

Space technology and robotics in school projects

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Space-related educational activities is a very inspiring and attractive way to involve students into science courses, present them the variety of STEM careers that they can follow, while giving them at the same time the opportunity to develop various practical and communication skills necessary for their future professional development.

As part of a large scale extracurricular course in Space Science, Space Technology and Robotics that has been introduced in our school, our students, divided in smaller groups of 3-4 students in each, try to understand the challenges that current and future space exploration is facing. Following a mixture of an inquiry-based learning methodology and hands-on practical activities related with constructions and experiments, students get a glimpse of the pre-mentioned fields. Our main goal is to gain practical knowledge and inspiration from the exciting field of Space, to attain an adequate level of team spirit and effective cooperation, while developing technical and research data-mining skills. We use the following two approaches:

1. Constructive (Technical) approach

Designing and constructing various customized robotic machines, that will simulate the future space exploration vehicles and satellites needed to study the atmosphere, surface and subsurface of planets, moons or other planetary bodies of our solar system that have shown some promising indications for the existence of life, taking seriously into account their special characteristics and known existing conditions (like Mars, Titan, Europa & Enceladus).

The STEM tools we use are the following:

- LEGO Mindstorms: to construct rovers for surface exploration.
- Hydrobots: an MIT's SeaPerch program for the construction of submarine semi-autonomous robots.
- CanSats: Arduino-based microsatellites able to receive, record & transmit data.
- Space balloons: appropriate for high altitude atmospheric measurements & photography.

2. Scientific approach

Conducting interesting physics experiments (propulsion, comet's compositions and trajectories, gravitational forces, etc.) using educational resources from ESA's website (<http://www.esa.int/Education>) and small theoretical researches related with subjects of Astrobiology, Mars & Moon Exploration and Space Science, trying to shed some light over some of the big questions related with:

- the origin of life in the universe.
- the requirements/conditions/possibilities for the existence of life elsewhere.
- whether terraforming is possible or not.
- the existing reasons/benefits/problems for the colonization of the moon/mars.
- the quest for earth-like exoplanets, etc.