ENGINEERING JOURNAL
Zonda

MEETING N°1

Date (dd/mm/yy): 10/12/22

Present Team Members: Joaquín Argañaraz - Joaquín Rodríguez

Present Mentors: Gustavo Viollaz - Enzo Juárez - Cecilia Budeguer

Hours of work: 4

Goals for the day

Communication: Our main goal for the day is to try to communicate our Lego Spike with a Teensy board, just to see if it's possible.

We know that we probably won't achieve that goal today, but we will try anyway! This is the first step we are taking in this wonderful journey, so we just want to remind ourselves that this is going to be fun!

Claw: Also, we want to start checking out some claws. Our goal is to look for claws on different websites and start choosing the ones that would be useful to us. We had a nice claw before, but it is quite simple and wouldn't be useful for this competition. We need something powerful and simple, yet small, as our robot isn't big, and we want to keep it simple and tiny.

To-Do List for the day

- Communicate Arduino with Lego Spike
    - Cut wires.
    - Solder wires
    - Download Arduino IDE 1.8.19 in all computers.
    - Download driver for Arduino IDE, so that it can work with Teensy 4.1
    - Look for information about how to communicate both devices.
    - Code, keeping the research we´ve done in mind.
- Look .slt files of claws.
- Choose the claw that best fits our needs.

Our work for the day

1) We started by cutting the cables and soldering them.

2) Then, we downloaded the Arduino IDE to all of our computers. Luckily, we all use a different OS, so we can test our progress in Windows, Linux and MacOS.

3) We downloaded “Teensyduino”, so that we can work with the Teensy,

4) We started testing communication between the Lego Spike and the Teensy/Arduino.

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-

Notes on articles and/or videos

Article or Video	Notes

-	-

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°2

Date (dd/mm/yy): 02/01/23

Present Team Members: Joaquín Argañaraz- Joaquín Rodríguez

Present Mentors: -

Hours of work: 4

Overall goal for the day

- Look for information on how to connect two Arduinos and a Lego with an Arduino using USB serial connection. Try out 1 or 2 methods to see if they work. If they do, we'll still keep on looking for new ways of doing it until we find the perfect one. The process of choosing the best way to connect these boards will be carried on keeping in mind that we do not have Lego Spike ports left. Another important thing to consider is that we'll have to use the charging point of the Lego Spike, so that we can have a stronger communication than the one we would have using Bluetooth.

To-Do List for the day

- Look for information on how to connect the two boards.
- Try out 1 - 2 methods.

Our work for the day

1) We started off by looking for information on how to connect two Arduinos, checking many different websites (listed below in *Notes in articles and/or videos* chart.)

2) Secondly, we tried to implement some of the communication methods we'd found on the Internet. However, when we opened the box where we keep all of our components and material, we found a complete mess of cables, boards, chips and robots. That box was, by all means, unusable, so we needed to organize it ASAP. And we did it.

3) After organizing the box, we attempted to connect an Arduino Uno with Lego Spike, with no success. More details on this.

Issues

Issue	Possible Solutions	Final Solution	Why?	How do we avoid such mistakes?
The box was messy	-	The solution for this is quite simple. We had to sit on the floor and put everything on the floor, classify everything considering whether something is useful for the project or not and put everything back inside in a convenient way.	The box ended up like that because we've been working on many projects for a couple of months already and, over the months, we've accumulated many things. Then, we totally forgot about keeping everything in order and we would just revolve around to look for what we needed instead of putting everything in order.	We have to be consistent and keep the box in order. It might seem dumb, but having our toolbox in order is crucial for a decent workflow. If our box is not functional to us, then it becomes an obstacle, and you bet it is. Not finding what you need quickly is awful, but also preventable. Keeping our box tidy will help us be more organized and work much more efficiently, making the most out of every second.
Some cables didn't work.	- Replacing the cables - Re-soldering them	Replacing the cables seemed like the best idea, as resoldering can take a lot of time.	The cables had a bad soldering, which we were kind of expecting, as it was our first time soldering.	It is a pity that we had to throw cables away, but this teaches us an important lesson: we need to accept when we just don't know how to do something, and learn it. Otherwise, these kinds of things happen: when we want to use the cables, we can't,

				which represents an incredible waste of time, considering our preparation time for the competition.

Ideas

Idea	How we would do it	Is it possible?
We were thinking about communicating the Arduino board with the Lego Spike using USB serial communication, which might seem kind of irrational, considering that the Lego Mini USB port is neither a sensor port nor an "extension-holder"[1] port.	Given the fact that serial communication between Lego Spike and Linux, as well as communication between Arduino and Linux/Windows/Mac is possible, we assume that it must be possible between them both too. One of them has to be a slave, and the other, a master. So, a data receiver code and a data sender code are needed. The idea is to upload the data sender code to the master board and the data receiver code to the slave board, so that one of them is sending info and the other is receiving and processing it. If this works, we can dig deeper and try to send more complex arrays of data between the two boards.	Even though most websites claim that doing such a thing is impossible, we still believe it really is, as we've tested communication between each board and a computer and it worked. Also, serial communication using TR-RX doesn't seem too complex. At least on paper, communication should work. However, we still need to try this out.

Notes on articles and/or videos

Article, Video or Repository	Notes
https://www.facebook.com/groups/SPIKECommunity/posts/11684	Useful information for pin identification.

[1] that lets you plug in some third-party accessories for the kit.

06093537621/?mibextid=HsNCOg	
https://github.com/GianCann/SpikePrimeHub	Pin documentation.
https://www.instructables.com/I2C-between-Arduinos/	I2C pins for Arduino.
https://www.raspberrypi.com/news/raspberry-pi-build-hat-lego-education/	Info about Raspberry HAT, which lets you control Spike.
https://www.dexterindustries.com/howto/connect-the-arduino-and-the-lego-mindstorms-together/	Connection between Arduino and NXT.
https://antonsmindstorms.com/2022/11/18/lms-esp32-tutorials-part-0-how-to-get-started/	UART connection library for Spike.
https://github.com/antonvh/mpy-robot-tools	MPY robot tools.
https://www.dexterindustries.com/howto/connecting-ev3-arduino/	I2C Connection between EV3 and Arduino.
https://playground.arduino.cc/Main/I2cScanner/	I2C Scanner.
https://github.com/justMega/spikeResources	Info about Raspberry Pi and Spike connection, which might be useful in case Arduino doesn't work out.
https://hubmodule.readthedocs.io/en/latest/port/	Spike complete documentation.

Bibliography consulted today

- https://www.facebook.com/groups/SPIKEcommunity/posts/1168406093537621/?mibextid=HsNCOg
- https://github.com/GianCann/SpikePrimeHub
- https://www.instructables.com/I2C-between-Arduinos/
- https://www.raspberrypi.com/news/raspberry-pi-build-hat-lego-education/
- https://www.dexterindustries.com/howto/connect-the-arduino-and-the-lego-mindstorms-together/
- https://antonsmindstorms.com/2022/11/18/lms-esp32-tutorials-part-0-how-to-get-started/
- https://uartremote.readthedocs.io/en/latest/arduinouartremote.html
- https://github.com/antonvh/mpy-robot-tools
- https://www.dexterindustries.com/howto/connecting-ev3-arduino/
- https://playground.arduino.cc/Main/I2cScanner/
- https://github.com/justMega/spikeResources
- https://hubmodule.readthedocs.io/en/latest/port/

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°3

Date (dd/mm/yy): 03/01/23
Present Team Members: Joaquín Argañaraz - Joaquín Rodríguez
Present Mentors: Gustavo Viollaz - Enzo Juárez
Place: Buenos Aires 135 - Of. 107 - Capital, Salta, Argentina.
Hours of work: 4

Goals for the day

Our main goals for the day are:

- Test out the robot to see if it can overcome the seesaw. We have to start thinking about testing our current robot to see how it behaves under the RCJ 2023 working environment. We've built a testing area that meets all the RCJ 2023 rules and conditions. The goal is to do some sort of diagnostic to the current robot and start thinking on improvements from that point.
- Choose the electronic components that we'll need and order them. We must start ordering everything right away, so that we can get those needed components as soon as possible. Otherwise, it will be impossible to finish everything before the competition. We haven't really though much about this, so we need to do it now.
- Think of a new design that allows us to, without changing the gravity center much, store the new board and some new components such as the claw and servos. After choosing the electronic components that we'll use, we will need to start thinking about how we will put everything together, considering that we need to keep the general physical characteristics as similar as possible, so that we do not need to make huge changes in the values in our code.

To-Do List for the day

- Test if the robot can overcome the seesaw.
- Choose the electronic components.
- Order them.

Our work for the day

1) We tested if the robot, without the Arduino and claw, can overcome the seesaw or not. This was something really important considering that we are planning on adding new pieces to the robot. Knowing if it can complete this task before adding anything to it is vital, as we now know that we need to keep everything in overall the same size and that the weight distribution is good enough; and, you know it, if it's not broken, don't fix it!
   After our tests, we could verify that everything works perfectly: the robot goes over the seesaw without any problems. However, it can tend to go a little bit forward when the seesaw comes down and may eventually fall. That's because the mass center is slightly forward. Therefore, we will try to keep everything in the same size, but adding a little bit more of weight in the back of the robot to compensate for the mass center. Our goal is to fit everything in between the motors, so that the robot doesn't become much larger, but we still need to check if this will be possible.

2) We built a proper seesaw to test the robot. We did have a seesaw around in the office, but it was too weak. Building one from scratch allows us to host tests under the conditions that the RCJ Committee has established.

3) We checked different components for the claw and looked for any pieces that we might need, so that we can be sure we won't lack of anything.

Issues

Issue	Possible Solutions	Final Solution	Why?
We can't find the servos we're looking for. We found some very similar ones, but we do need an adapter board (called TTLinker), which is not available in Argentina.	- Look for other servos instead of the ones we found. - Change the claw, as it is quite difficult to find all the pieces we need for it. - Try to find the adapter board we need for the servos.	- We decided to look for other servos.	We still want to use this claw, so changing it is not an option for now. Trying to find the adapter board isn't convenient neither, because it will take a really long time to get here, and that would not let us test the claw. Therefore, looking for other servos seems like the best option. Perhaps the ones the website suggested are too rare and we can find some similar ones here in Argentina.

Ideas

Idea	How we would do it	Is it possible?
-	-	-

Notes on articles and/or videos

Article or Video	Notes
https://microline.hr/HTML.ashx?_command=showItem&itemKey=mrm-rd-5606hb-300	Servos from a robotics team in Croatia.
https://es.aliexpress.com/item/1005004513	40 x 20 x 40.5 mm servo in Aliexpress. Lifts 2 kg

602392.html?spm=a2g0o.productlist.main.1.24f47bd8dU01Eq&algo_pvid=35020a50-6c27-4cf5-aba6-2de804e393c3&aem_p4p_detail=2023010305515228389343719781200009199 79&algo_exp_id=35020a50-6c27-4cf5-aba6-2de804e393c3-0&pdp_ext_f=%7B%22sku_id%22%3A%221200002943187021 4%22%7D&pdp_npi=2%40dis%21ARS%213510.49%212492.49%21%21%211300.96%21%21%40211bea7b167275391230711 75d06d7%211200002 9431870214%21sea&curPageLogUid=NSmmrZ9dr7UE&ad_pvid=2023010305515228 389343719781200000 919979_1&ad_pvid=20230103055152283 893437197812000091 9979_1	
https://es.aliexpress.com/item/1005004324501754.html?gatewayAdapt=glo2esp	40 x 20 x 40.5 mm servo. Lifts 2 kg
https://www.openhacks.com/page/productos/id/1532/title/FTSCSERVO#lightbox['galeria']/2/	Slightly different servo. Same measurements, but lifts 15 kg instead of 20 kg.
https://www.openhacks.com/page/productos/id/2743/title/FETTLINKMINI#.Y7RD3NLMJH4	TTLinker

https://www.ebay.com/itm/132604869181	TTLinker on Ebay
https://es.aliexpress.com/item/1005004198537971.html?gatewayAdapt=glo2esp	TTLinker on Aliexpress

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°4

Date (dd/mm/yy): 10/01/23

Present Team Members: Joaquín Argañaraz - Joaquín Rodríguez

Present Mentors: Gustavo Viollaz - Enzo Juárez

Hours of work: 4

Goals for the day

We've got many goals for roday. First of all, we need to choose the final claw. We've been wasting way too much time looking for components to build the claw we found a couple of weeks ago, with no success. Finding all the pieces seems like an almost impossible job that will take us ages. Therefore, we decided to try out a new option. We have to print it and see if it works. There are servos we can use with the new claw, so we don't have to get those.

A new testing scenario that meets the latest RCJ2023 rules was needed. Therefore, we need to design new tables and grippers for the tables, as well as a new mat.

Even though we don't know what the final robot will look like, we do know what things of the current design we won't need. So, we need to tear down one of the two robots we have (the other one will remain built in case everything goes wrong) and start thinking of new designs, keeping in mind that we have to make space for a new claw, as well as for the Teensy, the batteries, etc. We can start thinking of an approximate final weight and start testing challenging obstacles like the seesaw and the ramp with, too, to see how good or bad they may perform and begin thinking of changes from those conclusions.

DISCLAIMER → It's important to point out that there are many things we don't have and some others that we've already ordered, but are still not soon to arrive. That's why we have to test things this way, so that we don't waste time.

Also, we need to get back to deciding the communication method between the two boards. We think that serial communication using the USB A in the Spike might be impossible, but we are still willing to give it a final try, Nevertheless, we need to start looking for a new way of

communication our boards because we are conscious that sometimes things don't go the way we want them to, and that using the USB port might take A LOT of time; time that we do not have.

To-Do List for the day

- Look for a new claw and print it.
- Get some new servos for the claw, in case the ones we have don't work.
- Elaborate STLs with the new pieces for the scenario.
- Order wood tables for the walls and rescue area.
- Tear one of the robots down.
- Modify it, considering we have to make room for the claw and the new board.
- Try the new prototypic design in the seesaw and ramp.

Our work for the day

1) We started working on the old claw, to see if there was any chance we could still use it, while still looking for newer, simpler ones. We looked for all the pieces we needed and the specific servos we would need with the old claw.
    a) The website suggested dual axis servos with specific measurements, but we couldn't find the exact same ones here in Argentina; we could only find single axis ones. Given this situation, we double-checked if the model we're trying to imitate really uses the dual axis or not. If it doesn't, buying the single axis servos will be the smartest decision.

2) We found a simpler claw that would work just as well, but much much much easier to print and to use.

3) We sent the measurements for the wood tables to an ebanist so that we can get them cut by our next meeting and begin building the scenario, with all its obstacles and challenges.

4) We designed the different 'unions' to put the tables together when building the scenario.

5) We teared down the robot and reorganised every component in it.
    a) We tried different layouts for the robot, changing the sensors' position, the Spike Board position.
    b) We tried all those different prototypes in the seesaw and on the ramp.

6) We brainstormed different methods to communicate the Lego Spike and the Teensy:
    a) Tearing a Lego Spike cable down and then using one of its sides to solder an USB that will allow us to connect it to the board.

b) Using an USB cable transformer, which basically transforms the robot's USB into a normal PC's USB. It simulates a computer's USB, but with the robot's USB. This allows the robot to be host of the communication with the Teensy or Arduino.

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
We were thinking that maybe we could replace the Teensy with the Raspberry Pi. This is because, while we were doing some research, we found that it seems much simpler and easier to connect Lego Spike with Raspberry Pi than with Teensy, which would definitely save us some time and allow us to add even more functionalities to our robot, as RPI is much more powerful than Teensy.	We would have to do some more research on how to connect the Raspberry Pi to the Lego Spike and see which is the most effective way to communicate both boards. Then, we would have to find out new ways to connect all the sensors we were thinking about buying for the Teensy, researching if they are compatible or not. Once we know that we have all the sensors we need and that the Spike and RPI are compatible, testing will be needed.	Of course it is possible. We have to do a lot of research and keep many things in mind before making this huge change. Moreover, we still need to discuss it more calmly and see if it is suitable or not.

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°5

Date (dd/mm/yy): 17/01/22

Present Team Members: Joaquín Argañaraz - Joaquín Rodríguez

Present Mentors: Gustavo Viollaz - Enzo Juárez

Hours of work: 4

Goals for the day

Communication: Our main goal for the day is to communicate the Lego Spike with Teensy. Last Tuesday, we rethought the way we were trying to communicate on both boards, and we started thinking of different ways to do it. Therefore, our aim for the day is to test those different methods of communication to see which one is the most effective one.

Scenario: We've been working on building a RCJ2023 Rescue Line scenario with the most complicated situations possible, so that we can test our robot in the worst cases. So, today, we've got to keep on building that scenario. Our goal for today is to build double ramps, so that we can continue to test out the robot's ability to go over this obstacle.

Also, we still have to design some unions for the wood for ramps and seesaws. Our idea is to 3D print them. This way, we avoid using screws and complicated woodworking, and we have the possibility to assemble or dissemble the scenario quickly and to our convenience.

Claw: Last class, we sent the claw's stls to print, so we expect to have everything ready by today to test it out and debate what the best place to place it on the robot is.

To-Do List for the day

- Try out all the different communication methods we've found online.
- Design the 3D unions.
- Test the claw.

Our work for the day

1) We started by trying to establish communication between the two boards. Firstly, we used an USB to TTL adapter that was supposed to simulate a computer's port. As we've seen in previous classes, it is actually possible to communicate the Lego Spike and the arduino with a computer independently. This is, just one board to the computer and that's it. However it wasn't possible to communicate booth boards directly because they were both wasting for someone to be the host of the connection, as they were both slaves. Therefore, we figured that, with a USB to TTL, it would be possible to connect them both, as the adapter would immediately transform the Teensy to the host of the connection, making it possible to send and receive data. However, this wasn't possible. The USB–TTL that we had wasn't a computer port simulator, but a simple adapter.

2) We couldn't make the previous method work, but we had another one under the sleeve! We tore down a distance sensor and connected the TX-RX and GND pins to the arduino and finally made it work! We established a bridge between these two boards using the sensor. That sensor, being a Lego Spike original sensor, had the proper cable that connects to the Lego Spike. Therefore, half of the connection process was fixed! The sensor cable went straight to the robot, and we only had to find a way to connect the sensor to the Arduino

Board. And that's what we did. We searched online the Lego Spike Distance Sensor pinout and established a bridge between the sensor and the Arduino using RX-TX.

3) We designed unions for the ramps. We figured that we might need different types of ramps in order to test our robot in the most complicated situations possible. Therefore, it was necessary to design unions which would allow us to place the wood tables in almost every position, letting us create different ramps, ramps which turn into other ramps, and more!

4) We tested the claw we'd printed for today. However, when we did it, we found out that it couldn't pick the balls. So, we used a 3D pencil to add a ball-holder to the claw. However, we still find this claw too big and a bit unuseful. This is why we started looking for a new one.

Issues

Issue	Possible Solutions	Final Solution	Why?
While we were testing the claw, we found out that it was way too big for our tiny robot, so we can't use it.	- Firstly, we figured that we might be able to make it a little bit smaller by modifying the 3D design of the claw. However, having such a narrow aperture, it would be nearly impossible to pick the balls with even a smaller aperture. - Our second option was looking for a new claw, which means starting from the beginning for the third time! However, we think this might be one of the best options, as the	- We finally decided to look for a new claw on a website called https://www.thingiverse.com/, where we could find tons of different claws to test. Luckily, we found one that could be really useful. However, we still have to print it and test it.	- Looking for a new claw was the most convenient solution because the claw that we had was too big, and, even if we adapted it, it would take a lot of time (which we do not have), and we wouldn't even be sure if it would work or not. - On the other hand, designing a new claw by ourselves from scratch would also take A LOT of time and a lot of try

	claw is a really important part of the exercise and we want it to work the best way possible, and if that means getting another claw, one that would be 100% useful for us, we'll do it. - Our third option is designing one ourselves. We know how difficult embracing a task like this one can be. Thinking of the best way to design the claw and then bringing that idea to life is no easy task, and we know that it is likely to take a lot of time to develop. It would be really nice, we do have a lot of things to do, and we are like in a race with time, as we have to prepare a lot of things in a short period of time.		and error. Even though it sounds awesome and actually is an interesting project, we still have to take care of a ton of other aspects that are just as important, like the communication between the two boards, which seems like is under control, but it's better not to say anything until we are completely sure it works.

Ideas

Idea	How we would do it	Is it possible?
-	-	-

Notes on articles and/or videos

Article or Video	Notes
https://www.thingiverse.com/	Claw website

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°6
Date (dd/mm/yy): 02/01/23
Present Team Members: Joaquín Argañaraz- Joaquín Rodríguez
Present Mentors: -
Hours of work: 4

Overall goal for the day

- Look for information on how to connect two Arduinos and a Lego with an Arduino using USB serial connection. Try out 1 or 2 methods to see if they work. If they do, we'll still keep on looking for new ways of doing it until we find the perfect one. The process of choosing the best way to connect these boards will be carried on keeping in mind that we do not have Lego Spike ports left. Another important thing to consider is that we'll have to use the charging point of the Lego Spike, so that we can have a stronger communication than the one we would have using Bluetooth.

To-Do List for the day

- Look for information on how to connect the two boards.
- Try out 1 - 2 methods.

Our work for the day

4) We started off by looking for information on how to connect two Arduinos, checking many different websites (listed below in this chart)

5) Secondly, we tried to implement some of the communication methods we'd found on the Internet. However, when we opened the box where we keep all of our components and material, we found a complete mess of cables, boards, chips and robots. That box was, by all means, unusable, so we needed to organize it ASAP. And we did it.

6) After organizing the box, we attempted to connect an Arduino Uno with Lego Spike, with no success. More details on this.

Issues

Issue	Possible Solutions	Final Solution	Why?	How do we avoid such mistakes?
The box was messy	-	The solution for this is quite simple. We had to sit on the floor and put everything on the floor, classify everything considering whether something is useful for the project or not and put everything back inside in a convenient way.	The box ended up like that because we've been working on many projects for a couple of months already and, over the months, we've accumulated many things. Then, we totally forgot about keeping everything in order and we would just revolve around to look for what we needed instead of putting everything in order.	We have to be consistent and keep the box in order. It might seem dumb, but having our toolbox in order is crucial for a decent workflow. If our box is not functional to us, then it becomes an obstacle, and you bet it is. Not finding what you need quickly is awful, but also preventable. Keeping our box tidy will help us be more organized and work much more efficiently, making the most out of every second.
Some cables didn't work.	- Replacing the cables - Re-soldering them	Replacing the cables seemed like the best idea, as resoldering can take a lot of time.	The cables had a bad soldering, which we were kind of expecting, as it was our first time soldering.	It is a pity that we had to throw cables away, but this teaches us an important lesson: we need to accept when we just don't know how to do

				something, and learn it. Otherwise, these kinds of things happen: when we want to use the cables, we can't, which represents an incredible waste of time, considering our preparation time for the competition.

Ideas

Idea	How we would do it	Is it possible?
We were thinking about communicating the Arduino board with the Lego Spike using USB serial communication, which might seem kind of irrational, considering that the Lego Mini USB port is neither a sensor port nor an "extension-holder"[2] port.	Given the fact that serial communication between Lego Spike and Linux, as well as communication between Arduino and Linux/Windows/Mac is possible, we assume that it must be possible between them both too. One of them has to be a slave, and the other, a master. So, a data receiver code and a data sender code are needed. The idea is to upload the data sender code to the master board and the data receiver code to the slave board, so that one of them is sending info and the other is receiving and processing it. If this works, we can dig deeper and try to send more complex arrays of data between the two boards.	Even though most websites claim that doing such a thing is impossible, we still believe it really is, as we've tested communication between each board and a computer and it worked. Also, serial communication using PORTS NAMES doesn't seem too complex. At least on paper, communication should work. However, we still need to try this out.

Notes on articles and/or videos

[2] that lets you plug in some third-party accessories for the kit.

Article, Video or Repository	Notes
https://www.facebook.com/groups/SPIKEcommunity/posts/1168406093537621/?mibextid=HsNCOg	Useful information for pin identification.
https://github.com/GianCann/SpikePrimeHub	Pin documentation.
https://www.instructables.com/I2C-between-Arduinos/	I2C pins for Arduino.
https://www.raspberrypi.com/news/raspberry-pi-build-hat-lego-education/	Info about Raspberry HAT, which lets you control Spike.
https://www.dexterindustries.com/howto/connect-the-arduino-and-the-lego-mindstorms-together/	Connection between Arduino and NXT.
https://antonsmindstorms.com/2022/11/18/lms-esp32-tutorials-part-0-how-to-get-started/	UART connection library for Spike.
https://github.com/antonvh/mpy-robot-tools	MPY robot tools.
https://www.dexterindustries.com/howto/connecting-ev3-arduino/	I2C Connection between EV3 and Arduino.
https://playground.arduino.cc/Main/I2cScanner/	I2C Scanner.

https://github.com/justMega/spikeResources	Info about Raspberry Pi and Spike connection, which might be useful in case Arduino doesn't work out.
https://hubmodule.readthedocs.io/en/latest/port/	Spike complete documentation.

Bibliography consulted today

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- https://www.instructables.com/I2C-between-Arduinos/
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- https://www.dexterindustries.com/howto/connect-the-arduino-and-the-lego-mindstorms-together/
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- https://github.com/antonvh/mpy-robot-tools
- https://www.dexterindustries.com/howto/connecting-ev3-arduino/
- https://playground.arduino.cc/Main/I2cScanner/
- https://github.com/justMega/spikeResources
- https://hubmodule.readthedocs.io/en/latest/port/

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°7

Date (dd/mm/yy): 03/01/23

Present Team Members: Joaquín Argañaraz - Joaquín Rodríguez

Present Mentors: Gustavo Viollaz - Enzo Juárez

Place: Buenos Aires 135 - Of. 107 - Capital, Salta, Argentina.

Hours of work: 4

Goals for the day

Our main goals for the day are:

- Test out the robot to see if it can overcome the seesaw. We have to start thinking about testing our current robot to see how it behaves under the RCJ 2023 working environment. We've built a testing area that meets all the RCJ 2023 rules and conditions. The goal is to do some sort of diagnostic to the current robot and start thinking on improvements from that point.
- Choose the electronic components that we'll need and order them. We must start ordering everything right away, so that we can get those needed components as soon as possible. Otherwise, it will be impossible to finish everything before the competition. We haven't really though much about this, so we need to do it now.
- Think of a new design that allows us to, without changing the gravity center much, store the new board and some new components such as the claw and servos. After choosing the electronic components that we'll use, we will need to start thinking about how we will put everything together, considering that we need to keep the general physical characteristics as similar as possible, so that we do not need to make huge changes in the values in our code.

To-Do List for the day

- Test if the robot can overcome the seesaw.
- Choose the electronic components.
- Order them.

Our work for the day

4) We tested if the robot, without the Arduino and claw, can overcome the seesaw or not. This was something really important considering that we are planning on adding new pieces to the robot. Knowing if it can complete this task before adding anything to it is vital, as we now know that we need to keep everything in overall the same size and that the weight distribution is good enough; and, you know it, if it's not broken, don't fix it!
   After our tests, we could verify that everything works perfectly: the robot goes over the seesaw without any problems. However, it can tend to go a little bit forward when the seesaw comes down and may eventually fall. That's because the mass center is slightly forward. Therefore, we will try to keep everything in the same size, but adding a little bit more of

weight in the back of the robot to compensate for the mass center. Our goal is to fit everything in between the motors, so that the robot doesn't become much larger, but we still need to check if this will be possible.

5) We built a proper seesaw to test the robot. We did have a seesaw around in the office, but it was too weak. Building one from scratch allows us to host tests under the conditions that the RCJ Committee has established.

6) We checked different components for the claw and looked for any pieces that we might need, so that we can be sure we won't lack of anything.

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-

Notes on articles and/or videos

Article or Video	Notes
-	-

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°8

Date (dd/mm/yy): 10/01/23

Present Team Members: Joaquín Argañaraz - Joaquín Rodríguez

Present Mentors: Gustavo Viollaz - Enzo Juárez

Hours of work: 4

Goals for the day

We've got many goals for roday. First of all, we need to choose the final claw. We've been wasting way too much time looking for components to build the claw we found a couple of weeks ago, with no success. Finding all the pieces seems like an almost impossible job that will take us ages. Therefore, we decided to try out a new option. We have to print it and see if it works. There are servos we can use with the new claw, so we don't have to get those.

A new testing scenario that meets the latest RCJ2023 rules was needed. Therefore, we need to design new tables and grippers for the tables, as well as a new mat.

Even though we don't know what the final robot will look like, we do know what things of the current design we won't need. So, we need to tear down one of the two robots we have (the other one will remain built in case everything goes wrong) and start thinking of new designs, keeping in mind that we have to make space for a new claw, as well as for the Teensy, the batteries, etc. We can start thinking of an approximate final weight and start testing challenging obstacles like the seesaw and the ramp with, too, to see how good or bad they may perform and begin thinking of changes from those conclusions.

DISCLAIMER → It's important to point out that there are many things we don't have and some others that we've already ordered, but are still not soon to arrive. That's why we have to test things this way, so that we don't waste time.

Also, we need to get back to deciding the communication method between the two boards. We think that serial communication using the USB A in the Spike might be impossible, but we are still willing to give it a final try, Nevertheless, we need to start looking for a new way of communication our boards because we are conscious that sometimes things don't go the way we want them to, and that using the USB port might take A LOT of time; time that we do not have.

To-Do List for the day

- Look for a new claw and print it.
- Get some new servos for the claw, in case the ones we have don't work.
- Elaborate STLs with the new pieces for the scenario.
- Order wood tables for the walls and rescue area.
- Tear one of the robots down.
- Modify it, considering we have to make room for the claw and the new board.
- Try the new prototypic design in the seesaw and ramp.

Our work for the day

7) We started working on the old claw, to see if there was any chance we could still use it, while still looking for newer, simpler ones. We looked for all the pieces we needed and the specific servos we would need with the old claw.
    a) The website suggested dual axis servos with specific measurements, but we couldn't find the exact same ones here in Argentina; we could only find single axis ones. Given this situation, we double-checked if the model we're trying to imitate really uses the dual axis or not. If it doesn't, buying the single axis servos will be the smartest decision.

8) We found a simpler claw that would work just as well, but much much much easier to print and to use.

9) We sent the measurements for the wood tables to an ebonist so that we can get them cut by our next meeting and begin building the scenario, with all its obstacles and challenges.

10) We designed the different 'unions' to put the tables together when building the scenario.

11) We teared down the robot and reorganized every component in it.
    a) We tried different layouts for the robot, changing the sensors' position, the Spike Board position.
    b) We tried all those different prototypes in the seesaw and on the ramp.

12) We brainstormed different methods to communicate the Lego Spike and the Teensy:
    a) Tearing a Lego Spike cable down and then using one of its sides to solder an USB that will allow us to connect it to the board.
    b) Using a USB cable transformer

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
We were thinking that maybe we could replace the Teensy with the Raspberry Pi. This is because, while we were	We would have to do some more research on how to connect the Raspberry Pi to the Lego Spike and see which is the most effective way to communicate	Of course it is possible. We have to do a lot of research and keep many things in mind before making this huge change.

doing some research, we found that it seems much simpler and easier to connect Lego Spike with Raspberry Pi than with Teensy, which would definitely save us some time and allow us to add even more functionalities to our robot, as RPI is much more powerful than Teensy.	both boards. Then, we would have to find out new ways to connect all the sensors we were thinking about buying for the Teensy, researching if they are compatible or not. Once we know that we have all the sensors we need and that the Spike and RPI are compatible, testing will be needed.	Moreover, we still need to discuss it more calmly and see if it is suitable or not.

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°9

Date (dd/mm/yy): 24/01/22

Present Team Members: Joaquín Argañaraz - Joaquín Rodríguez

Present Mentors: Gustavo Viollaz - Enzo Juárez

Hours of work: 4

Goals for the day

Claw: Firstly, we have to test Claw N°3 to see how it performs with a couple of servos we have around here. We were thinking that this claw might be a little too big for our robot, so we want to see if the claw is likely to fit the robot or not as well. We want to try different positions for the claw in the robot and test if it's worth it or not. We will try to print it in a smaller scale, though.

We´re conscious that it's possible that the claw will be big for the our robot. So, in this case, we'll have to debate whether to look find a new claw or modify Claw n°3 to make it smaller.

Scenario: We intend to build new ramps with the unions we designed last week. We currently have one 'ramp model', and we still have to build the other 7 models. This way, we will have a ramp for every possible situation that may pop up. Even though we will have all kinds of ramps, we still have to build a proper seesaw, as the one we have right now is a little crappy.

Communication: We will keep trying to communicate the Arduino with the Spike. Our goal for the day is to read data sensor and then elaborate a mini communication method via string or char to send commands from the Spike to the Arduino and from the Arduino to the Spike. The way they communicate will mold the communication method we use: we will try to send strings, char, integers.

To-Do List for the day

- Test Claw n°3
- Test ramps with new unions
- Keep on trying to communicate Arduino and Lego Spike.
- Print Claw n°3 in a smaller scale.

Our work for the day

1) Claw: We started printing the new claw, but in a smaller size. Even though we still have to debate how we can solve our claw problem, we figured that claw n°3 works really well, and adapting it to our robot might be worth it. This is why we decided to print it at a smaller scale.

2) Communication: We kept on testing the communication: we coded a receptor and a sender for both the Spike and the Arduino. The sender in the Lego reads the data from the color sensor, and if it is reading red, it sends a message to the Arduino, which reads it and turns on a led. Then, the Arduino tells the Spike to turn on the motors.

3) Claw: We modified the claw so that it could be smaller, but still fit the servo well. As we´ve said, we wanted to print the claw at a smaller scale. However, this way, the servo wouldn't fit, as the servo box would be smaller too. Therefore, we modified everything.

4) Claw: While modifying Claw n°3, we came across a wonderful claw, which is smaller, fits perfectly in our robot, and has a pretty practical picking method, as it can open widely to do the ball sweep awesomely. The only problem with this claw is that it cannot pick more than one ball. Therefore, if it finds two balls exactly next to each other in a wall, it won't be able to pick any, as it will try to pick them both and will end up letting them fall. Nonetheless, we will have it printed by our next meeting so that we can test it out.

Issues

Issue	Possible Solutions	Final Solution	Why?
Claw n°3 is way too big for our robot, and even though we tried to make it smaller, it is still kind of unusable, considering that it will be beyond complex to integrate it to the robot design seamlessly. Instead, it	- We can dedicate time to integrating the claw perfectly to the robot. We mean brainstorming possible positions for it,	- We decided to look for a new claw, instead of integrating the one we have right now.	- Even though the claw is awesome and works perfectly well, integrating it can be really really hard, as there are many

would be quite unstable and fragile.	many possible ball recollection methods, among other important things. - We can give up on this claw and look for a new one. After all, there are many difficulties with integrating this claw to the robot, so perhaps, if we look carefully, we might find a better claw that'll be easier to implement and simpler to use.		things we should take into account before doing it, such as the size and therecolection mechanism. Although we can figure those things out, we believe the cons to this claw are more than its pros. Therefore, we believe we can find a better claw, with a simpler recollection mechanism and more comfortable for us to adapt to our robot.
- All the cables in the robot were falling, getting trapped in the robot caterpillars. Everything was quite a mess, because, as the robot would move forward, all the cables would disconnect and the connection would be lost.	- We coils leave it there, just as it was and, instead of modifying hardware, we could have just made the robot move really slow, so that there wouldn't be any problems with the cables. - We could organize the cable-board and sensor mess in tht robot's structure, so that the cables don't get tangled and	- We finally decided to organize all the cables in the robot's structure.	- Organizing the cables allows us to keep everything safe and tidy while we try the communication out. This way, we make sure that the arduino uno won't siconnect from the robot while it is in the box, or that all the bridges between the board and the sensor are in no danger. - Also, it lets us

	the board is protected.		start thinking of many designs for the robot. Now that we think we have the claw, having a possible place for the other board, we can start thinking of new designs for the robot, keeping in mind that the one we had previoulsy worked awesomely in all kinds of obstacles.

Ideas

Idea	How we would do it	Is it possible?
-	-	-

Notes on articles and/or videos

Article or Video	Notes
-	-

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°10

Date (dd/mm/yy): 25/01/22

Present Team Members: Joaquín Argañaraz - Joaquín Rodríguez

Present Mentors: Gustavo Viollaz - Enzo Juárez

Hours of work: 2

Goals for the day

Claw: We want to test the claw we printed yesterday. This means we've officially decided to replace the last claw. We balanced the pros and cons of claw n°3, and it just wasn't good enough for what we needed. Even though it was perfect for picking balls, it just wasn't perfect for what we want to do. Using that claw would force us to change our recollection method, which means familiarizing ourselves with a new method and starting a really important part of the code from scratch.

The claw we've found seems to match up perfectly to what we need, but we still have to test it out to see if it really works.

Sponsors: We met up with a mining company here in Salta that is willing to sponsor us, so that we can travel to France for the competition.

To-Do List for the day

- Clean Claw°4
- Add a servo to it and test it!

Our work for the day

1) Claw: We cleaned Claw N°4 from all the filament scraps in order to use it. This process, which ends to be quite simple and, at some point, entertaining, turned into a nightmare! The scraps were so hard to remove that it looked like they were part of the 3D model! We had to use a mini lathe to remove all the rests, which was kind of difficult, considering that we had to be really careful not to break something important from the claw!

2) Claw: We tried opening and closing the claw with a servo and tried to pick up some balls in the rescue area with it.

Issues

Issue	Possible Solutions	Final Solution	Why?
Claw N°4 has trouble picking up more than one ball, as expected.	- We can desing a sort of extension for the claw, so that it has a bigger space to hold the balls. -	-	

We couldn't decide how to place the claw: vertically or horizontally.	- We can put it horizontally, making the recollection process much simpler and easier, as the balls can be trapped by the claw. - Or we can put it vertically and pick the balls up much easier, as the claw is actually made to pick balls up vertically. Therefore, if we use it horizontally, we will have to use rubber to add grip. Otherwise, the claw would not be able to pick up the balls.	- We decided to use it horizontally.	- By using it horizontally, the ball recollection process becomes much simpler and accurate than if we use it vertically. Even though the calw is supposed to pick up the balls vertically and that we will have to add grip, we prioritize finding the balls rather than picking them up the best way possible, as we do not intend to use distance sensors for the balls. If we use it vertically, we will have a really hard time finding the balls or "coming across them". This is why using it horizontally will make everything simpler and more reliable.

Ideas

Idea	How we would do it	Is it possible?
-	-	-

Notes on articles and/or videos

Article or Video	Notes
https://www.thingiverse.com/thing:3041971	Claw website

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°11

Date (dd/mm/yy): 13/02/23

Present Team Members: Joaquín Argañaraz - Joaquín Rodríguez

Present Mentors: -

Hours of work: 4

Goals for the day

Claw: We intend to print and test a new extension for our claw. As we've said, the claw we originally downloaded from www.thingiverse.com had a rather useless extension, that ould barely pick up one ball. We tried different extensions designed by ourselves, and the one we have to test today is one of them.

Claw: After testing the new extension for the claw, we want to brainstorm how to place the claw in the robot. We tested the robot in the seesaw and in the ramps, resulting those tests in a robot's perfect behaviour. Therefore, we want to be really careful with all the new components we add to it; just one misplaced component will cost us the ramps and the seesaw. Keeping this in mind, we want to find the perfect position for the claw while it's not in use keeping mass centre and weight distribution in mind the whole time.

To-Do List for the day

- Print the claw extension.
- Test the claw extension.
- Look for the best ways to place the calw in the robot.
- Brainstorm those ideas and decide which one is the best.

Our work for the day

1) Claw:
    a) We started by printing the claw extension and removing all the remaining pieces of filament from it.

b) Secondly, we added the claw extension to the claw and tested it with the reglamentary balls. During this process, we had a little bit of trouble, as one part of the claw broke while we were adding the extensions to it. As we needed to test that as soon as possible, we glued the two parts of the claw. Of course, we re-printed that part of the claw.

c) *Claw placement:* Each one of us suggested different positions for the claw while in use and while not in use, as well as many mechanisms to move the claw from the 'inactive position' and the 'active position'. Also, we looked for ideas on how to place the claw in the robot on YouTube videos and other team's websites. At the end of the day, we debated all the different ideas we've had and decided to keep the claw on top of the robot while it's not in use (during line following, ramps, seesaw, after collecting rescue kit), and keeping it vertically while rescueing.

Issues

Issue	Possible Solutions	Final Solution	Why?
The claw does not close perfectly, due to the fact that we had to glue the claw after breaking it.	- Leaving it as it is right now because the problem is merely aesthetical and does not affect the claw's movements. - Reprinting the claw.	- We will reprint the claw, but it's not a priority.	We want everything to be as perfect as possible, but we also want to do as much as possible. Therefore, we cannot be waiting for small pieces to print. We will surely replace the piece, but not now.

Ideas

Idea	How we would do it	Is it possible?
-	-	-

Notes on articles and/or videos

Article or Video	Notes
https://www.youtube.com/watch?v=EY4whhQ0Q4w	Practical example of rescue kit and ball recollection.
https://www.youtube.com/watch?v=qQvz5cXM7Pk	Balls recollection mechanism using a vessel and rubber bands.
https://www.youtube.com/watch?v=JicqYc9jaZM	Ball recollection technique that detects the ball with an ultrasonic sensor at the front and collects them using some sort of ball holder situated at the back of the robot.
https://www.youtube.com/watch?v=RmoSf2v97fA-	Useful idea: shaking the robot after depositing the ball/rescue kit in the black triangle, so that it's sure that they'll fall.
https://www.youtube.com/watch?v=TFsaNvacoBw&t=7s	Two different victim holders in the robot: one for alive ones and another one for dead ones.

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°12

Date (dd/mm/yy): 14/02/23

Present Team Members: Joaquín Argañaraz - Joaquín Rodríguez

Present Mentors: -

Hours of work: 4

Goals for the day

Claw: We intend to test the new claw and claw extension in our test scenario. We've already noticed one possible issue with this new claw extension: the extension's main purpose is to hold balls perfectly. However, there's a problem with this, as we also have to store a rescue kit, which is a cube. This cube might get stuck in between the extension's bars, which might be a problem when it comes to depositing the cube in the rescue area.

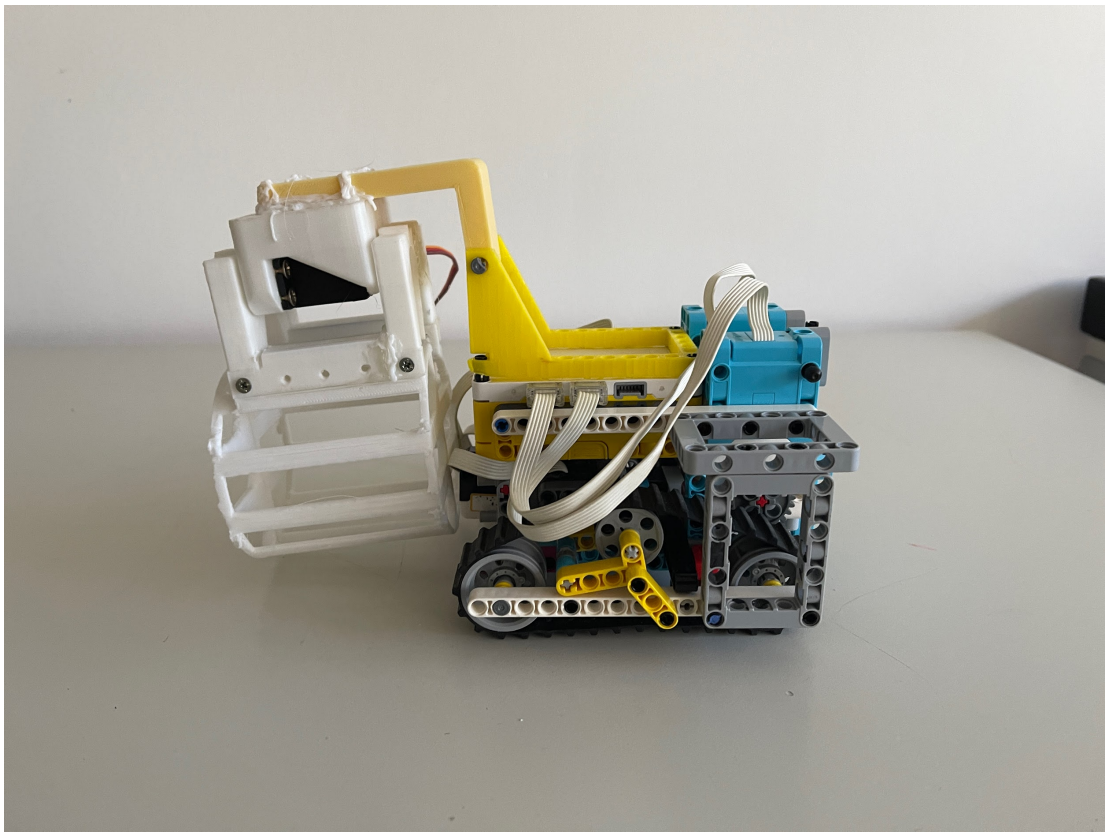
Claw: We need to decide the perfect place for the claw. Yesterday, we brainstormed some ideas on how to place it, and decided to keep the claw above the robot while following the line, avoiding obstacles, climbing the ramp, going over the seesaw and while holding the rescue kit, and keeping it vertically while collecting victims and rescue kit. However, we want to test that once

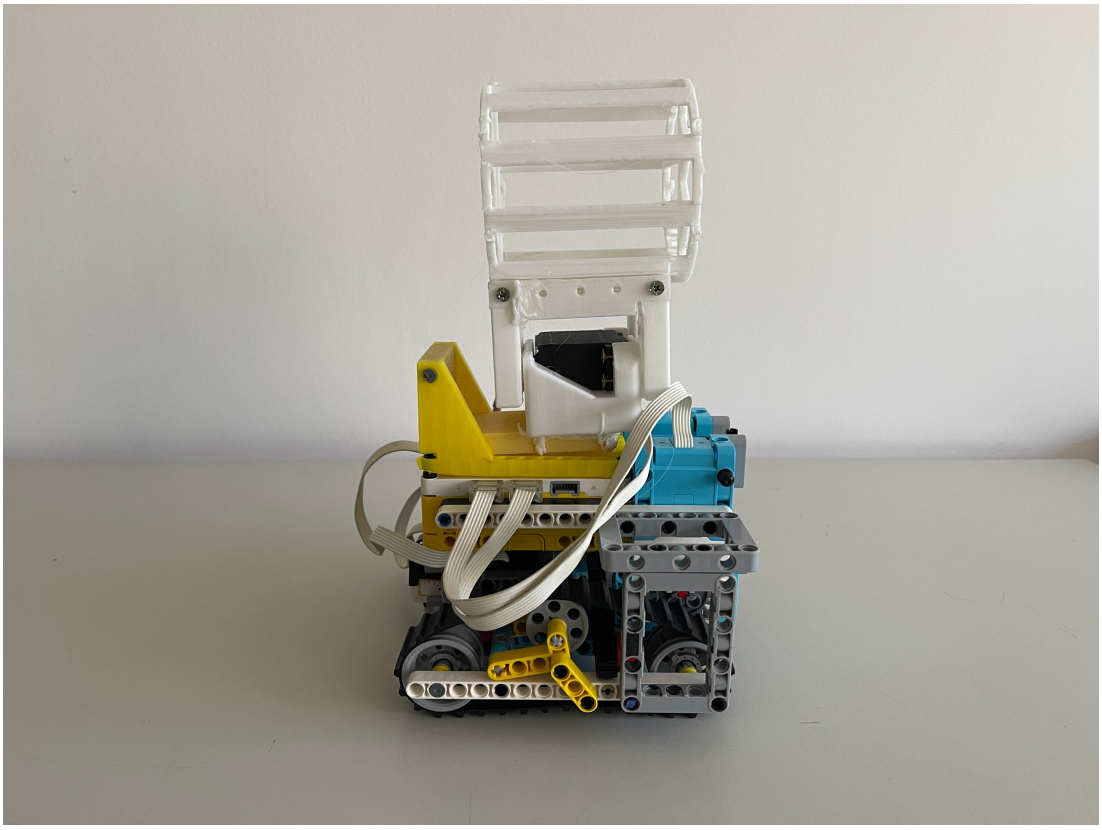
again, so that, if everything works out great, make it official or, in case we find some major issue with this solution, change it.

To-Do List for the day

- Test the claw and claw extension with victims.
- Test the claw and claw extension with the rescue kit.
- Test the claw in the position we decided yesterday in the most complicated parts of the scenario (ramp and seesaw)
- Decide the claw's final position.

Our work for the day

1) Claw: We started by testing the robot's behaviour during the ramp and the seesaw with the claw above the robot. Keeping the claw in "recollection state" (vertically in front of the robot) would cause lots of problems, as it would be impossible for the robot to overcome speedbumps. This way, it's sure that the claw will have two main positions:
    a)
    b) 

c) 

2) Design: We created a prototype for the mechanism that will move the claw from Position A (see 1.a) to Position B with some Lego pieces. It's a solid axis that allows us to test the turning angle of the claw. However, it's temporary.

3) Design: We looked for 3D printable Lego pieces, so that we can modify them and create a safe support for the claw using Lego pieces, which will guarantee us that the claw is firm and secure in whatever position we decide to put it in.

Issues

Issue	Possible Solutions	Final Solution	Why?
The claw might disbalance the robot in the ramp and seesaw, as the claw adds more weight to the back of the robot.	- We could lighter the claw, so that it isn't as heavy as it is now, making the problem a bit smaller. - Wait until we have the whole idea worked out and decide what to do then, as we still have to see if	- We will wait until we have everything ready to test and decide then.	- Because we cannot speculate with this. After all, this issue is something we think might happen, but we are not completely sure. So, we'll wait and see.

	this imbalance is solved when we add the missing servo that the mechanism will use. This servo will add weight to the front, which might solve the problem. - We could change the claw's position while the robot is sorting the ramp and the seesaw. This way, the claw would be up during the line following exercise and it would come down for the ramp. However, it would be a bad idea to make it come all the way down, as we do not know if there will be speedbumps in the ramp. Therefore, the claw would have to come 70% down, and not 100% down.		

Ideas

Idea	How we would do it	Is it possible?
Design a circuit board to keep the communication protocol tidy.		Indeed it is! If we work hard and make time for it, of course

By implementing this, we don't take the risk of having loosen cables or possible disconnections. Also, it keeps everything organised and makes communication something easier to deal with.		it's possible. We consider this is something important that would prevent many problems and would make working with the robot a lot an easier and more enjoyable experience, as we wouldn't have to be dealing with cables.

Notes on articles and/or videos

Article or Video	Notes
-	-

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°14

Date (dd/mm/yy): 3/02/23

Present Team Members: Joaquín Argañaraz - Joaquín Rodríguez

Present Mentors: -

Hours of work: 4

Goals for the day

Claw: We want to keep on testing the claw we tested yesterday. There are still a couple of things we want to test out and verify; we are not completely sure about the balance yet. We also want to test the specific angle at which the robot might fall off with the claw up.

Components: Today, we need to look for all the components we need. We need lots of components for our robot, so we are going to look in shops here in Salta, in other provinces in Argentina and, lastly, in places like Amazon and Ebay (those websites are not convenient for us because the products take from 3 to 6 months to arrive).

Scenario: We want to print a rescue kit and a ball according to the exact measures the RCJ2023 Committee shared, so that we can have everything as similar as it will be in the competition as possible. We wanted to buy the balls, but we couldn't find a ball that matched the measurements.

To-Do List for the day

- Test the claw to see how solid it is.
- Print the claw extension again.
- Print a rescue kit and a ball considering the exact measures the Robocup Junior 2023 Committee shared. If everything works out great, we'll print the other balls.
- Buy a 0.05 pinstripe, so that we can build a board to hold the communication protocol ourselves.

Our work for the day

1) Claw: We examined the claw carefully and found out that it is not as solid as we would expect. As we said, one part of the claw broke last week, so we wanted to see how resistant it was while glued. The claw is not resistant at all, so we will have to reprint that as soon as possible. This way, we can keep on working comfortably, and without having to worry about having broken pieces or being unable to work because something is not solid.

2) Scenario: We designed one of the balls and the rescue kit in Tinkercad and printed them. They are awesome, and will be very useful in the future, as they'll allow us to keep testing the robot in the most RCJ-Rescue-Line-2023-alike scenario.

3) Components: We bought the 0.05 pinstripe we were looking for.

Issues

Issue	Possible Solutions	Final Solution	Why?
The glued piece of the claw has twisted a little bit, resulting in the claw not closing completely.	-	- There's not much to think about this… We'll reprint the whole claw. We are going to start from the beginning and make sure the claw is solid and closes well.	- We cannot be wasting time with broken components. We are testing and working on the claw, and the truth is that we need a perfect claw. We cannot be dealing with twisted pieces or having to stick things.

			Having a well built claw will make working with the claw easier and less stressful

Ideas

Idea	How we would do it	Is it possible?
-	-	-

Notes on articles and/or videos

Article or Video	Notes
https://articulo.mercadolibre.com.ar/MLA-915130688-tira-de-pines-macho-recta-005-pulg-1x22-packx10-_JM#position=3&search_layout=stack&type=item&tracking_id=bc12b489-530b-4f7c-8817-fb102a5d6e8f	Pinstripe we needed: Option 1
https://articulo.mercadolibre.com.ar/MLA-1127777007-tira-de-50-pines-macho-127-rectos-arduino-ptec-_JM#position=7&search_layout=stack&type=item&tracking_id=dc602f36-a0ae-4982-8568-b5bf44cf73e0	Pinstripe we needed: Option 2

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°15

Date (dd/mm/yy): 19/02/23

Present Team Members: Joaquín Argañaraz - Joaquín Rodríguez

Present Mentors: -

Hours of work: 4

Goals for the day

Code: Our goal for the day is to test the PID control mechanism that we used for the line following part of the exercise in previous competitions. The PID control mechanism works with the mass centre, balance and weight distribution, so, having made so many changes in the robot's design, all those other areas must've been affected. Therefore, we want to see what we need to change in the PID control to match the new data. We know that those values are going to change one more time (after we put all the sensors, servos and the claw), but it's good to know how the values are changing, and to have an idea if the overall control system logic still works seamlessly.

Components: We need to keep looking for the components we need. Our intention is to list all the components we need with the exact specifications and prices, so that we can still manage how much we spend. The goal is to write this list of components with specifications, prices and some links and details on where to buy them. This way, we can then debate which components buy and from where and buy them.

To-Do List for the day

- Test PID control mechanism by making the robot follow a quite complex line, with 90° and 160° turns, intersections and more.
- Elaborate a list of components with detailed information, such as specs and prices.

Our work for the day

5) Code: We tested the PID with a rather complex line to follow. As expected, the PID didn't work properly. However, it worked, which was kind of unexpected. The logic and movements still work properly, after adjusting the mass centre, balance and weight distribution values, which tells us we won't have to change much from our original logic. This makes sense, as, even though the weight of the robot changed, the shape didn't change much.

6) Components: We created a detailed list of materials to buy. We still need to debate what to buy and where. Having a list makes the process of buying things much easier, as we do not have to worry about finding everything quickly because we forgot to buy. By defining

carefully what we'll use and making those purchases early, we are simplifying a very complicated part of this project, which is buying the pieces.

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-

Notes on articles and/or videos

Article or Video	Notes
-	-

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°16

Date (dd/mm/yy): 21/02/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw: Our goal for the day is to design support pieces for the claw. As we said before, we decided the final positions for the claw and defined them. Therefore, we now have to bring those ideas to life, and that starts by creating a prototype of the support for the claw and a movement mechanism that will allow it to move from Position A to Position B.

After that, we want to test the claw one more time in the ramp and seesaw to make sure everything is still working fine and the robot is not disbalanced.

To-Do List for the day

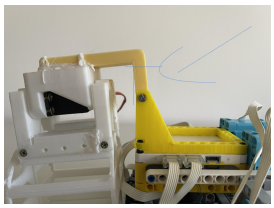
- Design 3D Models for the claw supports and print them.
- Test the robot with the claw support and movement mechanism installed in the ramp and seesaw to see how it performs.

Our work for the day

1) Claw: We designed and printed the 3D models for the claw support, and installed them in the robot. The claw is now firm and placed right where we wanted it to be placed. To design the supports, we had to use a 3D Model for Lego pieces and modify it to have the correct shape.

Then, we performed tests on the ramp with the claw fixed on the robot. The tests were not perfect. The robot did not climb the ramp with the claw up, as it fell down. However, it did climb it down with no problem at all.

Issues

Issue	Possible Solutions	Final Solution	Why?
- The robot is still disbalanced when the claw is up. Therefore, when it tries to climb the ramp, it falls down.	- The robot has extra weight on the back, so we could make the claw support a bit shorter, so that, when the claw is up, it is a little bit straight forward and does not add extra weight to the back, which is already kind of heavy, considering the back part of the robot holds the motors. - We could wait until we put the servos for the movement mechanism, which will add weight to the	- We will shorten the claw support to balance the robot. 	- Even though we still have to add the servo for the movement mechanism, which will add a little bit of weight to the front, we think the robot will still be a little disbalanced. That's why we decided to shorten the support; we are removing weight from the back while adding a small weight to the front.

	front and might balance the robot.		

Ideas

Idea	How we would do it	Is it possible?
-	-	-

Notes on articles and/or videos

Article or Video	Notes
-	-

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°17

Date (dd/mm/yy): 24/02/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw: Our intention for the day is to weigh the claw and see how heavy it is. As we said, the claw is disbalancing our robot and, while we modify some of the pieces so that the claw is more centred, we want to see if we can make it lighter by printing it with less density or by making it a little bit smaller.

Communication: While we were picking one of our robots up, the protoboard that held our communication system fell down and left us with no communication system! Therefore, we have to redo it all over, which will be easy, as we already know how to do it.

To-Do List for the day

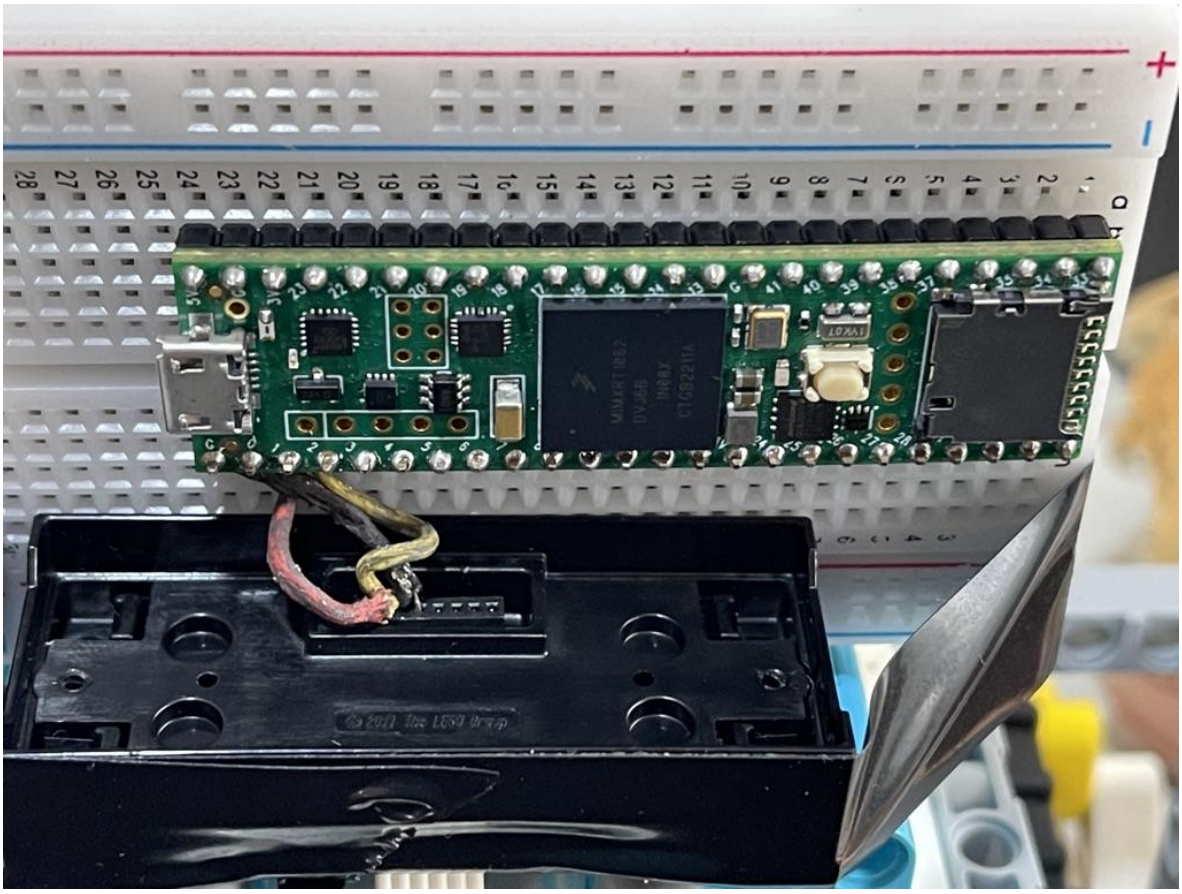
- Weigh the claw.
- Design new smaller claw support.
- Redo communication system.

Our work for the day

1) Claw: We weighed the claw and found out that it weighs 156 g., which is a lot, considering that the robot is 558 g. The servo itself weighs 73 g. This means that the claw weighs 83 g.
   We believed we could make the claw way lighter, so that's what we did. We started by making it a little bit smaller. We reduced the claw's height and width, resulting in a decrease in the robot's weight.

   Also, we are printing the new claw support, which will centre the claw and, therefore, help with the robot's overall weight and balance.

2) Communication: We redid the communication system. However, we did some slight improvements to it: instead of just putting all the wires back, we added thermofusibles, so that the communication is safer and we do not have to worry about the cables touching. Also, we temporarily used tape to hold the Ultrasonic Sensor and keep it firm. Despite being really useful and helpful, the tape is temporary, as we will design a board to keep the sensor and the Teensy connected properly.



Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-

Notes on articles and/or videos

Article or Video	Notes
-	-

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°18

Date (dd/mm/yy): 04/03/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw: One of our goals for the day is to test the claw. We want to see how it performs with the servos needed for the claw mechanism. When we tested it last week, it didn't have the two servos that would lift/lower and open/close the claw. Therefore, we want to see how it performs with all those things added to it.

Materials: We have to make a list of all the things we have to buy. We have very little time before the competition, so we need to have some components with us as soon as possible. We need to analyse carefully what we'll use and write it down. Then, buy it.

Organisation: We need to organise our work plan: how we will work from now on, the days we will meet and organisation. Also, we have to assign proper roles to each one of us, so that we are more clear about where we need to focus our attention.

To-Do List for the day

- Test the claw: see if it picks the ball and the rescue kit up and if it climbs the ramp.
- Make a list of all the materials we will need.
- Define roles for the team.
- We need to define a work plan for future classes.

Our work for the day

1) Claw: We tested if the claw was able to pick the ball and the rescue kit up and if it climbs the ramp.

2) Materials: We made a list of anything that could be missing and bough what was necessary.

3) Team and organization: We defined the roles each of us is going to play in the rest of the process. We also agreed on a work plan for future classes. We installed Notion and started to organize everything there. We also agreed on working a bit from home as well.

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°19

Date (dd/mm/yy): 11/03/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task
- 3rd task

Our work for the day

1) Claw:

2) Scenario:

3) Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°20

Date (dd/mm/yy): 18/03/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task
- 3rd task

Our work for the day

1) Claw:

2) Scenario:

3) Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°21

Date (dd/mm/yy): 25/03/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task
- 3rd task

Our work for the day

1) Claw:

2) Scenario:

3) Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°22

Date (dd/mm/yy): 01/04/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task
- 3rd task

Our work for the day

1) Claw:

2) Scenario:

3) Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°23

Date (dd/mm/yy): 08/04/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task
- 3rd task

Our work for the day

4) Claw:

5) Scenario:

6) Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°24

Date (dd/mm/yy): 15/04/23

Present Team Members: **Joaquin Argañaraz - Joaquín Rodríguez**
Present Mentors: **Enzo Juárez - Gustavo Viollaz**
Hours of work: **4**

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task
- 3rd task

Our work for the day

7) Claw:

8) Scenario:

9) Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°25

Date (dd/mm/yy): 22/04/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task
- 3rd task

Our work for the day

10)Claw:

11)Scenario:

12)Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°26

Date (dd/mm/yy): 29/04/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task
- 3rd task

Our work for the day

13)Claw:

14)Scenario:

15)Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-

-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°27

Date (dd/mm/yy): 06/05/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task
- 3rd task

Our work for the day

16)Claw:

17)Scenario:

18)Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°28

Date (dd/mm/yy): 13/05/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task
- 3rd task

Our work for the day

19)Claw:

20)Scenario:

21)Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?

-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°29

Date (dd/mm/yy): 20/05/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task

- 3rd task

Our work for the day

22)Claw:

23)Scenario:

24)Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°30

Date (dd/mm/yy): 27/05/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task
- 3rd task

Our work for the day

25)Claw:

26)Scenario:

27)Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°31

Date (dd/mm/yy): 03/06/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task
- 3rd task

Our work for the day

28)Claw:

29)Scenario:

30)Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°32

Date (dd/mm/yy): 10/06/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task
- 3rd task

Our work for the day

31)Claw:

32)Scenario:

33)Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°33

Date (dd/mm/yy): 17/05/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task
- 3rd task

Our work for the day

34)Claw:

35)Scenario:

36)Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-
-	-	-	-

Ideas

Idea	How we would do it	Is it possible?
-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

Article or Video	Notes

Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

MEETING N°34

Date (dd/mm/yy): 24/06/23

Present Team Members: Joaquin Argañaraz - Joaquín Rodríguez

Present Mentors: Enzo Juárez - Gustavo Viollaz

Hours of work: 4

Goals for the day

Claw:

Scenario:

Communication:

To-Do List for the day

- 1st task
- 2nd task
- 3rd task

Our work for the day

37)Claw:

38)Scenario:

39)Communication:

Issues

Issue	Possible Solutions	Final Solution	Why?
-	-	-	-
-	-	-	-

-	-	-	-

Ideas

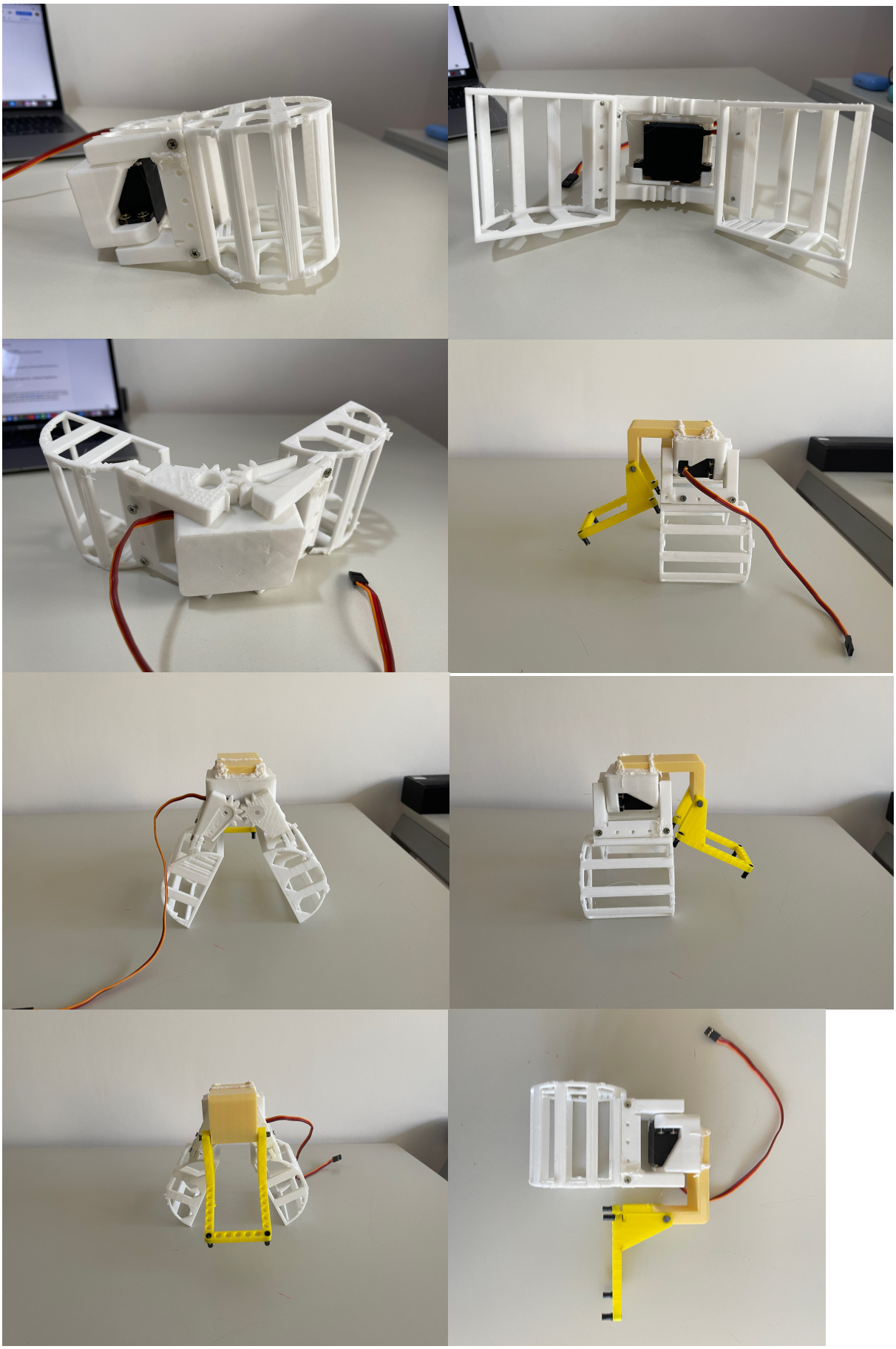
Idea	How we would do it	Is it possible?
-	-	-
-	-	-
-	-	-

Notes on articles and/or videos

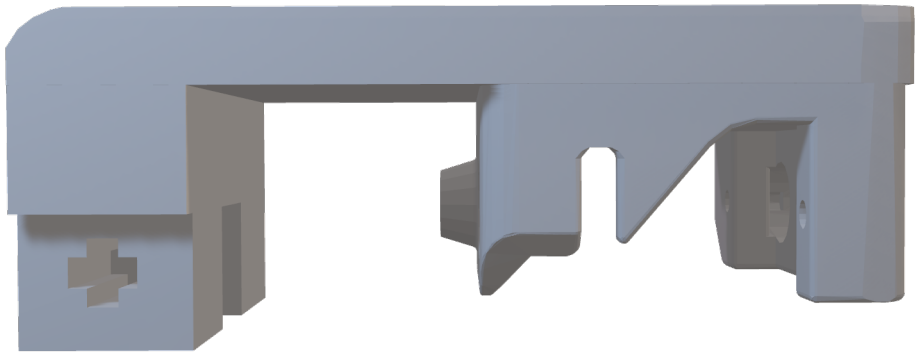
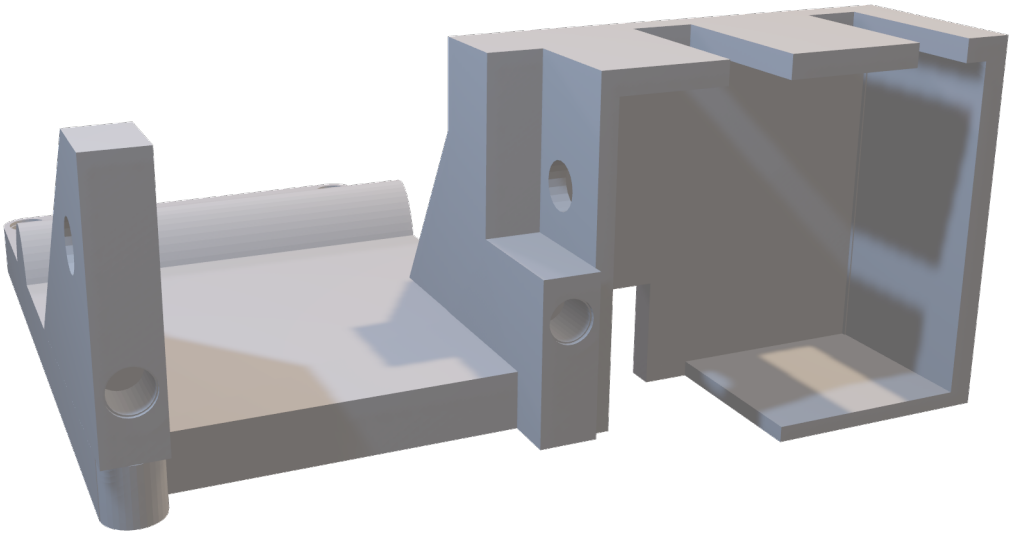
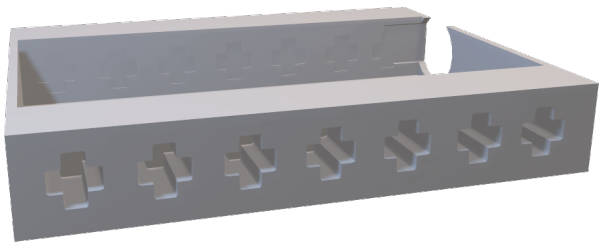
Article or Video	Notes

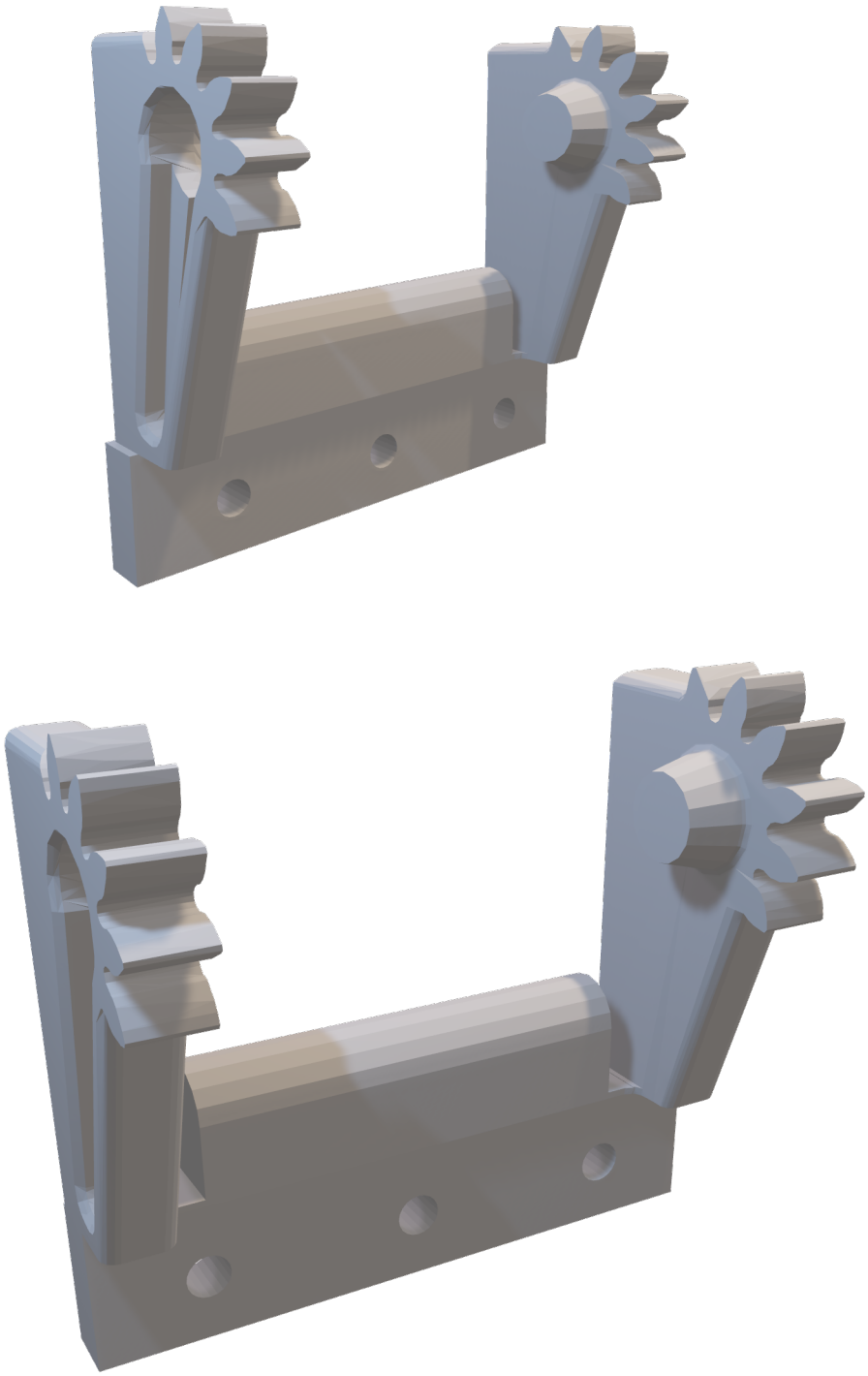
Joaquín Argañaraz (Team Captain)
Joaquín Rodríguez

Appendix 1: Claws

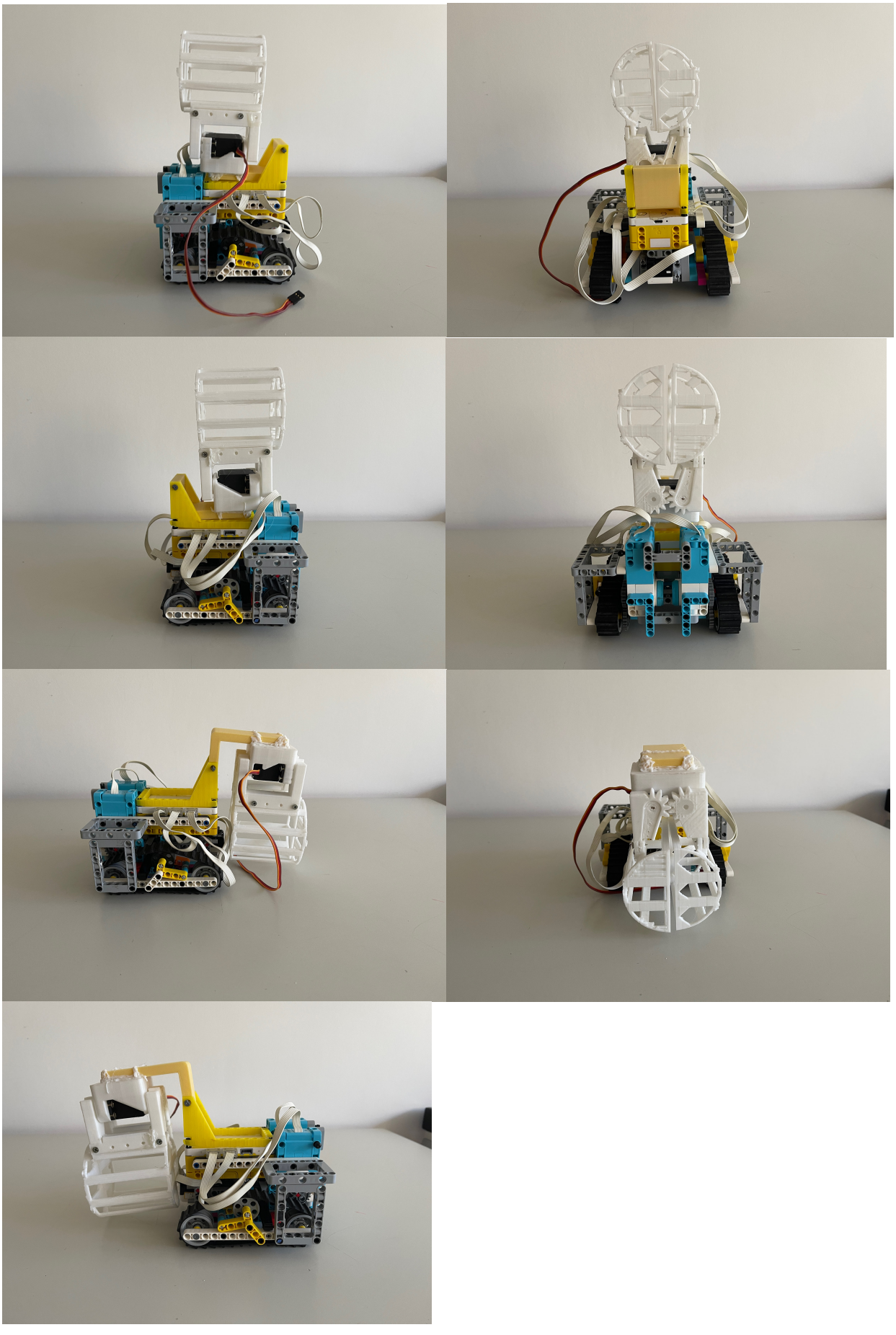


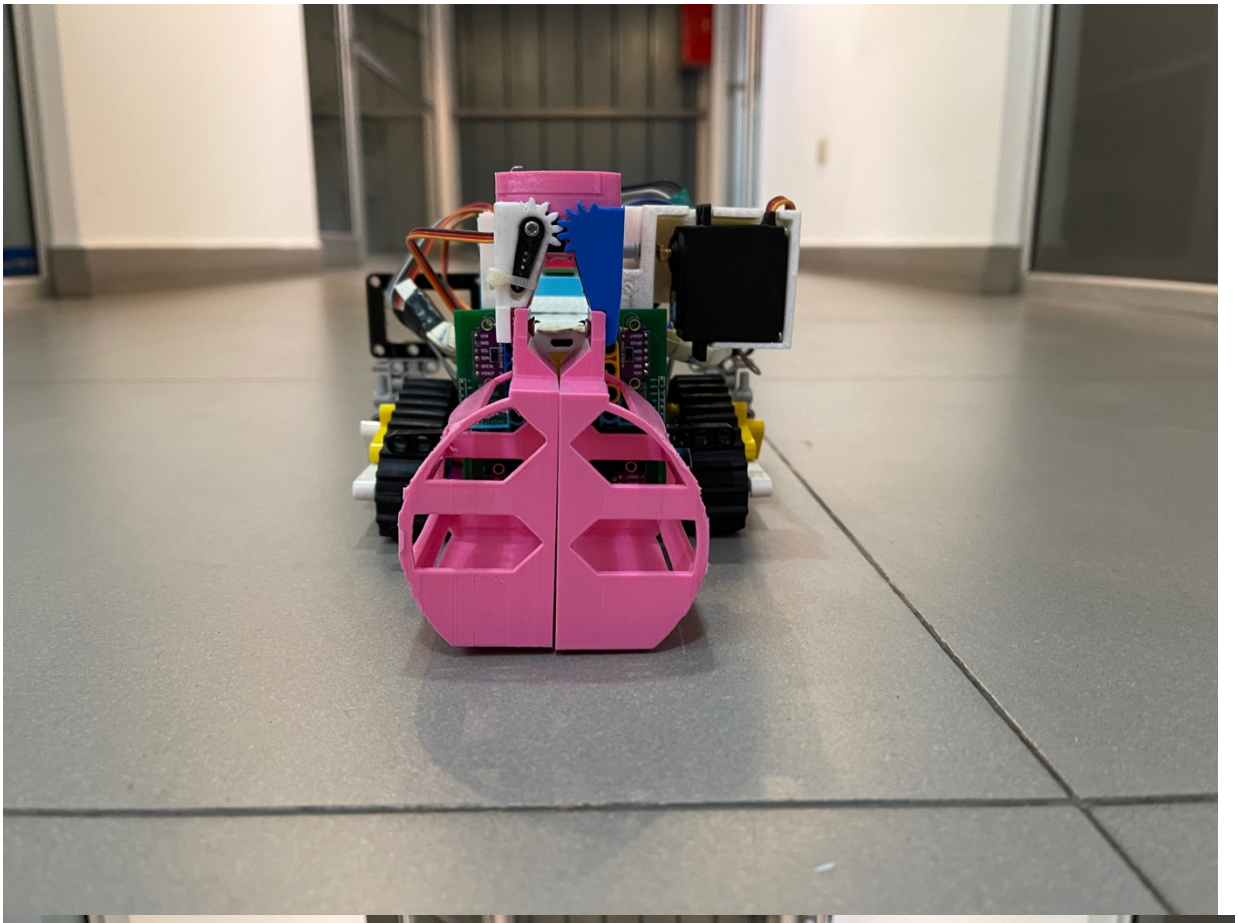
Appendix 2: Claw supports and gears

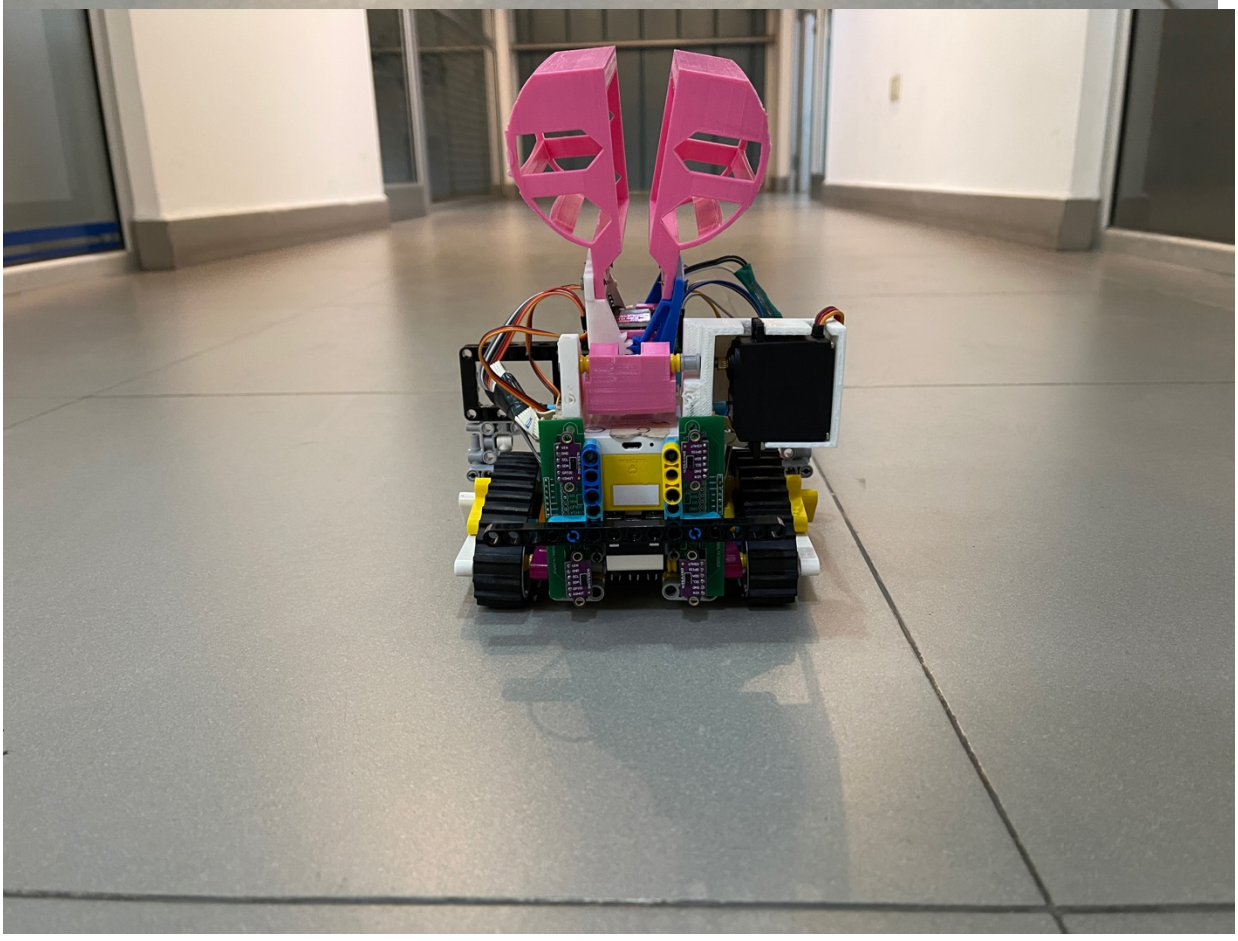
MiniServo Suppoort	
Standard Servo Support	
Battery Support	

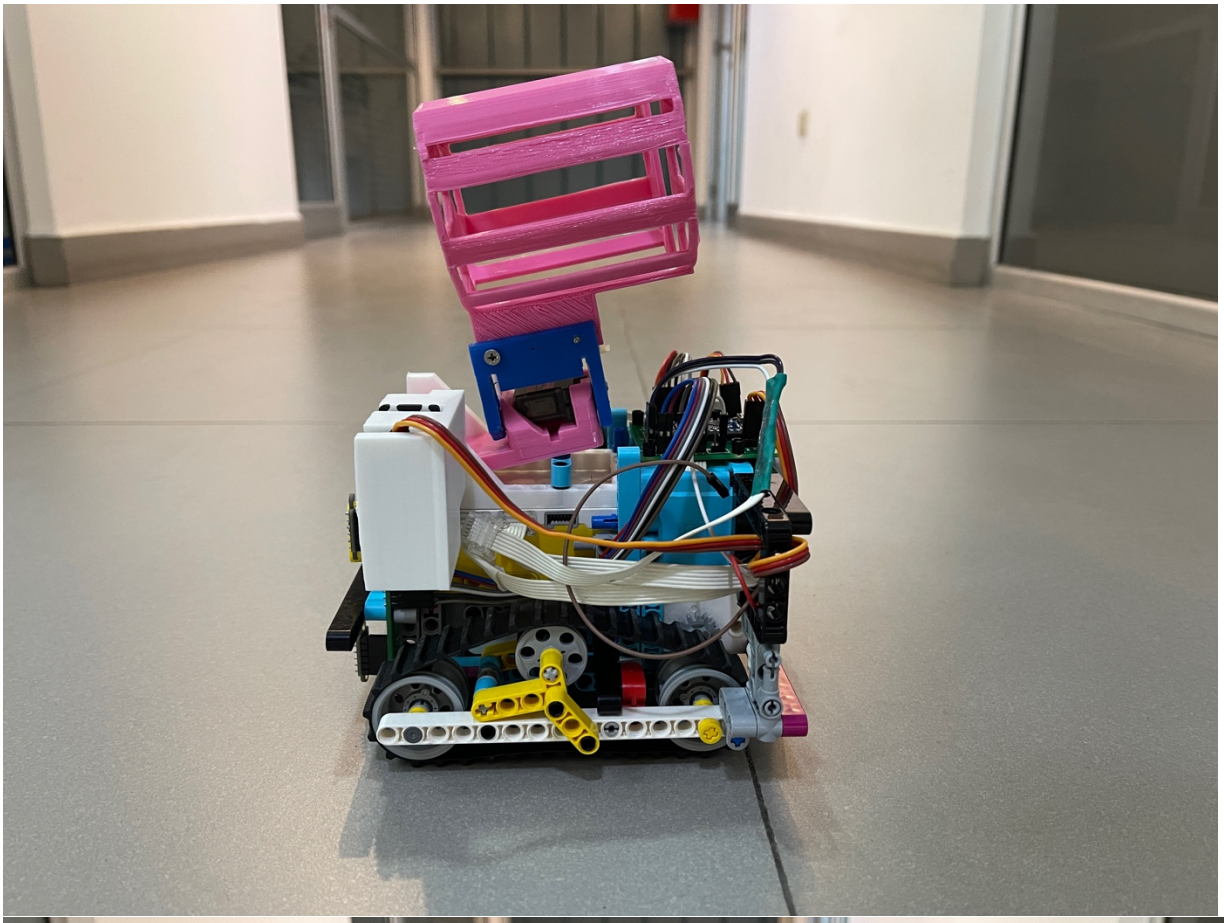
Gears	

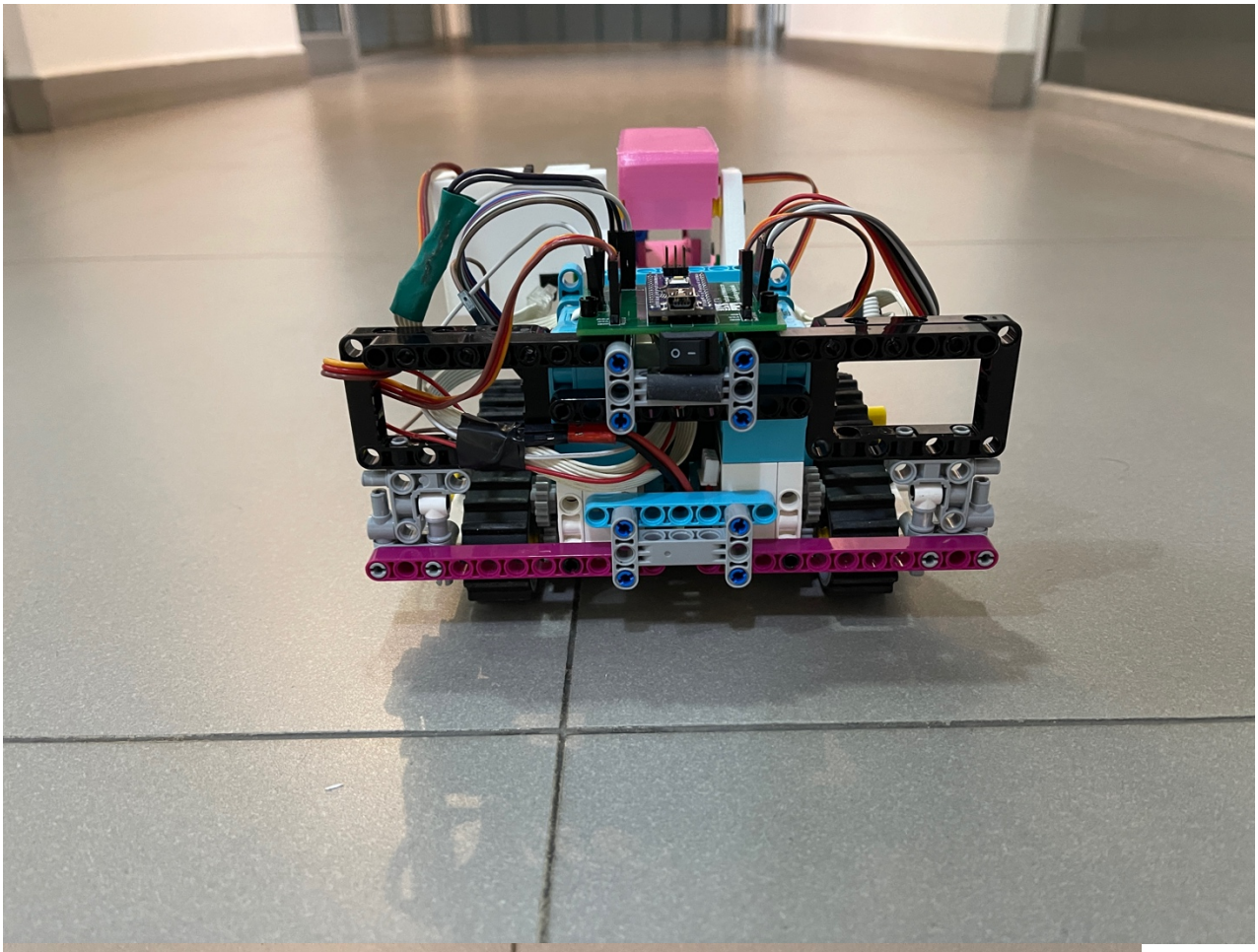
Appendix 3: Photos and Videos

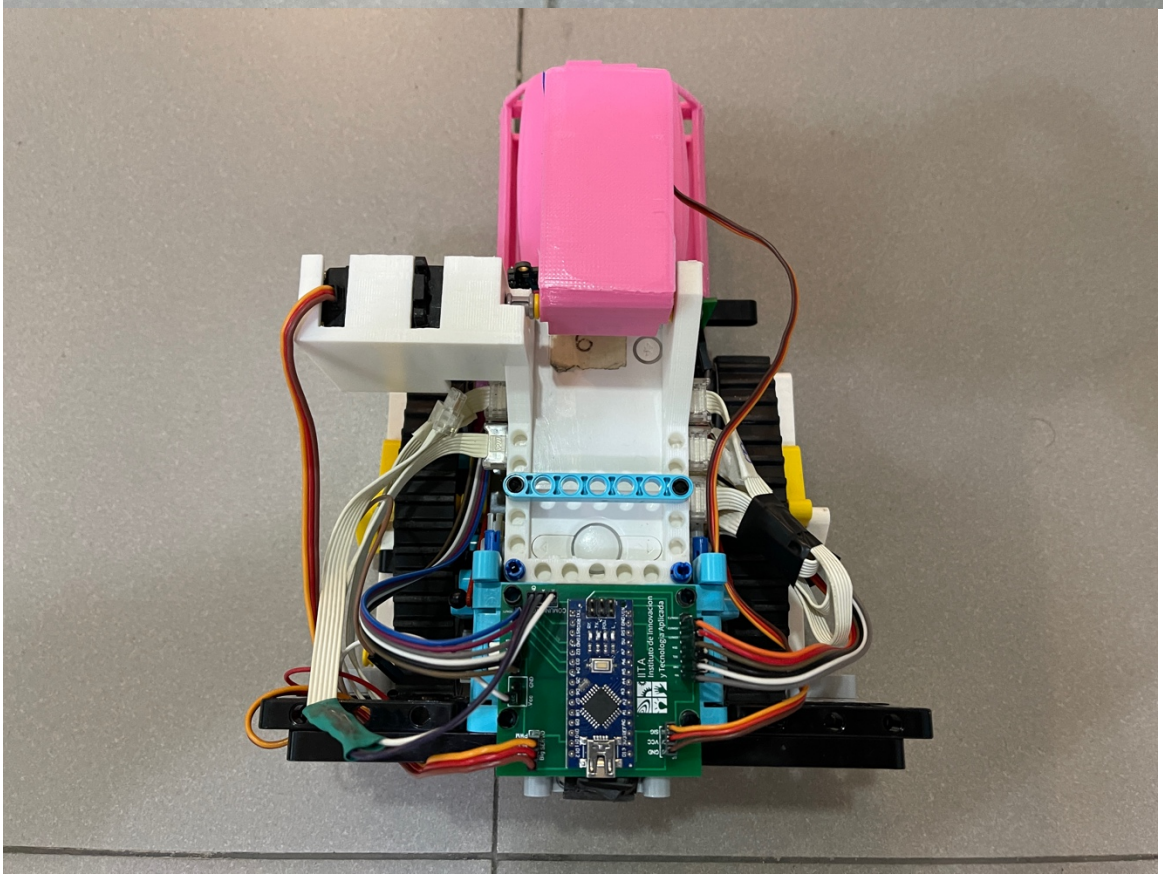


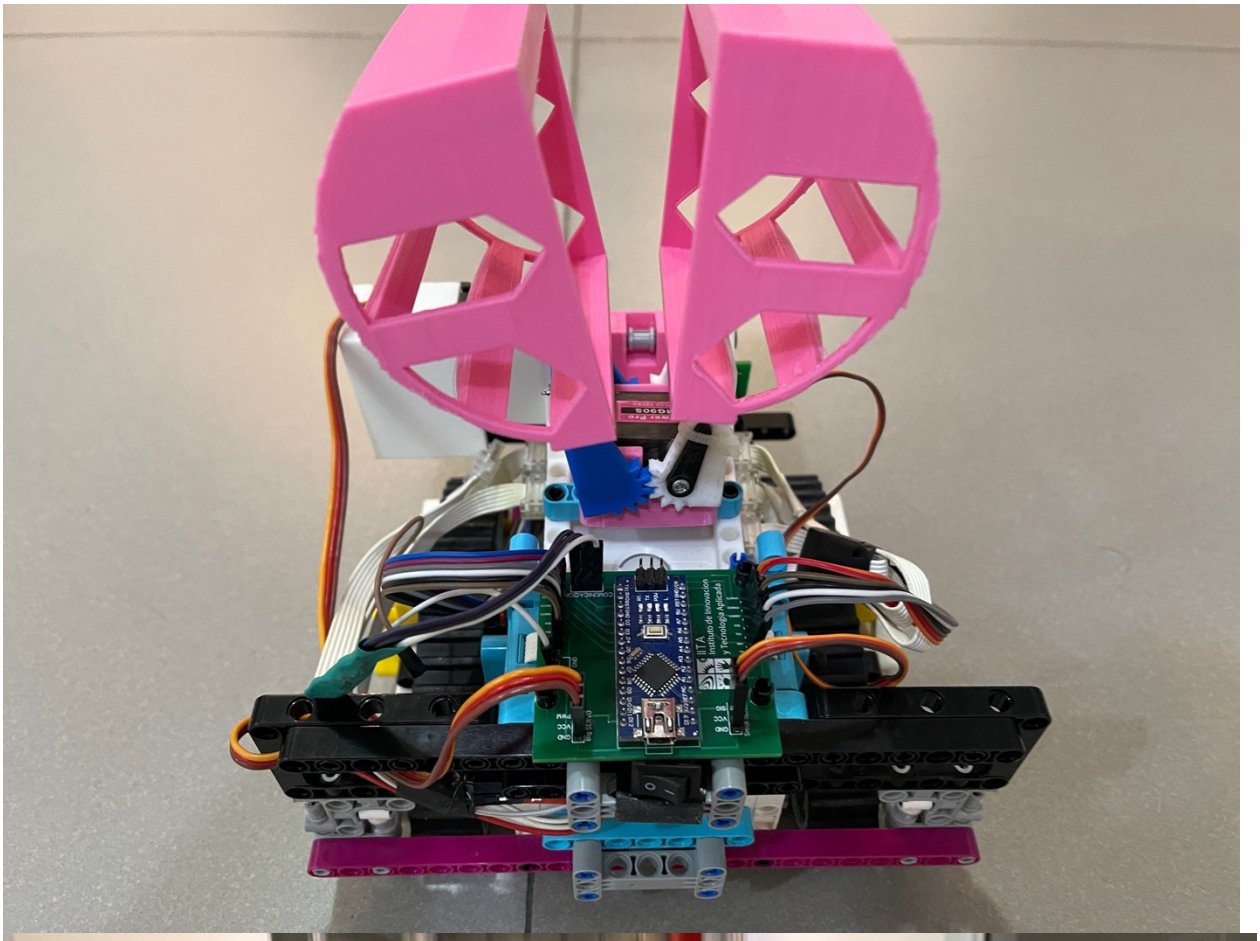


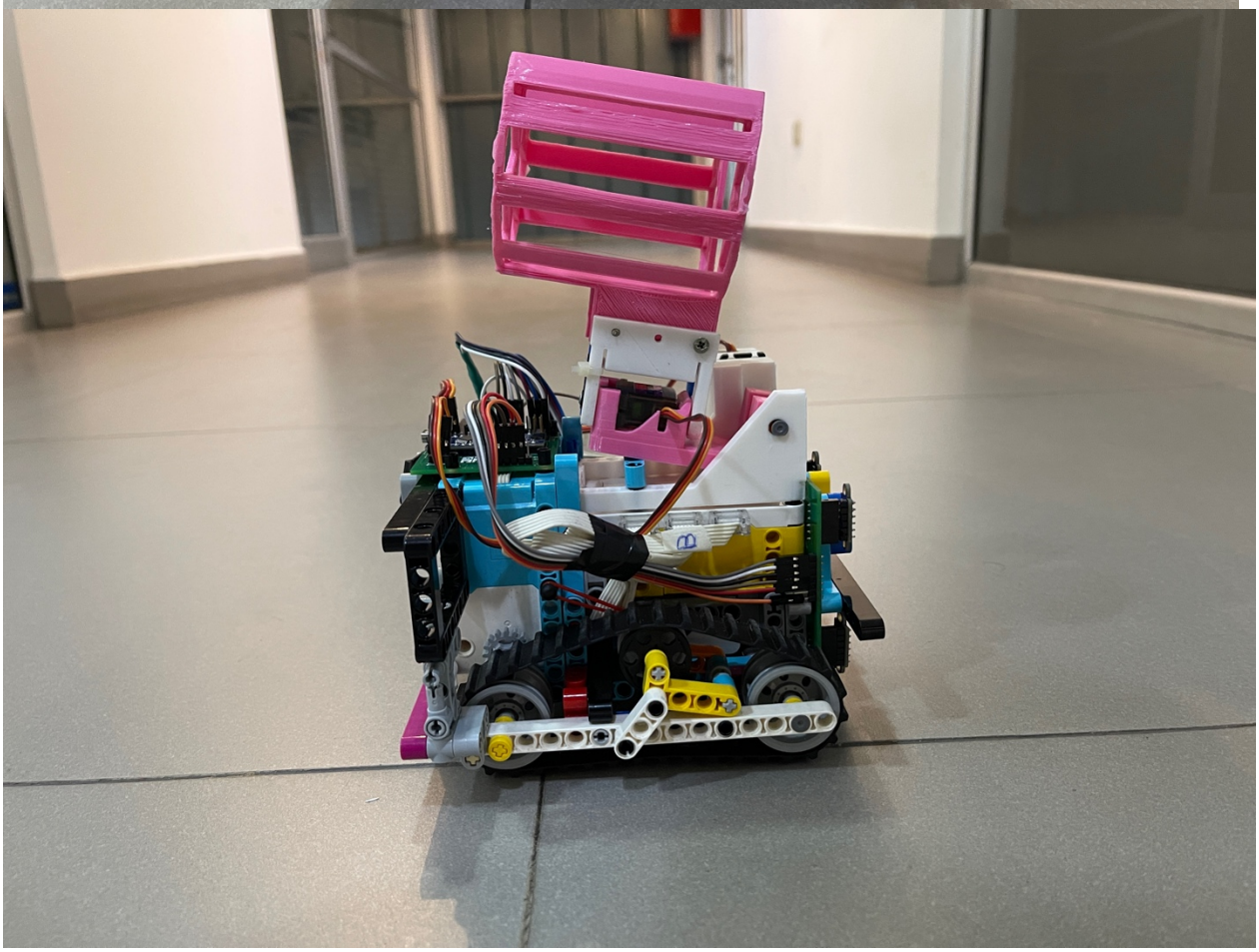


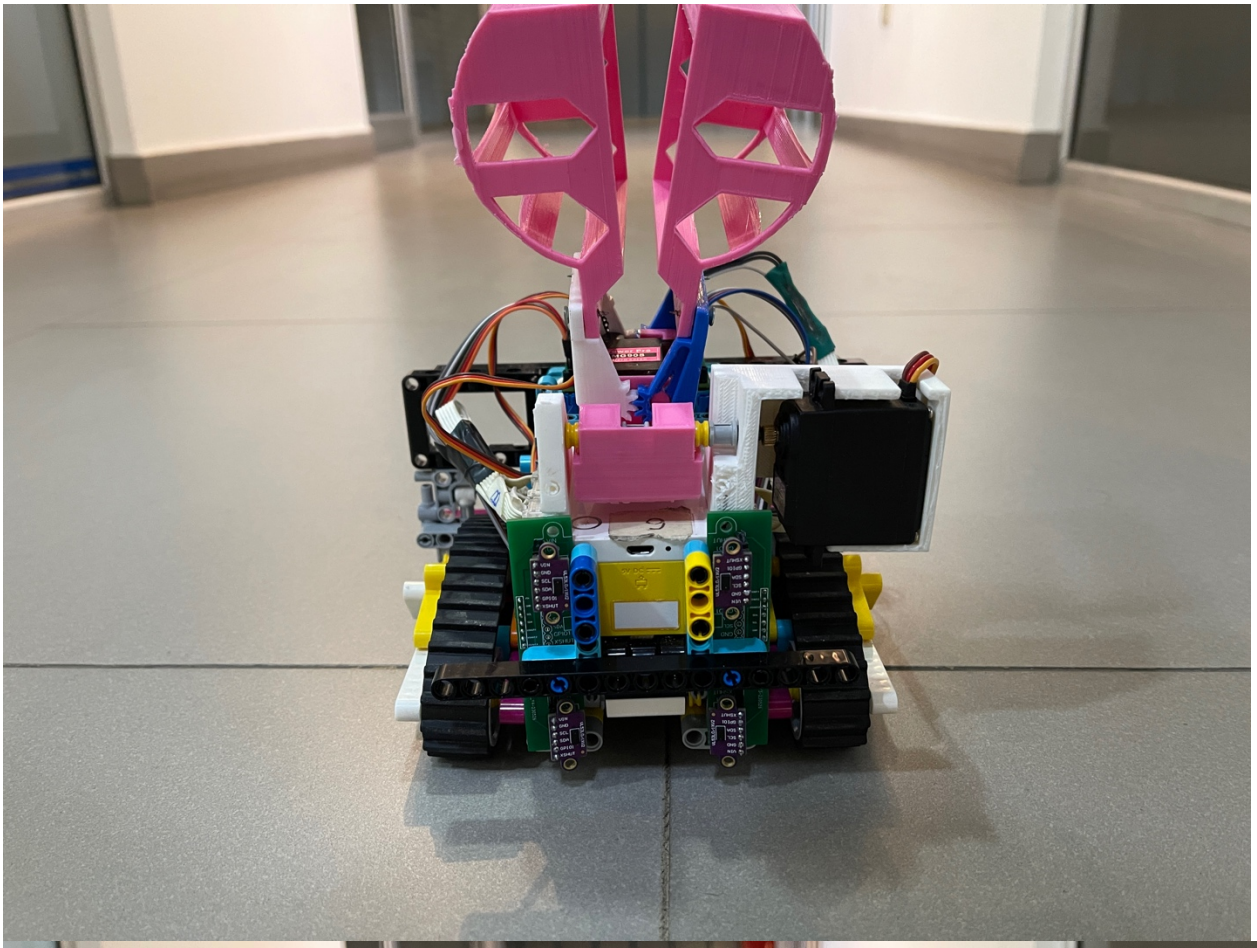


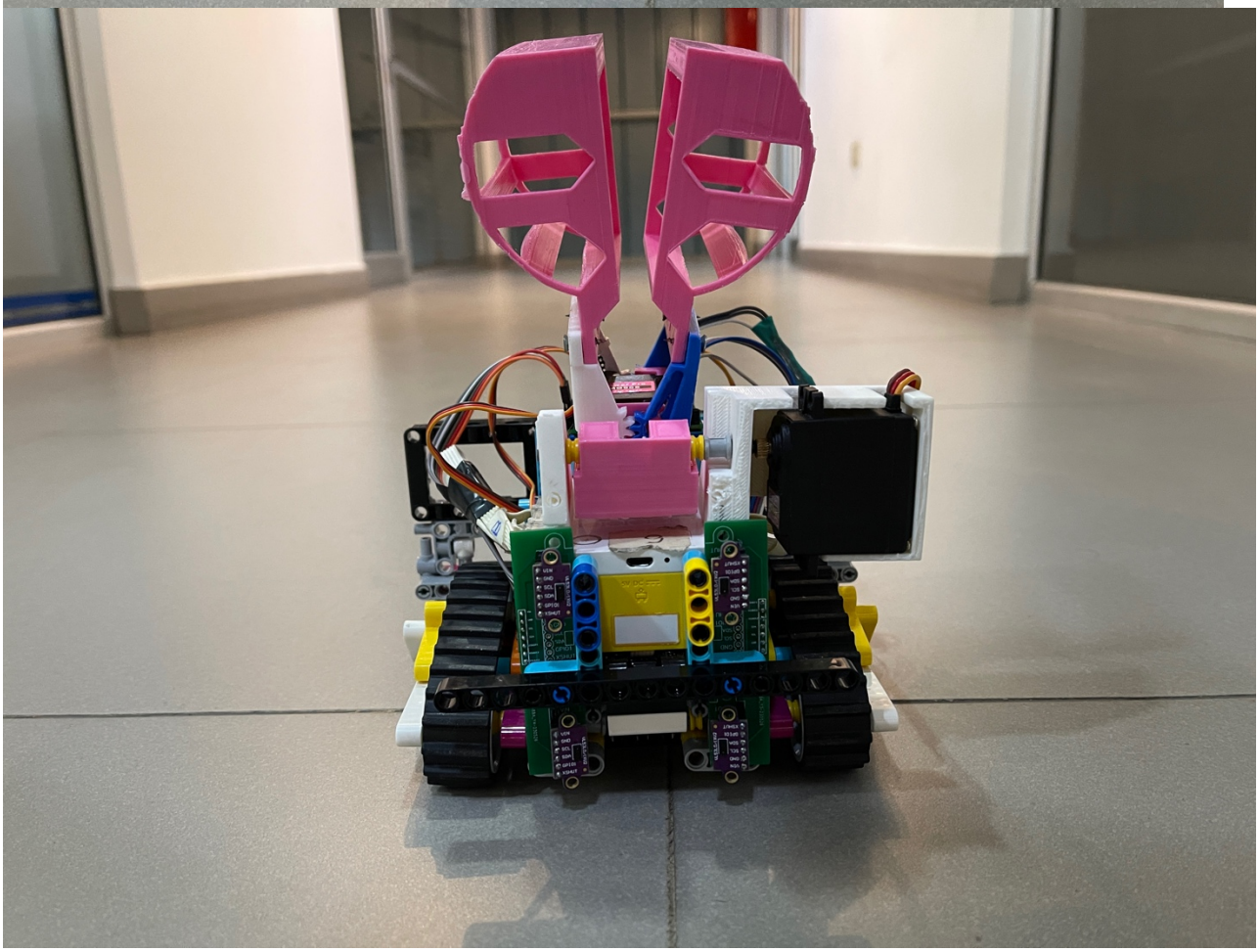


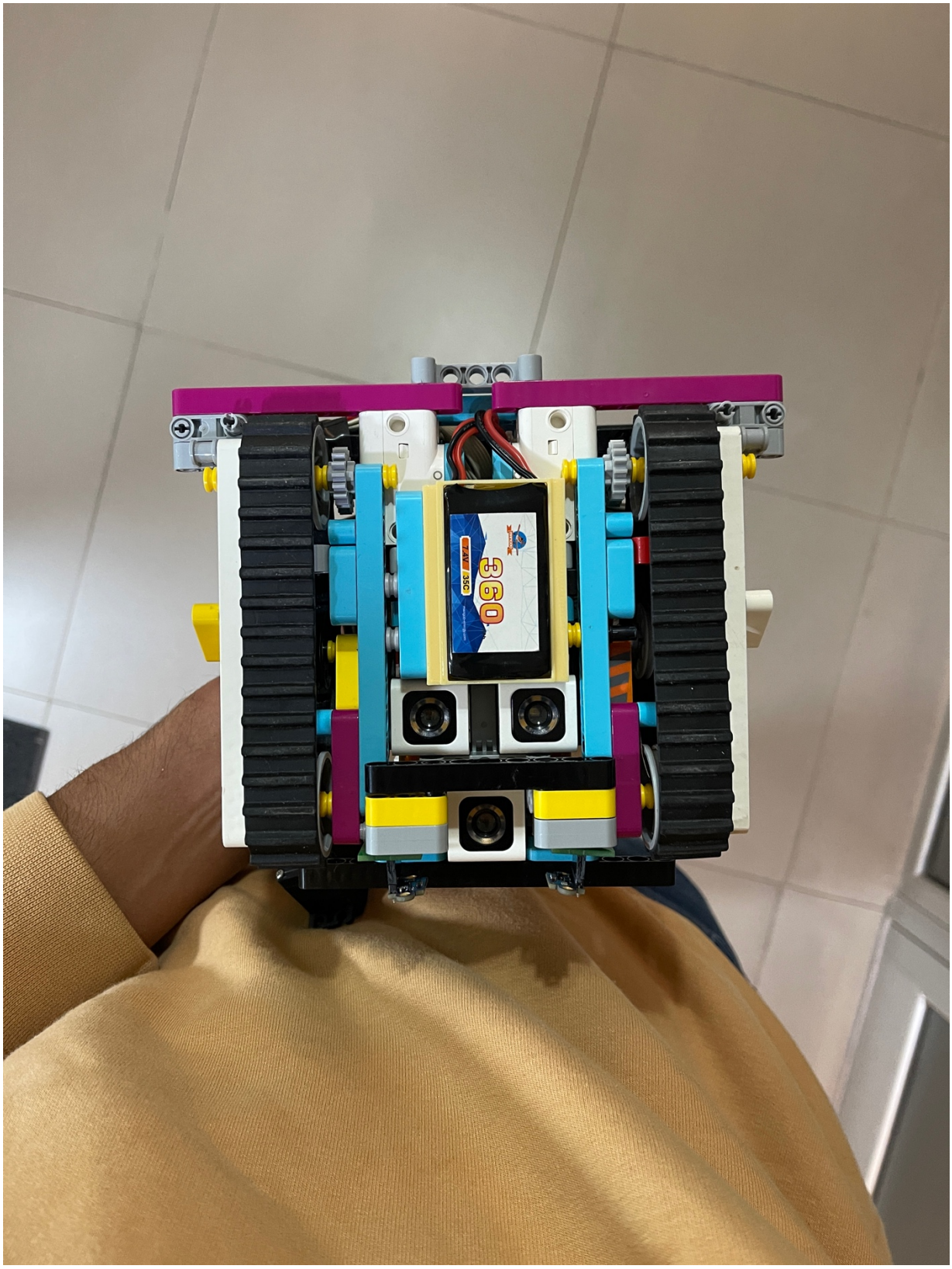











360
7.4V 35C

Appendix 4: Adaptor for the Servo

Adaptor N°2