

SPACE DETECTIVES: TAKING KIDS FOR A SCIENCE RIDE. J. Saraiva, S. Tyszka and R. Doran, NUCLIO – Núcleo Interactivo de Astronomia (S. Domingos de Rana, Portugal; geral@nuclio.pt).

Introduction: NUCLIO is a non-profit organization with a fifteen year history of investment in science education and outreach. Our main subjects have been Astronomy and Space Exploration, and though we have produced activities for all audiences, we have always been especially focused on the younger public, with talks and activities for school children. Here we report on a recently developed program that we called Space Detectives. It was created as a test-bed for activities to be performed in the framework of the European Commission-funded project Stories of Tomorrow, which will start later this year.

The Program: The idea was to create a story-line that would lead the participants through a number of challenges and opportunities to learn such diverse subjects as the electro-magnetic spectrum, communication with space probes and rovers, planetary processes, the Martian environment and history, coding and robotics. The subjects had to determine the origin and then decode a simple binary message that would point to Mars and provide a reason to experiment and adapt a small pre-existing robot to explore the “martian” landscape.

The Participants: We planned to implement the program on the week before Christmas, taking advantage of the school pause. We had six participants, aged between 9 and 12; their level of interest in science and maths was varied, ranging from the enthusiastic to a neutral attitude.

The Activities: We began by introducing the idea that a number of messages had been received from space, origin and content unknown. This led to a discussion about the ways that the messages could have been emitted and received, which included some fun activities about the electro-magnetic spectrum, waves, and communication.

We employed Stellarium to have the participants try and determine the origin of the messages, based on the time-stamps that they contained. This pointed to Mars, and the kids were then asked to research previous missions to the planet and make a short presentation about them. Then they used colour-filtered glasses of their own manufacture to look at 3D images of the martian landscape, and played a game where they tried to determine whether an image was from the Earth or Mars.

They had also to design and try out ways of protecting an egg (stand-in for an astronaut) from a freefall descent to the soil of the planet (Earth, in this case) from a height of several metres.



Figure 1 – Using tablets to learn about previous missions to Mars

Getting back to the message, the kids learned about binary code and how to decode a message consisting of 0s and 1s, thus finding out that the source was on the move on the surface of Mars and broadcasting its path.



Figure 2 – Determining the path followed by the source of the messages coming from Mars.

They also simulated how to control a machine that is far away and cannot be driven on-the-fly. To do this, each one took his/her turn as a “blind” rover, being led through a maze according to the instructions of a “command team” sitting in another room, that had a previous opportunity to check the course and map it.

They then built a commercially-available small mobile robot and learned about motors and controls. In the following step, they assembled a more complex rover with camera, controlled from their tablets, and put it through a series of trials, adjusting the weight

distribution, position of camera and other factors, before trying out a “martian” course.

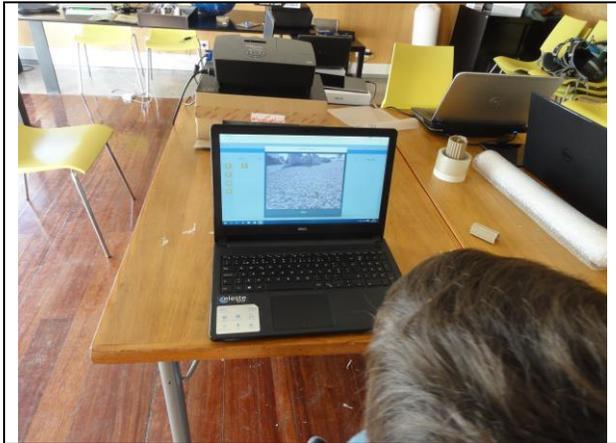


Figure 3 – Checking the images coming from “Mars”.

Conclusions: In the end, the participants had to present the activities they had done all through the week to their parents. Judging from the reactions, this program was a success, and the kids left with new skills and ideas for the future, namely on the subject of robotics. We hope that this will also translate into their level of commitment to school and learning.

We are currently reviewing the flow of the activities through the week and consider that there are a number of adjustments and improvements to be made before doing a second session.

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