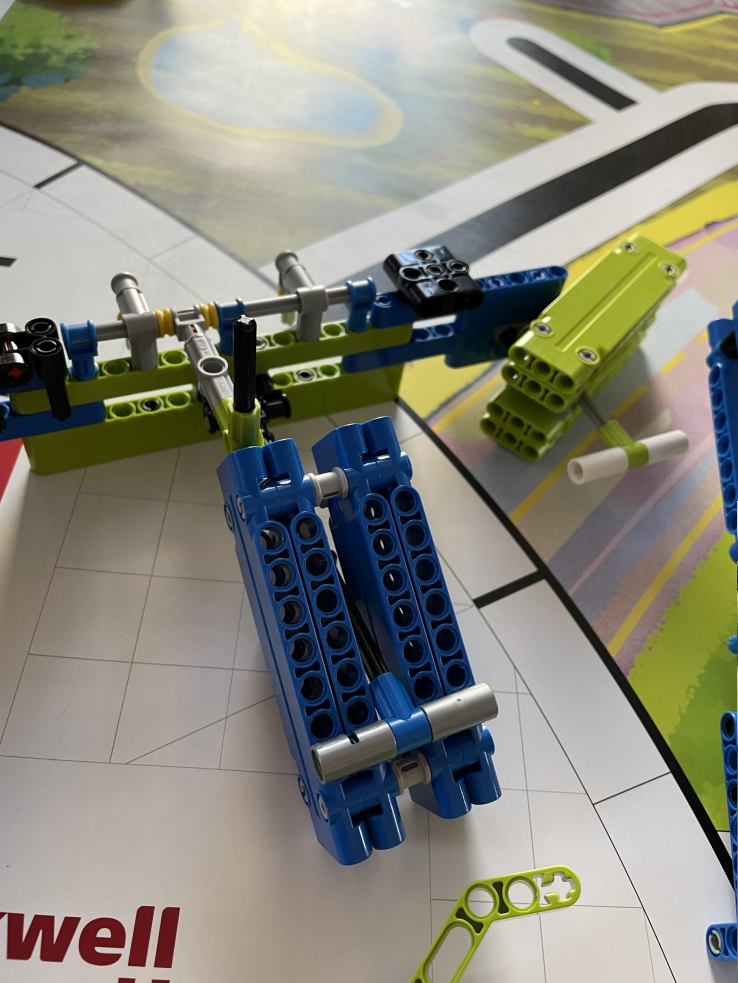
What we still need to do:

- The innovative architecture needs to be adjusted
- Test to find the best distance and angle ot always get the blue and green pieces of cargo
- We need to program the robot to push the blue cargo that can hold stuff into home

What we learned:

- We learned that it is harder to program remotely
- People can get COVID twice

Tom & Nes'et pictures!
1/14/22



Tom & Koda

1/15/2022



What we did:

- We changed the location of the cargo dragger to further left on the top of the robot.
- We changed the axle to a lightsaber (soon to come the sith lightsaber).
- We had a perfect run 4 times in a row!! We did the cargo ship, the switch engine, and even got the gray block in the circle and got the robot in home.

What we still need to do:

- We need to check for consistently in the run.
- We need to make an addition to the starting block by making it taller.
- We need to color coded cubbies for all of the attachment with a stand for the robot.

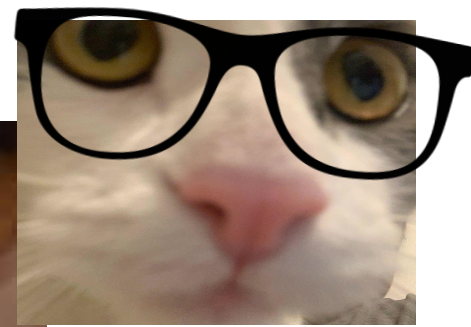
What we learned:

- That sometimes you make changes in 1's and other times you have to try numbers that are 100's different (especially when driving back home).



Thomas & Nes'et

1/15/22



What we did:

- We improved the consistency of the robot coming back, so that it is able to take the Unused Capacity block into home
- We changed the speed of the robot while it drives into the Sorting Center mission. We need to test it to see if it actually makes it consistent.
- We changed the left robot attachment so that it is within 12 inches
- Read over the rules

What we still need to do:

- We need to heavily improve the consistency on the robot coming back home
- Add the nose back on since it turns out it can be more than 12 inches in the launch area
- We need to run the mission by the sorting center 10 times to check that the new speed is working.

What we learned:

- When you're launching there is no ceiling which means our attachment can be higher than 12 inches (R12)
- If you interrupt the robot for an advantage, that mission will score zero points (R15)

Tom

1/17/2022

What I did:

- I started to label mission 3 code

What I still need to do:

- Make mission 3 run more consistent.
- Finish label mission 3's code

What I learned:

- The hub downloads updates faster if you plug it into the computer.

N E S E T & **K A I T L Y N**

1/19/22



What we did:

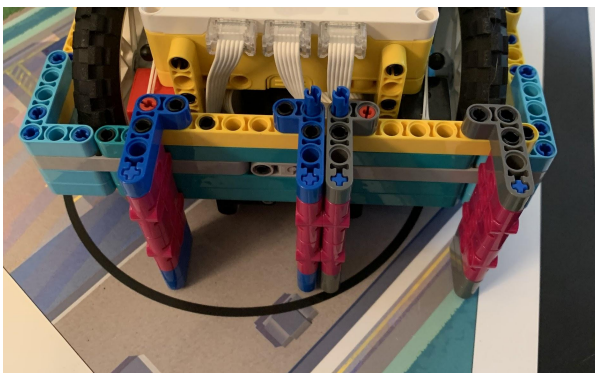
- Continue to program our robot run
 - Released the package
 - Pushed the train
 - Improved on the placement of the blue crate
 - Improved the placement of the two grey blocks on the ship
- Switched around the two colors of the attachment below (that way the blue block goes into the left slot) so that the block is not trapped at all, because we aren't dropping off the grey block as we do not have enough cargo

What we still need to do:

- Try to knock down the bridge using the hook
- Get back to home

What we learned:

- Having your hands on the table can mess up the gyro
- We learned that using wait for a button push functions to check whether the angle is right or not is super helpful



Tom & Nes'et

1/21/2022

What we did:

- We figured out that the drive that was driving towards the train tracks went to short because the robot was going in the wrong place. So we went and made it a longer drive.
- We added back on the nose to the ramp to have the ramp.
-

What we need to do:

- We need to have the rake bump the ramp



Nes'et and Kassie

Jan 24, 2022

What we did:

- WOOOOO KASSIES FIRST SMALL GROUP
- Helped the techno tigers (a first year team) with debugging and how judging sessions work
- Worked on mission one
 - Added a block where it looks for the line after doing innovative solution
 - Added another holder thing on the home delivery attachment
 - Cleaned programming and stuff
 - Used lots of wait for button pushes lol

What we still need to do:

- Finish up the fixing the code
- Make it go back to home
- Finish all the other missions

Kassie and Kaitlyn

Jan 25, 2022



Plan of attack:

- Master program: ✓
- Contact people from UPS, FedEx, etc. with our project: ✓
- Make a list & contact people we have/need to share with: ✓
 - Scott Walch (done)
 - Chris Holt
 - Dave Price
 - Mark Drennan
 - Ralph Smith???
- Work on mission 4 - mostly ✓

What we did:

- Worked on mission 4
 - Combined all the different sections
 - Refined each area
 - Made minor adjustments to the robot and the grabber for the forklift in the form of axle lengths
- Finished the plan of attack

What we still need to do:

- Finish mission four
 - Finish the truck thing (make it go closer by turning more right before)
 - Fix the backing into the wall haha it goes smack

What we learned:

- How to do accidental avoidance without knocking over all of it
- How to put on the mission 1 attachment

N E S E T & **K A I T L Y N**

1/26/22



What we did:

- Continue to program our robot run
 - Improved the consistency of the robot run, backing up to the north wall better, consistently dropping off the block, and consistently dropping the package from the helicopter
 - Adjust one of our find lines to use the left sensor, as it sensed the wrong line and messed the entire robot run up.
- Made all of our mission sorters (thank you to Kaitlyn for staying until 9!)
 - Made attachment sorters for mission one, two,, and three
 - They all connect together, and we can put it all in together
 - Everything fits within 12 inches, and leave extra space at the front
 - Pictures on the next slide!

What we still need to do:

- Try to knock down the bridge (may have to wait if/until state)
- Go home (may have to wait if/until state)

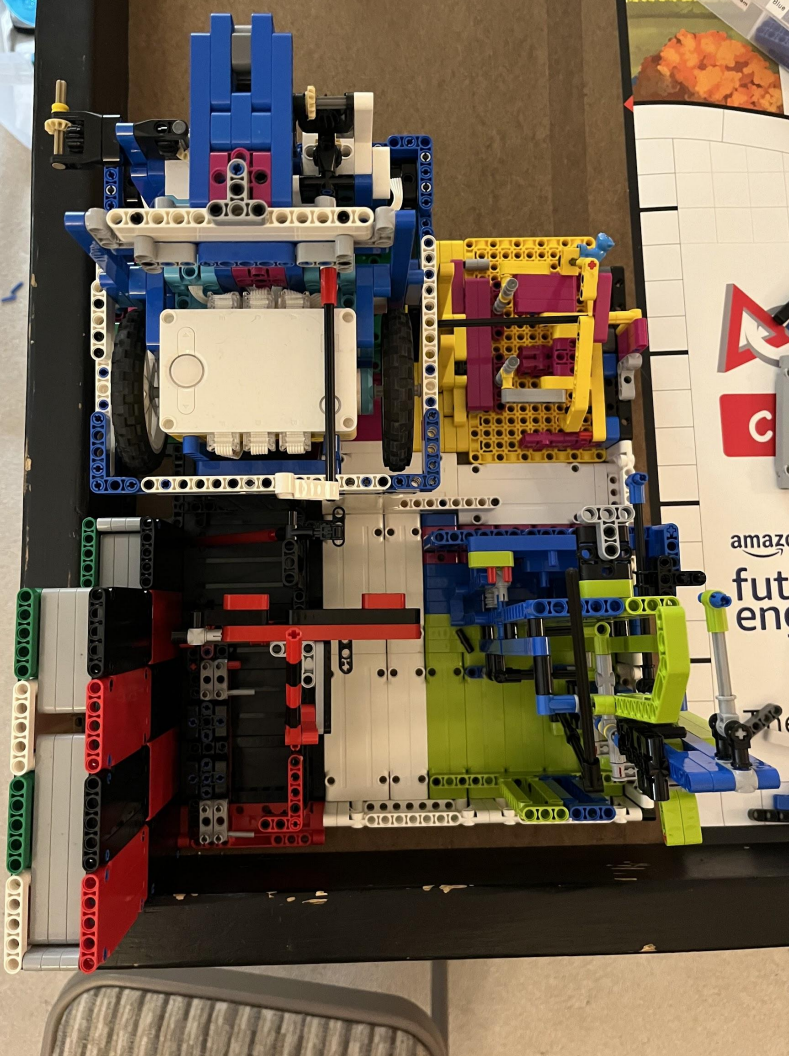
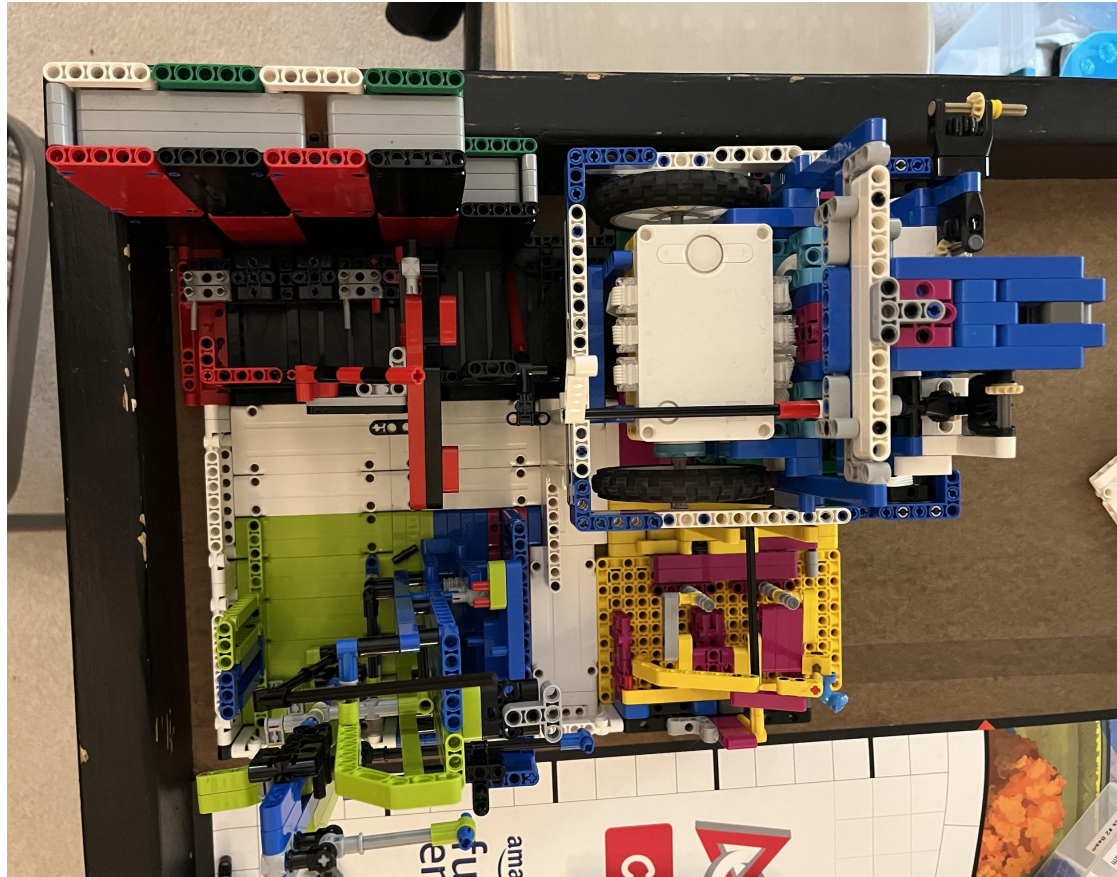
What we learned:

- Being more efficient may mean putting more effort in the beginning



N E S E T & K A I T L Y N

Pictures!
1/26/22



N E S E T & **K A I T L Y N**

1/28/22



What we did:

- Continue to program our robot run
 - Changed the turn towards the train to be more
 - Adjusted the drive back before the robot pushes the train to be more
 - Added a moveRake and left attachment turn so that it will work in the master program
- Added a holder for the hook that goes on the left attachment

What we still need to do:

- Try to knock down the bridge (may have to wait if/until state)
- Go home (may have to wait if/until state)
- Improve consistency

What we learned:

- The bluetooth symbol is a B
- One section of mission one has the potential to allow 170 points (that's a lot!) to be gained



WHOLE TEAM @ STEM EXPO
1/29/22

Tom & Koda

1/31/2022



What we did:

-

What we still need to do:

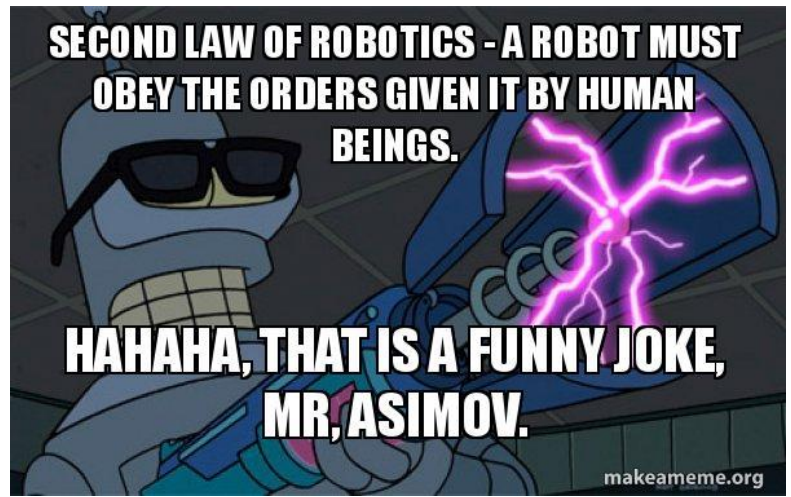
-

What we learned:

-

Kassie & Dakota

1/31/22



What we did:

- Action photo shoot of the robot for RDES posters
- Worked on our transition
- Decided who was going to do which parts of it
- Decided Kassie is in charge of doing Unused Capacity
- Got our transition under 10 seconds woot woot
- Added a move rake down with a wait to the beginning of our program to help it move smoother.
- Ran robot game with the whole team

What we still need to do:

- Make sure all the other missions are good to go
- Make checklists???
- Practice robot game & RDES

What we learned:

- Smooth is faster than fast
- Transition day is hard 🤠👍

Thomas & Nes'et

1/31/22

What we did:

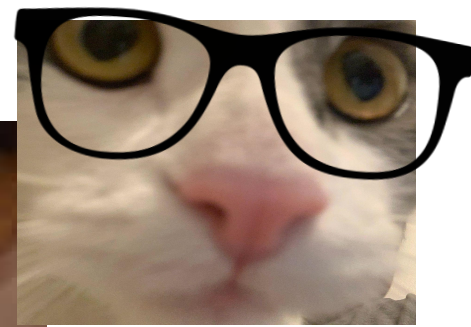
-

What we still need to do:

-

What we learned:

-



N E S E T & **K A I T L Y N**

1/31/22



What we did:

-

What we still need to do:

-

What we learned:

-



WHOLE TEAM Practicing Robot Runs

1/31/22

What we did:

-

What we still need to do:

-

What we learned:

-

```

def alignWithLine():
    hub.light_matrix.show_image('DUCK')
    #Find the line
    #FindTheLine setup
    done = False
    driveMotors.set_stop_action('brake')
    driveSpeed = 15
    backUp = -8
    rightSensorValue = 100
    leftSensorValue = 100
    darkEnough = 30
    isRightBlack = False
    #FindTheLine action
    while not done:
        driveMotors.start(0, driveSpeed)
        rightSensorValue = rightSensor.get_reflected_light()
        leftSensorValue = leftSensor.get_reflected_light()
        if rightSensorValue < darkEnough or leftSensorValue < darkEnough:
            done = True
            if rightSensorValue < darkEnough:
                isRightBlack = True
                hub.light_matrix.show_image('ARROW_NW')
            else:
                isRightBlack = False
                hub.light_matrix.show_image('ARROW_SW')
        driveMotors.stop()
        wait_for_seconds(1)
        #driveMotors.move(backUp, 'degrees', driveSpeed)
        #The second sensor needs to find black
        #SecondSensor setup
        done = False
        smallerDriveSpeed = ((-driveSpeed) * 1)
        #SecondSensor action
        if isRightBlack:
            while not done:
                driveMotors.start_tank(driveSpeed, trunc(smallerDriveSpeed))
                leftSensorValue = leftSensor.get_reflected_light()
                if leftSensorValue < darkEnough:
                    done = True
        else:
            while not done:
                driveMotors.start_tank(trunc(smallerDriveSpeed), driveSpeed)
                rightSensorValue = rightSensor.get_reflected_light()
                if rightSensorValue < darkEnough:
                    done = True
    driveMotors.stop()
    #WIGGLE time
    hub.light_matrix.show_image('PACMAN')
    #Wiggle set-up
    time = 300
    numberOfLoops = 0
    targetValue = 61
    #Wiggle action
    while numberOfLoops < time:
        numberOfLoops += 1
        Ck = 0.5
        rightSensorValue = rightSensor.get_reflected_light()
        leftSensorValue = leftSensor.get_reflected_light()
        rightDriveAmount = (rightSensorValue - targetValue) * Ck
        leftDriveAmount = (leftSensorValue - targetValue) * Ck
        driveMotors.start_tank(trunc(leftDriveAmount), trunc(rightDriveAmount))
    driveMotors.stop()

```

```
def driveStraightForSeconds(power, timeInSeconds):
    #-177 is limit
    #setup
    goal = 0
    hub.light_matrix.show_image('GHOST')
    hub.motion_sensor.reset_yaw_angle()
    done = False
    Kp = 3
    timer = Timer()
    timer.reset()
    yaw = hub.motion_sensor.get_yaw_angle()
    #execution
    while not done:
        yaw = hub.motion_sensor.get_yaw_angle()
        error = goal-yaw
        P=Kp*error
        driveMotors.start(P, power)
        if timeInSeconds < timer.now():
            driveMotors.stop()
            done=True
```


Kassie's Checklist:

Before judging session:

- Check project bins:
 - Flannel for kota, kaitlyn. Vest for tom, nes'et.
 - Jacket
 - Blue mask, mustache & tape
 -