

“Dream big, build bigger!”

Team summary page.....	2
Our team’s division into departments.....	3
Team bios.....	4
Offseason meeting notes.....	10
Engineering Notebook.....	25
3D-design related team meeting notes.....	25
3D design and printing resources.....	29
Assembly related team meeting notes.....	39
Robot assembly related resources.....	60
List of parts.....	65
Programming related team meeting notes.....	69
Programming and code resources.....	77
Team management and outreach activities.....	92
Team management related team meeting notes.....	92
Outreach related team meeting notes.....	108
Being part of the FTC community.....	113
Events.....	129
Team CSH’s business plan.....	133
Team CSH’s budget.....	151

Our color code:

3D design-teal

Assembly-blue

Programming-yellow

Team management-red

Outreach-grey

Business plan and budget-pink

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Team summary page



Who are we?

We are 14 students who have (at least) one thing in common: our passion for robotics.

Who are our mentors?

- Mrs. Carabas
- Mrs. Cojocaru
- Mr. Cojocaru
- Mr. Petolea

Who are our sponsors?

- **Gold:** Nokia, Simtel Team, Asgo Telecom, Caprice, Frigoglass;
- **Bronze:** Eltrex;
- **Other:** Zinom Impex, Agromarincus;

Who are our partners?

- **Media partners:** TVR Timisoara, Radio Romania Timisoara
- **Other partners:** ‘Carmen Sylva’ Parents’ Association

To what competitions do we plan on participating?

- the Timisoara Demo Games

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- the Timisoara Regionals
- the Bucharest Nationals
- the Detroit World Finals

What events did we host or attend?

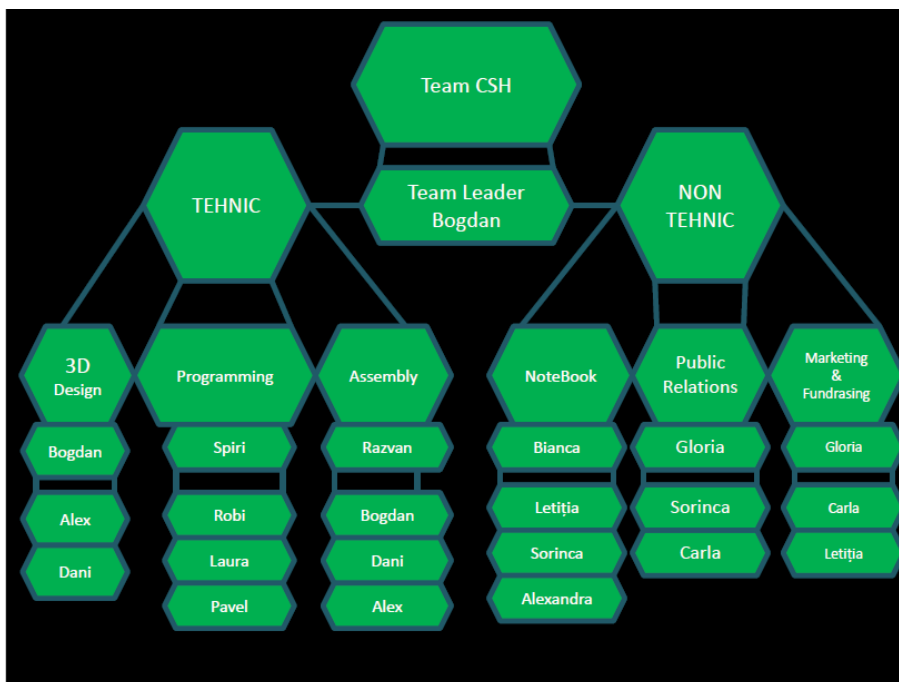
- Codecamp
- European Researchers’ Night
- European Robotics Week
- XEO Talks
- Timisoara City Marathon
- The Timisoara Demo Games
- The Iulius Mall Timisoara Demo Games

What score do we plan on getting during a normal game?

- 80 points from the autonomous period
- 55 points during the driver-controlled period (5*11 minerals dropped in the lander)
- 50 points during the end game for a total of *185 points*

Our team’s division into departments

(Technical- ‘tehnic’; Nontechnical- ‘nontehnic’)



Team bios

Ale

Name: Alexandra Munteanu

Grade: 10th

Team role: notebook and assembly

Hobbies: video games, listening to music and skiing

Why did you sign up for this competition?

I signed up for this contest because I thought it's a once in lifetime occasion to learn more about robotics.



Alex

Name: Alexandru Goman

Grade: 11th

Team role: 3D design

Hobbies: photography

Why do you like robotics?

I like robotics because I think it is the future of humanity and we should focus more on it.



Alexandra

Name: Alexandra Sorinca

Grade: 11th

Team role: notebook

Hobbies: writing, drawing, reading and exercising

What benefits did you obtain during this competition?

Besides the fact that I formed strong bonds with all of the team members, this competition teaches us how to cooperate with one another and it helps us in developing more knowledge about the STEM domains. I'm certain that the acquired experience within this competition will bring me lots of long-term benefits.



Bianca

Name: Bianca Fraunhoffer

Grade: 12th

Team role: main Engineering Notebook writer

Hobbies: playing video games, listening to music, playing the guitar, reading

Why do you like robotics?

Because I find it super interesting. There's nothing else to it, really.



Bogdan

Name: Bogdan Preda

Grade: 10th

Team role: team leader

Hobbies: cycling, programming and building robots

Why do you like robotics?

I like robotics because it is the domain of the future and I would love to progress in it.



Carla

Name: Carla Dumitrescu

Grade: 10th

Team role: marketing

Hobbies: dancing, photography, reading, drawing and watching movies

What do you like about teamwork?

Teamwork consists of collaboration, trust, respect and especially of efficient communication. A famous quote says “One individual can be a very valuable asset of a team, but one individual cannot form a team.”

Aside the fact that dividing the tasks to more members makes work much easier and efficient, there are many more advantages of working in a team. For example, working in this way, you can get done stuff that might seem hard to



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do on your own. Even if it might seem that the team members work on completely different things, all of them need the advice of their colleagues thus forming some kind of chain. And eliminating any part of it would lead to the total destruction of that chain. Only when all of the things are perfectly aligned and the purpose of the team is met, you can see the worth of every single member.

Dani

Name: Daniel Stoica

Grade: 12th

Team role: assembly and 3D design

Hobbies: gym, robotics, and everything that is related to technology

What benefits did you obtain during this competition?

First of all, I developed my team working skills; I also met a lot of new, amazing people and I broadened my horizons, but most importantly, I learned how to apply all of the theories I was thought in school and learned at home in real life.



Gloria

Name: Gloria Morosan

Grade: 10th

Team role: manager marketing and PR

Hobbies: dancing

Why did you sign up for this competition?

I joined FTC because it is a competition that combines all domains and together with the team we discover the joy of team-work while learning from one another.



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Laura

Name: Laura Chirila

Grade: 9th

Team role: programming

Hobbies: programming

Why did you sign up for this competition?

I joined FTC because I consider it to be a real challenge, but also an opportunity to learn new things.



Leti

Name: Letitia Bulica

Grade: 11th

Team role: notebook and marketing

Hobbies: hiking, video games, board games, reading and watching stuff

What benefits did you obtain during this competition?

Most importantly, I learned lots of new things that will help me later in life. I made new friends from all across the country and I improved my teamwork and communication skills.



Pavel

Name: Pavel Prodaniuc

Grade: 12th

Team role: programming

Hobbies: cycling many kilometers and cyber security

Why do you like robotics?

I like robotics because it combines the real, physical part with the software, mathematics, physics and engineering part.



Peto

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Name: Petolea Razvan

Grade: 11th

Team role: assembly

Hobbies: basketball and volleyball

Why did you sign up for this competition?

I signed up because I thought it sounded interesting. I liked robotics ever since I was little and went to a Mindstorms robotics course.



Robi

Name: Robert Bernad

Grade: 11th

Team role: programming

Hobbies: basketball, computer science and hanging out with friends

What benefits did you obtain during this competition?

I learned how to handle the stress of such a big competition and also new things.



Spiri

Name: Robert Iridon

Grade: 10th

Team role: programming

Hobbies: hanging out with friends and programming

Why do you like robotics?

I like robotics because it's more dynamic and fascinating than normal programming.



Mrs. Carabas

Name: Tatiana Cărăbaș

Occupation informatics teacher

Role in the team: mentor

Hobbies: manufacturing of handmade items

Why this project?

I was delighted by the idea of going into a project with the most devoted students from the classes I teach. Considering that my basic training is engineering, and robotics is one of its top branches, it was natural that I was attracted by this project, where the students have to build a robot.



Mr. Cojocaru

Name: Daniel Cojocaru

Occupation physics teacher

Role in the team: mentor

Hobbies: cycling, reading, traveling

Why do you like robotics?

Because robotics is a captivating and entertaining way that strengthens programming, physics, and mathematical notions that stimulate creativity, critical thinking, and the ability to work in a team.



Mrs. Cojocaru

Name: Nusa Cojocaru

Occupation informatics teacher

Role in the team: mentor

Hobbies: traveling

Why do you like robotics?

Because it is a novel field, one that draws the young people I work with, and because I consider robotics to be the future.



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Mr. Petolea

Name: Florin Petolea

Occupation: electrical engineer

Role in the team: mentor

Hobbies: Ham Radio, tennis

Why this project?

I was excited by the idea of being a part of a team that participates in such a diverse competition like the FTC, and also by being

surrounded by students. I think that sharing with them technical knowledge and brainstorming with them ideas about building the robot will be fun.



Offseason meeting notes

Our activity didn't stop after participating at last year's nationals! Until September, when the new season started, we kept busy! Read here how.

May 19th: A new working space?

Meeting held: at Nokia, at 19:30

Attendance: Ale, Bianca, Bogdan, Carla, Cristi, Dani, Gloria, Leti, Pavel, Peto, Spiri, Mrs. Cojocar, Mrs. Carabas, Mr. Cojocar, Mr. Petolea

Today, we met in full formation at the Nokia IoT Garage in Timisoara, because of two reasons: the first reason is that today (or *tonight*) is the Museums' Night, when you don't have to pay an entry fee to visit museums, and Nokia is holding a small exhibition about the evolution of phones and telecommunication which we found interesting, and the second is that, thanks to our mentor Mr. Petolea, we will work at our robot in a space provided by Nokia as part of their Internet Of Things Garage project.

The exhibition was great! We even got to see the famous Nokia 3310 mobile phone, and a very old computer which you could program to do things such as simple math operations, using a cheat sheet of the programming language that was provided.

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After viewing the exhibition, we were invited by Mr. Florin Ciocan to a tour of the Nokia IoT Garage. It was a very interesting visit, and we left the premises knowing that we have secured our working space this season.

Today we also said goodbye to Mircea and Cosmin, who decided to leave the team. It is sad, but we are happy with our collaboration with them so far and wish them the best of luck in the future!



The newly inaugurated building we will be working in the next season



Nokia's main building

May 30th: Just an update

Meeting held: at the Frigoglass factory, at 9

Attendance: Ale, Bianca, Bogdan, Carla, Cristi, Dani, Gloria, Leti, Pavel, Peto, Spiri, Mrs. Cojocaru, Mrs. Carabas, Mr. Cojocaru

Today, we went to Frigoglass, our biggest sponsor, and we held a small presentation which served to update them regarding our performance at the Finals in Bucharest. Gloria had prepared a PowerPoint slideshow, Bianca spoke about the Engineering Notebook, and Bogdan and Peto showcased our robot's abilities. After the bumpy ride which were the Finals, our robot wasn't exactly in perfect shape; however, the people at Frigoglass, including the manager, were thrilled to see us still so excited about our team, about robotics.

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After finishing with what we had planned, we were invited to go on a tour of the factory. Upon leaving, we all agreed that we’d like to continue our collaboration with Frigoglass in the next season. We’re keeping our fingers crossed!



Us, holding our diplomas next to Frigoglass’ building. Mrs. Carabas decided to wait until we met with our main sponsors to give us the diplomas from the National Finals.

June 7th: A Note-worthy day

Meeting held: at school, at 10

Attendance: Bianca, Bogdan, Carla, Mrs. Cojocaru, Mrs. Carabas

Today we are taking our first step towards the next season, by having try-outs for anyone who wanted to join. This try-out in particular was for another member who could help with the Engineering Notebook, since Bianca, the main writer, will be in the 12th grade, and will not be able to fully focus on the competition because of the Bacalaureate exam. Pavel and Dani are in the same situation, and we will have a try-out for another software developer on our team during the summer, but the details are still unclear.

We put a poster in the hallway a week ago, advertising that we need a new teammate, and stating what we’re looking for in them: good English and writing skills. We set up an online form for the interested to sign up, and it has been filled in by four girls: Maria, Oana, Andreea and even our own Carla! Carla felt like she wanted to do more for the team in the next season, and she wanted the selection process to be fair and square, so she participated in the try-out, along with the three girls.

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In the beginning, Bianca introduced herself and Bogdan, who attended the meeting as the team leader. She had a physical copy of last season’s Notebook prepared, and she walked the girls through it, explaining what the Engineering Notebook *is* exactly, what it must contain, and how should the content be written. Then, she showed them the guidelines from the official FIRST website, as well as a Notebook that won the Inspire Award, so they have an example that isn’t the team’s Notebook. Then, as the official try-out part of the meeting, she asked the girls to write a Notebook entry about today, both in English and in Romanian. Bianca will then look over the entries and will decide together with the mentors who will join the team.



The girls who tried out, working hard (left) and the poster we used to let people know we are looking for new teammates, which specifies that we need someone to help with the Engineering Notebook, as well as a software developer (right). It also mentions the job description and the requirements any candidate must fulfil.

June 12th: The last day of school, the first day of planning

Meeting held: at school, at 9

Attendance: Ale, Bianca, Bogdan, Carla, Cristi, Dani, Gloria, Leti, Maria, Pavel, Peto, Spiri, Mrs. Cojocaru, Mrs. Carabas, Mr. Cojocaru

Following the try-outs, a new member has joined our team: Maria Popescu, who will be helping with the Engineering Notebook. This is her first team meeting, and we all introduced ourselves to her.

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On our schedule today were many things. To begin with, we agreed on the process of welcoming a new software developer, so we won't have any issues regarding our code when Pavel will be busy. The try-out, which will be some sort of test of Java proficiency, will be at the beginning of September, so we wouldn't have to do that many things during the summer holiday, but to be able to film the registration video with them.

Speaking of, we found out that this year, as part of the preselection process we need: a one-page text answering a question ('What do you believe will be the impact of robotics and of studying STEM on your futures?'), a video in which the team members will tackle three topics ('What do you believe will be the impact of robotics and of studying STEM on your futures?', 'What do you expect to learn from BRD FIRST Tech Challenge?' and 'How do you plan to use the newly-acquired knowledge in the future?') and the team's name, logo and motto as a JPEG file, by October 1st.

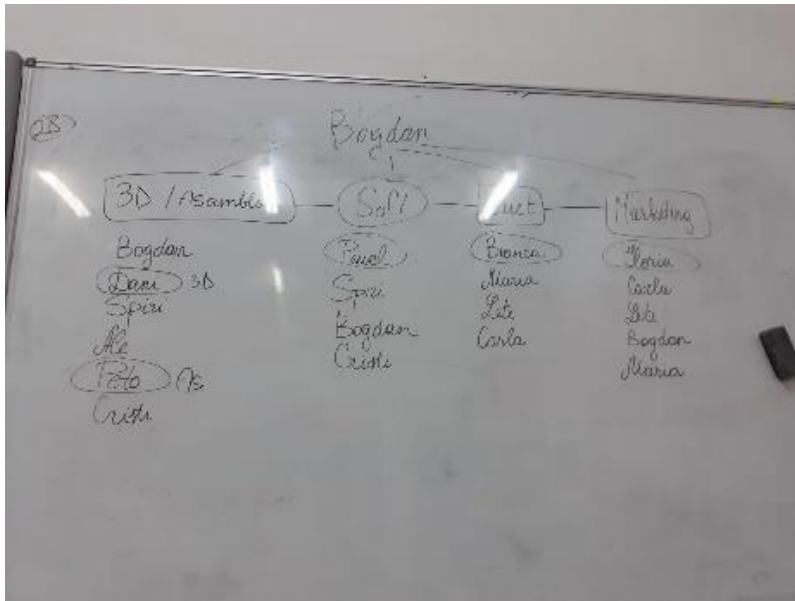
Everyone on the team is familiar with our rush to get ourselves registered last year, when we filmed the video in four hours before the deadline, only to get lucky because of an extension. We don't want a repeat of that, so we decided to change our approach to the video: considering how we've been wanting to upload some short videos which introduce us to our Facebook following for a while now, we agreed to all make an individual presentation video, where we would be careful to answer the specified questions. Then, in September, when we will most likely have our next full-formation meeting, we will bring our videos with us, shoot a few sequences with all of us together, and have them fused together into one standalone presentation video for the whole team.

Another subject we discussed was the issue of our team's departments. We felt like the past season's divide might not have been optimal, but we had to reorganize ourselves anyway since we lost two members. After choosing our departments again, we have come up with a new divide, which we hope will help us be even more productive in the upcoming season.

Before ending the session, Mrs. Carabas spoke with the team members who will be going to the Robotics Summer Camp, in the beginning of July. They are: Bianca, Bogdan, Dani, Gloria, Pavel, Peto and Spiri. We don't really know how

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we are going to transport the robot yet, since we will be going to Beclean by train, but we are sure we'll figure it out.



Our new division into departments

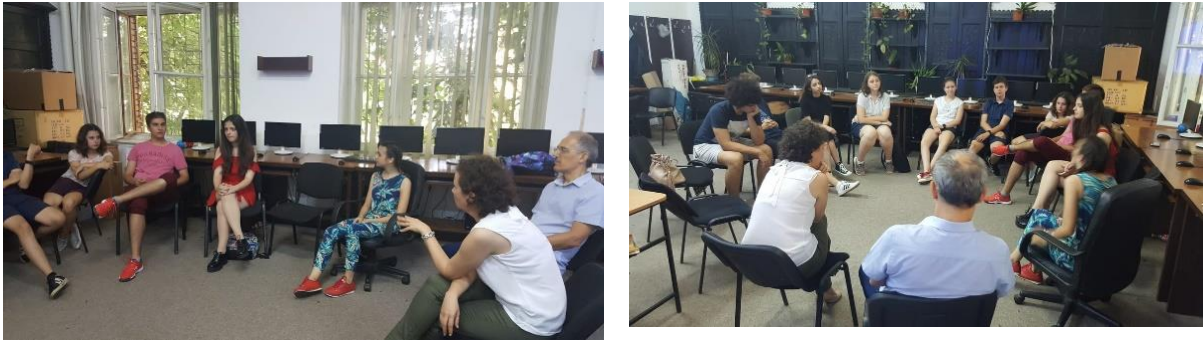
Calendar
- august (min) 1-15
- 1-11 septembrie - seminar PM (cursuri online)
- 15-20 septembrie - concurs
- 1-3 septembrie - Paul soft
- 4 septembrie - video partinuta - dist. 2) Paul grila

Our schedule from August to September.

Durata: 1-3 minute
Contiut: Nume
Scobita - timp liber (preocupari, pasiuni)
Ce asteptari ai de la FTC?
Cum s-a schimbat FTC?
De ce sunt participant FTC?
Termen: 4 septembrie

The content for the personal videos on facebook.

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Us, during the meeting.

July 2nd: Arriving at camp!

Meeting held: at the Robotics Summer Camp in Beclean, Bistrita county

Attendance: Bianca, Bogdan, Dani, Gloria, Pavel, Peto, Spiri, Mrs. Carabas

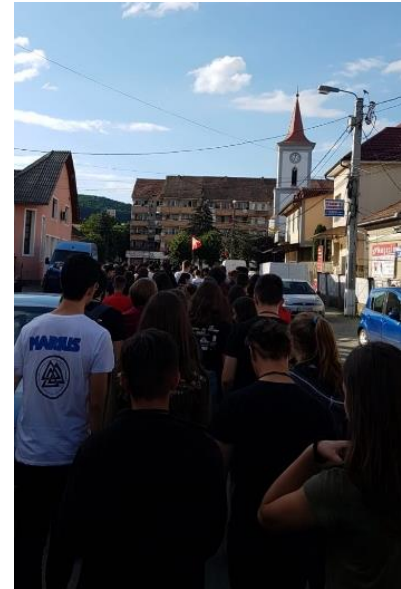
After a torturous 8-hour train journey, with the box containing Qubit sat in our leg room, we had finally arrived in Beclean. We met our coordinators, Cristina and Vasile, and we settled the rooming. Gloria and Bianca shared a room, together with Priscilla from team RO056, Muschetarii Roboticii, and all the boys share one room.

After unpacking and a couple of hours of free time, the whole camp formed a parade, which was how we walked from the ‘Petru Rares’ National College’s boarding school to the central park, where the opening ceremony was held. Seeing so many people wearing their team’s shirt reminded us of the Nationals.

The mayor spoke a few words, and then everybody received a file with the participation diploma, a badge with our name on it, and the camp’s schedule. It appears that, at the end of the week there will be a fair and several concerts, as part of the celebration for the town’s days. That’s good to know.

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As a team-building activity, we all took a walk by the river Someș, which passes through Beclean. Somewhere at the edge of the town, we found a big, rusty bridge which we crossed, and then we walked home on another route. We had an overall pleasant first day.



Spiri, Peto and Pavel crossing the rusty bridge (above) and the parade (right).

July 3rd: A friendly competition

Meeting held: at the Robotics Summer Camp in Beclean, Bistrita county

Attendance: Bianca, Bogdan, Dani, Gloria, Pavel, Peto, Spiri, Mrs. Carabas

After reading the camp's schedule, we found out that today will be a friendly competition between every team. Kind of like last season's friendly demo games. That being said, we geared up and took Qubit out of the box, to make every possible adjustment we can make. After our hectic Nationals, and a few months during which we didn't touch the robot, we have quite a few problems. We had to put scotch on the tray and on the relic arm, because one of the servo motors broke and we couldn't have them randomly moving during initialization. Also, one of the parts we 3D printed for our suction mechanism melted from the heat and is making the entire mechanism malfunction. A pretty big concern is that, somehow, through unforeseen circumstances, we lost the only copy of the code, which means that we can't modify anything.

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However, we'll try to manage. Since Cosmin left, our drivers were Bogdan and Peto, with Pavel as the coach. We had five matches.

Our first match was in alliance with team RO024 Hype, against the blue alliance, team RO001 Xeo and team RO056 Muschetarii Roboticii. During the autonomous period we knocked over the right jewel... and nothing else. To be honest, we didn't have the best autonomous period at Bucharest, either, so we're happy with this. During the controlled period we put four glyphs in the cryptobox, but sadly, one fell down. We can't put columns in the cryptobox since our slider is covered in scotch tape. During the end game, we returned on the balancing stone. The score was 102-104, for the blue alliance.

For the second match, we teamed up with team RO089 Relicbot as the red alliance, against teams RO015 Robotitans and RO14276/ RO046 Technogods. We knocked over the right jewel again, and we placed 6 glyphs into the cryptobox, making this one of our best performances ever. One glyph fell again, but the drivers remained focused and returned to the balancing stone. We lost again, 16-1AA.

Our third match wasn't very good, because a screw came loose and rendered our tray useless. We played with team RO063 Wafy as the blue alliance, versus the red teams RO014 Qube and RO042 Bionic_Royals. Our autonomous period went by as expected, but the malfunction of the tray left us with only one glyph in the cryptobox. We balanced our robot during the end period, too, and the score was 72-164 for the red alliance.

The fourth match was decidedly not only the best match of today, but the best match for us of all time, having put 8 glyphs into the cryptobox. We also had a satisfying autonomous period and end game, which translated into having won our first match! Together with team RO031 Soft Hoarders as the blue alliance, we scored a total of 126 points against the read alliance, teams RO002 Harambecartel and RO037 Byteforce, who scored 106 points.

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advertising various tv channels or internet websites: a news channel, a sports channel, a history channel, a travel channel, a fashion channel, a music channel, youtube, facebook, linkedin, netflix and instagram. We got to talk with members of the other teams and have fun at the same time! Spiri’s team, the team which advertised the sports channel, won.

After that, during the evening, the organizers took everyone to a place where we ate dinner and had a campfire, as a way of celebrating the 4th of July, since FIRST Tech Challenge is an American contest. The fire was great, and everyone had an amazing time.



Dani and Spiri having fun during the afternoon assignment (above and left) and everyone, gathered around the fire (below).



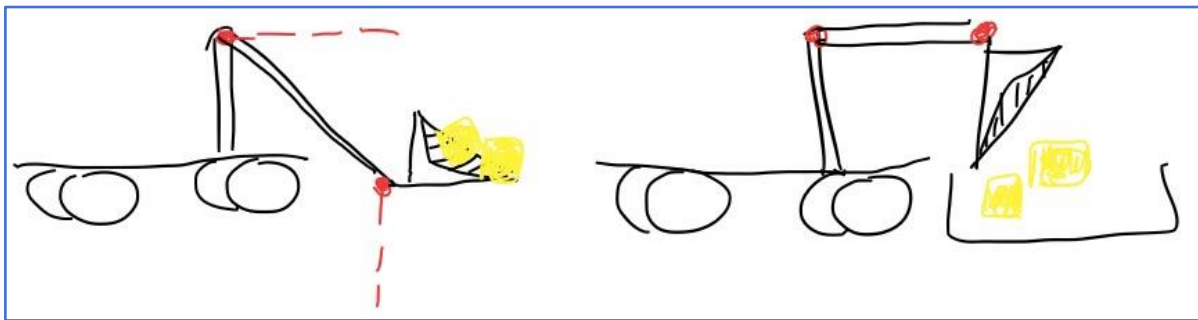
July 5th: Brainstorming

Meeting held: at the Robotics Summer Camp in Beclean, Bistrita county

Attendance: Bianca, Bogdan, Dani, Gloria, Pavel, Peto, Spiri, Mrs. Carabas

Since the robot assembly trainer told us that we will have to start working so the robot will be functional by Saturday, we began disassembling as much as we could. Nobody really thought that we might need spare parts, so every alteration to the robot’s design will have to use the same parts we have now.

Spiri, Dani and Bogdan have started brainstorming for ideas as to how we will pick up the yellow cubes. Dani thought of making a shovel that connects to a jointed arm. The cubes will be picked up as the robot goes towards them, and the arm will move and drop the cubes from the shovel into the box.



The way our robot would pick up the cubes.

However, we have the problem that we don’t have the code anymore, therefore we can’t reprogram any of the motors on the robot. Also, Pavel has to leave tomorrow due to personal reasons, and he was the main programmer. We will just use what we have right now and hope for the best. Speaking of the shovel, we used the sides of our robot to make it.

Later during the day, back in the workshop, when we attached a motor to the arm and tried operating it, we noticed that the movement was spasm-like, and that it would often catapult the cubes behind.

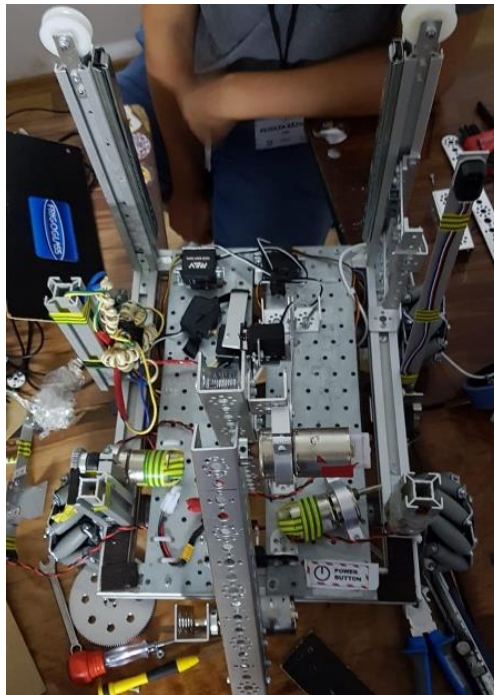
This happens because of how we have too much power in the motors we can attach. At some point the shovel split along the top because of the strength of

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the second motor. We have to figure something out because, at this rate we might not have a functional robot by Saturday.



Spiri and Dani discussing Dani's idea (left), Bogdan and Peto taking the robot apart (right) and a view of the updated robot from above (below).



As for the other camp activities, today everybody went to the Beclean public pool. The weather was a little cloudy at first, and we were scared it might rain, but eventually the clouds cleared, and we spent a fun day in the sun.

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Bodgan, Spiri, Dani and some friends from team RO075 LittleFutureRobots from Jimbolia, at the pool (right).

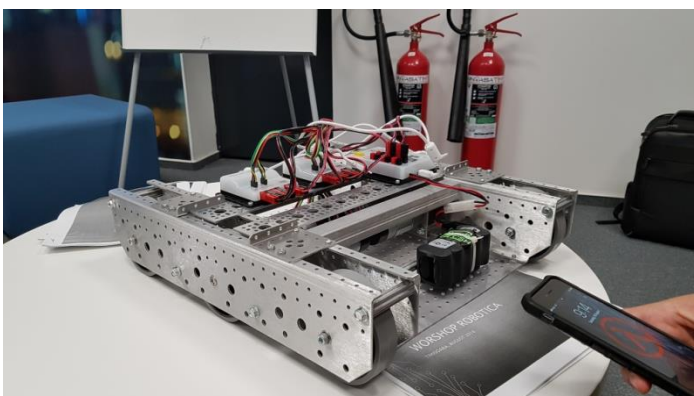
August 18th: Back in business!

Meeting held: at the Nokia IoT Garage, at 9

Attendance : Ale, Bianca, Bogdan, Carla, Dani, Laura, Pavel, Peto, Mr. Petolea

Mr. Petolea held a workshop, which served to familiarize us with basic concepts of electronics and programming. We received an Arduino each, along with a few other accessories, such as a breadboard, LEDs and wires. The workshop was particularly useful, especially because we learned a lot about the functioning of motors, as well as using this knowledge in programming them.

Also, Mr. Petolea brought the chassis he built over the summer, the example one from AndyMark. We already have a base on which we can build as soon as the theme comes out, which is great!



The chassis Peto and Mr. Petolea built over the summer

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August 19th: Back in business!- part 2

Meeting held: at the Nokia IoT Garage, at 9

Attendance: Ale, Bianca, Bogdan, Dani, Laura, Pavel, Peto, Robi, Mr. Petolea

We had a small exercise in programming; trying to program the color sensor on the robot. We have an inkling that the theme this year will use color recognition in some way, but even if it doesn't, you can never have too much practice.

We browsed the list of parts the others compiled over skype last week, and we're considering buying other shafts, perhaps the Shaft Prime D from Tetrix, but we'd like something made of metal. We removed lots of items, which can only help our budget this year. We added a chain, and we looked for a linear motion kit, or something which we could use to reproduce the 200\$ lift from Rev Robotics.



Everyone, checking out the chassis (left) and Mr. Petolea, writing down new ideas for this year's systems (right).

Engineering Notebook

3D-design related team meeting notes

We often came up with ideas that required parts we had to make ourselves, including the entirety of our collecting system, parts which were designed in 3D-designing programs such as Cura or Fusion, and printed using a 3D printer. Since designing can be done anywhere on a computer, the only things done at the Nokia Garage regarding 3D-design were brainstorming and printing.

For more information about the 3D-printed parts on our robot, please see the ***3D design and printing resources, starting from page 29.***

September 23rd: Settling in

Meeting held: at the Nokia IoT Garage, at 9

Attendance: Ale, Alex, Alexandra, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Peto, Robi, Spiri, Mrs. Carabas, Mr. Petolea, Mr. Cojocar

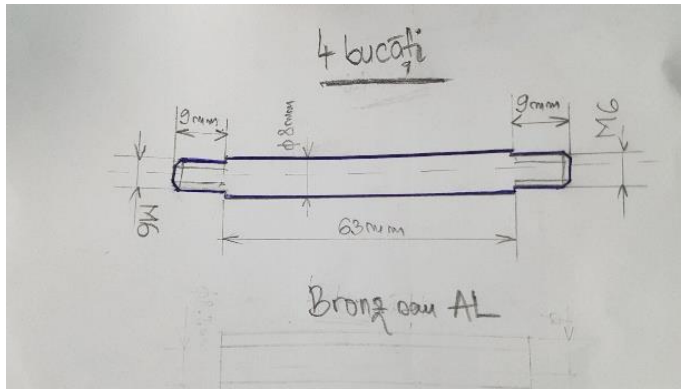
Today we received our 3D-printed pieces of the crater; only 2, because 3 of the 5 we wanted didn't print right. We also brought the playing field from the school, to put it together at Nokia. The foam tiles will play a part in whether our chassis can cross the crater, and the playing field with its dimensions is extremely important for coding the autonomous period. The other parts of the field, such as the lander and the minerals can't arrive fast enough.

We tested the chassis on the carpet first, and it barely crossed the crater. We removed the plexiglass bottom, and then we tried again, only on the playing field this time. It crosses it, but it scratches the crater pieces, and we'd like to keep our penalties to a minimum, so we will work on easing the crossing. Peto had a very good idea: putting a smaller wheel between the big wheels, so the crater won't get stuck. Ideally, we would have a wheel like the ones on skateboards or roller-blades, because the silicone they are made of is both adherent and resistant, or metal- ideally bronze or aluminum.

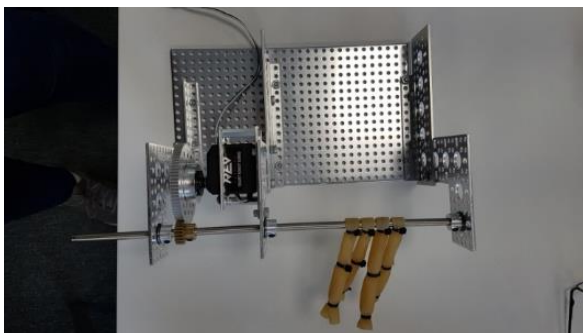
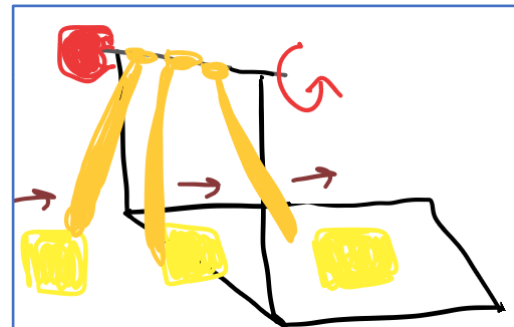


Where the small wheels should go (left), and a sketch of an ideal wheel, made by Alex (below).

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Regarding collecting the minerals, we have a prototype mechanism that uses a servo motor which spins an ax on which are tied thick pieces of rubber, which then would suck any object in their way. However, the rubber is too thin, so we need to either find another material, or to make the rubber we have thicker by putting some sort of plastic tube inside it. Materials we are currently considering are a polyvinyl chloride tube, an electricity-conductive cable, or copper wire.

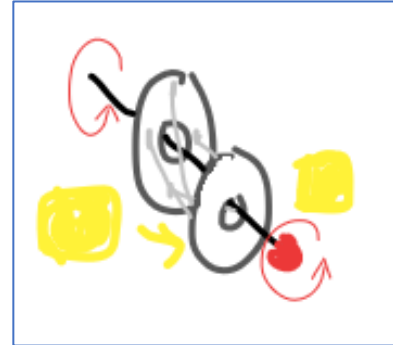
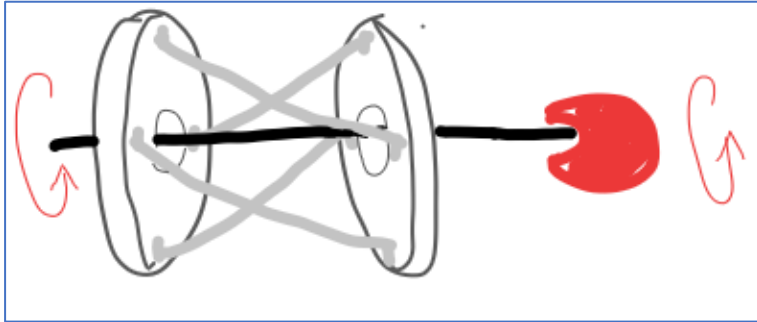


The first mineral collector prototype

Another idea for gathering the minerals is a system that uses taut rubber bands. The rubber bands are tied to two flat wheels, which are spun by a servo motor. Dani, Alex and Alexandra built a prototype, and it seems to be really efficient. Mr. Petolea told us that this is, undoubtedly, the best mechanism, and that we should begin to think about implementing our design. A problem

“Dream big, build bigger!”

we had was that the cube was getting stuck in the bottom of the mechanism, so we adjusted the height at which the system is placed by 8,5 cm. Since the cube is 5 cm tall, we'd like it to come in contact with the mechanism at 4,8 cm, so it will be drawn inside.



The second collector mechanism prototype

September 30th : 3D printing? 3D printing.

Attendance: Alex, Alexandra, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Leti, Peto, Robi, Spiri, Mr. Petolea

Meeting held: at the Nokia IoT Garage, at 9am

Today we received the 3D printer from Symme, and we also tested it by printing bracelets, which was fun.

We implemented Peto's idea to have smaller wheels to smoothen the movement when climbing the crater, and today we tried to include these wheels in the chassis. Symme even offered to have some made for us, out of metal. Unfortunately, their diameter was too small, because they didn't protrude, which meant that we were back to square one. Alex thought of 3D printing some 'sleeves' for these wheels, to increase their diameter.



The wheels, without the sleeve(left) and with the sleeve(right)

“Dream big, build bigger!”

After calibrating and testing the 3D printer, we got down to business and started printing some of the parts we currently need: the sleeves and some discs which would hold the suction mechanism in place; the prototype had gears, but the teeth could damage other robots or parts from the playing field, and we want our systems to be foolproof.

December 9th :Final touches

Attendance : Bianca, Bogdan, Carla, Gloria, Laura, Leti, Spiri, Mr. Petolea

Meeting held: at the Nokia IoT Garage, at 9 am

There weren't that many members here today, because most of us have to study for finals at school. However, we still want to work, because there still are a number of things that need to be finished.

Alex printed the new collector, and Bogdan and Mr. Petolea worked on replacing the old collector. While they were busy with that, they also noticed that one of the axles in the collector arm is broken, but they fixed it in no time.

December 23rd: Designing our team marker

Meeting held at: at the Nokia headquarters at 9 am

Attendance: Peto, Carla, Leti, Bogdan, Laura

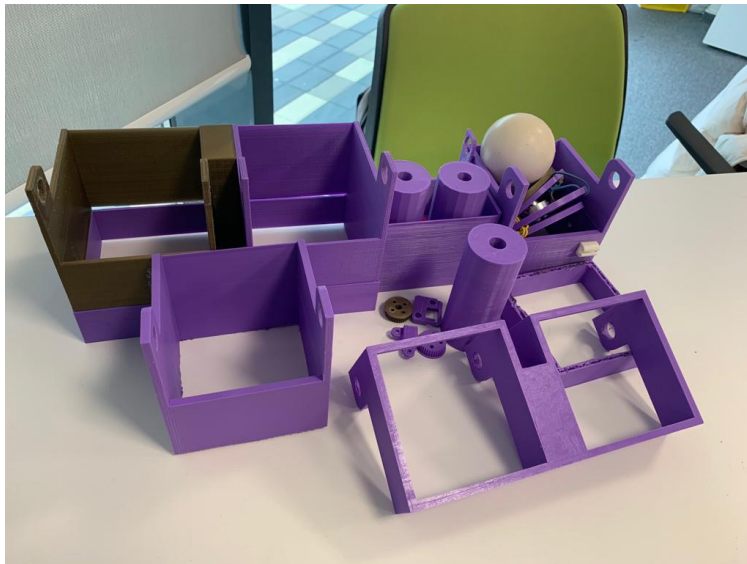
We thought of making the team marker a snowflake since the robot will be designed to look like a sleigh (because of the challenge that we launched: First Frost Challenge). A possibility is that the snowflake won't be durable enough or that it will get stuck in the elastic.

In the end, we decided on a small cube with our logo dented into it, but until we will be able to print it, we will use a small box.

“Dream big, build bigger!”

3D design and printing resources

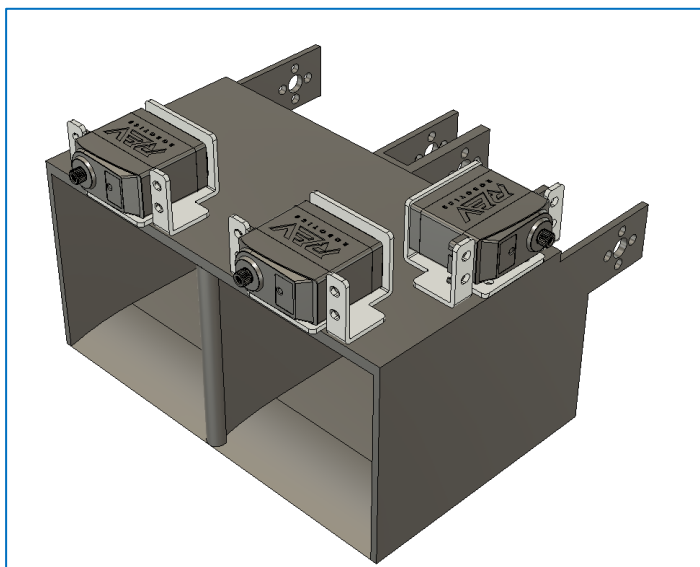
We use Fusion and Cura for designing any parts we might need to print. Here are pictures and explanations for every 3D-printed part we currently have on our robot.



The leftovers from the prototypes we 3D printed during the season

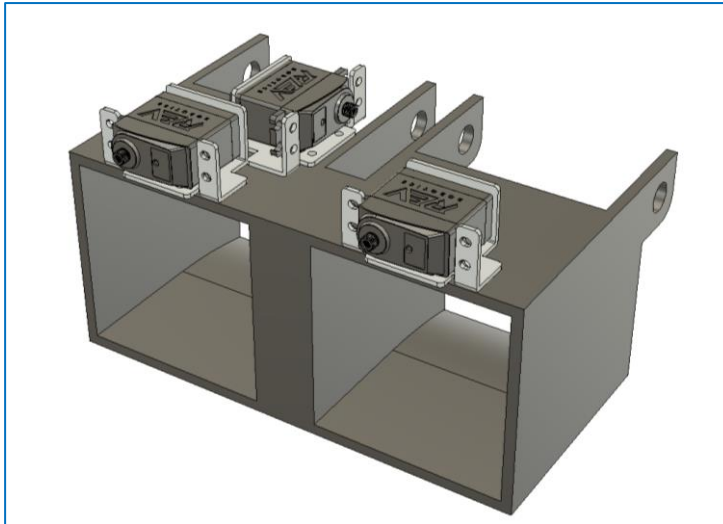
The collecting mechanism's box

Right after deciding on which prototype we wanted to implement, we began working on the box which would handle the collected minerals. Over six months, we have gone through five versions of the box, as exemplified below:

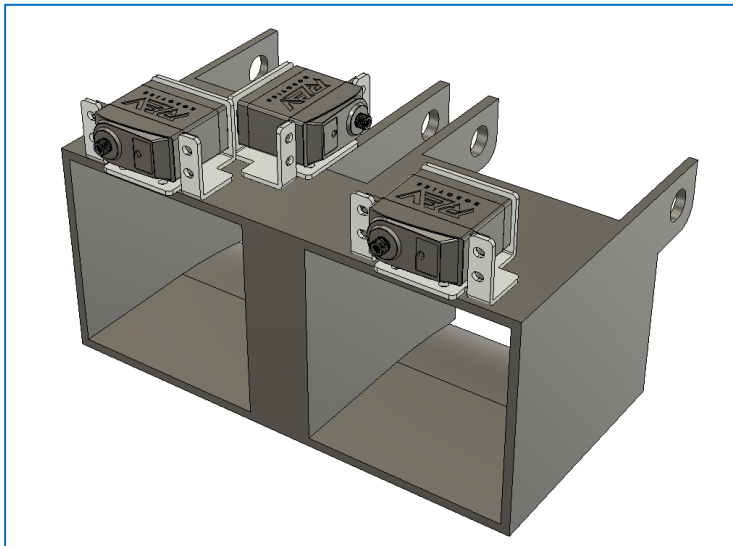


The first version, where we wanted to collect two minerals at once, but still have them separated, hence the two compartments.

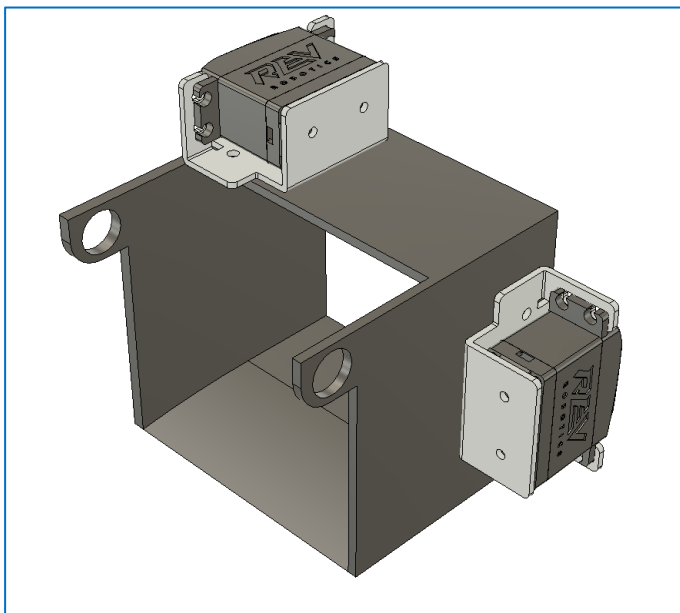
“Dream big, build bigger!”



The second version, whose most significant difference is the positioning of the suction mechanism's servo motor.

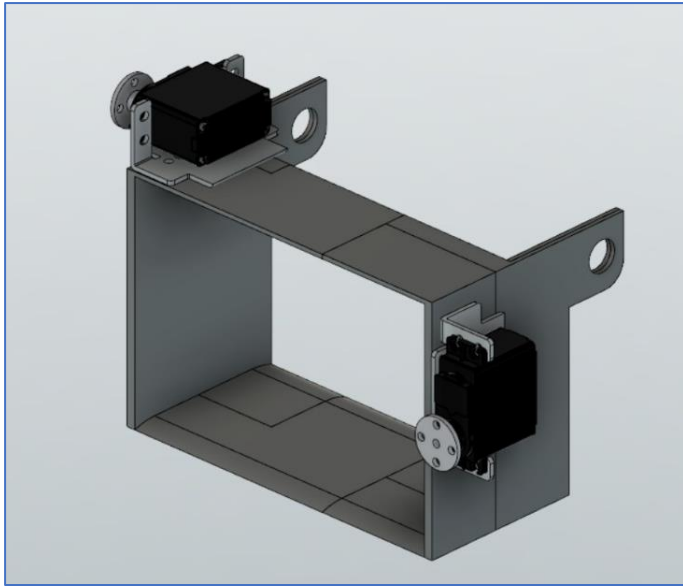


The third version, whose only difference is the thickness of the outermost walls.



The fourth version, which is significantly different with its single compartment.

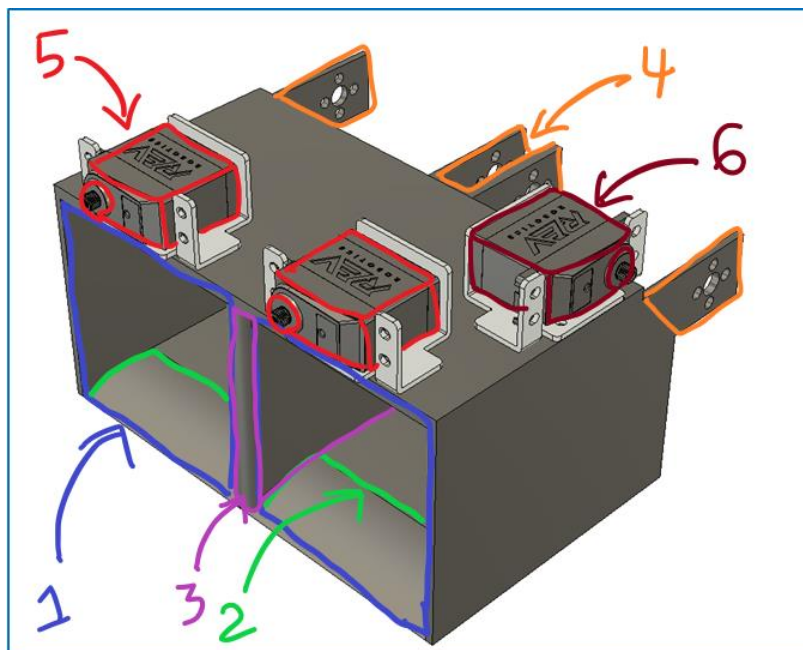
“Dream big, build bigger!”



The fifth and final version, which has been widened as to accommodate two minerals at once.

The first version

What we were aiming for, in the beginning, was a failsafe way to collect and deposit minerals in the lander. Since the minerals must be also sorted upon deposition, the issue of how to sort them came into question. Soon enough, we thought that, if we could somehow handle the minerals separately but at the same time, the problem would be solved, which brought us to build a prototype for a box that contains two compartments.



The dimensions of the box are: (L*I*h) 18 cm*12 cm*9 cm

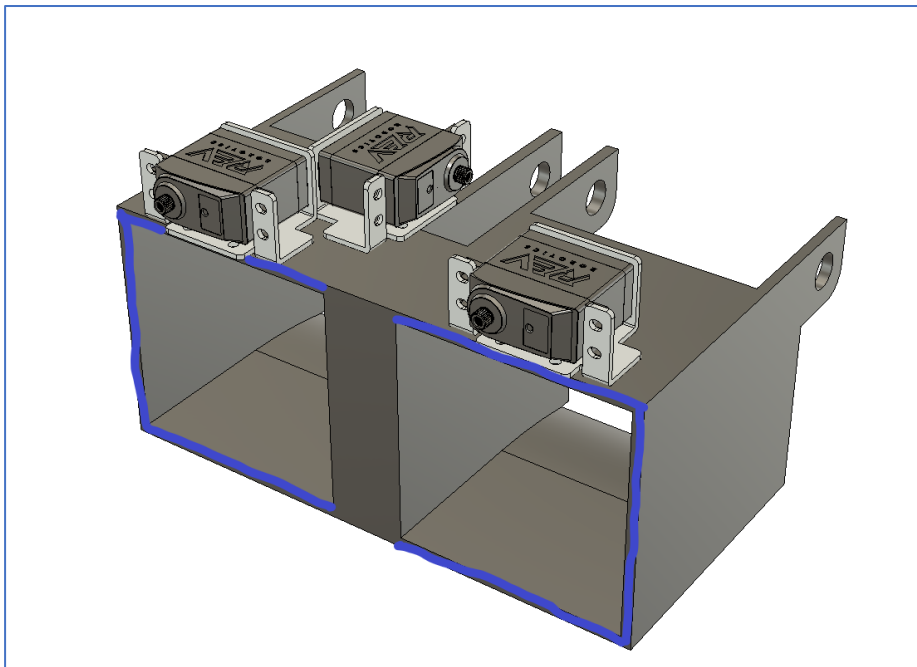
The dimensions of the separating wall are: (L*I*h) 1 cm*12 cm*8.5 cm

“Dream big, build bigger!”

4. three pieces which will hold the axle for the wheels
5. two servo motors which will activate a stopper, to hold the minerals in place until deposition
6. a servo motor which will power the suction mechanism, positioned towards the middle
7. a channel which will accommodate the movement of the servo motor

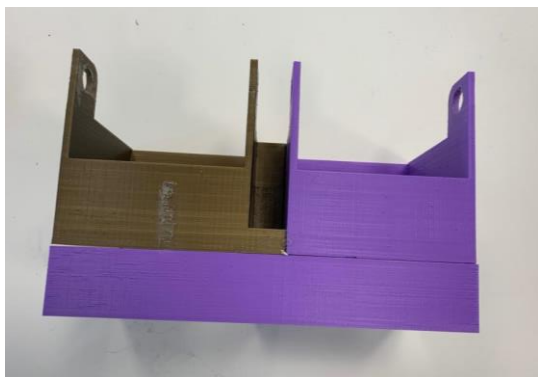
The third version

The only modifications made to the previous version were related to the sizing; the outermost walls now being 1 cm thinner.



Aside from the highlighted feature, there are no other modifications.

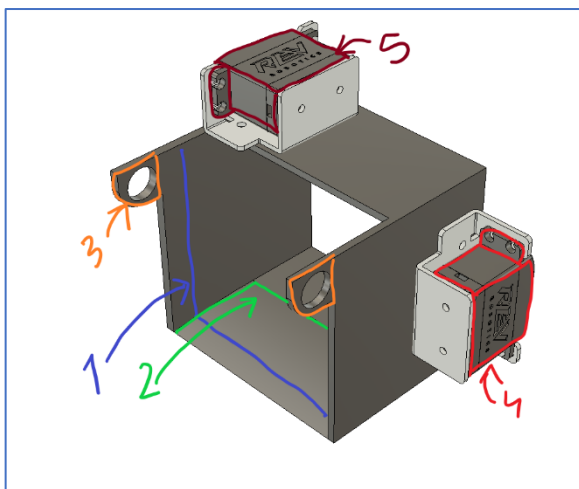
Highlighted feature: the thinner outermost walls.



A 3D-printed prototype of this version; we tried printing it in turns, to save plastic

The fourth version

This version is significantly different from the others, because of its single compartment. While testing the previous prototype, we realized that the collected minerals would more often than not get stuck in the box because of the separating wall, so we chose to remove the second compartment altogether, trusting in the training the drivers will have with collecting and sorting the minerals before depositing them. Another modification is the position of the (now single) servo motor which will activate the stopper that keeps the collected minerals in place, having moved it to the side of the box.



The dimensions of the box are: (L*I*h)
10 cm*7.5 cm*11 cm

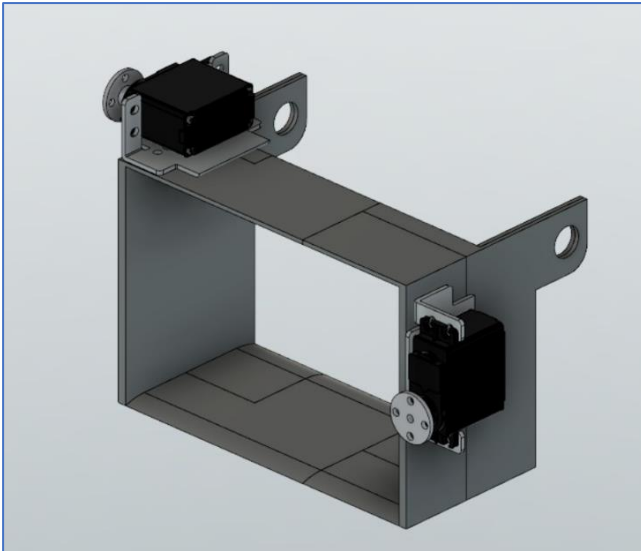
Highlighted features:

1. one single compartment
2. a smoothed floor, which helps reduce friction
3. two pieces which will hold the axle for the wheels
4. one servo motor which will activate a stopper, to hold the minerals in place until deposition
5. a servo motor which will power the suction mechanism

The fifth and final version

The only difference between this version and the previous one is the width of the box, which is calculated as to allow us to handle two minerals at once.

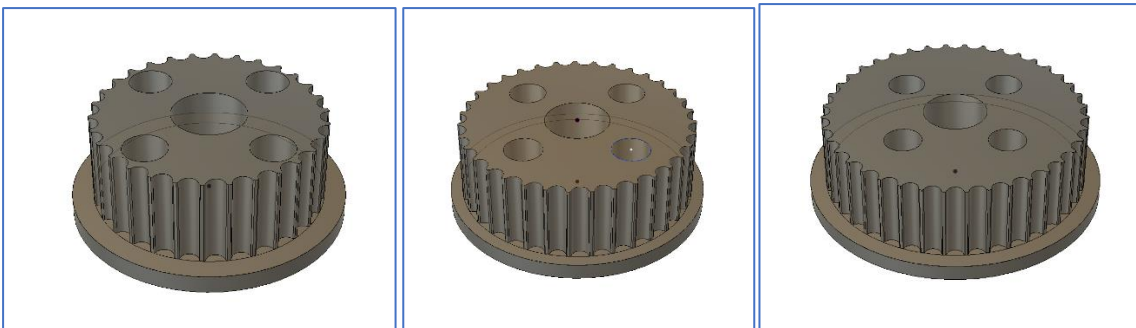
“Dream big, build bigger!”



The dimensions of the box are: (L*I*h) 14.02 cm*9 cm*10 cm

The custom servo pulleys

The servo motors from the suction mechanism needed custom-made pulleys, which we printed in a variety: with 30 teeth, with 35 teeth, and with 40 teeth, as seen below:



The servo horns, with 30 teeth(left), 35 teeth(middle) and 40 teeth(right).

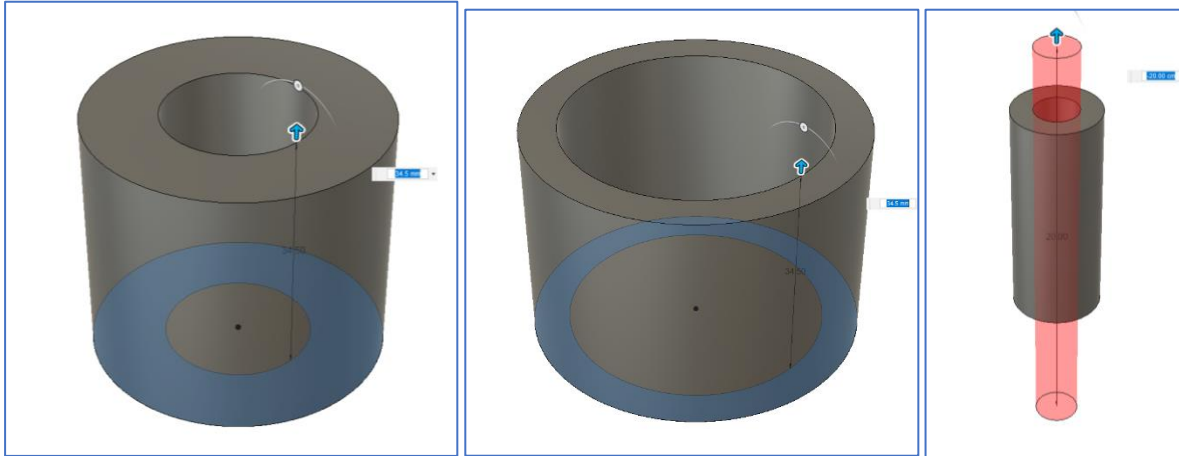
The pulley with 30 teeth is designed with metric dimensions, while the other two use the imperial system.

The intermediary wheels

The intermediary wheels are the wheels that come in contact with the crater when the robot needs to park. They smoothen the movement up the crater,

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which is essential for keeping a good speed during the match. We have gone through three similar versions, which are shown below.



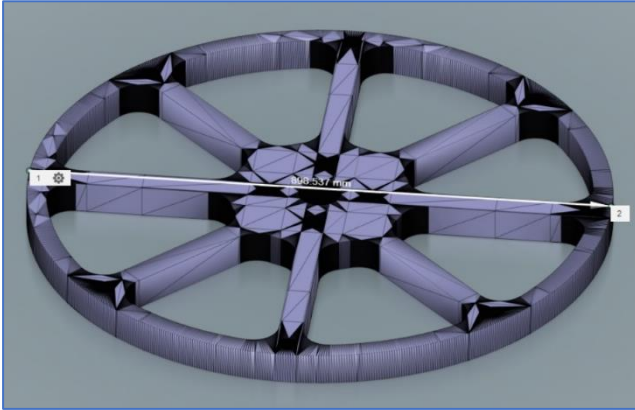
The first version (left), the second version (middle) and the third (right).

The collecting mechanism's wheels

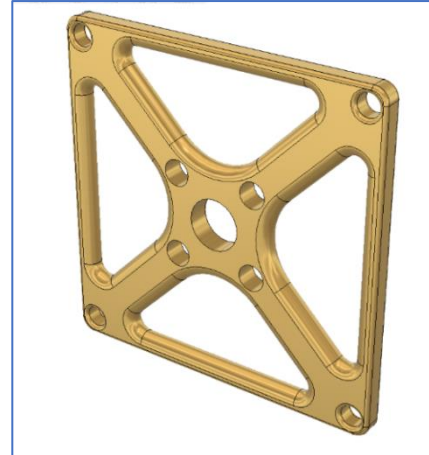
These are the two wheels which collect the minerals. They are put on an ax which is, in turn, connected to a servo motor which makes the mechanism spin, both inwards and outwards. When spinning inwards, any mineral that approaches the mechanism is caught by the rubber bands that are tied between the wheels, and then dragged in the box, being collected. When spinning outwards, any mineral in the box will be ejected, which is a feature the drivers might use in the case of picking up three minerals at once.

We have gone through two versions of the wheels, mostly because we needed to modify their dimensions as to have no issues with fitting the robot in the official sizes.

“Dream big, build bigger!”



The first version is a slim spoked wheel with holes punched in for the ax and for the rubber bands.



The second (and final) version is visibly different with its smaller, square shape.

The first version

We wanted to have a finished product fast when designing the first prototype, which left us with a reliable design that made us break the sizing rule. We also thought that we needed more rubber bands, which is why this version has eight rubber band holes.

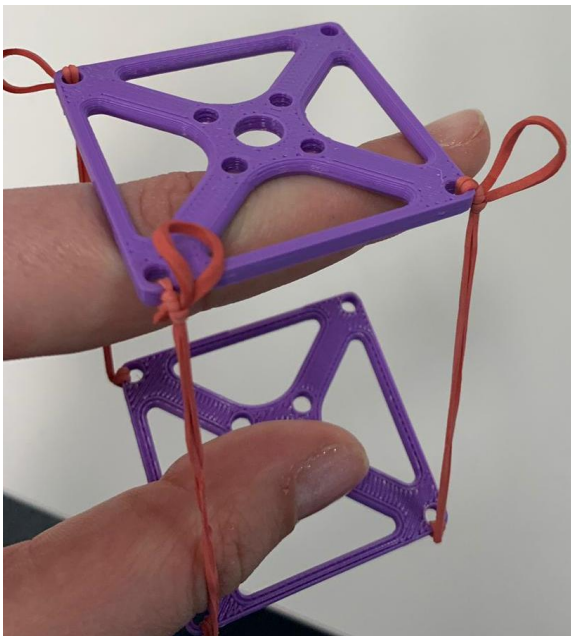
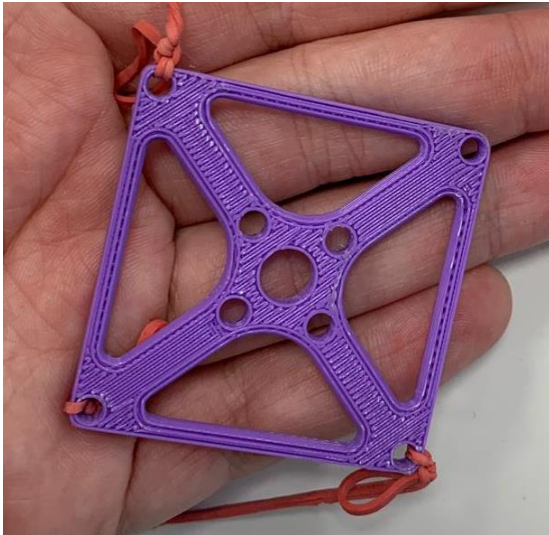


The first version of wheels for the suction mechanism.

“Dream big, build bigger!”

The second (and final) version

The first thing we wanted to focus on was reducing the size of the wheels. This new square shape is smaller and just as effective. We’ve also realized that we didn’t need that many rubber bands, which is why we’ve reduced the number of rubber band holes to four.



The new, smaller square-shaped wheels (above), also shown tied with rubber bands (below).

Assembly related team meeting notes

Everything behind the assembly of the robot is contained here, from the brainstorming sessions to the prototype testing and the final touches. Since we’ve made prototypes using 3D-printed parts, some of the meeting notes also appear in the 3D printing and design category.

Our chassis is the AndyMark Tilerunner and the robot has mechanisms for every intended task of Rover Ruckus. The mechanism that collects and deposits the minerals is referred to as ‘the suction mechanism’ or as ‘the collecting mechanism’ and the ensemble we use to latch onto the lander is ‘the lifting mechanism’.

Another important note is that, in every sketch, the motors or the direction of movement are drawn with red.

For more information about the functioning of our mechanisms, please see the ***robot assembly resources, starting from page 60.***

September 13th: Talking strategy

Meeting held: at school, at 2 PM

Attendance: Ale, Alex, Alexandra, Bianca, Bogdan, Carla, Cristi, Dani, Gloria, Laura, Peto, Robi, Spiri.

We met without any mentors today, and the purpose of today’s meeting was to familiarize ourselves with this season’s theme, and to talk about the video we need for the preselection.

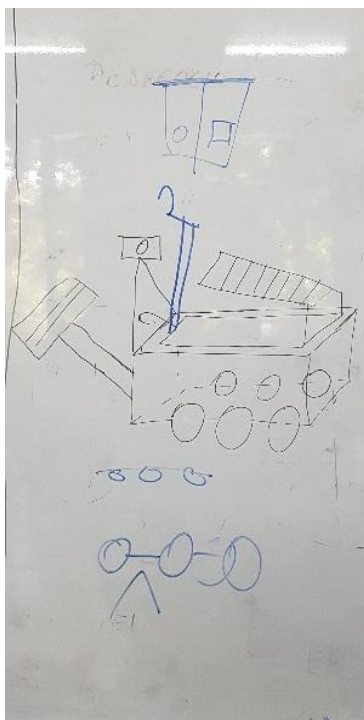
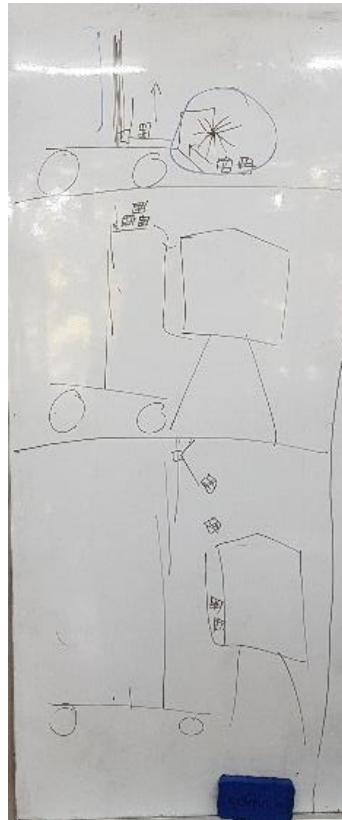
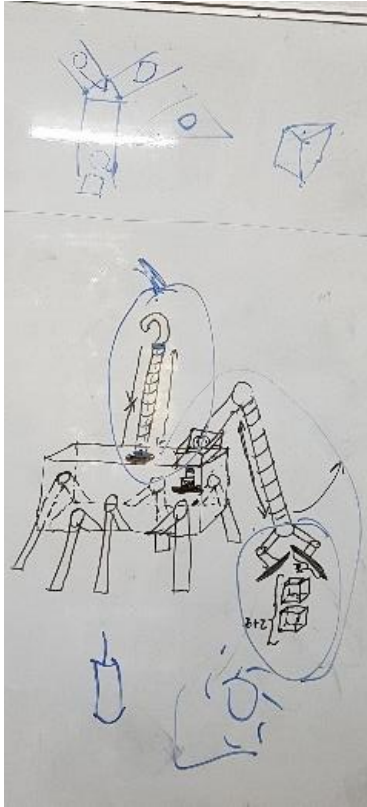
Regarding the theme, we all believe that it is harder than last year’s, but that doesn’t discourage us! If anything, it only makes us more motivated to work harder and to improve our performance. We then brainstormed a little about any potential ideas for the robot. Luckily, Dani, Peto, Spiri, Laura and Bogdan already have something in mind.

Laura thought of collecting the silver minerals with a mechanism that uses rubber strings, and then the collected spheres would be deposited in some sort of box. She was inspired by a video from Rev Robotics’ Youtube channel.

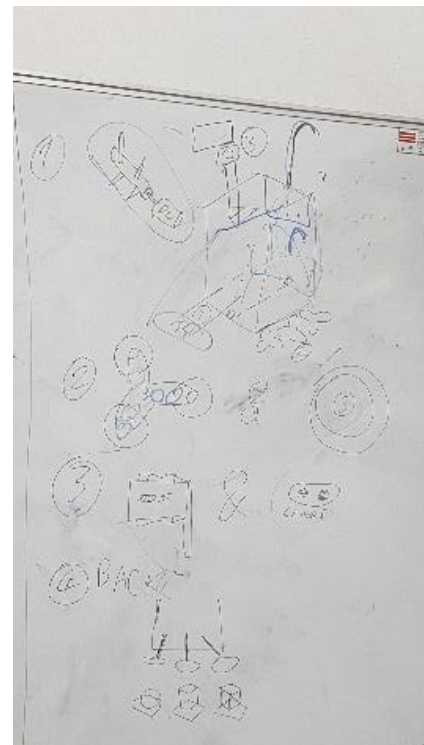
“Dream big, build bigger!”

Dani’s idea tackled the lifting and lowering of the robot from the hook on the lander; he thought of adding four rack and pinion mechanisms to lift the robot half by half.

Bogdan’s idea was to use a touch and a color sensor in a dark chamber to sort the minerals.



The sketches of (left to right) Peto, Laura, Spiri, Dani, Bogdan, with their ideas for this year’s robot.



“Dream big, build bigger!”



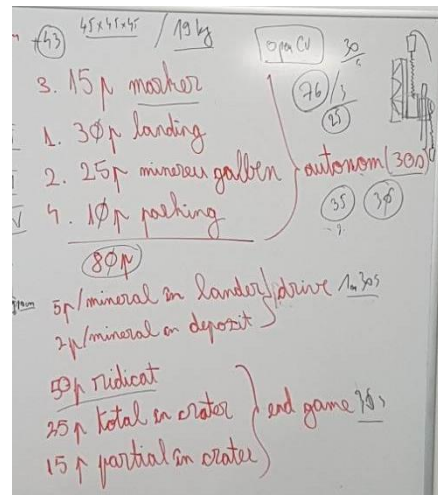
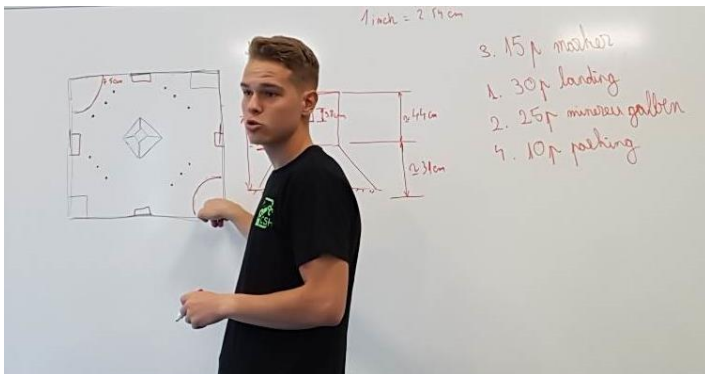
Peto, Laura, Spiri, Dani, Bogdan drawing their sketches.

September 16th: Make it official

Meeting held: at the Nokia IoT Garage, at 9

Attendance: Ale, Alex, Alexandra, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Pavel, Peto, Robi, Spiri, Mrs. Carabas, Mr. Petolea, Calin from Symme, Radu Ticiu

Our goal for today was to cover as many of the mechanisms we need, and to plan our strategy for this season. We had two visitors, Calin from Symme, who will provide us with a high-performance 3D printer, and Radu Ticiu, who simply attended our meeting.



Our strategy for this year (right), and Dani, writing our plans regarding the strategy (above).

We agreed on a total of 260 points, split by: 80 points in the autonomous period, 130 points in the driver controlled period, and 50 points in the end

game. In the autonomous period, we settled on completing the following tasks: landing, placing our marker, moving the yellow mineral completely off its initial position and parking on the crater. Considering that if our alliance partner wouldn't place their team marker in the deposit during the autonomous period, our points could get stolen by the other alliance quite easily. Therefore, we shouldn't count on placing minerals in the deposit, but placing them in the lander proves to be more difficult. During the end game, we want to hatch back on the lander.

We started to brainstorm for the autonomous period. The code will follow these four stages:

1. We land on the ground. So far, Mr. Petolea's idea for the landing mechanism is to use a servo motor, which would control the claw around the hook, and a DC motor, which would lower the robot.
2. We move the gold mineral.
3. We place our team marker
4. We park on the crater.

But, the randomized position on the sides of the lander might prove to give us a disadvantage. We might have to switch the stages in accordance to where we will start the match.

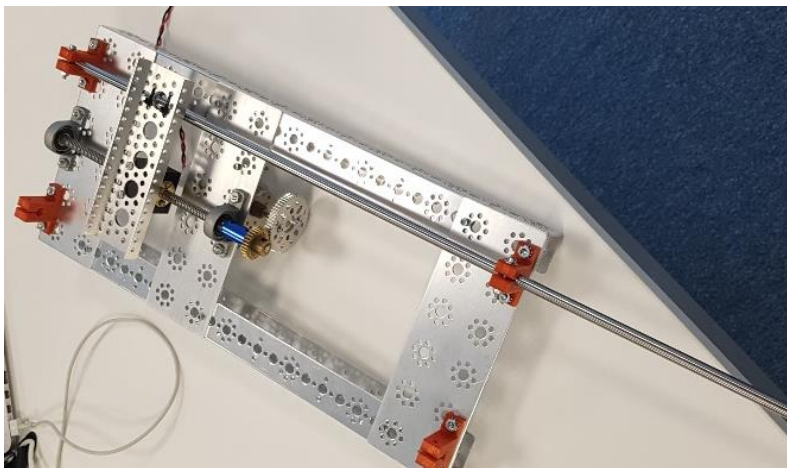
The playing field, the elements in it and the distances are key to helping our programmers write the code for the autonomous period, so building the playing field, and finding a way to obtain the new parts, for example the crater, is a priority for us. Calin from Symme offered to help us with 3D printing, for which we are grateful.

Last year, we didn't use the images placed on the field walls to orient ourselves in space at all, but this year, with the inclusion of OpenCV to the list of allowed software libraries, we will use the pictures to the fullest. Calin offered to print them for us, so we won't have to wait until we receive the parts from Natie prin Educatie. Speaking of orienting the robot in the play field during the autonomous period, we must check the maximum number of cameras, in order to know if we can begin to test a system that uses cameras or to think of something else.

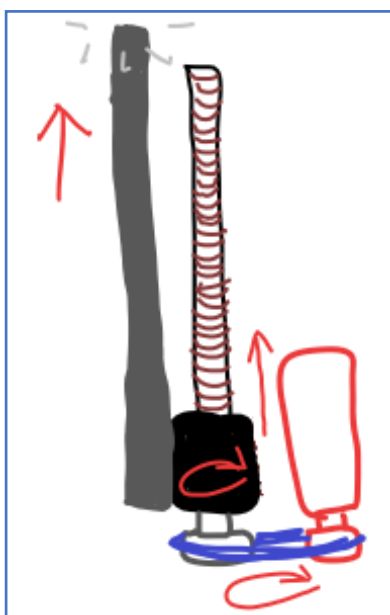
“Dream big, build bigger!”

We should keep in mind the maximum number of motors: 8 DC motors and 12 servo motors. Perhaps we might want a mechanism that doesn't use any electricity for going up and down.

We talked about the driver-controlled period as well. We are certain we don't want to count on placing minerals in the deposit, so we must figure out a way to place them in the lander, which is 75 cm off the ground. The problem of almost doubling the maximum reached height of the robot is quite important, and we feel that having a foolproof mechanism in place will increase our performance exponentially. Mr. Petolea brought a prototype, and below are photos and sketches which explain how it works. Considering the weight limit of 19 kgs, we might want to have one mechanism that fulfils two roles, both the lowering and hatching back on the lander, and placing the minerals.



The prototype Mr. Petolea brought



The motor (drawn in red, left) is tied to a nut which will climb up the screw when the motor is running. As the nut climbs, it brings up with it an aluminum extrusion, which is the body of the arm. The nut, as viewed from above(left), and the screw, as viewed from the side(right).

“Dream big, build bigger!”

Calin had the idea that we might want to use an oblique arm to grab the hook, which could double as a conveyor belt. Bogdan thought that we might want to have a support underneath the arm, so that this mechanism forms a triangle, which is more stable. Alex elaborated on the conveyor belt idea, by proposing having a retractable conveyor belt split in two. We could control the slope of the belt by making the pivot underneath be movable, it being able to move beyond the length of the robot.

Another point we should focus on is how will we move over the crater, which is 7.5 cm tall. Our chassis might have a hard time moving over it.

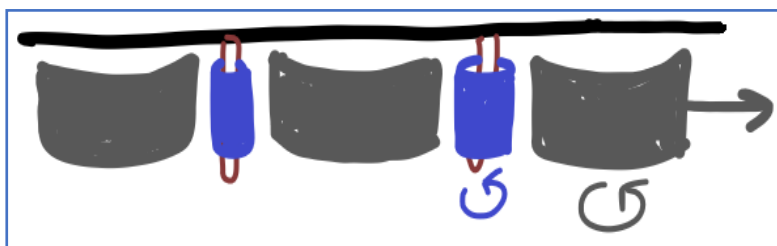
One of the main issues with the mineral collecting that we face is separating the golden minerals from the silver minerals. Bogdan’s idea, the dark chamber with the color and touch sensors, might prove to be problematic, because the rules state that the two minerals should be visible at all times.

September 23rd: Settling in

Meeting held: at the Nokia IoT Garage, at 9

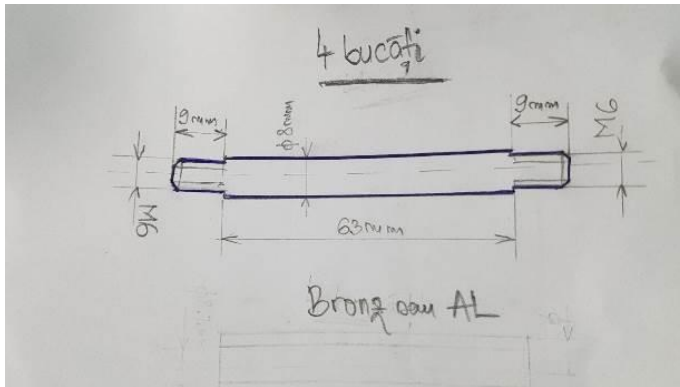
Attendance: Ale, Alex, Alexandra, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Peto, Robi, Spiri, Mrs. Carabas, Mr. Petolea, Mr. Cojocaru

We tested the chassis on the carpet first, and it barely crossed the crater. We removed the plexiglass bottom, and then we tried again, only on the playing field this time. It crosses it, but it scratches the crater pieces, and we’d like to keep our penalties to a minimum, so we will work on easing the crossing. Peto had a very good idea: putting a smaller wheel between the big wheels, so the crater won’t get stuck. Ideally, we would have a wheel like the ones on skateboards or roller-blades, because the silicone they are made of is both adherent and resistant, or metal- ideally bronze or aluminum.



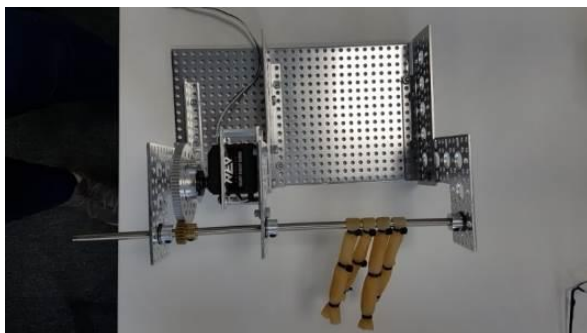
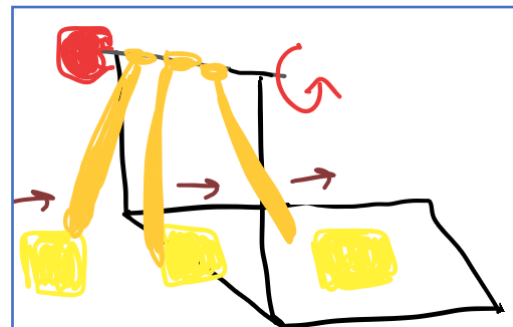
Where the small wheels should go.

“Dream big, build bigger!”



A sketch of an ideal wheel, made by Alex.

Regarding collecting the minerals, we have a prototype mechanism that uses a servo motor which spins an ax on which are tied thick pieces of rubber, which then would suck any object in their way. However, the rubber is too thin, so we need to either find another material, or to make the rubber we have thicker by putting some sort of plastic tube inside it. Materials we are currently considering are a polyvinyl chloride tube, an electricity-conductive cable, or copper wire.

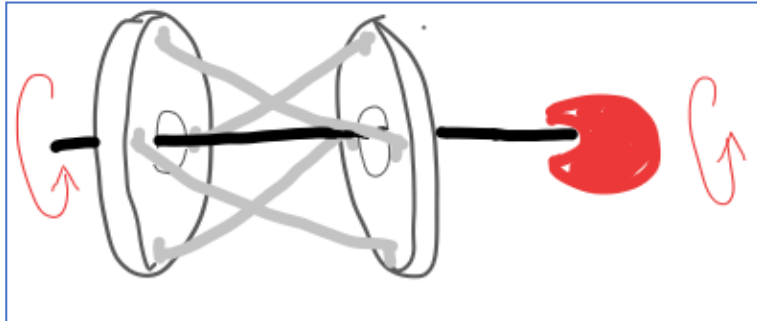


The first mineral collector prototype

Another idea for gathering the minerals is a system that uses taut rubber bands. The rubber bands are tied to two flat wheels, which are spun by a servo motor. Dani, Alex and Alexandra built a prototype, and it seems to be really efficient. Mr. Petolea told us that this is, undoubtedly, the best mechanism, and that we should begin to think about implementing our design. A problem we had was that the cube was getting stuck in the bottom of the mechanism,

“Dream big, build bigger!”

so we adjusted the height at which the system is placed by 8,5 cm. Since the cube is 5 cm tall, we'd like it to come in contact with the mechanism at 4,8 cm, so it will be drawn inside.



The second collector mechanism prototype

September 30th :Latching

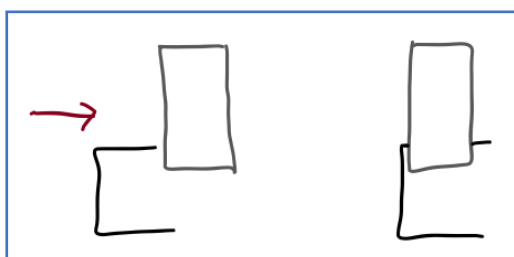
Attendance: Alex, Alexandra, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Leti, Peto, Robi, Spiri, Mr. Petolea

Meeting held: at the Nokia IoT Garage, at 9am

One of the most important mechanisms will be the arm that will handle the minerals. On it will most likely be the system that allows the robot to hang from the lander. The arm will be extensible, with 3 motors at the joints, and it will be made from aluminum extrusions. The latching mechanism will be a little more difficult, and so far we have two ideas for a prototype:

- simply using a hook
- attaching some sort of locking mechanism

However, after a short session of brainstorming, we agreed that using a hook will be more efficient, and it will save us more time. Below is a sketch of the hook.



Before latching (left) and after latching (right)

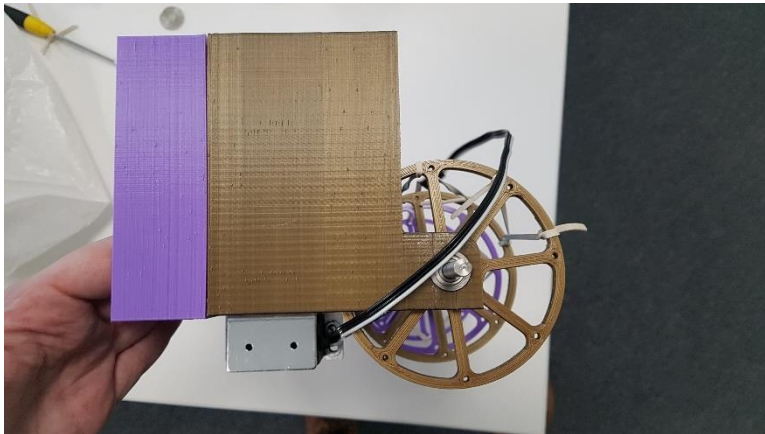
“Dream big, build bigger!”

October 7th: Working hard (as usual)

Meeting held: at the Nokia IoT Garage, at 9:00 am

Attendance: Alex, Ale, Bianca, Laura, Leti, Robi, Peto

Regarding the assembly of the robot, Peto and Ale started working on the mineral collecting mechanism. Alex printed for them a prototype of the storage box, and Peto drilled 2 holes in the front, where they placed bearings. Through the bearings went the ax that will hold two wheels, which will be tied together with rubber bands. After making these adjustments, we noticed that the box was too tall, that's why it couldn't get any minerals.



The finished prototype; it ended up breaking and Alex printed a smaller piece we glued to the rest.

October 14th : Brainstorming!

Meeting held: at the Nokia IoT Garage, at 9

Attendance: Ale, Alexandra, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Leti, Peto, Robi, Spiri

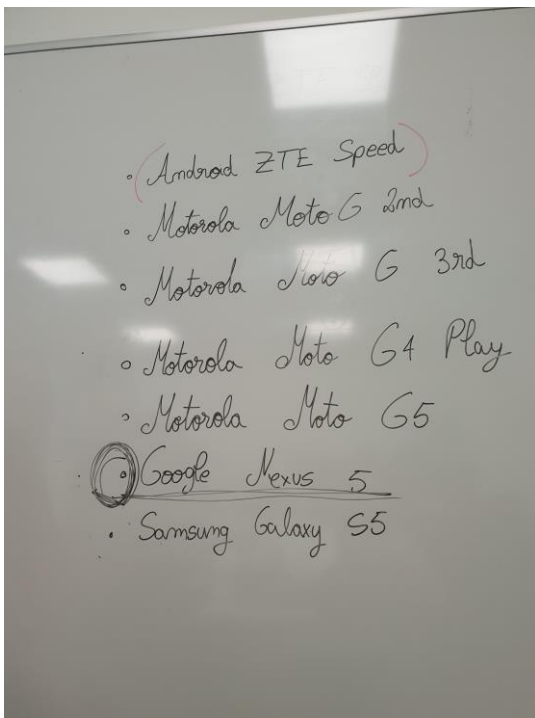
Bogdan worked a lot on the 3D model of the robot during the past week. He imported last year's Mecanum wheels, he added all the parts we didn't have last year, and made sure to check the exact measurements. In order to cross the crater, Bogdan thought of including a mechanism shaped like a downwards V. Four motors and four chains ensure movement. For extra rigidity, he added a support for the motors. He would like to add a board above that would hold all the other mechanisms.

“Dream big, build bigger!”



Us, during a break.

We had to change our phone for a better processor, so after a lot of research on reddit and on the First Tech Challenge discord server we have chosen Google Nexus 5.



The list of allowed mobile phones we had to choose from.

October 18th: More work

Meeting held: at the Nokia IoT Garage, at 4pm

Attendance: Spiri, Robi, Carla, Leti, Laura

Today Spiri and Robi talked about the best possible way to position the camera. At first, they thought about putting it on a long, metallic rod, way above the robot so that they could see everything. That idea didn't work well, given the fact that the robot might exceed the allowed parameters. They decided to just place it on the robot and with the help of a servo-motor turn it left and right.

October 25th: A short meeting

Meeting held: at the Nokia IoT Garage, at 4pm

Attendance: Alexandra S, Peto, Spiri, Robi

We had to fix the lander because it was hold to tight and it almost broke the plexiglass. Besides, we had a minor problem when we received the pieces: a lateral one was a bit damaged and there was a risk of breaking it if we held the screws too tight.

We also had few difficulties with the robot, at first we thought that we tightened the motor too much, but the problem was that the battery was completely empty. After we replaced it, things got better.

November 4th: Happy Birthday, Team CSH!

Meeting held: at the Nokia IoT Garage, at 10am

Attendance: Alex, Alexandra, Ale, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Leti, Pavel, Peto, Robi, Spiri, Ms. Carabas, Ms. Cojocar, Mr. Cojocar

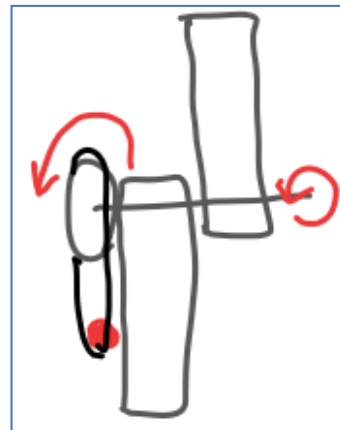
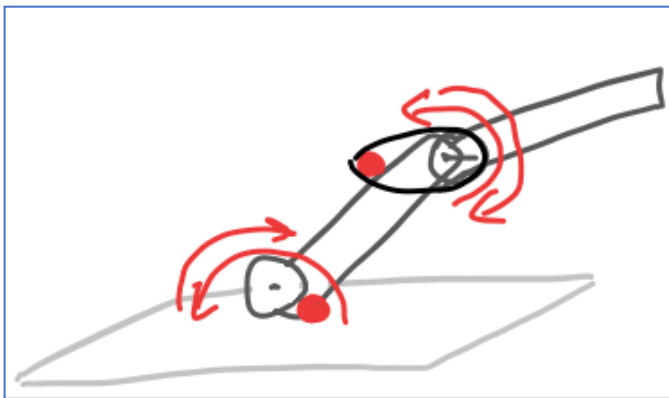
Bogdan had the idea of building another robot from scratch, without dismantling the one we currently have, in order to have where to test and implement some more prototypes. Meanwhile, some of the others in assembly started a brainstorming session for a way to modify the current chassis so it won't get stuck on the crater. We might replace the wheels- mecanum front and back, and omni in the middle. Although track wheels would eliminate any problems we had with entering or leaving the crater, they don't offer us the same mobility in the normal field, which is why we won't be using them anytime soon. But we can't switch to mecanum wheels without making the appropriate adjustments: our chassis is currently exactly 45 cm wide, and the mecanum wheels need more space than we have. We would have to tighten the inside but doing so would imply many complications.

November 11th: Raising our arm(s)

Attendance: Alex, Bianca, Bogdan, Carla, Gloria, Laura, Peto, Robi, Spiri, Mr. Petolea

Meeting held: at the Nokia IoT Garage, at 9 am

Today we will get started on the arm that will gather the minerals. Bogdan already prepared a prototype some time ago, but now we will make a new one from scratch. We fixed it to the board with L pieces, and it has a motor attached next to it, which will extend and retract the first part of the arm. The rotations are multiplied 40:1, but we also have 3 differently-sized gears which will transmit the movement. The second part is connected to the first one with an axle which is in connection with a gear. The gear is linked to another motor through a chain.



A sketch of the mineral collecting arm. The motors are drawn in red, and the red arrows show the way it moves.

Our programming team is keeping up the work on the code for the autonomous period, but they also tackled the code for the arm we built today. Laura found a function that would help ease the code for the rotations.

Later, we tested the arm in order to see if it performs to our standard. Extended fully, it is 72 cm long, and combined with the chassis' height, it gets up to 82 cm. However, it is too tall when retracted, which means that we should try to make it shorter. We built it from one larger part (40 cm), and a smaller part (30 cm), but if we'd use two 30 cm parts it would be shorter when retracted and it will still reach high enough, so we will be doing exactly that. Another improvement we'd like to bring to the arm is to make both of the parts to be in a straight line, instead of a broken line like it is now.

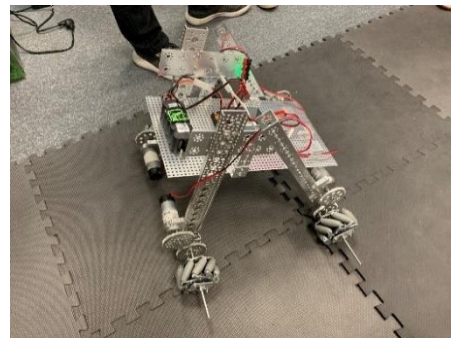
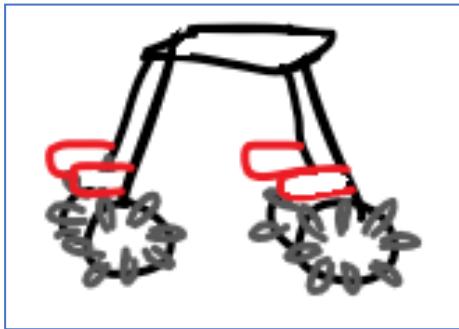
“Dream big, build bigger!”

November 16th: After school special

Attendance: Ale, Bianca, Bogdan, Carla, Peto, Spiri, Andreea

Meeting held: at the Nokia IoT Garage, at 12 pm

Meanwhile, Bogdan and Alexandra got started on building the second chassis, with the Mecanum wheels. It's a little difficult, because the parts from Andymark use the imperial scale, and ours use the metric. They used two gears to multiply the rotations. The chassis will actually be some sort of downwards V, in order to be able to cross the crater.



A sketch of the robot and a picture.

November 18th: European Robotics Week- start!

Attendance : Alexandra, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Peto, Robi, Spiri, Mr. Petolea

Meeting held: at the Nokia IoT Garage, at 9 am

Regarding the assembly, the arm that will grab and place the minerals will be added to the robot today. The motor at the base of the arm will be placed towards the left, so we can save enough place to put the arm that will help us hang from the lander. We also made a list of the parts we will order.



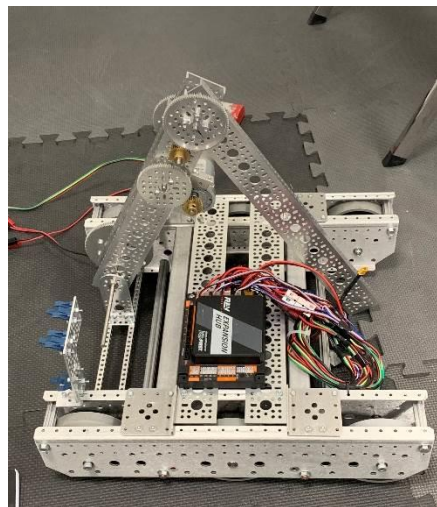
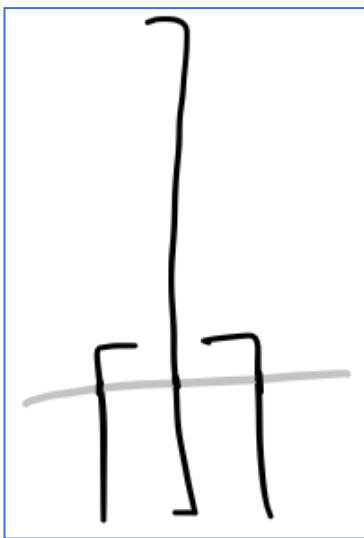
The motor is drawn in red, and the dotted grey space is where the hanging arm should fit

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Name	Price	Brand
Tile Runner upgrade	145\$	AndyMark
Expansion hub	175\$	REV Robotics
Blue Stealth wheels	6*7\$	AndyMark
Socket head screw	4*3.95\$	Tetrix
Kep nut	3.95\$	Tetrix
	Total- 381.75\$- 1559.98 lei without VAT	

The parts we want to order

We also made the mineral collector arm into one straight line, as seen below:



The axle is drawn in grey, and the channels that make up the body of the arm are black. The way the arm works is still the same.

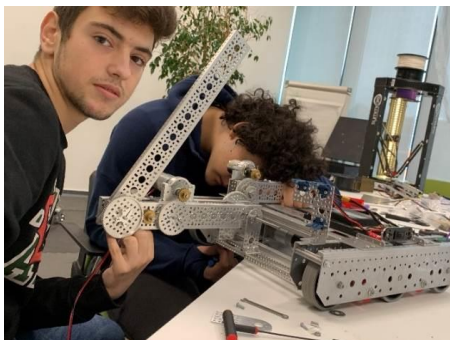
On the right side is a picture of our robot so far.

November 25th: Another wheel?

Attendance : Alex, Bianca, Carla, Gloria, Peto, Robi, Spiri, Mr. Petolea, Unguru

Meeting held: at the Nokia IoT Garage, at 9 am

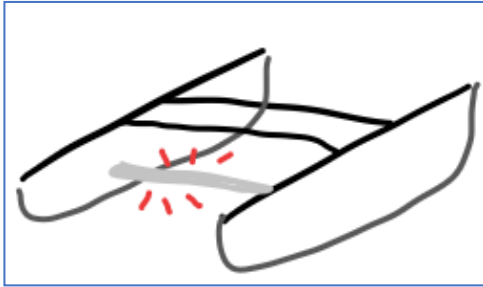
Today we had a visitor! One of Robi’s classmates, Unguru, was interested by the presentation we held about volunteering, and he stuck around during the meeting, in order to see if he would like to help us in the future.



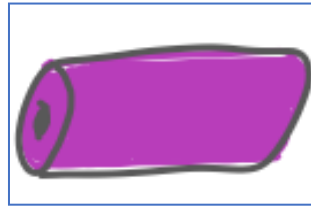
Unguru helping Peto out

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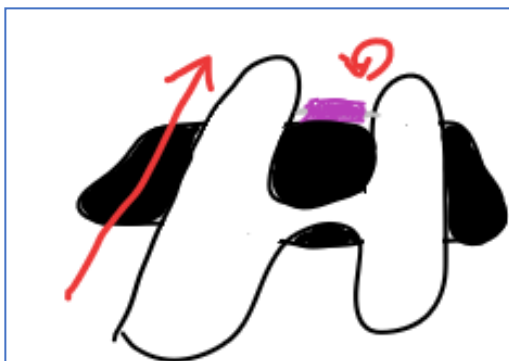
Speaking of what we want to get done today, we want to add a 3D-printed wheel to the front of the chassis, to help us cross the crater.



The robot would often get stuck in this pipe.



This is the wheel we want to add, and where.



This is what we're hoping for.

November 30th: Progress

Attendance : Bianca, Bogdan, Carla, Dani, Gloria, Peto, Robi, Spiri, Mr. Petolea

Meeting held: at the Nokia IoT Garage, at 9 am

Because today is a national holiday and we didn't have to go to school, we decided to use this long weekend to finish our robot once and for all.

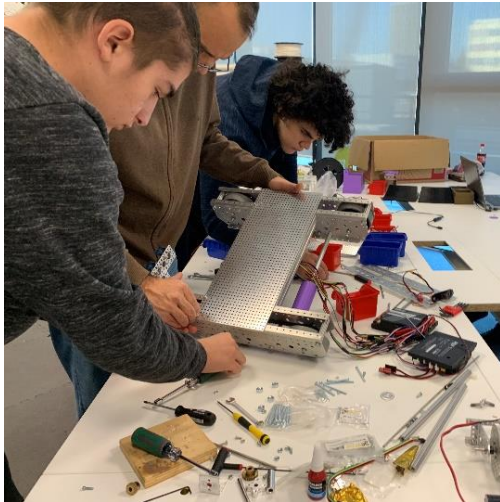
We discovered that the axle that connected the first part of the mineral arm to the second was already worn, because we had to keep handling the arm with our hands, which puts stress on the motors, so we disassembled it again, in order to replace it.

Another very important thing we want to get done is the arm that we will use to hatch onto the lander. Bogdan and Dani started thinking about prototypes; so far, we have an idea that uses a metal claw that would latch onto the hook. We should make sure that the weight is evenly distributed across the claw's

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arms, because that will make our robot be stable, but we don't know yet how to do that.

We wanted to have more space on the robot, so we switched the board on the chassis.

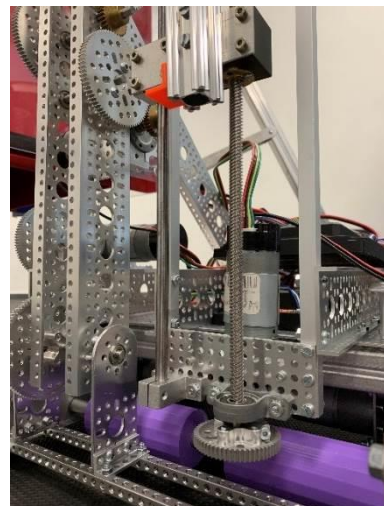


Bogdan, Peto and Mr. Petolea switching the board.

After putting the collector arm together again, we started the testing. We had some difficulties with connecting the two expansion hubs, but it wasn't anything we couldn't manage. The arm worked according to plan, after Spiri modified some of the limits in the code.

We added the mineral collecting mechanism to the top of the arm, and we measured our robot in its initial position to make sure it fits in 45 cm. Well, it didn't, and we have to make some sort of adjustment to it, like printing the box again, only smaller. If we were to print the box again, we would also include a small window that would help the driver know what mineral has been collected, or some plastic extensions that would guide any runaway minerals to the mechanism.

The lifting mechanism



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Later, we added the arm that will lift the robot, and we tested it. The robot gets off the ground, but the mechanism doesn't seem to support the weight very well, because it keeps making a rough noise whenever it climbs up the rod.

December 1st: Cable management

Attendance : Alex, Bianca, Bogdan, Carla, Peto, Mr. Petolea

Meeting held: at the Nokia IoT Garage, at 3 pm

We have liftoff! Today we fixed the arm that helps us latch to the lander, by adding a gear to the motor. It's good to know that was all we needed to fix.

On another note, we added a phone holder and did the cable management.

We have two expansion hubs, and we used them like this:

- To the first hub, we connected the motors involved in movement, and the servo from the collecting mechanism
- To the second hub, we connected the motors that control the collecting arm, the motor from the lifting mechanism and the touch sensor we use to stop the robot when reaching the floor during the autonomous period.

Alex is having some trouble with the 3D printer.

We want to add the mineral collecting mechanism to the arm for good, but the positioning seems to be a little troubling, because it either extends beyond 45 cm, either messes up some of the wires from the underside of the robot. After having finished most of the cable management, we will test everything, including the movement of the mineral collector arm.

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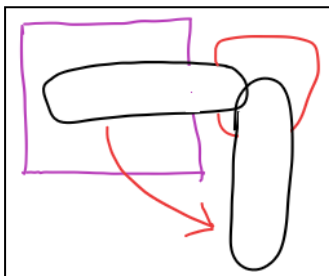
Bogdan, Peto, Alex and Mr. Petolea testing the collecting mechanism

December 2nd: Finishing up

Attendance : Alex, Ale, Ale S, Bianca, Bogdan, Carla, Dani, Gloria, Spiri, Pavel, Peto

Meeting held: at the Nokia IoT Garage, at 9 am

The first thing we want to get done today is finishing up the mineral collector arm. We added a stopper that controls when we drop the minerals in the lander. It uses a servo connected to a flat, and the driver controls the position of the flat, as seen below.



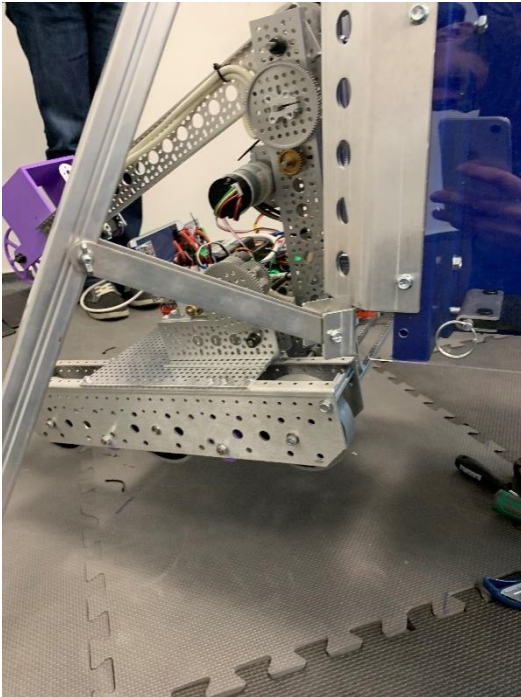
The stopper underneath the collector.

We fixed the collector, and we ran some tests. It works just fine, but the minerals don't fall in the box in the lander because the collector isn't high enough. We moved the box a little towards the exterior, and it did the trick. Bogdan started a list with the team members who are interested in trying out for the two driver positions. We have 10 members who are interested in becoming drivers: Laura, Bianca, Ale, Peto, Dani, Bogdan, Pavel, Spiri, Alex and Robi.

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We noticed a small issue with the way the collector arm handles some direction switches. If the driver would bring the arm lower, but then would suddenly change direction, the arm would continue moving lower, regardless of the command from the joystick.

The lifting mechanism is posing one problem; the robot needs to be 10 cm above the ground, but currently, the lowest point is only 9 cm above. By moving the hook lower on the support rod, the robot is high enough.



The robot, latched onto the lander.

The fact that the robot doesn't fit in 45 cm because of the collector is troubling; we decided to shrink it up, by reducing practically every dimension on it, and we would also turn the discs to squares, since we only need 4 rubber bands. Alex will design it, and we are hoping to have it printed as soon as possible.

December 9th :Final touches

Attendance : Bianca, Bogdan, Carla, Gloria, Laura, Leti, Spiri, Mr. Petolea

Meeting held: at the Nokia IoT Garage, at 9 am

There weren't that many members here today, because most of us have to study for finals at school. However, we still want to work, because there still are a number of things that need to be finished.

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Alex printed the new collector, and Bogdan and Mr. Petolea worked on replacing the old collector. While they were busy with that, they also noticed that one of the axles in the collector arm is broken.

December 16th : CSH's Secret Santa Gift Exchange!

Attendance :Ale M, Alex, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Leti, Peto, Spiri, Robi, Mr. Petolea

Meeting held: at the Nokia IoT Garage, at 9 am

Today was out gift exchange! But that didn't take too long, because we have more work to do.

Regarding actual work, our goal for today is to replace the older parts in our robot with the ones we 3D printed. We began by replacing the collector with the final, square version, and by adding a small L piece to the bottom of the lifting mechanism, that would touch a touch sensor, so that the robot would stop descending when the mechanism is fully extended.

January 4th : Working some more

Attendance : Ale M, Alex, Bianca, Bogdan, Carla, Laura, Leti, Pavel,Peto, Spiri, Mr. Petolea, Martha

Meeting held: at the Nokia IoT Garage, at 10 am

We'd like to move the latching hook's position on the robot, to make sure it respects the center of gravity. Another issue with the lifting mechanism is that, when retracting, the arm doesn't activate the touch sensor, which means that the robot doesn't automatically stop when it's supposed to. After tinkering with it a little, Alex and Peto made it work.

Since the Demo Games are approaching, the drivers should start practicing. The only driver pairs present today were Alex and Peto, and Ale and Bianca. They practiced collecting minerals and latching onto the lander. Everything went rather smoothly, but we will keep practicing whenever we will have the time, in order to choose a pair of official drivers.

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January 6th: Practicing for the Demo Games

Attendance :Ale, Alex, Bianca, Bogdan, Carla, Dani,Leti, Peto,Robi, Mr. Petolea

Meeting held: at the Nokia IoT Garage, at 9 am

The first thing on our to-do list was replacing the mineral collector.

Aside from that, the drivers kept practicing. Bogdan and Dani practiced today as well, and Robi, who wants to be the coach, was behind every pair of drivers, and tried to guide them.

Alex and Peto attempted to do a timed run for the first time; they collected 4 golden minerals and one silver mineral and latched onto the lander during the end game. They scored 25 points for the minerals, and 50 for the end game.

Next, Bogdan and Dani tried a timed run.

January 8th: A quick update

Attendance : Bogdan, Peto

Meeting held: at the Nokia IoT Garage, at 9 am

Today, we replaced the collector box again with a wider one that allows us to also get 2 silver minerals at once, not only 2 golden minerals.

After that, we did a test run, where, without latching on the lander during the end game, we scored 35 points.

January 13th: Practicing with RO012 Davos

Attendance: Alex, Bianca, Bogdan, Carla, Laura, Peto, Spiri

Meeting held: at the Nokia IoT Garage, at 9 am

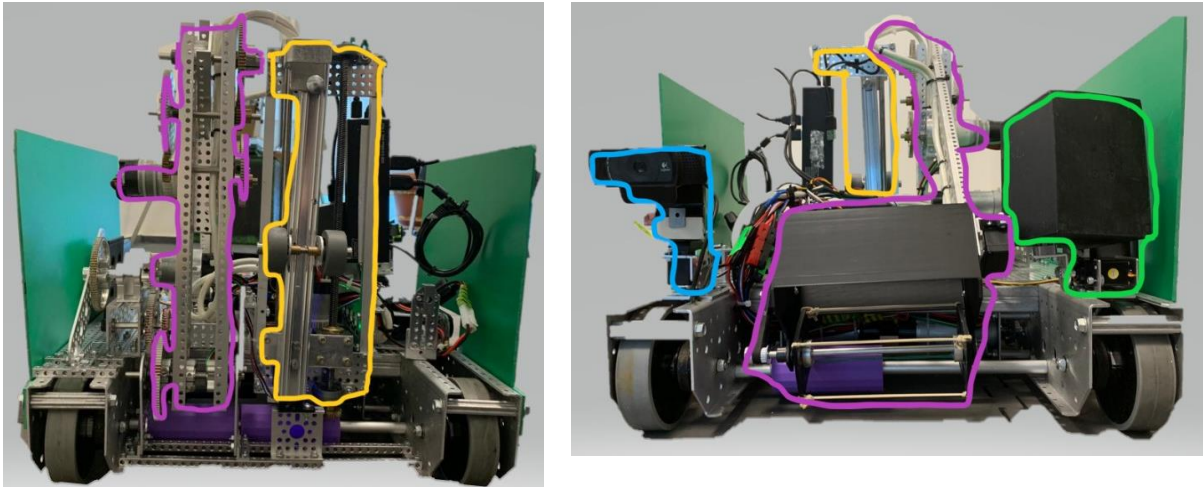
A while ago, we arranged to have a friendly game with team RO012 Davos.

However, they didn't arrive until 11, so we had 2 hours of tinkering with the robot. After securing the additional battery, that we added to power the camera, we wanted to make our latching mechanism faster, so we switched the gearbox from the motor that powers the latching mechanism.

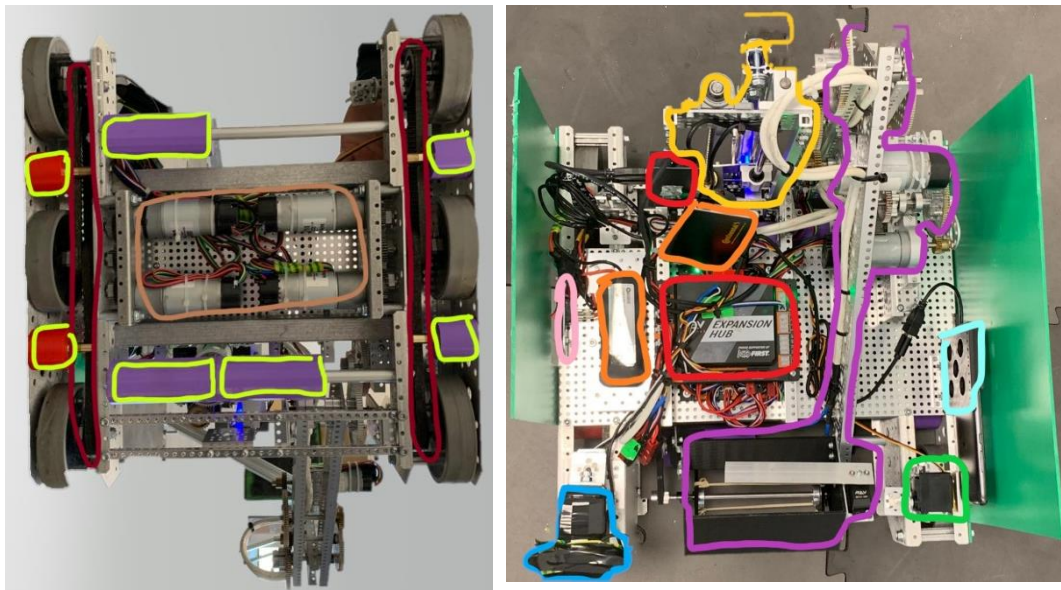
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Robot assembly related resources

Here is a detailed description of every mechanism on our robot, as well as every unique adjustment we made.



The fully assembled robot, viewed from behind (upper left), the front (upper right), below (lower left), above (lower right). The highlighted components are detailed below.



Highlighted components:

- purple: the mineral collecting mechanism
- warm yellow: the lifting mechanism
- sky blue: the web camera
- green: the team marker depositing mechanism
- tan: the motors powering the chassis
- dark red: the belt

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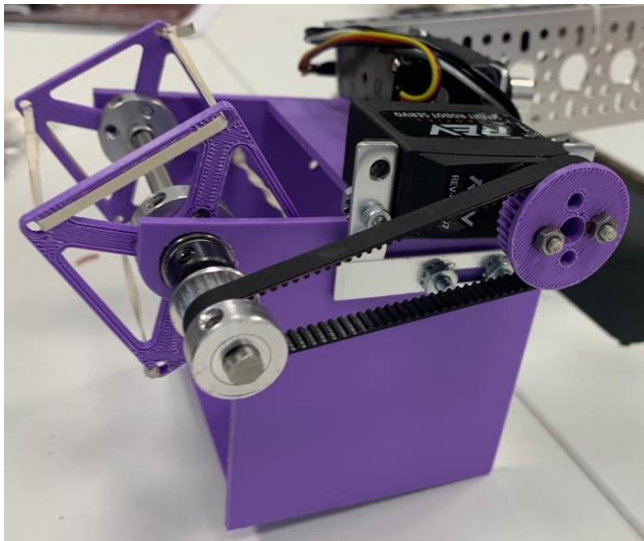
- lime green: the 3D-printed intermediary wheels
- red: the expansion hub
- orange: the batteries
- pink: the power switch
- turquoise: the phone holder

The mineral collecting mechanism

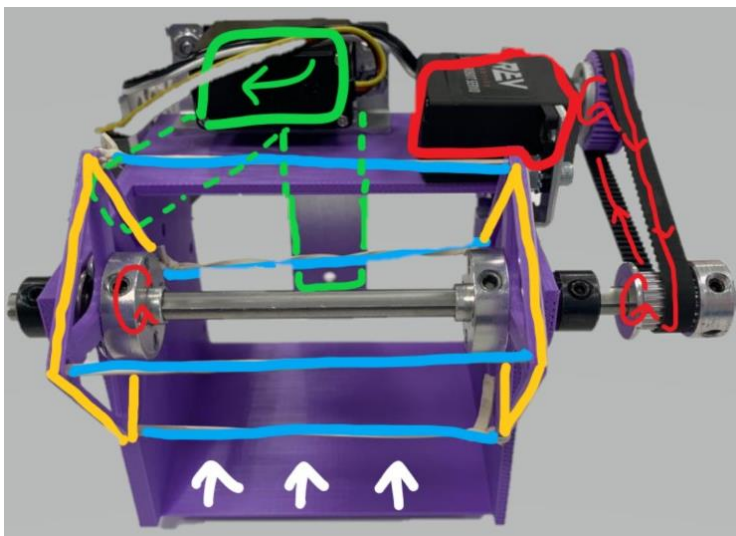
The mineral collecting mechanism (or suction mechanism) is made of two main components: the arm and the collecting box.

The collecting box

This box is a custom-made part, having the purpose of helping us gather the minerals, as well as storing them until deposition.



One of our fully functional collecting boxes, as viewed from the side.



The functioning process is explained below.

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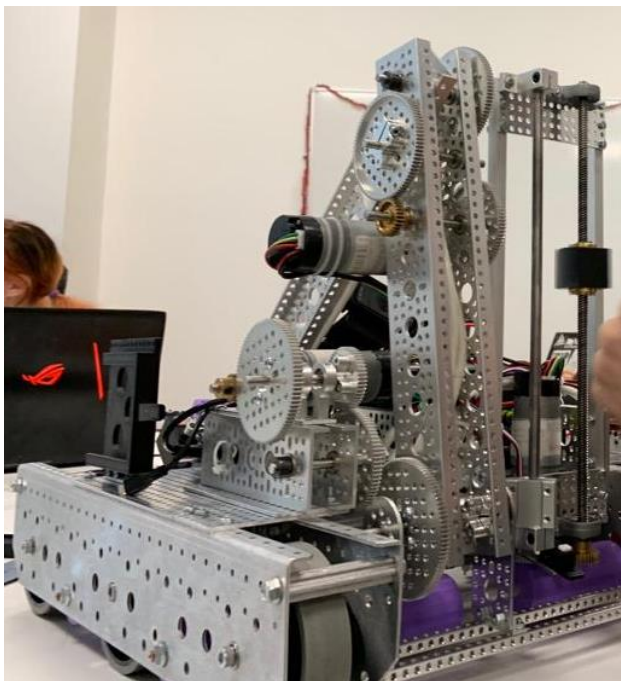
The functioning process:

The (red) servo starts spinning, transmitting the movement through a belt to the ax, making the wheels (yellow) and the rubber bands tied to them (blue) spin. When this ensemble comes in contact with a mineral, the mineral gets caught in the rubber bands and is drawn in the box, in the direction of the white arrows.

After one or two minerals have been collected and the arm has been raised, the (green) servo behind the box comes into play. It is tied to a stopper (dotted/continuous green line), which doesn't let the minerals fall through. At the lander's edge, the (green) servo turns on, making the stopper get out of the way of the minerals (the second position of the stopper is the one drawn with a dotted green line, to the left), allowing them to fall in the lander's container.

The collecting arm

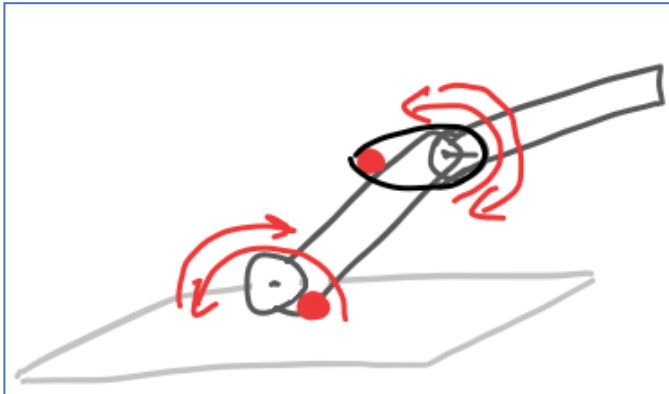
The arm has two joints, a 'shoulder' and an 'elbow', which grant us higher precision when handling and sorting the minerals.



The arm, folded (left) and fully extended (right)

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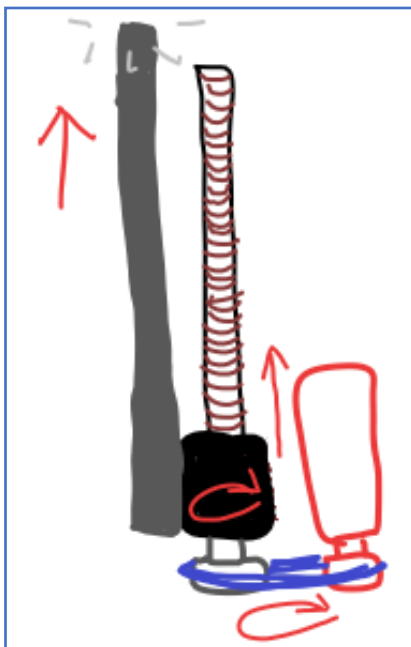
Since this arm needs to carry the weight of the box and of up to two minerals and to be precise in its movements, we decided to favor the power in the detriment of speed, by adding 6 gears between the shoulder motor and the ax.



The movement of the arm in both joints (red arrows), as well as the position of the elbow motor (red).

The lifting mechanism

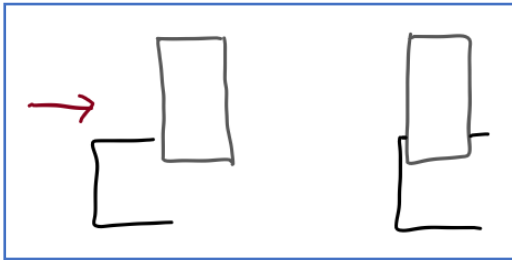
The lifting (or latching) mechanism allows us to descend from the lander during the autonomous period, as well as latching back on during the end game. It uses a nut that climbs on a screw, as described below.



The motor (drawn in red, left) is tied to a nut which will climb up the screw when the motor is running. As the nut climbs, it brings up with it an aluminum extrusion, which is the body of the arm. The nut, as viewed from above (left), and the screw, as viewed from the side (right).

At the top of the aluminum extrusion is the hook we use to hold on to the lander, which is made of metal.

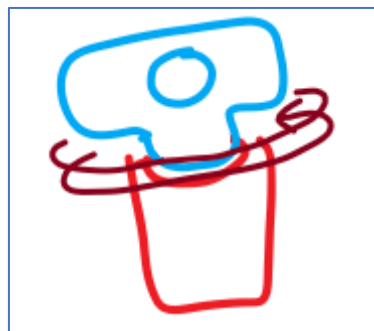
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Before latching (left) and after latching (right)

The web camera

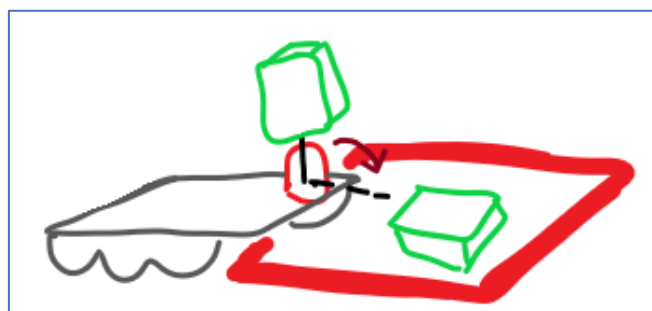
The web camera is positioned on top of a servo which allows it to move during the autonomous period.



The left picture depicts the camera on the robot, and on the right side, the sketch explains the way it moves.

The team marker

Our team marker has a thin hole through it, which allows it to rest on an ax attached to a servo. Before depositing the team marker, the servo is inactive, and the ax stands upright, perpendicular to the floor. When depositing the marker, the ax ‘falls’, the team marker falling down in the deposit.



The team marker, ready to be deposited (left), and a sketch of the mechanism (right).

List of parts

Here is a list of every part that goes into the robot.

We have bought the Tile Runner Chassis set, which uses the following:

- 2 - Chassis Inside Plate (am-3392_Inside)
- 2 - Chassis Outside Plate (am-3392_Outside)
- 4 - 4x4 Plate for Chassis (am-3393)
- 1 - Belly Pan for Chassis (am-3394)
- 2 - Peanut Extrusion, 11.25" (am-3395)
- 8 - Churro, 63mm (am-3399)
- 4 - HTD Timing Belt, 9mm wide, 93T (am-3378)
- 8 - 6mm D Bore Double Boss Nub w/Set Screw (am-3215a)
- 4 - 6mm Round Bore Double Boss Nub w/Set Screw (am-3413)
- 14 - 6x12x4mm Flanged Bearing (am-3377)
- 6 - 24T HTD Pulley, 6mm Bore (am-3401)
- 2 - 24T HTD Pulley Extension (am-3404)
- 6 - 40T Gear for PicoBox (am-3407)
- 4 - 35T Gear for PicoBox (am-3408)
- 4 - 45T Gear for PicoBox (am-3409)
- 8 - Spacer for PicoBox (am-3406)
- 2 - 6mm D Shaft x 100mm (am-3226-100)
- 4 - Aluminum Spacer, 5/16" OD x .257 ID x 1/4" (am-3424)
- 2 - Aluminum Spacer, 8mm OD x 6.15mm ID x 15mm (am-3425)
- 2 - Aluminum Spacer, 12.7mm OD x 6.15mm ID x 9mm (am-3426)
- 1 - Red Tacky Grease, 14.2 gram (am-2768)

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56 - 6-32 0.5" SHCS (am-1436)

8 - 6-32 x 0.75 in. Hex Head Screw (am-1424)

16 - 6-32 x 1.25" Hex Head Screw (am-1437)

32 - Nylock Nut, 6-32 (am-1419)

28 - 1/4-20 x 0.75 in. Thread Forming Screw (am-1310)

8 - 1/4-20 x 1.75" BHCS (am-1420)

8 - 1/4-20 Nylock Jam Nut - Bulk Qty (am-1102)

24 - M3-0.5 x 6mm SHCS (am-1254)

4 - M6-1 x 75mm" SHCS (am-1417)

4 - M6 Nylock Nut - Bulk Qty (am-1111)

4 - NeveRest Classic 40 Gearmotor (am-2964a)

2 - Duo Plate for PicoBox (am-3405)

6 - 4" Stealth Wheel, 8mm Bore, Gray (am-2648)

2 - Hall Effect Encoder Cable with 4-Pin Connector (am-2992)

The rest of the robot is made of the following:

2 x 8mm x 8mm SQUARE BEAMS (35 Hole, 280mm Length)

2 x L-Beams (7 Hole, 56mm Length)

2 x Flat Pattern Bracket 40-2

5 x 6mm D-Shaft

7 x Low Side U-Channel

- 3 x 13 Hole, 336mm Length

- 2 x 9 Hole, 240mm Length

- 2 x 4 hole, 120mm Length

2 x Tetrrix MAX Flats

2 x Tetrrix MAX L Bracket

1 x Tetrrix MAX Battery Clips

4 x Pinion Gear MOD 0.8 (6mm D-Bore, 20 Tooth)

1 x Standard Go-Rail Extrusion

5 x Grid Plate

- 3 x 5 x 11 Hole

- 1 x 5 x 17 Hole

- 1 x 29 x 53 Hole

2 x 6mm Single Side Mount Pillow Block

7 x 6mm Bore Face Tapped Set Screw

1 x 6mm Bore Face Tapped Clamping D-Hub

6 x 14mm OD Bearings (6mm Bore)

7 x Hub Spur Gear 14mm Bore

- 2 x 60 Tooth

- 2 x 80 Tooth

- 3 x 90 Tooth

- 1 x 108 Tooth

1 x Tetrrix R/C Switch Kit

2 x Rev Expansion Hub

1 x Max Flat Bracket

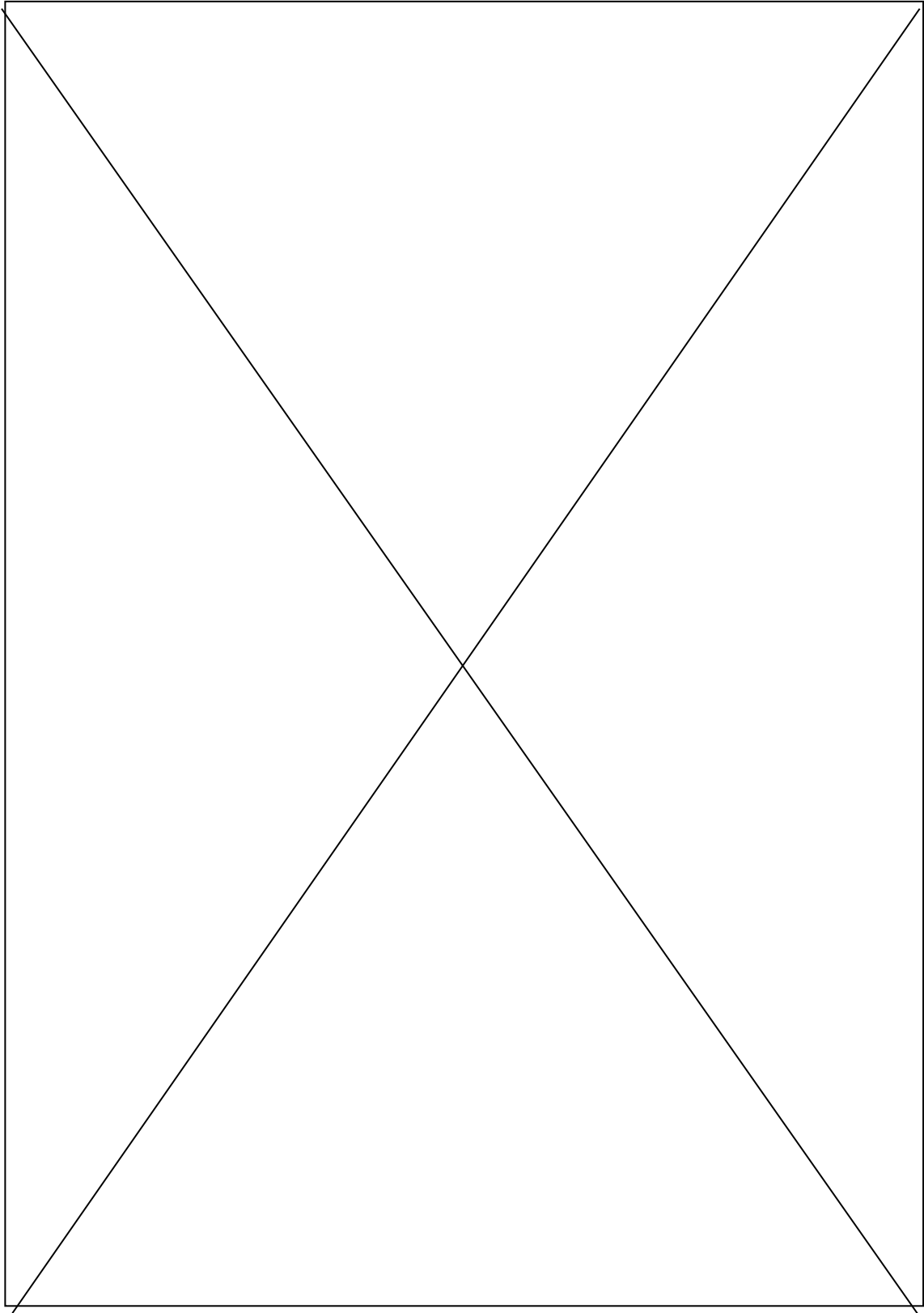
1 x Sigle 4 Hole Servo Arm

3 x NeverRest Classic 60 Gearmotor

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2 x Tetrax MAX Motor Mount

1 x Tetrax MAX DC Motor Mount



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Programming related team meeting notes

Here are the team meeting notes which present the activity of the programming team: developing, writing and streamlining the code for our robot.

Our code was written in Java, using Android Studio.

For more information about the code and the way it works, please see the ***programming resources, starting from page 77.***

September 25th : All about the autonomous period!

Meeting held: at the Nokia IoT Garage, at 3:30 pm

Attendance: Alex, Bianca, Robi, Spiri

Robi and Spiri, the team’s programmers, have gathered to compare the code they wrote at home for the autonomous period, but also to write some more. The goal for today would be to finish the portion of the code that recognizes the minerals; the robot should recognize a golden mineral in any one of the three positions, because we are counting on getting the 25 points from moving the yellow mineral completely off its place.

The meeting began with a test run of the code Spiri wrote at home. He used the dogeCV and openCVLibrary3 libraries

```
public class TeleOP extends LinearOpMode
{
    /* Movement Motors */
    private DcMotor leftFrontMotor;
    private DcMotor rightFrontMotor;
    private DcMotor leftBackMotor;
    private DcMotor rightBackMotor;
    /* Sensors */
    // private ColorSensor colorSensor;
    /* Servos */
```

The code for the movement of the robot

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```
// private Servo servo;

@Override

public void runOpMode() {

    this.configureMotors();

    // this.configureServos();

    //
    this.configureDigitalSensors();

    this.waitForStart();

    this.telemetry.addData("Status", "Initialized");

    this.telemetry.update();

    while(this.opModelsActive()) {

        this.leftFrontMotor.setPower(this.gamepad1.left_stick_y + this.gamepad1.left_stick_x);

        this.leftBackMotor.setPower(this.gamepad1.left_stick_y + this.gamepad1.left_stick_x);

        this.rightFrontMotor.setPower(-this.gamepad1.left_stick_y + this.gamepad1.left_stick_x);

        this.rightBackMotor.setPower(-this.gamepad1.left_stick_y + this.gamepad1.left_stick_x);

        //
        this.servo.setPosition(0.5);

        // this.telemetry.addData("Color Sensor (red): ", this.colorSensor.red());

        // this.telemetry.addData("Color Sensor (blue): ", this.colorSensor.blue());

        // this.telemetry.addData("Color Sensor (green): ", this.colorSensor.green());

        this.telemetry.update();
    }
}
```

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```
private void configureMotors()
{
    this.leftFrontMotor = hardwareMap.get(DcMotor.class, "leftFront");

    this.rightFrontMotor = hardwareMap.get(DcMotor.class, "rightFront");

    this.leftBackMotor = hardwareMap.get(DcMotor.class, "leftBack");

    this.rightBackMotor = hardwareMap.get(DcMotor.class, "rightBack");

    this.leftFrontMotor.setMode(DcMotor.RunMode.RUN_USING_ENCODER);

    this.rightFrontMotor.setMode(DcMotor.RunMode.RUN_USING_ENCODER);

    this.leftBackMotor.setMode(DcMotor.RunMode.RUN_USING_ENCODER);

    this.rightBackMotor.setMode(DcMotor.RunMode.RUN_USING_ENCODER);

}

// private void configureServos()
{

// this.servo = hardwareMap.get(Servo.class, "servo1");

// }

// private void configureDigitalSensors()
{

// this.colorSensor = hardwareMap.get(ColorSensor.class, "color");

/
/
}
```

We had quite some trouble getting the two phones to connect to each other through WiFi Direct; they didn't exchange the data, although they appeared to be connected. It turned out that we didn't update the app.

Upon running our robot, something was wrong with the controls, because although in the code the motion controls used the left switch, in reality it was

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controlled with the buttons on the left side. After a while, Spiri realized that he was pushing a wrong button.

October 2nd : Orienting in space (and chill)

Meeting held: at the Nokia IoT Garage, at 3:30 pm

Attendance: Alex, Bianca, Laura, Leti, Robi, Spiri

Last Sunday, right before leaving, we noticed an issue with the movement of the robot; today, after making some adjustments, Spiri wanted to see if the code had anything to do with it. It turns out that there was something wrong with the expansion hub, and all we had to do was replace the hub, and everything went back to normal. The cable that connects the phone and the expansion hub doesn't look so good, either; we will replace it soon.

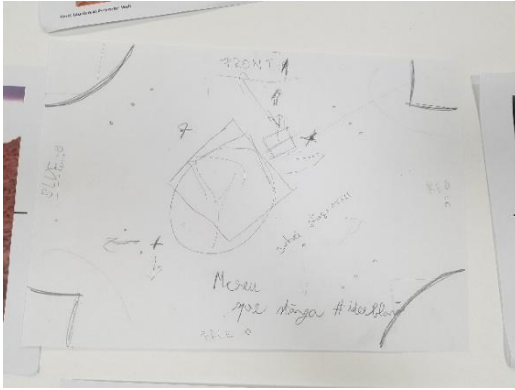


Robi and Spiri brainstorming, and Leti listening carefully.

The most important task of the day was finishing up everything about orienting the robot in the field during the autonomous period. After importing the OpenCV library in our code, we tested it by showing the phone the photos, and checking if it recognizes them. The next big thing to do was to establish the pattern the robot will follow when trying to recognize the pictures; Robi and Spiri came with an idea:

Each picture is assigned its own variable, which is set to false; the robot turns left once, and checks for pictures; when it comes in contact with one, it changes the corresponding variable's value to true, and then repeats the process until it comes back to the initial position.

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Robi's sketches, which helped inspire him to write the navigation algorithm.

October 18th: More work

Meeting held: at the Nokia IoT Garage, at 4pm

Attendance: Spiri, Robi, Carla, Leti, Laura

Today Spiri and Robi talked about the best possible way to position the camera. At first, they thought about putting it on a long, metallic rod, way above the robot so that they could see everything. That idea didn't work well, given the fact that the robot might exceed the allowed parameters. They decided to just place it on the robot and with the help of a servo-motor turn it left and right.

Spiri came with the idea to use sleeps instead of encoders when moving the robot in the autonomous period. Robi calculated the difference between the initial position and the final one, so that they could know what the distance between various objectives was. Laura, Spiri and Robi tried to implement Robi's calculations and Spiri's idea into the code, but it turned out that the calculations weren't exact, so the robot moved longer than he should have.

Of course, we needed a well-deserved break, so Spiri ordered some pizza and juice for all of us.



Robi and Spiri, enjoying a well-deserved break.

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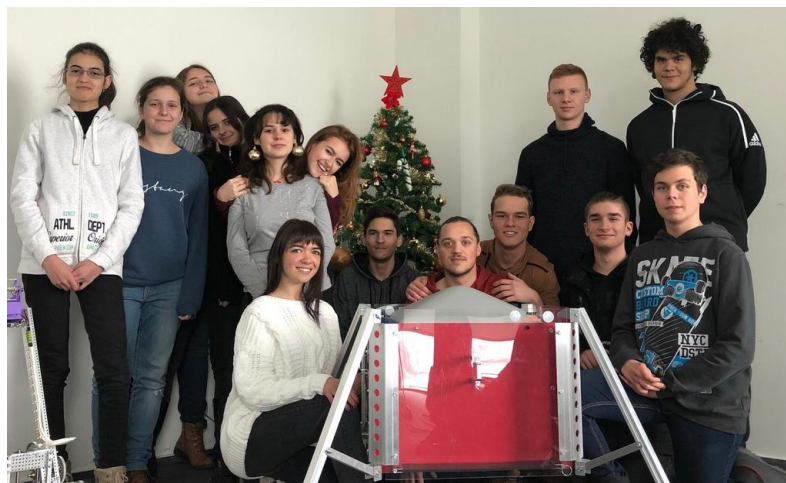
December 16th : CSH’s Secret Santa Gift Exchange!

Attendance : Ale M, Alex, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Leti, Peto, Spiri, Robi, Mr. Petolea

Meeting held: at the Nokia IoT Garage, at 9 am

Today is our gift exchange! Some time ago, we drew one of our teammates, for whom we’ve bought a gift. We will also decorate a small Christmas tree.

While initializing the robot once, everyone noticed that the lifting mechanism would suddenly start functioning, although we initialized the TeleOp mode. Spiri fixed the problem from the code.



December 21st : Home (Nokia) Alone

Meeting held at: at the Nokia IoT Garage, 1 pm

Attendance: Robi, Laura, Spiri, Leti, Carla, Ale, Bogdan, Bianca, Alex, Dani

Before work, we planned a teambuilding session and watched the classic movie: “Home Alone”.

The programming team stayed to work on their code. The second rotation of the second route has a few problems. The code doesn’t answer to changes and it doesn’t see any of the code’s functions.

We modified the code for the second rotation: trying different values to see if the movement of the robot changes. When we input 0 it doesn’t move at all, so we know for a fact that the code somewhat works. We’re trying to find the perfect value by trying out different numbers.

December 23rd: Designing our team marker

Meeting held at: at the Nokia headquarters at 9 am

Attendance: Peto, Carla, Leti, Bogdan, Laura

We made the t-shirt and sweatshirt design for each member personalized with their name and role.

Laura came in a rush to load the code into the phone, because apparently it didn't save from yesterday.

January 4th : The official beginning of a lovely partnership

Attendance : Ale M, Alex, Bianca, Bogdan, Carla, Laura, Leti, Pavel, Peto, Spiri, Mr. Petolea, Martha

Meeting held: at the Nokia IoT Garage, at 10 am

Martha, team RO0124 The Emperor's leader is in Timisoara, and today she joined us for a meeting. Gloria wrote a partnership contract, and Bogdan and Martha signed it, marking the official beginning of our mentorship.

Since the Demo Games are approaching, the drivers should start practicing. The only driver pairs present today were Alex and Peto, and Ale and Bianca. They practiced collecting minerals and latching onto the lander. Everything went rather smoothly, but we will keep practicing whenever we will have the time, in order to choose a pair of official drivers.

Later in the day, the programming team started doing tests for the autonomous period, and accidentally ran the robot into the lander, breaking the 3D-printed mineral collector. Luckily, we have some spares.

January 6th: Practicing for the Demo Games

Attendance : Ale, Alex, Bianca, Bogdan, Carla, Dani, Leti, Peto, Robi, Mr. Petolea

Meeting held: at the Nokia IoT Garage, at 9 am

The first thing on our to-do list was replacing the mineral collector.

Aside from that, the drivers kept practicing. Bogdan and Dani practiced today as well, and Robi, who wants to be the coach, was behind every pair of drivers, and tried to guide them.

Alex and Peto attempted to do a timed run for the first time; they collected 4 golden minerals and one silver mineral and latched onto the lander during the end game. They scored 25 points for the minerals, and 50 for the end game.

Next, Bogdan and Dani tried a timed run.

January 8th: A quick update

Attendance : Bogdan, Peto

Meeting held: at the Nokia IoT Garage, at 9 am

Today, we replaced the collector box again with a wider one, that allows us to also get 2 silver minerals at once, not only 2 golden minerals.

After that, we did a test run, where, without latching on the lander during the end game, we scored 35 points.

January 9th: Improving the code

Attendance: Bianca, Pavel, Robi, Spiri

Meeting held: at the Nokia IoT Garage, at 9 am

Today, only the programming team met, because we still have issues with the autonomous period:

- whenever the robot climbs down from the lander, it touches the ground in a random position, which makes it hard to calculate the rotation angle so that the robot goes towards the golden mineral in a straight line
- the camera we use for orienting the robot in space doesn't register the picture on any closest field wall, even if we already tested the camera with a laptop, where it seemed to work just fine

Aside from that, the only improvements that could be made are to the movement and rotation function, which would smoothen and increase the accuracy of our moves during the autonomous period.

Spiri and Pavel tried to find other methods to detect the gold mineral and the pictures on the field walls. At the moment, the code uses the Vuforia library, but even after searching online and asking on the FTC Discord forum, they found nothing they could use.

Until the end of the day, they worked on perfecting the detection of the routes, which entailed improving the way the robot detects the navigation targets.

January 11th :A short meeting

Attendance : Bogdan, Spiri

Meeting held: at the Nokia IoT Garage, at 9 am

The programming team told us about their issue with the way we deploy from the lander in the autonomous period, and we decided to try and brainstorm some new ideas for a latching mechanism that allows a more precise deploy.

Later, Spiri perfected the code for detecting the golden mineral.

Programming and code resources

Here is the entirety of our code, explained. The explanations are italicized and written in **dark yellow**.

Autonomous period code:

Vuforia

```
this.telemetry.addLine("initializare camera");  
this.telemetry.update();
```

```
VuforiaLocalizer.Parameters parameters = new  
VuforiaLocalizer.Parameters();
```

```
parameters.vuforiaLicenseKey =  
"AWbfTmn/////AAABmY0xule3C0RHvL3XuzRxyEmOT2OekXBSbqN2jot1si3OGB  
ObwWadfitJR/D6Vk8VEBiW0HG2Q8UAEd0//OliF9aWCRmyDJ1mMqKCJZxpZem  
ft5ELFuWnJIZWUkKyjQfDNe2RIaAh0ermSxF4Bq77IDFirgggdYJoRlyi2Ys7GI9ID/t  
SonV8OnldIN/Ove4/MtEBJTKHqjUEjC5U2khV+26AqkeqbxhFTNiIMl0LcmSSfugG  
hmWFGFtuPtp/+fIPBRGoBO+tSI9P2sV4mSUBE/WrpHqB0Jd/tAmeNvbtgQXtZEG  
Yc/9NszwRLVNI9k13vrBcgsiNxs2UY5xA4Wb6LN7Yu+tChwc+qBiVKAQe09\n";  
parameters.fillCameraMonitorViewParent = true;
```

```
parameters.cameraName = hardwareMap.get(WebcamName.class,  
"webcam");
```

```
vuforia = new Dogeforia(parameters);  
vuforia.enableConvertFrameToBitmap();
```

Up until this point, vuforia's processes have been initialized.

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```
VuforiaTrackables targetsRoverRuckus =
this.vuforia.loadTrackablesFromAsset("RoverRuckus");
VuforiaTrackable blueRover = targetsRoverRuckus.get(0);
blueRover.setName("Blue-Rover");
VuforiaTrackable redFootprint = targetsRoverRuckus.get(1);
redFootprint.setName("Red-Footprint");
VuforiaTrackable frontCraters = targetsRoverRuckus.get(2);
frontCraters.setName("Front-Craters");
VuforiaTrackable backSpace = targetsRoverRuckus.get(3);
backSpace.setName("Back-Space");
```

Here, we recall the navigation targets from the library and give them proper names.

```
// For convenience, gather together all the trackable objects in one easily-
iterable collection */
```

```
allTrackables.addAll(targetsRoverRuckus);
```

```
OpenGLMatrix blueRoverLocationOnField = OpenGLMatrix
.translation(0, mmFTCFieldWidth, mmTargetHeight)
.multiplied(Orientation.getRotationMatrix(EXTRINSIC, XYZ, DEGREES, 90, 0, 0));
blueRover.setLocation(blueRoverLocationOnField);
```

```
OpenGLMatrix redFootprintLocationOnField = OpenGLMatrix
.translation(0, -mmFTCFieldWidth, mmTargetHeight)
.multiplied(Orientation.getRotationMatrix(EXTRINSIC, XYZ, DEGREES, 90, 0,
180));
redFootprint.setLocation(redFootprintLocationOnField);
```

```
OpenGLMatrix frontCratersLocationOnField = OpenGLMatrix
.translation(-mmFTCFieldWidth, 0, mmTargetHeight)
.multiplied(Orientation.getRotationMatrix(EXTRINSIC, XYZ, DEGREES, 90, 0,
90));
frontCraters.setLocation(frontCratersLocationOnField);
```

```
OpenGLMatrix backSpaceLocationOnField = OpenGLMatrix
.translation(mmFTCFieldWidth, 0, mmTargetHeight)
```

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```
.multiplied(Orientation.getRotationMatrix(EXTRINSIC, XYZ, DEGREES, 90, 0, -90));  
    backSpace.setLocation(backSpaceLocationOnField);
```

Here, we mentioned the location of the navigation targets in the playing field.

```
    final int CAMERA_FORWARD_DISPLACEMENT = 220; // Camera is 220  
mm in front of robot center  
    final int CAMERA_VERTICAL_DISPLACEMENT = 210; // Camera is 210 mm  
above ground  
    final int CAMERA_LEFT_DISPLACEMENT = 1; // Camera is OFF the  
robot's center line
```

```
    OpenGLMatrix phoneLocationOnRobot = OpenGLMatrix  
.translation(CAMERA_FORWARD_DISPLACEMENT,  
CAMERA_LEFT_DISPLACEMENT, CAMERA_VERTICAL_DISPLACEMENT)  
.multiplied(Orientation.getRotationMatrix(EXTRINSIC, YZX, DEGREES,  
CAMERA_CHOICE == FRONT ? 90 : -90, 0, 0));
```

```
    for (VuforiaTrackable trackable : allTrackables)  
    {  
        ((VuforiaTrackableDefaultListener)  
trackable.getListener()).setPhoneInformation(phoneLocationOnRobot,  
parameters.cameraDirection);  
    }
```

```
    targetsRoverRuckus.activate();
```

```
    GoldAlignDetector detector = new GoldAlignDetector();  
detector.init(hardwareMap.appContext, CameraViewDisplay.getInstance(), 0,  
true);  
detector.useDefaults();  
detector.areaScoringMethod = DogeCV.AreaScoringMethod.MAX_AREA; //  
Can also be PERFECT_AREA  
detector.alignSize = 200; // How wide (in pixels) is the range in which the gold  
object will be aligned. (Represented by green bars in the preview)  
detector.downscale = 1;
```

Here, we declared the gold detector object.

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```
detector.alignPosOffset = 0;
```

```
vuforia.setDogeCVDetector(detector);  
vuforia.enableDogeCV();  
vuforia.showDebug();
```

```
vuforia.start();
```

```
this.telemetry.addLine("terminat initializare camera");  
this.telemetry.update();
```

IMUinit

This portion of code initializes the IMU.

```
private void initializeIMU() {  
    BNO055IMU.Parameters parameter = new BNO055IMU.Parameters();  
  
    parameter.angleUnit = BNO055IMU.AngleUnit.DEGREES;  
    parameter.accelUnit = BNO055IMU.AccelUnit.METERS_PERSEC_PERSEC;  
  
    this.imu.initialize(parameter);  
    }  
  
    public double getAbsoluteHeading() {  
        return this.imu.getAngularOrientation(AxesReference.INTRINSIC,  
        AxesOrder.ZYX, AngleUnit.DEGREES).firstAngle;  
    }  
}
```

Gold detection and movement-former version

This code allows us to detect and move the gold mineral off its position, using GoldAlign from the DogeCV library.

```
private void detectGoldMineral() {
```


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```
//Detect when the robot is aligned with the gold and save the position
while (this.goldPosition.contentEquals("none")) {
this.telemetry.addData("getAligned: ", vuforia.detectGold());
this.telemetry.update();

moveCamera(0.64, 1250);
    if (this.vuforia.detectGold()) {
this.goldPosition = "right";
    } else {
moveCamera(0.46, 1250);
    if (this.vuforia.detectGold()) {
this.goldPosition = "center";
    } else {
moveCamera(0.36, 1250);
    if (this.vuforia.detectGold()) {
this.goldPosition = "left";
}else{
moveCamera(0.64, 1250);
    }
    }
}

}
```

Here, we fixate the camera on each of the minerals' positions and check if the robot is aligned with any of them.

```
// vuforia.stop();

}private void moveGold(){
    switch (this.goldPosition){
        case "left":
this.rotate(25);
this.driveUsingEncoder(1.0, this.computeDistanceWithPadding(70));
this.driveUsingEncoder(1.0, this.computeDistanceWithPadding(-70));
this.rotate(-26);

        break;
```

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```
        case "center":
this.driveUsingEncoder(1.0, this.computeDistanceWithPadding(68));
this.driveUsingEncoder(1.0, this.computeDistanceWithPadding(-68));

        break;

        case "right":
this.rotate(-25);
this.driveUsingEncoder(1.0, this.computeDistanceWithPadding(70));
this.driveUsingEncoder(1.0, this.computeDistanceWithPadding(-70));
this.rotate(26);

        break;

        default:
telemetry.addLine("Invalid position");
telemetry.update();

        break;
    }
}
```

This piece of code lets the robot move, push the gold mineral and then return to its initial position.

Gold detection and movement-final version

This code allows us to detect and move the gold mineral off its position, using the position of the golden mineral as measured in pixels.

```
private void detectGoldMineral() {
    double goldXpos = 0; //This variable will store the position of the golden mineral on the X axis
    double goldYpos = 0; //This variable will store the position of the golden mineral on the Y axis
    while (goldPosition.contentEquals("none")) {
moveCamera(0.54, 1000);
        goldXpos = vuforia.getGoldXpos();
        goldYpos = vuforia.getGoldYpos();

        if (goldYpos > 160 && goldYpos < 250) {
```

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```
    if (goldXpos > 450 && goldXpos < 650) {
        goldPosition = "right";
this.telemetry.addData("Gold Position: ", this.goldPosition);
this.telemetry.update();
        } else if (goldXpos > 150 && goldXpos < 350) {
            goldPosition = "center";
this.telemetry.addData("Gold Position: ", this.goldPosition);
this.telemetry.update();
//This if statement checks the minerals in the right and in the center position;
if the golden mineral is not there, it moves and checks the left and center
positions; The values were determined following a testing period
        } else {
moveCamera(0.40, 1000);
            goldXpos = vuforia.getGoldXpos();
            goldYpos = vuforia.getGoldYpos();

            if (goldYpos > 130 && goldYpos < 230) {
                if (goldXpos > 200 && goldXpos < 300) {
                    goldPosition = "left";
this.telemetry.addData("Gold Position: ", this.goldPosition);
this.telemetry.update();
                }
            }
        }
    }
}
```

Navigation target detection

This section of our code is used when trying to orient in the playing field by using the navigation targets.

```
private void detectNavTarget(){
this.moveCamera(0.84, 0);
```

```
    boolean foundImage = false;
```

This Boolean variable will take the TRUE value when any target will be detected.

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```
while(!foundImage) {
this.telemetry.addLine("Cautam target...");
this.telemetry.update();

for (VuforiaTrackable trackable : allTrackables) {
    if (((VuforiaTrackableDefaultListener)
trackable.getListener()).isVisible()) {
telemetry.addData("Visible Target", trackable.getName());
this.trackableImage = trackable.getImage();

        if (trackableImage.contentEquals("Blue-Rover") ||
            trackableImage.contentEquals("Red-Footprint") ||
            trackableImage.contentEquals("Front-Craters") ||
            trackableImage.contentEquals("Back-Space")) {
            foundImage = true;
        }
    }
}

telemetry.update();

vuforia.stop();
}
```

This if statement checks if the detected target is any of the ones we initialized earlier.

```
    }
    break;
}
}

telemetry.update();
}

vuforia.stop();
}
```

Encoder movement

This code is used for the movement of our robot in the autonomous period by using encoders.

```
static final double COUNTS_PER_MOTOR_REV = 1440 ; // eg: TETRIX Motor
Encoder
    static final double DRIVE_GEAR_REDUCTION = 1.0 ; // This is < 1.0 if
geared UP
    static final double WHEEL_DIAMETER_CM = 4.0 * 2.54; // For figuring
circumference
```

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```
static final double COUNTS_PER_CM = ((COUNTS_PER_MOTOR_REV *  
DRIVE_GEAR_REDUCTION) / (WHEEL_DIAMETER_CM * 3.1415)); /*This  
formula takes the AAAA, multiplies it by the gear reduction and then divides the  
result by the diameter of a wheel times  $\pi$ . The result we obtain after using this  
formula is the number of rotations of a motor per centimeter.*/
```

```
public void driveUsingEncoder(double speed, double distance) {  
this.stopAllMovements();
```

```
this.configureTractionMotorsForAuto();
```

The next four lines will determine new target position and pass to motor controller.

```
int leftFront = this.leftFrontMotor.getCurrentPosition() + (int)(distance *  
COUNTS_PER_CM);  
int leftBack = this.leftBackMotor.getCurrentPosition() + (int)(distance *  
COUNTS_PER_CM);  
int rightFront = this.rightFrontMotor.getCurrentPosition() + (int)(distance  
* COUNTS_PER_CM);  
int rightBack = this.rightBackMotor.getCurrentPosition() + (int)(distance *  
COUNTS_PER_CM);
```

```
this.leftFrontMotor.setTargetPosition(leftFront);  
this.rightBackMotor.setTargetPosition(rightBack);  
this.leftBackMotor.setTargetPosition(leftBack);  
this.rightFrontMotor.setTargetPosition(rightFront);
```

// keep looping while we are still active, and there is time left, and both motors are running.

// Note: We use (isBusy() && isBusy()) in the loop test, which means that when EITHER motor hits

// its target position, the motion will stop. This is "safer" in the event that the robot will

// always end the motion as soon as possible.

// However, if you require that BOTH motors have finished their moves before the robot continues

// onto the next step, use (isBusy() || isBusy()) in the loop test.

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```
    while (this.leftFrontMotor.isBusy() && this.rightFrontMotor.isBusy() &&
this.leftBackMotor.isBusy() && this.rightBackMotor.isBusy()) {
//      this.telemetry.addData("leftFrontPower:
",this.leftFrontMotor.getPower());
//      this.telemetry.addData("leftBackPower:
",this.leftBackMotor.getPower());
//      this.telemetry.addData("rightFrontPower:
",this.rightFrontMotor.getPower());
//      this.telemetry.addData("rightBackPower:
",this.rightBackMotor.getPower());
//
//      this.telemetry.addData("leftFrontPos:
",this.leftFrontMotor.getCurrentPosition());
//      this.telemetry.addData("leftBackPos:
",this.leftBackMotor.getCurrentPosition());
//      this.telemetry.addData("rightFrontPos:
",this.rightFrontMotor.getCurrentPosition());
//      this.telemetry.addData("rightBackPos:
",this.rightBackMotor.getCurrentPosition());
//
//      this.telemetry.update();
this.leftFrontMotor.setPower(Math.abs(speed));
this.rightFrontMotor.setPower(Math.abs(speed));
this.leftBackMotor.setPower(Math.abs(speed));
this.rightBackMotor.setPower(Math.abs(speed));
    }

this.stopAllMovements();
}
```

Gyroscopic rotation

This portion of the code tackles the issue of rotating our robot during the autonomous period, using the IMU.

```
public void rotate(double angle) {
this.stopAllMovements();
```

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```
this.configureTractionMotorsForTele();

    double target = this.getAbsoluteHeading() + angle;

    boolean targetReached = false;

telemetry.addData("getAbsoluteHeading(): ", this.getAbsoluteHeading());
telemetry.addData("Target", target);
telemetry.update();

    while(!targetReached) {
this.turn(-Math.signum(angle) * 0.25);
```

The 0.25 represents the power the motors will have; we chose a smaller value because we want the robot to have more precision.

```
telemetry.addData("this.getAbsoluteHeading(): ", this.getAbsoluteHeading());

if(target < 0) {
if(angle < 0) {
    if(this.getAbsoluteHeading() < target + 0) {
        targetReached = true;
    }
    } else {
        if(this.getAbsoluteHeading() > target - 0) {
            targetReached = true;
        }
    }
} else {
if(angle < 0) {
    if(this.getAbsoluteHeading() < target + 0) {
        targetReached = true;
    }
    } else {
        if(this.getAbsoluteHeading() > target - 0) {
            targetReached = true;
        }
    }
}
}
```

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```
telemetry.update();  
    }
```

```
this.stopAllMovements();  
    }
```

This if statement checks the actual position of the robot and the target it needs to reach. Based on these two, it calculates the angle at which it needs to turn at, and whether it's a positive or a negative angle.

Tele-op period code

Movement

The code for the movement in the tele-op period simply uses the values the controllers' input.

```
private void moveRobot() {  
    this.leftFrontMotor.setPower(this.gamepad1.left_stick_y -  
    this.gamepad1.right_stick_x);  
    this.leftBackMotor.setPower(this.gamepad1.left_stick_y -  
    this.gamepad1.right_stick_x);  
    this.rightFrontMotor.setPower(this.gamepad1.left_stick_y +  
    this.gamepad1.right_stick_x);  
    this.rightBackMotor.setPower(this.gamepad1.left_stick_y +  
    this.gamepad1.right_stick_x);  
  
    // Range.scale() pe viitor.  
}
```

The collector arm

This is the code that controls our mineral collector arm.

```
private void moveSuction() {  
    if(this.gamepad1.right_bumper && !this.gamepad1.left_bumper) {  
        this.suctionServo.setPower(-1.0);  
    } else if(this.gamepad1.left_bumper && !this.gamepad1.right_bumper) {
```


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```
this.suctionServo.setPower(1.0);
    } else {
this.suctionServo.setPower(0.0);
    }

    if(this.gamepad2.b){
this.dropServo.setPosition(-1.0);
    }

    if(!this.gamepad2.b){
this.dropServo.setPosition(0.5);
    }
}
```

This bit controls the servo motor that collects the minerals in the crater and drops them in the lander.

```
private void moveCollectorArm() {
this.armMotor.setPower(-this.gamepad2.left_stick_y * 0.4);
this.armElbowMotor.setPower(-this.gamepad2.right_stick_y * 0.4);
}
```

This function uses the values inputted from the controllers.

The latching arm

This portion controls the arm we use to both deploy from the lander and to latch back on it during the end game.

```
private void moveLanderArm() {
this.telemetry.addData("armLatching: ",
this.armLatching.getCurrentPosition());

this.telemetry.addData("y: ", this.gamepad1.y);
this.telemetry.addData("a: ", this.gamepad1.a);

    if(this.digitalTouch.isPressed() && this.gamepad1.a && !this.gamepad1.y)
    {
this.armLatching.setPower(0.0);
```

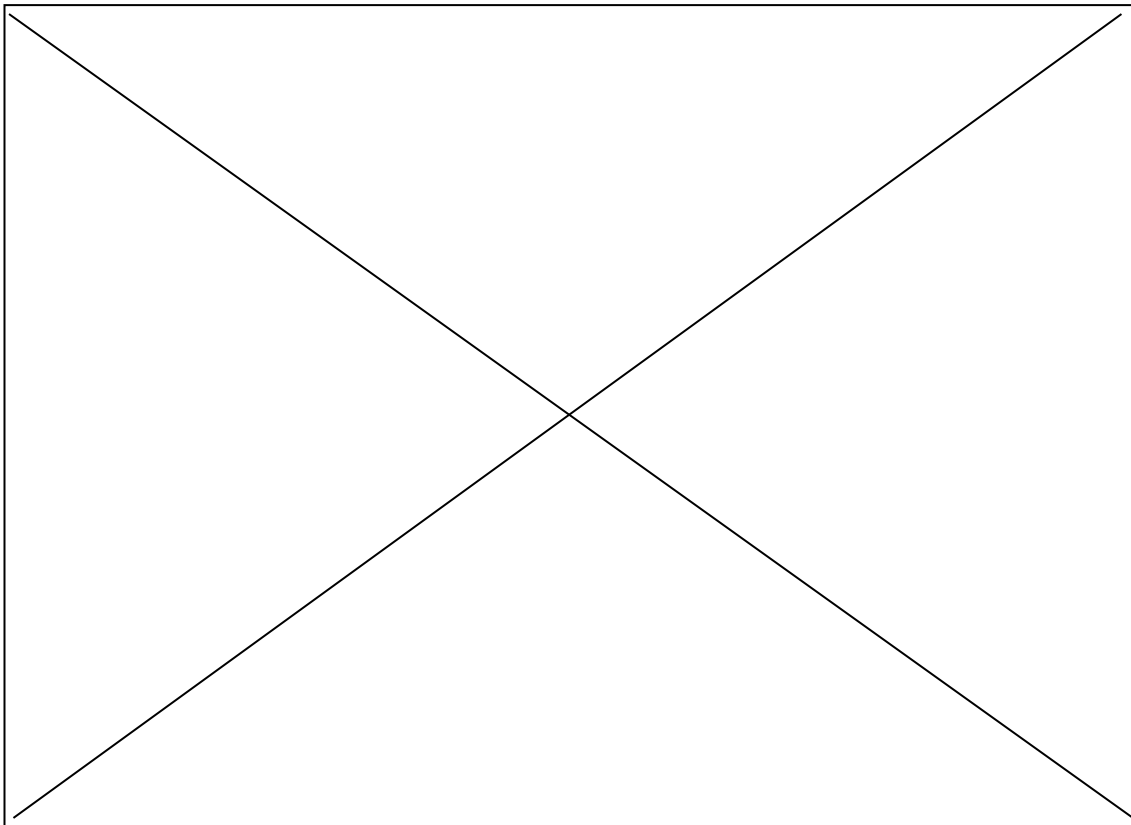
“Dream big, build bigger!”

```
    } else if(this.digitalTouch.isPressed() && this.gamepad1.y &&
!this.gamepad1.a) {
this.armLatching.setPower(-1.0);
    } else {
        if (this.gamepad1.y&& !this.gamepad1.a) {
this.armLatching.setPower(-1.0);
        } else if (this.gamepad1.a&& !this.gamepad1.y) {
this.armLatching.setPower(1.0);
        } else {
this.armLatching.setPower(0.0);
        }
    }
}
```

Our deploying mechanism uses a touch sensor: the robot keeps compressing until the lower end of our arm touches the touch sensor, which happens when the robot is fully off the ground.

```
this.telemetry.addData("armLatchingPower: ", this.armLatching.getPower());
```

```
this.telemetry.update();
}
```



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The controls of our robot



Controller A- the movement of the robot

Left and Right Stick-movement

Y- climbing on the lander

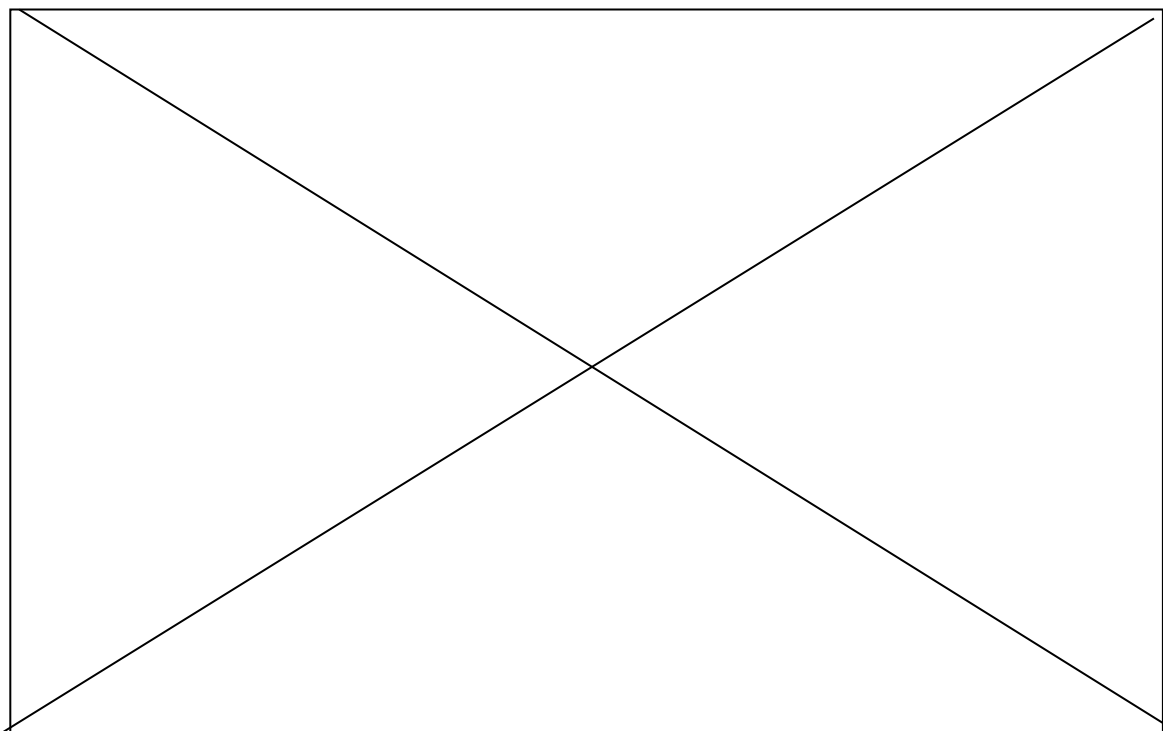
A- descending from the lander

Right Bumper- activating the servo in the collecting mechanism



Controller B- the mineral collector arm and latching back on the lander during the end game.

Left Stick- controlling the 'shoulder' motor
Right Stick- controlling the 'elbow' motor
B- dropping the two collected minerals



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Team management and outreach activities

Team management related team meeting notes

Here are the team meeting notes about the team management that goes on behind the scenes, what makes us work together so well.

September 11th : Back to school!

Meeting held: at school, at 10

Attendance: Ale, Alex, Alexandra, Bianca, Bogdan, Carla, Cristi, Dani, Gloria, Laura, Peto, Robi, Spiri, Mrs. Cojocaru, Mrs. Carabas

Today was our first meeting in the new school year! We have new members, which is exciting: Laura and Robi from ‘Carmen Sylva’, who will work in the programming department, Alex, who is from ‘Jean Louis Calderon’ with Dani and Pavel, who will work in robot assembly, and Alexandra, from ‘Carmen Sylva’ too, who will help with the Engineering Notebook.

One of the things we talked about were the presentation videos we had to film over the summer, and about their quality (or lack of). Dani’s was, by far, the best, and we considered it to be the standard for everyone else’s videos, which will have to be redone.

Due to the lack of time, we settled two later team meetings this week: one on Thursday, at 2 PM, at school, and one on Sunday, at Nokia, at 9.

We found out that Maria had to quit being on the team over the summer, which is sad, but at least we have Alexandra now! We wish Maria the best of luck in her future endeavors.



Us, talking about the presentation videos.

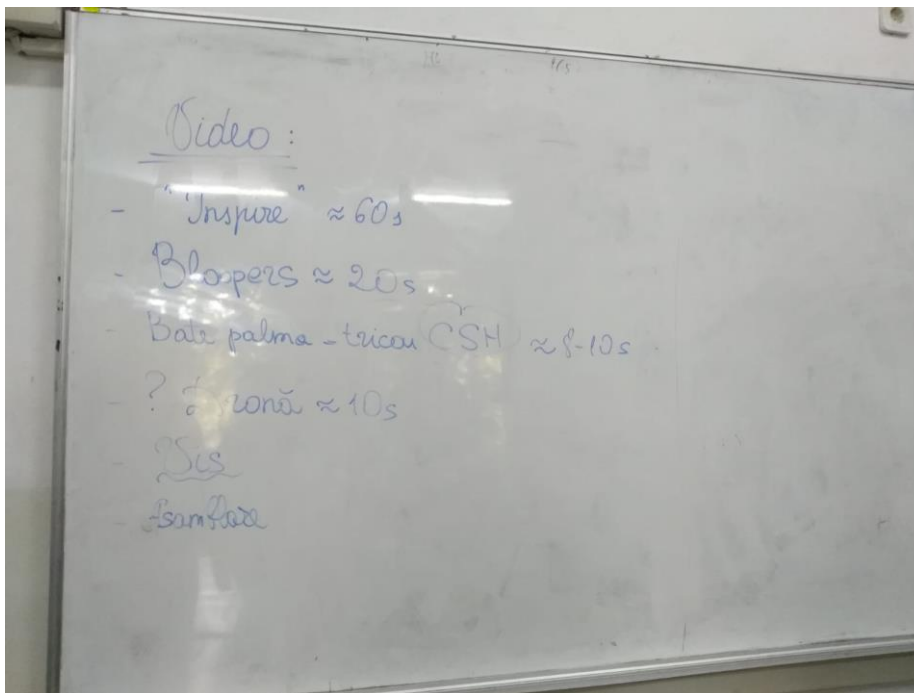
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September 13th: Talking strategy

Meeting held: at school, at 2 PM

Attendance: Ale, Alex, Alexandra, Bianca, Bogdan, Carla, Cristi, Dani, Gloria, Laura, Peto, Robi, Spiri.

In the second half of the meeting, we talked about the presentation video for the whole team, and Alexandra and Spiri told us that they have friends who might be able to help us with it. Since this year we need to answer some questions, and not just introduce our team, a good idea would be to write the letter for the preselection first, and to use some of the things we will state there as our scenario. We even came up with a few ideas to make our video more interesting: we could pretend we won the Inspire award in the finals in Detroit, and then we would answer the questions as part of an interview with the press. Bogdan, since he's the team leader, would high-five all of us and then we'd be wearing the team t-shirts, as some sort of transformation.



The main scenario of the presentation video.

Right before leaving, we spoke about how we could change our appearance as a team to make ourselves more remarkable during the regionals or the

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nationals. We discussed wearing some sort of costume; perhaps pajamas, or cosplaying Star Wars.

September 16th: Make it official

Meeting held: at the Nokia IoT Garage, at 9

Attendance: Ale, Alex, Alexandra, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Pavel, Peto, Robi, Spiri, Mrs. Carabas, Mr. Petolea, Calin from Symme, Radu Ticiu

We were also filmed during the meeting, for the presentation video, by one of Spiri’s friends Alex, who brought a drone. We had some nice shots with the Nokia building, and some with the room we work in. Next week, Gloria will bring two people who will help film some closer shots of us.



Us and Alex after the shooting.

Cristi decided to drop out over the week. Since he was a member last year, his departure is a little sad, but this was his decision, and we wish him the best of luck for whatever he decides to do next.

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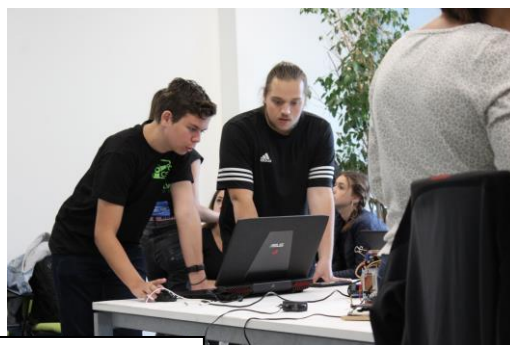
Everyone at the meeting, working hard.

September 23rd: Settling in

Meeting held: at the Nokia IoT Garage, at 9

Attendance: Ale, Alex, Alexandra, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Peto, Robi, Spiri, Mrs. Carabas, Mr. Petolea, Mr. Cojocar

Today we also filmed the presentation video. Gloria brought two people which filmed our meeting, in order to get some nice shots of us at work, which will be combined with what Alex filmed with the drone last week. We can't wait to see the final product!



Stills from the presentation video.



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September 30th : Closer to enrolling again!

Attendance: Alex, Alexandra, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Leti, Peto, Robi, Spiri, Mr. Petolea

Meeting held: at the Nokia IoT Garage, at 9am

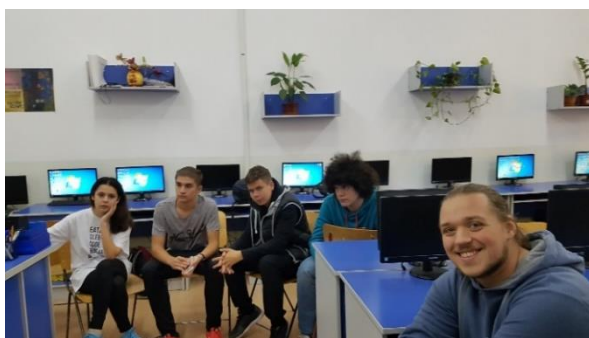
We also received our video from the people who edited it, and we all agreed that it was beautiful! The shots that were filmed with the drone really make it special, and, it turns out we picked the background music really well! We have to record the voiceover, in order to address the questions we must answer, but that shouldn't take more than a day. Alexandra is making progress with the essay, which means that we'll be enrolled in the competition again in no time!

October 10th : Discussing outreach events

Meeting held: at school, at 10

Attendance: Ale, Alexandra, Bianca, Bogdan, Carla, Gloria, Laura, Leti, Peto, Robi, Spiri, Ms. Carabas

Recently we received two invitations to two events which would happen in the same day; we could go to team RO0001 XEO's event in Alba Iulia, XeoTalks, or we could be volunteers at the Timisoara City Marathon. Both sound exciting, so we decided to split up in two groups: one who will meet the other teams in Alba Iulia and one who will volunteer in the Marathon. Carla, Leti, Ale, Robi and Bogdan will go to Alba Iulia, and everyone else will stay in Timisoara.



Everyone paying attention and discussing our participation in the two events

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October 14th : Brainstorming!

Meeting held: at the Nokia IoT Garage, at 9

Attendance: Ale, Alexandra, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Leti, Peto, Robi, Spiri

Carla started sending our letter to potential sponsors. Spiri scored a partnership with the restaurant Caprice, who will bring us food during our future meetings.

List of potential sponsors:

- AEM
- Saguario
- Haufe
- Irian Solutions
- Comsertim
- Configcar
- Vox
- Dc New Mode
- Dialogdata
- EE Test Sa
- Elan-Solutions
- EEE
- Upfit.cloud
- Egeria
- Elba
- Eta2u
- Euroccoper
- Gallprint
- I Computer Solutions

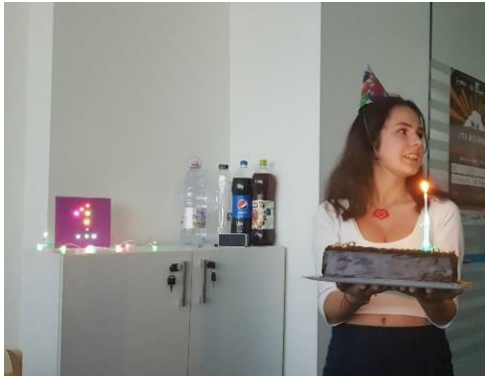
November 4th: Happy Birthday, Team CSH!

Attendance: Alex, Alexandra, Ale, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Leti, Pavel, Peto, Robi, Spiri, Ms. Carabas, Ms. Cojocar, Mr. Cojocar

Meeting held: at the Nokia IoT Garage, at 10am

Today we celebrated the team's one year anniversary! Gloria, Carla and Leti took it upon themselves to plan a party, and to bake cupcakes. They decorated the room with the green balloons we had for our stand at Nationals, had prepared party hats for everyone, and had ordered a cake for the occasion. We had loads of fun, and we reminisced about the past year. We vowed to improve our performance this year, by getting to go to the US for the World Finals. After an hour or so of partying, we got back to work.

“Dream big, build bigger!”



Happy Birthday, team CSH!

November 11th: Happy birthday, Alex, Bianca and Carla!

Attendance: Alex, Bianca, Bogdan, Carla, Gloria, Laura, Peto, Robi, Spiri, Mr. Petolea

Meeting held: at the Nokia IoT Garage, at 9 am

Aside from working, today we celebrated the joint birthdays of Alex, Bianca and Carla, who are born on the 9th, 13th and 10th of November. We bought them a surprise cake and we sang them ‘Happy Birthday’. We all had fun, and they were touched by our surprise!



The cake we got, and Alex, Bianca and Carla.

November 15th: All about the European Robotics Week

Attendance : Alexandra, Ale, Bianca, Bogdan, Carla, Gloria, Laura, Leti, Peto, Robi, Spiri, Ms. Carabas

Meeting held: at school, at 11 am

Since the European Robotics Week begins this Saturday, our non-technical department prepared a bunch of activities we could be a part of, and today we will talk about what our participation will entail.

The first activity will be on Sunday, when we will bring two classes from our school to our workshop at Nokia. We will show them the playing field, our robot and our notebook from last year, and we will all talk about our role in the team. Bogdan and Dani will talk about robot assembly and 3D design, Laura and Spiri about programming, Robi will present the field and the rules for this year's game, Peto will be the driver, and Alex will talk about the 3D printer. From the non-technical department, Gloria will talk about what type of activities you need to do as responsible for the PR of the team, Carla will speak about fundraising and Bianca and Ale will talk about the Engineering Notebook.

Moreover, we'll have the pleasure to meet with engineers from Eltrex that are curious of the way we work together as a team. We are excited to meet them, and we also can't wait to receive some feedback and advice from people that are far more experienced than us in this field.

The next activity will be on Tuesday when the non-technical department will hold a PowerPoint presentation about the benefits of volunteering. The way we see it, volunteering is the best way you can improve your skills and abilities, and also enjoy your time with other people. This event is going to be held at our school.

After that, on Wednesday, at the "Jean Louis Calderon" High School, we will organize an event similar to the one on Sunday, whose purpose will be informing students from a different school.

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November 26th: The return of Mrs. Cojocaru

Attendance: Alexandra, Ale, Bianca, Bogdan, Carla, Gloria, Laura, Leti, Peto, Robi, Spiri, Ms. Carabas, Mrs. Cojocaru

Meeting held: at school, at 10 am

Mrs Cojocaru made her official return today, after not being able to involve herself too much due to health issues. We filled her in with everything that happened while she was gone, including the events we coordinated during the European Robotics Week and what progress we made with the robot.



Everyone at the meeting.

Alexandra proposed to us an interesting outreach activity: we could go to a hospital and volunteer to spend some time with the children there. We kept this in mind.

Among other things, we were recently contacted by rookie team RO0124 The Emperor, who asked us if we would agree to joining a partnership, where we would be their mentors of sorts. After discussing it, everyone felt positive about this and we gave them our response. Whenever they will need any sort of help whatsoever, we will be there, and give them tips.

Right before ending the meeting, we drew a name for team CSH's first Secret Santa, which will take place on the 16th of December. We can't wait!

December 16th : CSH's Secret Santa Gift Exchange!

Attendance : Ale M, Alex, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Leti, Peto, Spiri, Robi, Mr. Petolea

Meeting held: at the Nokia IoT Garage, at 9 am

“Dream big, build bigger!”

Today is our gift exchange! Some time ago, we drew one of our teammates, for whom we’ve bought a gift. We will also decorate a small Christmas tree.



Carla and Gloria, decorating the Christmas tree.



December 21st : Home (Nokia) Alone

Meeting held at: at the Nokia IoT Garage, 1 pm

Attendance: Robi, Laura, Spiri, Leti, Carla, Ale, Bogdan, Bianca, Alex, Dani

We all gathered to watch a film together. We decided to go for Home Alone since it’s a classic Christmas movie. All of us brought cozy socks, comfortable clothes, blankets and snacks to get into the Christmas spirit. We had lots of fun and we plan on doing that again.

December 23rd: Designing our team marker

Meeting held at: at the Nokia headquarters at 9 am

Attendance: Peto, Carla, Leti, Bogdan, Laura

We finished translating the project and the letter in English and aligning them nicely in page.

We made the t-shirt and sweatshirt design for each member personalized with their name and role.

January 13th – Talking management

Meeting held at: at the Nokia IoT Garage, at 9 am

Attendance: Robi, Spiri, Leti, Carla, Ale, Bogdan, Bianca, Alex, Dani, Mrs. Cojocaru

In this meeting, we established a new method of planning and keeping a register of not only the meetings, but also of the group’s activities. The table below is meant to help everyone keep informed with every team member’s tasks, while displaying the completion status of every activity and the other members who are involved.

Table 1 –Plan of activities from February 4th to February 10th

Department	Department Leader	Activity	Responsible	Dead-line	The status of activity
3D Design	Preda Bogdan	Making the scaled sketches of the printed pieces, finishing the robot’s 3D model	Alex Bogdan	February 18 th	Under development
Programming	Iridon Robert	Autonomous testing	Spiri, Alex	February 6 th	finished
Assembly	Petolea Razvan	Preparing the team marker deployment mechanism for the regionals.	Peto, Robi, Spiri	February 19 th	Under development
Marketing	Morosan Gloria	Finishing the design of the promotional materials: - bracelets, arrows - rollup, business card, flags - design sticker on robot - design stand	Gloria, Ania Bogdan, Carla Gloria, Leti, Carla	February 10 th	finished
Public Relations	Morosan Gloria	Finishing the list of volunteers Attendance –promotion at Radio TM and TVR Timisoara	Gloria Nusa Cojocaru, Laura, Pavel		Under development finished
Notebook	Fraunhofer Bianca	- description of Events + statistics and posting them in the team’s google drive - translating the rest of the events -restructuring the notebook	- Spiri, Carla, Leti, Gloria, Bogdan - Sorinica, Letitia - Gloria, Leti	February 6 th February 9 th	Under development Finished notebook in 11 th feb
Fundraising	Dumitrescu Carla	Writing the team’s budget	- Sorinica	February 20 th	Under development
Other activities		Training	Alex, Peto, Bogdan, Dani	February 21 st	Under development

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Table 2 – Plan of meetings (partially completed)

Planned by	Date	Time	Duration of the meeting	Department	Participants	Obtained result
Spiri	02.01.2018	09:00	10-11 hours	Programming	Spiri, Laura, Pavel	Autonomous functions
Bogdan	04.01.2019	10:00	3-4 hours	The entire team	Carla, Peto, Bogdan, Ale M, Bianca	Partnership, Technical Mentoring support
Spiri	03.01.2019	10:00	10 hours	Programming	Laura, Spiri, Bogdan	The paths for the autonomous period
Pavel	04.01.2019	13:00	6 hours	Programming	Laura, Pavel	Testing
Bogdan	06.01.2019	09:00	4-5 hours	Drivers	Bogdan, Peto, Alex, Robi, Leti, Bianca, Dani, Carla, Alexandra	Testing + changing the collecting mechanism's box
Bogdan	08.01.2019	09:00	4-5 hours	Drivers	Bogdan, Peto	Testing + changing the collecting mechanism's box
Spiri	09.01.2019	09:00	10-11 hours	Programming	Pavel, Spiri, Robi, Bianca	Finishing the paths, the detection of the Navigation Targets
Bogdan	11.01.2019	09:00	4-5 hours	Assembly	Bogdan	deploy lander ideas...testing systems
Bogdan	13.01.2019	10:00	3-4 hours	The entire team	Bogdan, Spiri, Alex, Peto, Laura, Carla, Bianca, Dani	Practice matches
Spiri	11.01.2019	12:00	2-3 hours	Programming	Spiri	Gold detection
Spiri	18.01.2019	12:00	10 hours	Programming	Spiri, Laura, Carla, Gloria	Autonomous finished
Bogdan	17.01.2019	15:00	3-4 hours	Drivers	Bogdan, Robi	training
Gloria	20.01.2019	11:00	5-6 hours	The entire team	all members	Demo Iulius Mall
Spiri	25.01.2019	13:00	5-8 hours	Programming	Spiri, Alex, Peto	Gold Detection pixels
Bogdan	26.01.2019	09:00	7-8 hours	Drivers	Bogdan	3D/Augmented reality
Alex	25.01.2019	09:00	3-4 hours	Drivers	Alex, Peto, Spiri	training
Peto	04.02.2019	11:00	2 hours	Drivers	Peto, Bogdan	training
Peto	05.02.2019	10.30	2 hours	Drivers	Alex, Peto	training
Spiri	06.02.2019	12:00	5 hours	Programming	Spiri, Alex	Autonomous testing
Spiri	14.02.2019	14:00	5 hours	Programming	Spiri	The code for two golden mineral samples

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January 15th –Preparing everything for the Timisoara Demo Games

Attendance: Ale, Alex, Alexandra, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Pavel, Peto, Robi, Spiri

Meeting held: at school

The technical department added the finishing touches to the robot, or to the code. They made sure that the robot passed the technical inspection, checked the timing during the autonomous period.

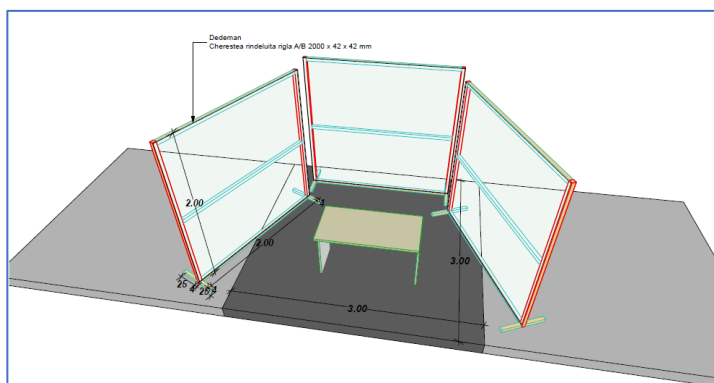
The nontechnical department has selected the promotional materials, has prepared the notebook and the two manuals of the game, has brought in volunteers for photography, video recording and score keeping. In the spirit of the competition, some members have gotten in touch with other participating teams, in order to welcome them to our beautiful city in the evening before the demonstrative matches. Because our team is full of joy and enthusiasm, it has prepared all the necessary logistics to create a colorful atmosphere through music.

7th - 21st February – Creativity and skill

Attending: Ale, Alex, Alexandra, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Pavel, Peto, Robi, Spiri

Meetings held: at school, at Nokia IoT Garage

The arranging of the stand for Timisoara’s regionals was a true challenge for the whole team. The first idea of the stand was projected in order to create a wood frame. Gloria and her family went to a store in order to inform about the form, the size and the prices of the wooden frame.



Our first stand model

“Dream big, build bigger!”

This decision was very hard to make because there wasn't an alternative that satisfied us regarding the aspect, weight, sizes and price. Neither the technical details were very easy to establish.

In order to get to a convenient and realistic alternative we asked a volunteer for help, Mr. Ciprian. Together we established the sketch of the stand, what are the most right materials and what solution we would pick for the dismantling and the transport of the stand.



The stand's frame.

In two days from the day we finished the discussions and the frame was done. Alex and Peto received instructions for dismantling and assembly and Gloria noted the exact sizes in order to begin the arranging of the surfaces of the panels.

To see what our ideas would look like in reality, we designed its 3D model.



“Dream big, build bigger!”

Gloria and Carla established the content of the panels and the final solution for its surfaces.



Gloria and Carla's 'blackboard', where they designed the stand.

Carla, Gloria and Leti bought the necessary materials and products. We hope that the stand will attract many attending people and will reflect the spirit of our hardworking team.

17th February: The interview - an important test (part I)

Attending: Bianca, Gloria, Bogdan, Carla, Spiri, Alex, Peto

The meetings occurred at Nokia IoT Garage

This day's meeting aimed at finalizing the latest details on participation in the regional stage of the competition. One of the important decisions was to establish the members who will represent the team for the interview. After the debates, the following members have been selected: Bianca, Gloria, Bogdan, Spiri, and Peto.

“Dream big, build bigger!”

February 19 - Interview - an important test (part II)

Attending: Bianca, Gloria, Bogdan, Spiri, Peto

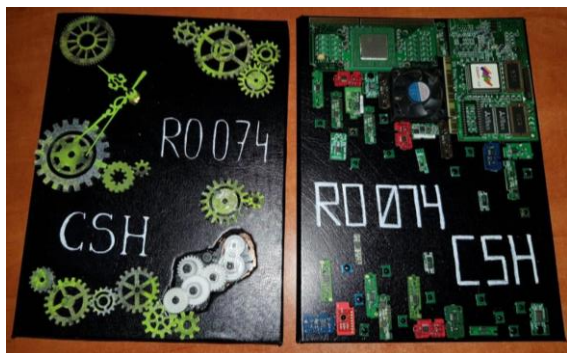
The meetings occurred at the school

The five members who were assigned to represent the team at the interview gathered to establish the field they would talk about and how to structure the content. It is a great responsibility that they have assumed and will do everything in their power to honor the work of the team.



Everyone, brainstorming about our strategy for the interview (left), and Spiri, being confident (right)

Aside from that, the girls working on the decorations for the stand finished everything later at night.



The hand-made cover of our notebook (left), Gloria and Leti working on our decorations (below).



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Outreach related team meeting notes

Here are the team meeting notes about our outreach events.

The community’s support means everything to us, which is why we wanted to give back as much as possible, through as many different activities as we can.

Being part of the FTC community



September 23th: Meeting the teams from Timiș



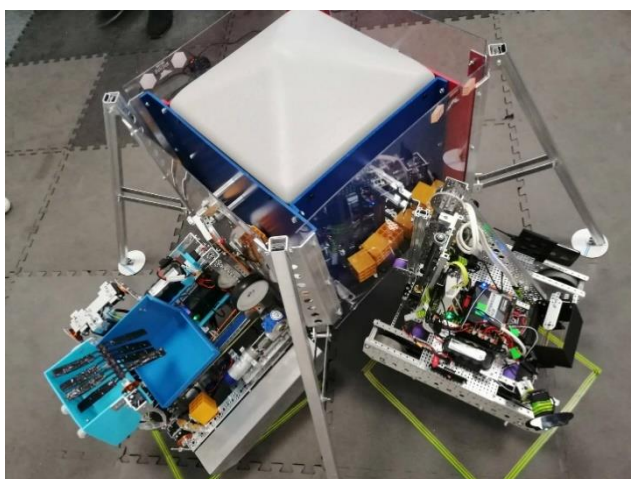
October 27-28th : Beginning of XEOtalks



November 22nd: Helping out team RO093 Bliss



January 4th : The official beginning of a lovely partnership CSH &The Emperor



January 13th: Practicing with RO012 Davos



January 18th: Welcoming RO0cc Soft Hoarders and RO0cc Bionic Royals to Timisoara before the Official Demo

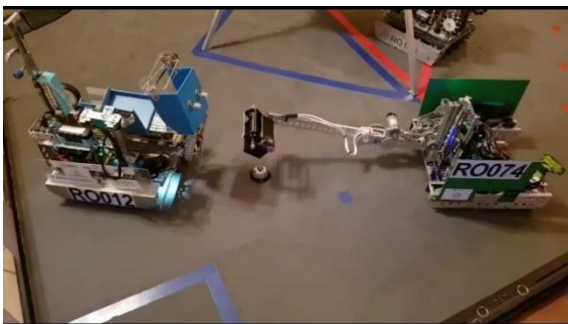
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January 19th: The Timisoara Demo Games!



January 20th: team CSH at the Mall Demo Timișoara



January 31st: Davos partnership - All team from Timiș can practice on the common space

Events



September 8th :
International Events in
Republic of Moldova



September 28th : CSH was partner
to the event European
Researchers' Night 2018!

“Dream big, build bigger!”



October 6th: Codecamp



October 27th: Visit from the kids from the Stefan Bozian Middle School.



November 18th: European Robotics Week- start!



November 20th: The importance of volunteering



November 21st: Impressing the ‘Jean Louis Calderon’ Theoretical High School



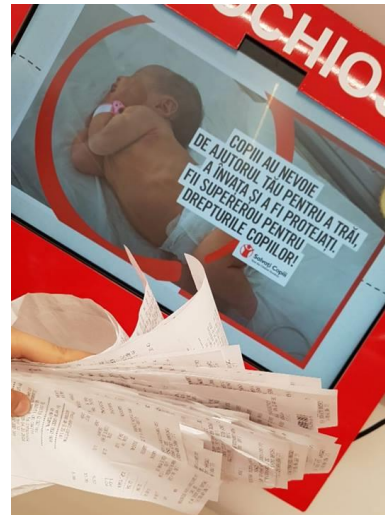
January 30th: The Story of Qubit

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Community



September 16th : becoming Partners with Symme3D



October 11th: Helping 'Save the Children'



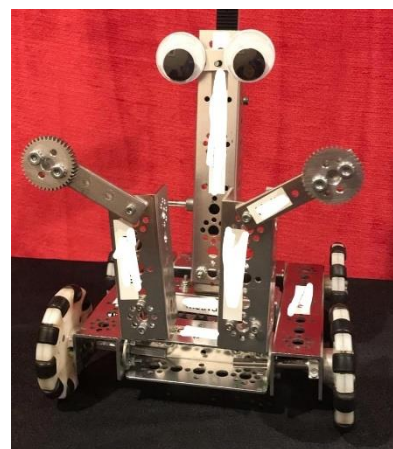
October 28th: Running in the Timisoara City Marathon



December 22nd: Meeting little people



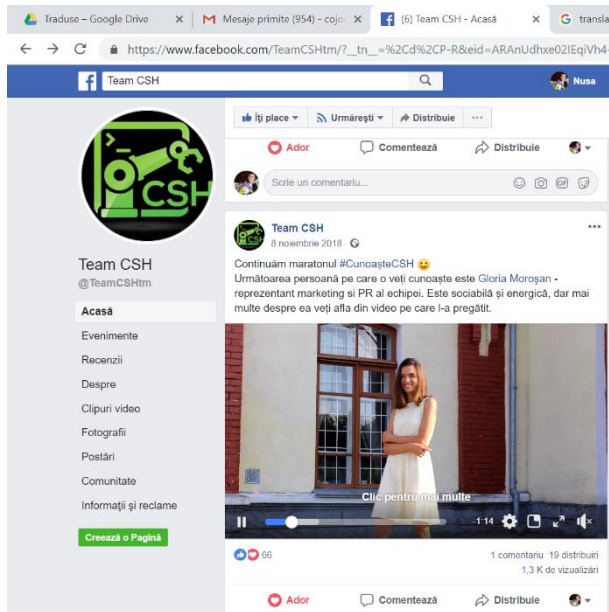
18-19th December 2018: Caroling our sponsors



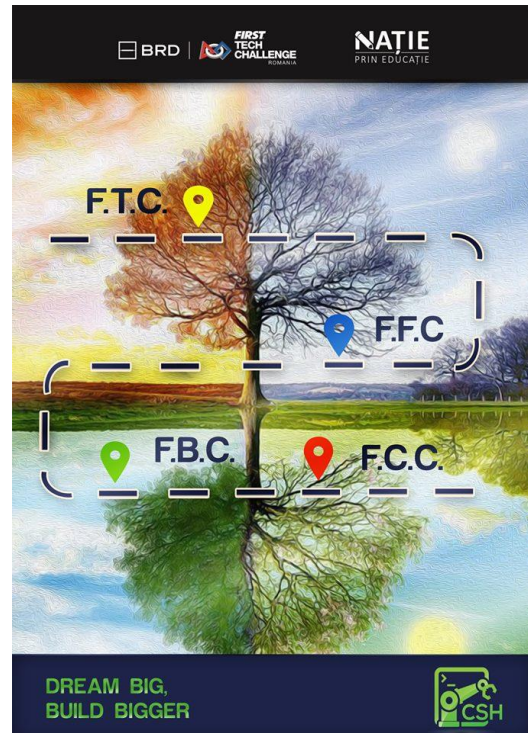
CSH Academy

“Dream big, build bigger!”

Media



November 6th: CSH Marathon on facebook



November 11th: #Seize the Season



February 5th: Live on radio!



February 5th: Live on TVR Timișoara



February 16th: Video support from Peregrinii

“Dream big, build bigger!”

Being part of the FTC community

September 23th: Meeting the teams

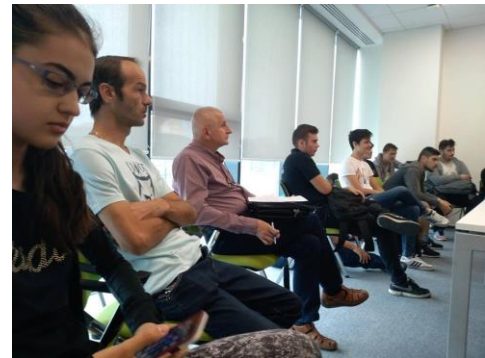
Attendance: Carla, Dani, Pavel

Meeting held: at Nokia Garage IoT

Today every team that's in Timis got together at CSH's workplace: Nokia Garage IoT to talk about the new FTC season. Each team talked about what exactly do they need in order to excel this year.

In this meeting some possible sponsors participated: Symme3D, Nokia and representatives of some organizations/creative spaces willing to help the teams in Timisoara. Each team gave their personal information to the people that could help them achieve their dreams.

Mr. Petolea, our team's mentor offered to help all of the teams in Timisoara. He managed to get sponsorships from Asgo Telecom and Simtel for all of the teams.



Everyone who attended the meeting, paying attention.

October 27th : Beginning of XEOtalks

Meeting held: at Alba Iulia

Attendance: Robi, Leti, Gloria, Carla, Bogdan, Ale

Today we woke up early in the morning to catch the train that went to Alba Iulia. At first, we got on the wrong train and we tried to find our seats, only to realize all our seats were either taken, or they didn't even exist. After six hours of travelling we finally got to Alba Iulia.

“Dream big, build bigger!”



#CSHpassion



Us, in Alba Iulia, waiting for the activities to start.

The first thing we did when we got there was to play a game. Together with another 3 teams, we got divided in 6 groups, each one containing 3 people. We received straws, papers and a ball. We had to make a trail so that the ball could move for as long as possible. Each group had innovative ideas and we had fun while constructing the route.

After the game, the actual work began at “1 December 1918” university.

The first speaker, professor Ciprian Cucu talked about team work and how important it is. As a team, we spend a lot of time together, and we need to be able to work out our conflicts.

The second speakers, Gabriela Ivan and Ana Popescu who were the representatives of BRD First Tech Challenge presented us a “Season 3 Overview”. We watched 2 videos, we talked about how the regionals will unfold, how we should make the engineering notebook and about the webinars. We were highly encouraged to mentor and help the new teams, since we already are a bit experienced.

Ioan Istrate, a guy who went to US and participated in XPRIZE (a world-wide competition) told us about his achievements and projects. He also motivated us to not leave the country.

“Dream big, build bigger!”

The fourth speaker, Sorin Badea is a journalist at Radio Guerilla. He advised us to use the internet in our favor, to learn what we are passionate about. He told us to email persons and companies who would be interested in helping us with our projects. Life is an endless competition and we need to come out as winners. Fun fact, he is the individual who brought Rick and Morty to Romania.

Adrian Rosian is a web developer and an expert in efficient digital solutions for businesses. He spoke about functional programming and about the challenges of it. He told us to write the code in such a way that everyone who is reading it should know everything about our whole life.

After those speakers, the main mentor of the team presented us a brief history of XEO. Seeing them in their journey was very interesting for sure.

Evening's surprise was a skype call with the ones who won Inspire Award in US: wizards.exe. We watched 2 youtube videos made by them about Judging and Awards. We also asked them questions and they were very receptive.

The last speaker of the day was Crina Luha. The main topic was personal branding. She inspired us to talk to the local press and make our name known. We had different activities: first of all, we had to beautify a team member in such a way that it resembles our team and we chose Gloria to represent us. Then, we had to say which animal represents CSH and we chose the phoenix because here, in Timisoara, the democracy began and just like a phoenix we were reborn again from ash. Lastly, we said which superhero and bad guy represents us. We went for Doctor Strange and Thanos.

After all the hard work we went to a Halloween party and each one of us had a costume. Robi was a unicorn, Gloria was Pikachu, Carla was Morticia Addams, Leti was Wednesday Addams, Bogdan was a tiger and Ale came into her pajamas. We had a lot of fun with all the other teams at the party!

“Dream big, build bigger!”



#CSH at XEO's Halloween Party

October 28th: XEO Talks day two

Meeting held at: Alba Iulia

Attendance: Robi, Gloria, Leti, Bogdan, Carla, Ale

Today we had a day full of conferences and fun activities at “1 December 1918” University.

Everyone, one by one, had to say a reason why robotics unites Romania, since that was XEOtalks’ motto. The main reasons were friendship, team-work, family, challenge and unity.

Since it was almost Halloween, the next thing we had to do was to carve a pumpkin, but in an unconditional way. On a table there were different tools, each one labeled with 4, 6 or 10. We only chose a few nails, which were 6 points. We had half an hour to complete the carving. After each team finished, the pumpkins were placed in the city for people to vote for the best one. The amount of points you used was cut from the votes’ points. Sadly, we didn’t win, but we were proud of how it turned out.

“Dream big, build bigger!”



#CSH's pumpkin

Then, we moved back inside for an open talk about the game manual. We asked Ionel Doboaca about whatever uncertainties we had about the manual. He told us that a person in our team had to know the manual by heart and he encouraged our mentors to become judges in the regional games.

The next speaker was Florin Rasteiu, the president of The County's Council in Alba Iulia. He gave us a list of potential sponsors and some tips and tricks on how to attract sponsors. He said that there are numerous methods to do that, but the most efficient one is the “emotional” one. We should start by telling the company to put themselves in our shoes, to remember how they wanted something, how they had a dream. But someone else had to decide whether they can achieve that dream or not, their parents. We are in the same situation and our happiness, our dream, depends on them. He also answered to questions about fund raising.

Claudiu Ceia had a speech on how to get out of your comfort zone. We should never impose limits on ourselves, we can always do better. We talked about the difficulties that might come along the way and how we should always try new things and do extracurricular activities.

The next and last speaker was Mihai Oltean with the story of Jenny5, a human-like robot. The project wasn't entirely finished so he only showed us how it was supposed to work. He projected the robot in OpenSCAD and he programmed it in JavaScript.

At the end of the day we went to the railway station to take the train home.

“Dream big, build bigger!”

November 22nd: Helping out team RO093 Bliss

Meeting held at: Nokia IoT Garage, at 12am

Attendance: Bianca, Carla, Leti, Gloria, Ale, Peto, Dani, Robi, Spiri, Laura, Pavel, Bogdan

Today our team met with National College C.D. Loga’s rookie team Bliss RO093 so that we could mentor them and answer their questions. We were divided in teams: 3D designing, Java programming, marketing and notebook-keeping.

Bogdan showed them how to use Fusion 360 because it’s easier then Creo (the program they were using).

The programming team showed them where they could find information about the coding, for example: r/ftc, Java Dox Official and predefined functions.

Bianca told them about the notebook. She advised them on how to divide the tasks, how a notebook representative should always be present in every meeting they have and so on. Andreea (the notebook responsible in team Bliss) asked her multiple questions and Bianca showed her our last year’s notebook.

Gloria, Leti and Carla gave them some useful ideas on: possible events in their high school and city, advertisings, volunteering, stand and robot designing. The three of them advised the rookies to get along with the other teams, form friendships and know the game manual by heart. They also spoke about our team, our achievements in the previous season and the difficulties that came along the way.

Today was a very productive day both for us and Team Bliss! We were very glad to help them and we hope to cooperate more with them in the future!



Us, giving Bliss’ members tips.



“Dream big, build bigger!”

January 4th : The official beginning of a lovely partnership

Attendance : Ale M, Alex, Bianca, Bogdan, Carla, Laura, Leti, Pavel, Peto, Spiri, Mr. Petolea, Martha

Meeting held: at the Nokia IoT Garage, at 10 am

Martha, team RO0124 The Emperor’s leader is in Timisoara, and today she joined us for a meeting. Gloria wrote a partnership contract, and Bogdan and Martha signed it, marking the official beginning of our mentorship.



The present team members and Martha (in white).

January 13th: Practicing with RO012 Davos

Attendance: Alex, Bianca, Bogdan, Carla, Laura, Peto, Spiri

Meeting held: at the Nokia IoT Garage, at 9 am

Today is quite an exciting day! A while ago, we arranged to have a friendly game with team RO012 Davos. We are ready to test our robot and our driving skills against legitimate opponents.

However, they didn’t arrive until 11, so we had 2 hours of tinkering with the robot. After securing the additional battery, that we added to power the camera, we wanted to make our latching mechanism faster, so we switched the gearbox from the motor that powers the latching mechanism.

“Dream big, build bigger!”

After Davos arrived, we decided to test the autonomous period as well; we did mostly fine, other than, when moving towards the depot, we accidentally knocked over one of the silver minerals.

Up next were a few turns of practicing for the driver-controlled period. The first pair of drivers were Bogdan and Peto. We agreed to practice collecting the minerals without timing it, until the crater ran empty. The next pair of drivers were Dani and Peto, who did a timed run. They scored 60 points without latching onto the lander, because the mechanism started lifting the robot one second too late.



At the Nokia iot garage with team Davos

While practicing, Davos’ robot malfunctioned. They had a problem with one of the wheels, because they didn’t use gears when assembling the motors for the wheels, which means that the motors were under a lot of stress. Just as expected, one of the gears from within the motor broke because of the stress, and, since this issue is unfixable, they need to replace their motor.

“Dream big, build bigger!”

January 18th: Welcoming Bionic Royals and Soft Hoarders to Timisoara!



Welcome, Bionic Royals!

January 19th: The Timisoara Demo Games!

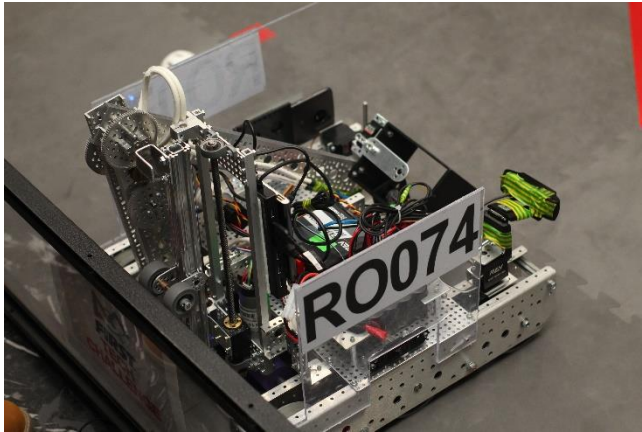
Attendance: everyone!

Meeting held: at the West University of Timisoara, at 9 am

The official Timisoara Demo Games are today, reuniting a grand total of 31 teams from all over the country under the university's roof. We are happy to meet again with our friends from the other teams, but also to finally get a more accurate idea of our robot's performance among the rest. We are aiming for the World Finals in Detroit, after all.

Right after arriving, we brought our robot to the training field, and had it go through an autonomous run. We were shocked to find that, instead of dropping the team marker in the deposit and parking in the crater, the robot does the opposite! Spiri checked the code, and found the mistake: when we assembled our training field at Nokia, we didn't tape the navigation targets on the wall properly, which meant that the way the robot would orient itself in space was wrong. Thankfully, this mistake wasn't hard to fix, but we are wasting time, since the quickest solution provided leaves the robot heading to the crater, then going to the deposit, then returning to the crater.

“Dream big, build bigger!”



The robot, standing in the training field.

On the topic of the navigation targets, the lighting in the room makes it hard for our robot to see one of the targets, the one with the one with the galaxy, but the programming team came up with a quick fix; if, while looking for the targets, the robot can't find any target, it will assume that the target nearest is the one with the galaxy.

Our robot inspection came soon. It was rather uneventful, save for two comments the judges made: the first was that we should find a way to modify the dimensions of the collecting mechanism, because it makes the robot not fit perfectly within the sizing box, and the other was that the corners the plexiglass covers on our robot were too sharp, meaning that we should file them down.



Spiri, Peto, Robi, Alex and Bogdan looking at the robot right before the robot inspection.

The first match of the day saw us in alliance with team RO038 RobotX_HD, against teams RO031 Soft Hoarders and RO132 LTCDMN Robotics. Our alliance didn't move the golden mineral completely off of its position, but the rest of the autonomous period was flawless. During the tele-op period we deposited

“Dream big, build bigger!”

six minerals in the lander, and both of our teams latched back onto the lander during the end game. The score was 265-180, a win for us.

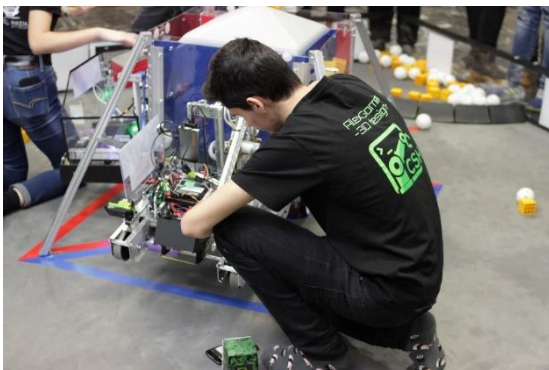


Alex and Peto (our drivers), together with Robi (our coach), applauding the end of our first match, in alliance with team RO038 RobotX_HD (right).

In the second match we were allied with team RO 059 NRG ROBOTIX against teams RO002 Harambe Cartel and RO124 The Emperor, whom we are mentoring. Unfortunately, the robot got stuck in the lander during the autonomous period, meaning that we couldn't do anything. The tele-op went better, us managing to deposit 5 minerals in the lander and then latching during the end game. The score was 126-81.

We didn't have any luck with the autonomous period in the third match, either, since the app crashed. Luckily, our alliance partners team RO121 RobotY_HD were alright. During the tele-op period, we collected 6 minerals in the lander and both teams latched in the end-game, earning us a score of 215-60 against teams RO001 Xeo and RO110 Bots Brain.

Due to the bad lighting of the evening, the last few games were cancelled, meaning that we didn't get to play our fourth and final match. However, we did have fun, and we can't wait for the regionals in February!



Alex, checking on the robot during a practice run.

January 20th: Mall Demo

Meeting held at: Iulius Mall Timisoara at 1am

Attendance: Robi, Gloria, Leti, Bogdan, Carla, Ale, Bianca, Alexandra, Alex, Dani, Peto, Spiri

Today another demo game took place at Iulius Mall. The teams that were involved were: RO074 CSH, RO012 Davos, WizzTech, Team Originals and RO098 Bliss.

We glued stickers with Iulius Mall on our robot and on the field's walls. We gave CSH flags to the children, stickers and bookmarks to teens and adults. When we were about to start training we realized that the pictures on the walls were missing, we forgot to take them from yesterday's demo. Alexandra went to copy some new ones.

While training, the servomotor of the pallet that keeps the minerals in place succumbed and the small plastic part broke. We didn't have many tools with us, so our short-term solution was to screw the nail more tightly.

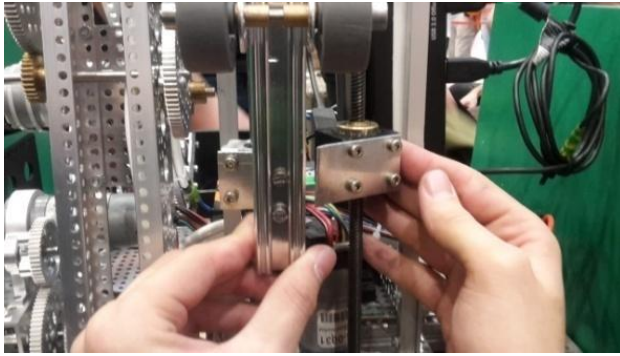
First match: We played in alliance with Davos, team blue versus WizzTech and Bliss, team red. We moved the gold mineral while in the autonomous period, our alliance put 10 cubes in the lander and we latched onto the lander. We won by scoring 155 points while the opponents scored 35 points.

Second match: We played in alliance with Davos, team blue versus WizzTech and Bliss, team red. We had a perfect autonomous period: we moved the gold mineral, placed out team marker and parked in the crater. Our alliance put 7 cubes and one sphere in the lander and we latched onto the lander. We won by scoring 305 points while the opponents scored 2 points.

Third match: We played in alliance with WizzTech, team red versus Davos and Bliss, team blue. We moved both gold minerals, placed our team marker and parked in the crater while in the autonomous period. Our alliance put 5 cubes in the lander. We lost by scoring 172 points while the opponents scored 200 points.

During the third match the phone got extremely hot due to video processing, the pallet that keeps the minerals in place fell and one of the pieces from the body of the latching arm broke, making us unable to play in the next match. Mr. Petolea went to Nokia to get another servomotor and a bigger collecting box since it just got done printing. We realized that during the autonomous period the robot collided into the walls too hard, so Spiri changed the code's values.

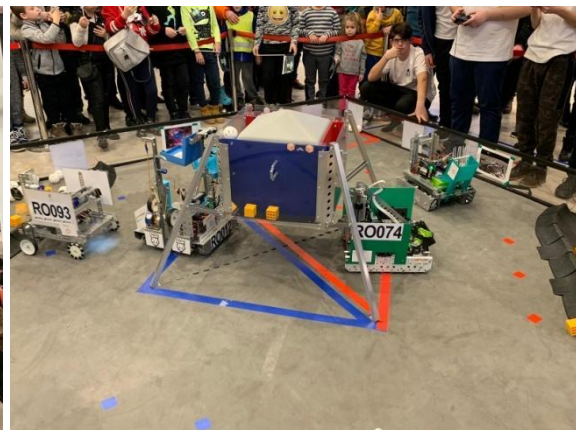
“Dream big, build bigger!”



Peto trying to replace one of the parts(left) and the audience, cheering us on(right).

Fourth match: The robot's systems got over solicited from yesterday's and today's matches so we weren't able to latch onto the lander or place minerals in there. We played in alliance with Bliss, team blue versus Team Originals and Davos, team red. We placed the team marker, moved the gold mineral but we also moved a sphere while in the autonomous period. Our alliance put 2 cubes in the lander and 6 minerals in the deposit. During end game we managed to park in the crater. We lost by scoring 96 points while the opponents scored 115 points.

Fifth match: We played in alliance with Davos, team blue versus WizzTech and Team Originals, team red. We did nothing during the autonomous period because the application crashed. Our alliance put 4 cubes in the lander and 7 minerals in the deposit. We won by scoring 169 points while the opponents scored 69 points. Some rubber bands broke, but we weren't using that system anyways.



The playing field, as seen from above(left) and an ongoing match(right).

“Dream big, build bigger!”

Sixth match: This match was a 2v1. We played in alliance with Davos, team blue versus Team Originals, team red. During the autonomous period we moved the gold mineral and parked in the crater. Our alliance put 2 minerals in the lander and 7 minerals in the deposit. We won by scoring 179 points while the opponents scored 45 points.

Seventh match: We’re playing 2v1 again. We played alone, team red versus WizzTech and Davos, team blue. We placed the team marker, moved the gold mineral and we parked in the crater. We put 7 minerals in the deposit. We lost by scoring 94 points while the opponents scored 155 points.

January 31st: Davos partnership

Attendance: Bogdan, Alex, Peto, Spiri, Mrs. Cojocau

Meeting held: at Technical College Emanuil Ungureanu

The idea of this partnership started from the need of a practice space that simulates the actual contest’s condition. Each team would compete against each other in order to be well prepared for the biggest robotics competition BRD- First Tech Challenge Romania.

Our objectives are:

- Improving the team-working skills of students and mentors through the interconnection of all of the teams in Timis with the help of FIRST principles and Gracious Professionalism
- Stimulating our creativity and improving our robot building skills
- Developing an efficient marketing strategy to promote the teams

Beneficiary teams:

- Davos- Technical College “Emanuil Ungureanu” Timișoara
- CSH- National Pedagogical College „Carmen Sylva” Timișoara
- Bliss- National College C.D.Loga Timișoara
- Wizztech- Theoretical High School „Grigore Moisil” Timișoara
- Team Originals- Technical College „Henri Coandă” Timișoara
- Little Future Robots- Theoretical High School Jimbolia

Activities:

- Team CSH and Davos signed the partnership contract.

“Dream big, build bigger!”

- Team CSH created a Whatsapp group with the team representants (drivers and the leader) of the teams in Timis and a Google document with the planification of the meetings (4 teams at once).
- Together with Davos we arranged a complete field in the basement of Technical College “Emanuil Ungureanu” Timișoara that any team in Timis can use.

Nr. 343 din 31.01.2019

Nr. 265 din 31.01.2019

PROIECT DE PARTENERIAT

An școlar 2018-2019

Robotica la nivel liceal

Unități partenere	
Colegiul Tehnic	Colegiul Național Pedagogic
<i>Emanuil Ungureanu</i>	<i>Carmen Sylva</i>
Timișoara	Timișoara
	
ECHIPA DAVOS	ECHIPA CSH
	

Analiza de nevoi

Nevoia amenajării unui spațiu de antrenamente care să simuleze condițiile de concurs, având ca scop testarea produsului final, a robotului realizat de fiecare echipă de robotică, în vederea pregătirii temeinice a echipelor din Timiș pentru cea mai mare competiție de robotică BRD- First Tech Challenge România.

Misiunea

Misiunea FIRST este de a inspira tinerii să fie lideri și inovatori în știință și tehnologie, de a dezvolta la aceștia abilități științifice, ingineresti și tehnologice care produc inovație și care promovează capacități de viață bine conturate, inclusiv încrederea în sine, munca în echipă, comunicarea și conducerea, aplicând principiile educației STEM. Tinerii sunt însoțiți în călătoria lor educațională, "învățând prin practică", joc" și "distracție" în timp ce creează un robot de la zero.

Scop

Instruirea la standarde europene a elevilor.

Obiectivele proiectului:

01. Dezvoltarea abilităților de muncă în echipă a elevilor și a mentoilor prin interconectarea echipelor din județul Timiș, în baza principiilor FIRST, în baza spiritului Gracious Professionalism;
02. Stimularea creativității și dezvoltarea abilităților de cercetare ale membrilor echipelor pentru a construi un robot care îndeplinește funcțiile necesare;
03. Dezvoltarea unei strategii de marketing eficiente pentru a promova echipela, competiția BRD-FTC și principiile FIRST.

February 15th: Helping BraveBots

Meeting held: on a Discord server

Attendance: Gloria, Laura, Spiri + BraveBots

During a discussion with Adelina Didescu, Spiri mentioned that we have a complete autonomous. Since the team that she is part of have some problems at programming, but also in other departments, Adelina proposed to us to have a Discord conference to help each other.

“Dream big, build bigger!”

We started to discuss about the Engineering Notebook, because at the demo at Bucuresti, the jury has told them that the notebook wasn't well structured. We suggested them to divide every chapter into departments, to have an easy access. Also, we told them that they have to arrange the content very well for it to be simpler.

Another problem is that the app disconnects before the match starts and the robot will not start in the autonomous period. Luckily, we knew what caused the problem because it happened to us before (at the demo in Timisoara), we proposed to them to replace in code “waitForStart();” with

```
“while( !opModelsActivate() && !isStopRequested() )
```

```
{
```

```
    this.telemetry.addLine ( lineCaption: “DA START”);
```

```
    this.telemetry.update();
```

```
}“
```

Another reason that could cause the problem is the phone model. Using Samsung S5 mini, an import part is to change into the specific configuration for their phone model.

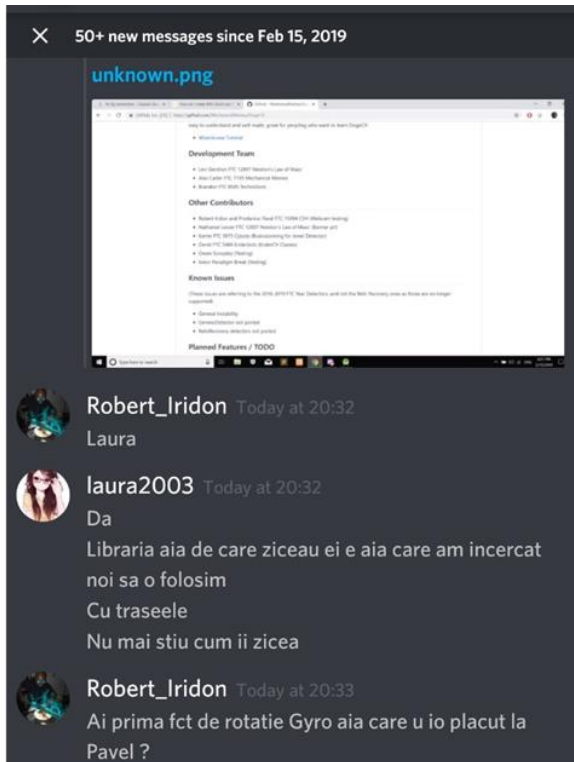
We told them that we use a web camera for the identification of the Navigation Targets from the field's walls. This motivated them to use one, trying to get a GoPro camera.

We helped them with a gyroscopic rotation function, but with some documentation.

“Are you in the crater or not – that's the question?”

We had a brainstorming meeting in which analyzed the rules. We came across an interesting idea: we could make a robot that moves a little during the match, to be placed between the lander and the crater and to have a collecting system that could reach from the crater up to the lander in order to collect as many minerals without losing movement time.

“Dream big, build bigger!”

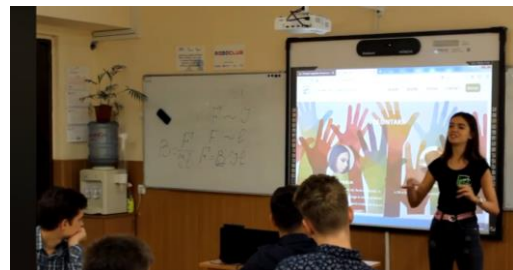


Conversation between Laura and Spiri to help BraveBots.

Events

September 8th : International Events in Republic of Moldova

During 6th to 8th of September 2018, Team CSH conducted few events in Republic of Moldova, being inspired by the spirit of the Centenary Year. These events were organized in public schools, and their purpose was to present as much as we know about robotics. Moreover, as proper FIRST ambassadors, we promoted BRD First Tech Challenge competition and its values and principles.



Gloria holding our presentation.

“Dream big, build bigger!”

Our first event was organized on 6th of September at Luceafărul Highschool from Biruința city. The public was formed of all the 9th grade classes, in a total of 39 pupils. The presentation lasted 45 minutes, and it included general facts about robotics and its impact in the near future. Because the pupils are in their last year of middle school and they'll have to decide soon the profile they are going to follow during high school, we talked to them about the importance of STEM studies at a subconscious level (it develops your logical-mathematical intelligence, creating the foundations of a rational way of thinking and efficient problem solving skills), and how volunteering helps you make the right choices for your future (you basically learn what kind of people do you like working with, how should your working environment be like etc.).



Students paying attention.

On 7th of September we visited George Coșbuc Theoretical High School from Bălți. This time the public was slightly bigger, being present two 10th grade classes, with a total of 50 pupils. We decided to present to the freshmen the BRD First Tech Challenge Competition and encourage them to join the biggest robotics competition worldwide for high school students. We met former members of the FIRST Lego League Team, who, because they are over the acceptable age, can't participate in the FLL competition anymore. They seemed very interested of the FTC competition and asked us about more details about signing up and participation.



The students from George Coșbuc Theoretical High School.

“Dream big, build bigger!”

Last meeting took place at Mihai Eminescu Theoretical High School from Bălți. There we met an 11th grade class, with a total of 27 students. The event was held in an informatic class, where, together with the professor, we decided to show them a method of applying the knowledge you acquired during school in real life. We discussed about the uniqueness of the competition, and the fact that it makes it so different from the others is that it is based on both technical and non-technical sides. We analyzed the structure of the team, highlighting every member’s part. They’ve been impressed of the complexity of our activity in the moment we showed them a table that contained our actions during the whole season, reported to a number of hours involved. They asked us more about time management and how to organize efficiently as a team, all these answers being useful both during school and after. Last but not least, we offered them some information about volunteering and its importance.

The activities we organized in Republic of Moldova woke the interest of teenagers to involve in as many extracurricular activities as they can manage, most of them even considering the idea to create a robotic team and participate into the FTC competition.

September 28th : European Researchers’ Night 2018!

Attendance: Ale, Alex, Alexandra, Bianca, Bogdan, Carla, Dani, Gloria, Laura, Peto, Robi, Spiri, Mrs. Carabas, Mr. Petolea, Mr. Cojocar

Meeting held: at the Nokia IoT Garage, at 5 pm



Our logo on the poster.



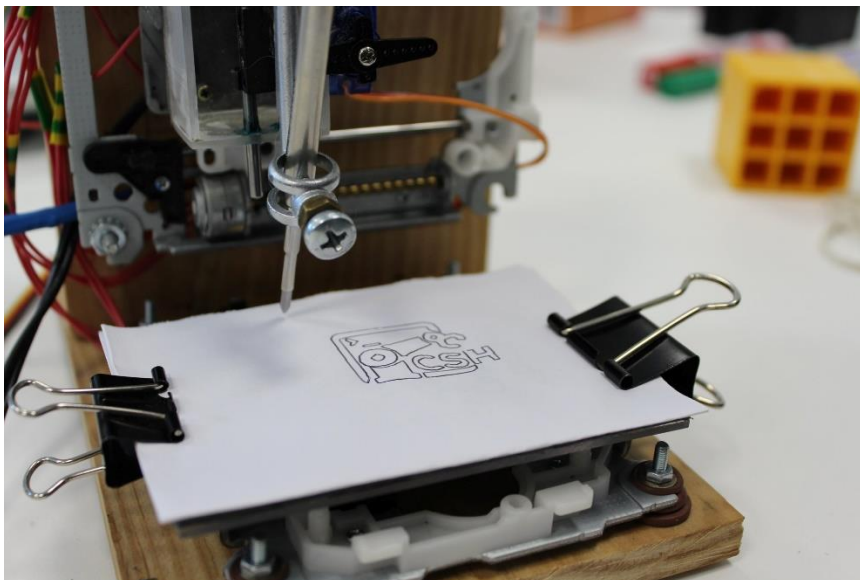
“Dream big, build bigger!”

We were invited to be a part of the European Researchers’ Night as exhibitors, which we consider to be a huge opportunity to ‘rehearse’ for our stand at the Regionals and Nationals!



Our promotional materials (left) and our crowded stand (right).

Sadly, we couldn’t bring our robot, because we only have the chassis, which doesn’t really do anything other than move, but we brought the small robot that can draw our logo, and Laura brought her robot that moves using captured brain impulses.



The small robot that can draw our logo- CSH

Team CSH’s business plan

Introduction

- [About FIRST](#)

“FIRST is more than robots. The robots are a vehicle for students to learn important life skills. Kids often come in not knowing what to expect – of the program nor of themselves. They leave, even after the first season, with a vision, with confidence, and with a sense that they can create their own future.
“– Dean Kamen

FIRST (For Inspiration and Recognition of Science and Technology) was founded in 1989 by Dean Kamen to inspire young people's interest and participation in science and technology. Based in Manchester, FIRST is a nonprofit organization. FIRST is More Than Robots. FIRST participation is proven to encourage students to pursue education and careers in STEM related fields, inspire them to become leaders and innovators, and enhance their 21st century work-life skills.

The mission of FIRST is to inspire young people to be science and technology leaders and innovators, by engaging them in exciting Mentor-based programs that build science, engineering, and technology skills, that inspire innovation, and that foster well-rounded life capabilities including self-confidence, communication, and leadership.

Many of world’s most known companies support FIRST. Some of them are: Google, Caterpillar, FedEx, Motorola, Nasa, Lego Education, Xerox.

- [About BRD- FIRST Tech Challenge România](#)

FIRST Tech Challenge invests in future tech leaders. The student teams design, build and program their robot and compete during the championship in an alliance format with other teams.

FIRST Tech Challenge seems, on the outside, a robotics competition, but the core value that FIRST Tech Challenge promotes is embodied in the phrase "Gracious Professionalism." Although FIRST Tech Challenge includes thousands of competitive teams, gracious professionalism makes it a friendly competition where teams help other teams, and fun makes a strong presence in any tournament.

“Dream big, build bigger!”

The FIRST Tech Challenge (FTC) is designed for students in grades 7–12 to compete head to head, using a sports model. Teams are responsible for designing, building, and programming their robots in a 10-week build period to compete in an alliance format against other teams. The robot kit is reusable from year-to-year and is programmed using Java or the MIT App Inventor. Teams, including coaches, mentors and volunteers, are required to develop strategy and build robots based on sound engineering principles. Awards are given for the competition as well as for community outreach, design, and other real-world accomplishments.

Along with building and programming a robot, FTC teams are required to create an 'Engineering Notebook' that documents their build season and team experience. It helps teams learn the value of the engineering process and gives them an opportunity to reflect on their experiences and improve. It also shows the judges at tournaments what the teams have overcome throughout the year.

Team overview: RO 074, Team CSH

- *Mission statement:*

Our mission is to learn and apply STEM principles as we build a robot from scratch, blending them with well-defined life skills such as teamwork, communication and leadership and to become a strong, sustainable and active FIRST hub in our community by creating and participating in events that spread FIRST's values.

By involving ourselves in both the technical and non-technical aspects of the competition, and by applying FIRST's motto (Gracious Professionalism), we become familiarized with many real-world processes, such as making a budget and we also help and inspire other teams through our own work, creating and implementing different competition strategies.

- *General objectives:*

Student involvement in exciting programs based on mentoring, research, and robotics in order to help them become science and technology leaders and also forming their independent life skills and career planning. This overall objective is within the FIRST mission that promotes well-rounded life skills, including self-confidence, teamwork, communication and leadership skills,

applying STEM education principles. Young people are accompanied on their educational journey, "learning by doing", "playing" and "having fun" while creating a robot.

•Specific objectives:

OS1 Developing the teamwork skills of 14 students and the four mentors by interconnecting team roles based on FIRST principles over the course of the project (feedback paper sheet)

OS2 Stimulate creativity and develop the research skills of the team's 14 students in order to build a robot which performs the required functions and contains at least 3 innovative elements.

OS3 Developing an effective marketing strategy to promote FIRST project and principles by conducting at least 5 types of outreach activities and co-opting of a minimum of 45 volunteers.

•Project beneficiaries:

The direct beneficiaries are 14 students from 9th-12th grade, passionate about robotics and eager to gain genuine professional experience. The following categories of educational needs can be attributed to the 14 students:

- The need to increase the applicative potential of study subjects
- Lack of training for young people for today's labor market requirements
- Lack of skills and abilities needed for working in a work place: the ability to work in a team, adaptation to higher technology, ability to learn new things, ability to transfer knowledge from one domain to another

At the stage of setting up the participating team, they expressed their interest to get involved in the project 20% of the students of the mathematics and computer science and science classes. Through the selection process, a team consisting of 14 students (the maximum admitted by the organizers being 15) accounted for about 27% of the students.

Indirect beneficiaries are high school students who are interested in the various activities within the project but also the parents and the local community participating in the dissemination sessions. The results of the project will also be disseminated via the Internet (<https://team-csh.ro/>), on facebook <https://www.facebook.com/TeamCSHtm/> and on Instagram

@team_csh) and in the local media and will provide successful models to other communities, so the number of potential beneficiaries cannot be estimated.

Also, 15 of the teachers who are not involved in the project will benefit from the mechanism and practices developed within the project and will be able to take over and extend to work with other students in order to participate in the next edition of the competition. The results of the project will be presented at the teachers' councils and within the special event organized at the county level with the purpose of promoting it.

The students' parents and the volunteers involved in the project (approximately 30 parents) will indirectly benefit from the implemented project in order to get support in planning their children's careers.

The local community as a whole enjoys the prestige induced by the participation of the teams at the biggest robotics competition in Romania addressed to the high school students. Higher education institutions will win well-trained, creative, self-esteemed students, young, responsible people for multilateral intellectual capacities, promoters of scientific and technological progress.

Main proposed activities

A.I Management activities - related to OS1 but also to OS2 through analysis and identifying their own constructive solution developed from the basic version activities.

A.I.1 Selection of the team members

As soon as the information has been disseminated by Natie Prin Educatie and BRD, FIRST partners in Romania, the selection process of the members of the "Carmen Sylva" Pedagogical High School in Timisoara starts. The activity consists in verifying the practical skills of candidates in visual programming, creating applications on Android systems, assembling devices and manipulating objects in virtual spaces. Priority has been given to experienced students who have participated in similar competitions.

- Team Members

- Prodaniuc Pavel Ruben – 18 years, 12th grade

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- Morosan Gloria Victoria – 17 years, 10th grade
- Stoica Daniel Stefan – 19 years, 12th grade
- Petolea Razvan Mihai – 17 years, 11th grade
- Fraunhoffer Andreea Bianca – 18 years, 12th grade
- Dumitrescu Vivienne Carla Floriana – 16 years, 10th grade
- Bulica Letitia Anda – 17 years, 11th grade
- Munteanu Alexandra – 16 years, 10th grade
- Iridon Robert – 16 years, 10th grade
- Preda Bogdan – 16 years, 10th grade
- Bernad Robert Leonard- 17 years, 11th grade
- Goman Alexandru- 18 years, 11th grade
- Chirila Laura- 15 years, 9th grade

- [Date Team CSH started: November 2017](#)
- [Location: Carmen Sylva High School, Timisoara, Romania](#)
- [Team values](#)

FIRST is about more than just building a robot. By participating in FIRST programs we develop many abilities that are seemingly unrelated to the STEM field: leadership, entrepreneurship, public speaking, teamwork.

Team CSH understands the need for such programs and embraces them, hoping to spread the spirit of Gracious Professionalism and to inspire anyone that collaborates with us in any way, or crosses our path.

We are a larger team, and only three out of thirteen members are in year 12, which means that most of us will carry on and participate to other competitions and write the next pages in our team’s history.

- [At a glance- FIRST Tech Challenge team RO 074: CSH \(Carmen Sylva High School\)](#)

We are a veteran team, who is participating in the BRD- FIRST Tech Challenge for the second time, and who plans to compete again in every aspect of the word: everyone is getting involved in something, be it designing the robot, building it, coding it, maintaining the Engineering Notebook, promoting the team, or working in outreach events.

- [Team history](#)

We are a veteran team, which means that we already have the experience of last year under our belt. Some of our members participated three times in the Zero Robotics High School Tournament (a robotics programming competition

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where the robots are SPHERES inside the ISS contest’s world final in 2016- as heRObotics , and as CSH in 2017, which was held in MIT Boston, USA, ESA’s Space Research and Technology Centre (ESTEC) in the Netherlands, and Australia.

- Current position

Our participation in BRD FIRST Tech Challenge’s second season (Relic Recovery) culminated with winning the Judges’ Award for our efforts. We have spent the months in the off-season to analyze our performance and to come up with strategies and methods to improve it. As of January 2019, there aren’t any other FIRST competitions available in Romania other than the FIRST Tech Challenge, but we hope that by strengthening our bonds with other teams and by promoting the FIRST values to the community, programs such as FLL or FRC might be brought here too, allowing Romania to become a pillar of support in the worldwide FIRST landscape.

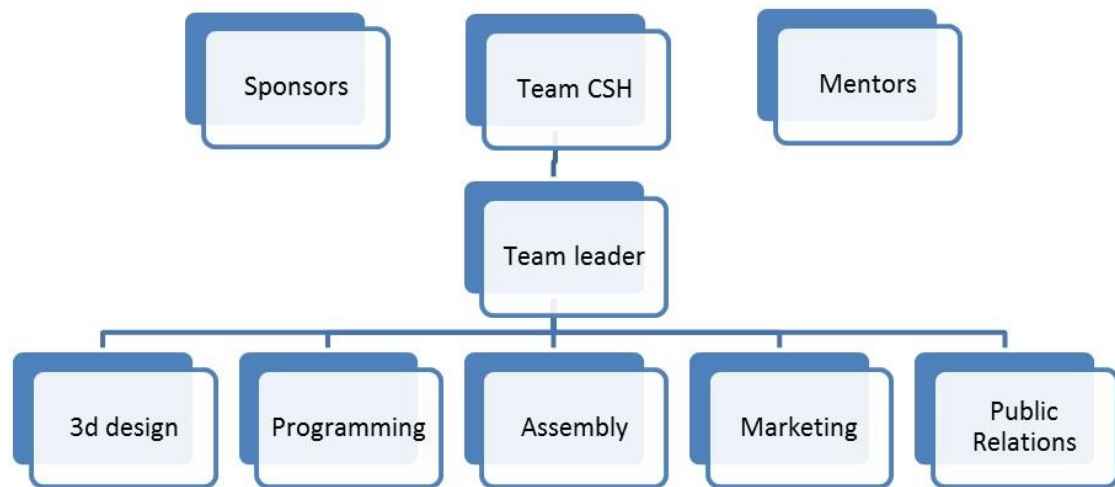
A.I.2 Creation of a presentation video and composition of the letter of intent

The purpose of the activity is to involve the whole team in the creation of the two products, which will express the team-spirit and later lead to the enlistment in a contest. Initiated by mentors, becomes after a while, the result of the dynamics within the group.

A.I.3 Selection of the roles within the group, departments’ organization

The 14 team members are assigned to departments considering the organizational plan.

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Purposes of the team-members within the projects are assigned after the following scheme:

1. Team-leader is the person who assigns the responsibilities and ensures consistency and linkage between all project team members, is responsible for monitoring, evaluating and reporting the project's development.
2. One person responsible for the 3D design. They will coordinate the entire department to design and implement the robot's 3D design.
3. One person responsible with the programming, who will coordinate the whole department assigned for the robot's programming.
4. One person responsible for the marketing, who will coordinate the development of the marketing campaign.
5. One PR representative for the department in which the relationship of the team with outside factors will be monitored.

The project team will meet weekly, approximately 20 h/week, and even more if necessary.

A.I.4 Documents/Research – online materials, webinars

The theoretical preparation based on the materials offered by organizers, the knowledge of the competitions’ rules and objectives through direct and online meetings, the briefing through the experiences of the previous editions of the competition obtained from the representatives of the Romanian partners of the competition, ensures the bases of the development of all project activities.

A.I.5 Kits’ distribution

The purpose of the activity is to equip all teams with a basic set containing mechanical, electrical, electronic components as well as suitable tools with which any team can build a robot.

A.I.6 Organization of the working space

It is an activity of identifying and setting up a working space for the team.

All Activities with a technical and technological base- correlated with OS2

These activities are developed under the wish of exploring new fields of actuality situated outside the school program and outside the existence of some theoretical and practical abilities that can be valued and developed within the project through the assigned tasks.

A.II.1 Identification of the constructive solution accepted by all team-members

The robot is set up at a theoretical level and from the team’s point of view, it will have maximum efficiency and it will be based on the possibility of the team-members to find optimal technical solutions throughout the entire process in order to solve all the requested tasks and all the problems that occur.

A.II.2 Robot design

The design activity is done through brainstorming sessions, whose purpose is to find the most efficient designs for our robot’s mechanisms.

A.II.3 Assembling the robot

The assembling activity refers to the making of the modules designed in the projection stage using the kit components provided by the organizers, commercially purchased parts, or those made with the 3D printer.

A.II.4 Programming the robot

It is an activity developed by the team's programming department and it consists in writing a Java code for performing all working tasks, testing it and debugging it.

A.II.5 Testing

This activity involves both testing the implemented code for performing different tasks, as well as checking the behavior of the robot’s components during these tests.

A.II.6 Participating in the Timisoara Demo Games

It gives the team the chance to enter the competition and participate actively in its running, to spend exciting and motivating moments with other teams animated by the same desires and ideals, and last but not least, to self-assess.

A.II.7 Improving the robot performance

Changing the constructive solution from the experience gained by participating in the regional competition in order to increase the robot performance and simplify driver activity.

A.III Outreach activities - correlated with OS1 and OS3

This type of activity takes places for developing the team member’ teamwork skills by cooperating with all the aspects cooperation implies(open attitude, clear expression of ideas, requesting and accepting others' opinions,

reflection, evaluation) and for developing interpersonal skills. They also aim to spread the FIRST message in the community, promoting STEM education, BRD FIRST Tech Challenge and the slogan underlying it, namely 'Gracious Professionalism' (fair-play).

A.III.1 Team promotion

The team will run a promotional campaign aimed to bring the attention of a broad audience of the existence of the team and its goals. During the marketing campaign, the items which the team has identified as useful and effective for promoting the results are: creating a logo, choosing a motto, a message, creating your own web page, creating a Facebook page, an Instagram account and updating the stages through which the team passed in order to achieve its goals.

As promotional materials for the events and for our stand at the nationals we chose calendars, book signs, posters, a banner, flags, stickers and badges.

A.III.2 Promotion of FIRST and BRD-FTC competition

Since peer learning is a more natural framework for passing on experiences, this activity aims to bring through the team members the knowledge and experiences accumulated throughout the project. In this sense we intend to promote the FIRST phenomenon within:

- promoting the FIRST values to as many grades VI-XII as possible in the "Carmen Sylva" Pedagogical High School in Timișoara;
- interactive presentations with the robot for inspiring children and young people;
- participating in various technology-related events, such as Codecamp and the European Researchers' Night;
- getting involved in the community through volunteering, or by joining city-wide events such as the Timisoara City Marathon.

A.III.3 Fundraising

The activity refers to the steps taken to obtain the necessary funds for the project, namely: developing the necessary documents to obtain sponsorship, setting sponsorship levels, identifying and contacting potential sponsors.

Sponsorship levels:

39720 lei (8580€ =10000\$)

Diamond Partner: Name displayed both on t-shirt and robot (+ the other levels' benefits)

19860 lei (4290€ =5000\$)- *Platinum Partner*: Name displayed on t-shirt (+ the other levels' benefits)

7944 lei (1716€ =2000\$)- *Gold Partner*: Printed Logo on all promotional materials - posters, flyers (+ the other levels' benefits)

3972 lei (858€= 1000\$)- *Silver Partner*: Logo displayed on social media websites: facebook (on the team's website and on the high school's website), etc. (+ other level's benefits)

1986 lei (429 €= 500\$)- *Bronze Partner*: Name or Logo displayed on both websites (team and high school) and in team's notebook as well

AIII.4 Cultivating volunteering

The activity refers to the attraction of young people and adults to volunteering activities with the main purpose of developing social abilities like: solidarity, tolerance, trust, civic spirit and social responsibility. Starting with team members which got involved as volunteers in this project, we extended to their parents and continued extending to other people with different ages which might accompany us in this journey of knowledge. We also remark members of our team involving in other volunteering projects. A complete list of every volunteer that helped us achieve our dreams is available below.

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	Name	Activity	Event	Date
1	Aniela Nicolin	Design	#SeizeTheSeason, promotional materials	November 11 th , November 13 th , January 1 st -11 th , February 1 st -22 nd
2	Alex Lorinti	Filming with a drone	Presentation video	September-October
3	Alexandru Dusca	Photography	Presentation video	September-October
4	Oxani Corina	Score keeping	Timisoara Demo Games	January 19 th
5	Toba Gabriel	Photography	Timisoara Demo Games	January 19 th
6	Cone Maria	Photography	Iulius Mall Demo Games	January 20 th
7	Coroian Bianca	Photography	The story of Qubit	January 30 th
8	Bulica Oana	Actor	The story of Qubit	January 30 th
9	Dan Aparaschivei	Photography	Timisoara Demo Games	January 19 th
10	Isac Andrei Florin	Photography	Timisoara Demo Games	January 19 th
11	Adrian Pașcalău	Photography	Timisoara Demo Games	January 19 th
12	Iridon Adrian	Running	Timisoara City Marathon	October 28 th
13	Daescu Cristian	Participating in the meeting	Meeting Little People	December 22 nd
14	Sandu Ciprian	Building the frame for our stand		January 13 th -16 th
15	Laura Ciuleanu	Photography	Iulius Mall Demo Games	January 20 th
16	Dorogan Sanda	Translating Russian	Timisoara Regionals	February 22 nd -24 th
17	Petrusca Denisa	Translating Russian	Timisoara Regionals	February 22 nd -24 th
18	Trofim Victoria	Translating Russian	Timisoara Regionals	February 22 nd -24 th
19	Tănase Florin	Photography	Timisoara Regionals	February 22 nd -24 th
20	Turcin Cristian	Photography	Timisoara Regionals	February 22 nd -24 th
21	Degău David	Photography	Timisoara Regionals	February 22 nd -24 th

Every volunteer team CSH had during the season.

A.IV Planning and managing funds

The activity refers to drafting an Amt Budget, estimated, comparing with the Actual Cost per category.

Expected outcomes as a result of implementing project activities

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Following the actions described above, students are expected to be better prepared for the labor market by forming their skills and competencies in the applicative field of study subjects and for training for the future job.

The measurable expected results at the end of the project are as follows:

Final results:

Qualitative:

- scientific and technological competencies - in 3D design, mechanical and assembly
- communication skills / public speaking
- social skills, through involvement as volunteers
- computer skills / programming, mathematics
- language skills (in Romanian)
- language skills (in English)
- the technique of learning to learn
- entrepreneurial competitions
- appropriate skills / job-specific skills
- networking, conflict resolution and teamwork
- result orientation / solutions in times of crisis
- personal efficiency, self-development
- initiative
- organizational / managerial / marketing and promotional skills, fund raising

Quantitative:

- 14 students participating actively at the program
- 6 sponsors

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-15 teachers from other high schools who are not involved in the project will benefit from the mechanism and practices developed within the project and will be able to take over and extend them to work with other students in order to participate in the next editions of the competition

-21 volunteers

-The robotics kit and all the additional components purchased within the project

The way of monitoring and evaluating the project:

The project team will have the responsibility to monitor the project while the project evaluation will take place at the BRD First Tech Challenge Romania

In this sense, a Notebook will be developed which will contain all the results of the project, technical and non-technical.

Below is a statistic of every department's activity, measured in hours.

The project's sustainability

Through the implementation of the project both the short-term and the long-term effects and results are overseen. At the end of the project all of the objectives will be reached and the results the sponsorships were needed for will be achieved.

The project's sustainability will be assured from three essential points of view: organizational, financial and from the point of view of human resources.

From an organizational angle, the already-agreed-upon partnerships will be kept, hoping to reduce the ulterior costs of implementing similar activities, seeing how similar collaborations in other projects are desired. Also, the material resources and the equipment will be stocked and managed carefully so they will be usable in the future. The materials that were purchased during the project will remain in the high school's possession. They will be maintained functional, with the purpose of being used in ulterior activities.

The notebook, all the documents, expense accounts and any other similar writings will be archived and kept, making them valuable sources of guidance

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during later initiatives. Also, in the case that additional costs and expenses will appear, unforeseen after the end of the project, they will be paid from the sponsorships, with the hopes of decreasing or eliminating their impact over the project’s sustainability.

From the point of view of human resources, the sustainability will be achieved through:

1. The whole team, involved in the progress of the project through:

- the acquired experience; also, in the spirit of Gracious Professionalism we will offer counseling to the rookie teams who will pass the preselection during BRD FIRST Tech Challenge’s future seasons in Romania

2. The students who benefitted from the project’s services, through:

- developing teamwork abilities, forming their independent life skills and learning how to plan their career;

- activities which stimulate creativity and research abilities;

The community will participate with people who have a direct interest. Those people who supported us during the unfolding of the project have offered us the possibility of collaborating even after the team’s participation in the nationals in Bucharest.

Team CSH’s SWOT analysis

We want to accept our weaknesses and transform them in strong suits, in order to defeat threats. This is the first analysis of team CSH’s activities.



Strengths:

Confident: We are a team which firmly believes in the ideas they proposed and their implementation in real life. We take everything into consideration, not straying from thinking outside the box.

Motivated: Our high school’s good name is at stake, which means we are motivated to work hard.

Innovative: We all have ideas to improve the project, to perfect the robot and to organize ourselves in both the technical and non-technical department.

Competitive: We want to win! We are confident, open-minded and driven by the desire to win, to prove to ourselves and to the world what are we capable of, as a new generation.

Weaknesses:

Disorganized: We are only human, we can’t be 100% productive at all times.

Individualistic: We are still learning how to work together better, but we still make mistakes sometimes.

Opportunities:

Visibility: Any young individual is motivated to become known in the community, to show their qualities.

Applying our ideas: We’ve all got ideas, but the fact that we can apply them to reality gives us satisfaction.

Resume: This project is very valuable, being an asset in any young person’s resume. It can open the doors to a bright future.

Experience: Theory is connected to practice. By thinking and working we gain experience. The team itself is a new experience. Organization is experience. Commitments and achievements are experience. Discovering the new leads to experience.

Keeping it together: When facing new challenges, one of the toughest things to manage is keeping it together. You know you can solve the challenge,

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but you’re afraid of the unknown. Being a team, we help each other in order to get over anything.

Threats:

14 people with different personalities; sociable, but used to being on their own. Getting organized can be quite tough, since it requires that you know where both you and your teammate belong.

It may be difficult, but we don’t care, since we know what we want: to win, and that is enough. We will get together and definitely walk the path to victory.

Team CSH’s sponsors

Gold Partners Nokia	
S.C. Simtel Team SRL	
S.C. Asgo Telecom SRL	

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S.C. Caprice SRL	
Bronze Partners S.C. Eltrex SRL	
Other partners S.C. Zinon Impex SRL	
S.C. Agromarincus SRL	
“Carmen Sylva” Timisoara's Parents' Association	

Thank you!

To Our
Sponsors



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Team CSH’s budget

Here is our budget for this season.

Category	Team Income	Income notes	
Sponsors			
Rest Proiect CSH 2018	1.197,70 lei		
S.C. Simtel Team SRL	9.000 lei		
S.C. Asgo Telecom SRL	7.944 lei		
S.C. Eltrex SRL	2.000 lei		
S.C. Zinom Impex SRL	1.000 lei		
S.C. Agromarincus SRL	1.000 lei		
Frigoglass Romania SRL	13.037 lei		
Mr. Petolea Florin		chassis and other necessary pieces	
Caprice		food+transport worth 6650 lei	
NOKIA NETWORKS S.R.L		work space	
Asociatia Parintilor Carmen Sylva Timisoara		accounting services	
Total income for 2019 (lei)	35.178,70 lei		
Total income for 2019 (dollars)	\$ 8.383,00		
Expenses	Actual Cost(lei)	Actual Cost(\$)	Rationale/Explanation
Category: ROBOT SUPPLIES	4.787,31 lei	\$ 1.142,88	
Pieces Order - 24th of august 2018	921,88 lei	\$ 220,08	
Pieces Order - 24th of august 2018	980,92 lei	\$ 234,18	
Pieces Order 2-20th of november 2019	1.871,51 lei	\$ 446,79	
Phones	812,00 lei	\$ 193,85	
HUB USB 3.0 7 port (DA-70241)	201,00 lei	\$ 48,00	
TOTAL	4.787,31 lei	\$ 1.142,88	

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Category: Team promotion	7.440,39 lei	\$ 1.773,48	
Promotional Materials Printtech DEMO	41,51 lei	9,91	
Promotional Materials Printtech DEMO	14,99 lei	3,58	
Promotional Materials Printtech DEMO	34,20 lei	8,16	
Tshirts, hoodies, embroidery	3.517,88 lei	839,83	
Promotional materials	3.831,80 lei	912	
TOTAL	7.440,38 lei	\$ 1.773,48	
Category: Travel	16.890,00 lei	\$ 4.032,18	
Accommodation (17 people/9 rooms/5 nights)	6.190,00 lei	\$ 1.477,75	
Airplane tickets	2.200,00 lei	\$ 525,21	
Food (100lei/day)	8.500,00 lei	\$ 2.029,22	
Gasoline	330,47 lei	\$ 78,65	
TOTAL	17.220,47 lei	\$ 4.110,83	
TOTAL for 2019 Season	29.448,16 lei	\$ 7.027,19	
Backup	5.730,54 lei	\$ 1.355,81	