<u>**Team**</u>

1. Team Name: ToucanPi
2. Mentor name: Turgut Durduran
3. Mentor Email: turgut.durduran@icfo.eu
4. What is the age range of your team? 10-11

Introduction and background

Our team name is ToucanPi. We thought of this name because our class is year 6 Toucans class of the British school of Barcelona, and this is Astro Pi, hence ToucanPi. Our team is composed of three students, Gaia, Tom, Iris, and a mentor, Turgut Durduran, his email is turgut.durduran@icfo.eu. We are 10-11-years old.
Our group came together when Turgut sent a message on the parents' class WhatsApp but, sadly, only our parents answered it.
Gaia, Turgut and Bulut, Gaia's little brother, had already entered mission zero. Which is a simpler version of mission space lab, that also involves the astro pi. So this year, they decided to try to enter a slightly more challenging one with some classmates.
 So, Tom and Iris discovered Mission Space Lab because Turgut, our mentor, and his daughter, Gaia, offered this opportunity.

Tom is interested in space and loves learning more things.
"It compelled me to do it because I am really interested in space and I want to learn about it while having fun in a group.' Tom said.

Iris likes sports but she is also really interested in space. "I am fascinated by it because of its beautiful and shimmering colours and the astronauts that float in space," said Iris.

Gaia in our class suggested we work on a project about space, experiments and coding. We agreed because we were curious and we really like space.
Then the next Friday we met at Gaia's dad's lab to talk about it, presenting ourselves and saying why we wanted to do this project and we were telling him why.

After that we started to go to her dad's lab every Friday to work on the project and code in python and it's really hard!

Questions and answers

<u>Q: What is your experience level of coding?</u>

Iris: "I was completely new to coding. I find it hard because you need to write specific instructions very precisely and accurately and there is no freedom and no room for error.
if you speak french and you say it wrong they will understand and correct you but if you train a dog and then if you do the command incorrectly, the dog doesn't obey. If you make an error in coding the computer does not obey. So programming a computer is a bit like training a dog."

Tom: "Even though my coding experience is not so good, Turgut showed us how to do it better."

Gaia: "So, you can say: We are intermediate/beginners."

Tom: "Before we began, Turgut sent us a sheet with many coding activities to get us started."

<u>Q. How has your participation in Mission Space Lab impacted your team? Please tell us about any personal benefits experienced, as well as the skills learnt.</u>

Iris: "I now know the other team members so much better because we worked on a challenge together and we became better friends. I learned more divisions, because we had to use division in the project. I learned about gravity, about cameras and how they take pictures, the timing and how you can program a camera to take pictures and put timestamps on them, I learned about raspberry PI and about computers."

Gaia: "We learnt a lot about libraries, flowcharts and python."

Tom: "This has been very fun for me to be with the group to learn more about space and getting some coding skills."

Tom: "I think I played a big role in the team as I helped with the coding and the concept of the experiment, even though I was at home for 2-3 of the times."
Iris:- "I think I contributed to the team by asking questions and proposing questions to address with an experiment. "
Gaia:-...
Iris:" Gaia is too humble to say anything. She is very good at maths and helped us think through the project, systematically, logically and coherently."

<u>Q. Has participation in Mission Space Lab so far inspired your team to do any further activities in coding, science or space?</u>

Iris: "I would be interested to do another project with the same team about Earth, in particular about climate and politics."

Phase 1

Q. What did your team enjoy the most about Phase 1?

Gaia: "I enjoyed brainstorming ideas for the experiment and trying to use the formula that shows how much gravitational acceleration there is at the position of the ISS "

Tom: "In Phase 1, I loved the way we thought about the plan, by getting turns to say an idea, then discussing it, thinking about the pros and cons, and then we narrowed them down to 1 idea from Iris, which is our experiment now."

Iris: "I like discussing possible projects because I like hearing other people's ideas and their comments and questions about mines. I am interested to find out how the other team-members came up with their ideas. I enjoyed the discussions: what we were going to do and the outcome and consequences."

Q:. What was your team's greatest challenge at Phase 1?

Iris: "Shaping the ideas. Defining a project is to come up with a question. The question must be interesting, must be a question, so it must not be dumb, and something you can find an answer to. Some people come up with really good questions and I came up with questions that are not that interesting. I feel 'deactivated' when people are more interested in somebody else's question and not into your one because your one is a bit weird and not really into the subject but the other's is really interesting."

Tom: "Our greatest challenge in Phase 1 was deciding which idea to choose for the experiment because we all had such great ideas. It was great how we thought about it by thinking how we would do each experiment, if we had enough skills to do it, and which one we wanted to know more about."

Gaia: "We were also having a little difficulty documenting our proposal, writing it up to be submitted."

Tom: "But we did it!"

3. As a mentor that has made it through to Phase 2, is there anything you would have approached differently at Phase 1 if you had the chance?

My experience in teaching/working with children comes mainly from our outreach activities to explain our scientific research to the general public and from involving them in basic projects. However, hands-on projects are mostly limited to high-school students. Then I have a bit of experience dealing with my daughter (Gaia) and her friends. So I approached Phase 1 with this background. It did not go exactly as I planned so improvised as we went along. If I do it again, I would probably introduce some project ideas in advance and guide the kids accordingly. Instead, this time, it was completely open ended. We were lucky that we converged on a project because Iris, Tom and Gaia were all very enthusiastic and were open to each other's ideas.

Phase 2

1. How did your team react to receiving their kit and hearing that they made it through to Phase 2?

Gaia: "We were very happy about our proposal being accepted."

Tom: "It was breathtaking to hear that we got onto Phase 2."

Iris: "We were really happy, and excited. I was jumping up and down. I felt satisfied, because I found phase 1 challenging and I worked very hard. I have ADHD and I have trouble concentrating, but I tried my best, and together with the team we all succeeded.
We felt lucky that we made it through and into phase 2 because many other teams did not make it. We were really excited to see the kit and curious and anticipating and guessing how we would build it and what each piece would do."

Tom: "But then, when we got the kit I was sadly online so I couldn't be there to help them assemble it."

Iris:-" Tom, we missed you ! but at least you could participate in remote".

2. Tell us about your team working with the kit hardware for the first time?

Iris: "When the raspberry pi came, we were really excited to build the raspberry pi and see what happens to it when it connects to the computer and puts the wires in different places.
When we got the little SD card and I smelled it, it was like biting black licorice.

It was really fun and we had a lot of time to be together and work on it. We got to see how it communicated with the computer and our code."

Gaia: "We were playing with lights and found out how to display text on the screen for the first time."

Tom: "For the first time that we used the kit, it was exhilarating. We looked at how we use it and we looked at some experiments to run on the Astro Pi, such as the Rainbow Panel one. The only problem with it was that it had the wrong time setup and only after a few weeks, we figured out how to fix it."

3. What did your team enjoy the most about participating in Phase 2?

Tom: "The thing I think we enjoyed most was the coding part because we got to experiment with many different things and it was very fun to see and test our results."

Gaia: "I especially enjoyed testing our code when we took pictures. It was very funny to see our pictures in the end."

Iris: "I liked to learn by looking at the other teammates coding in python and learning from them. We tried to do the code so many times and it always said we had an error! and then, we finally made it, it started running, it was finally working! and we were finally not struggling doing it over and over again. It was like solving a problem and I enjoyed finding the solution."

4. What was your team's greatest challenge at Phase 2?

Iris: "The challenge for us was to write the python code to make the raspberry Pi do what we wanted it to do. The hardest part was making it take photos. Coding is really hard!
My mentor was very supportive and helped me a lot."

Tom: "I agree, I think the greatest challenge was also the coding because it took a lot of practising and learning to figure out how to code it."

Gaia: "But also, remember, one of our challenges was that Tom was online for two sessions so we had to code in a weird way."

5. As a mentor is there anything you would have approached differently at Phase 2 if you had the chance to do it all again?

Phase 2 was a different challenge. The students had very little experience in coding with a language like Python. Their experience was more with visual coding – Scratch, MakeCode – and there were a lot of rules we had to follow. It worked really well that I took up the coding and moved the code to visuals – flowcharts – for them to understand and make their suggestions. COVID-19 did not help either, we had to do things online/in-person hybrid and with complex schedules. If I were to do Phase 2 again with students of this age, I would devote a couple of hands-on lessons to learn Python together first.

6. Is there anything the Astro Pi team could do differently to better support you at Phase 2?

As a mentor, the resources were extremely valuable, they got us off the ground very fast and allowed me to understand how to solve the problems, guide the kids etc. One issue which could be better is that the examples were a bit outdated and, therefore, there were discrepancies between some libraries and the new hardware etc. Either way, it worked out well. I hope I can give specific feedback about different sections to improve the documentation for next year.

Tom: "I think there is nothing else you could do to help because the instructions and the videos were very clear and helpful."

Conclusions

Mission Space Lab has helped us with coding skills,, Turgut sent us a sheet with many coding activities and tutorials to get us started. We have also been seeing other labs in ICFO, where we have our meetings and those have been very interesting to see. For example the work that Gaia's dad does in ICFO, checking baby's brains, it's very cool!
Our is probably a small team and we are young, but we compensate with curiosity and determination. Gaia is smart and helps with the maths equations, Tom knows a lot about python, and Iris helps with imagination and thinking out of the box.

Iris: "Our team is strong and fearless and never gives up".

We made it to phase 2 because of Turgut, who carefully taught us everything about the Astro Pi and how we use it and helped us understand so many things about space and the ISS.

"Overall, I think this experiment has been very fun and great to do, and I'm sure the rest of my team can say the same thing.", Tom concluded, while beating Iris at solving the Rubick's cube under a minute.

If you are a year 6 student and are interested in space or coding we recommend to do the mission space Lab with Turgut because he is an excellent mentor and explains things in a fascinating way!

Our photos:
https://docs.google.com/presentation/d/1eSuY28bHBfWMCYO53kDM-Or0lxqyv0HoPSZgU0jlPhg/edit?usp=sharing