

# Astronomy and Arduino applications in Physics class

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**Abstract.** In this poster, few school projects are presented which helps to combine theoretical knowledge and students' creative and innovative skills in STEM activities. The topic is applied in Physics classroom and in practical outdoor activities with the Science Club students. The activities are based on taking and analysis of astrophotos, designing of simple rovers and measuring devices controlled by an Arduino microcontroller. The goal is to develop students' competencies in a way that is interesting and stimulating to them.

## Astronomy with astrophotography's

The idea of analysing (and taking) astrophotos arose from the fact that there are no astronomy and space research topics in the compulsory school curriculum, but the students are excited about the topic. The media news constantly reports on the most advanced space research results, but they receive very incomplete knowledge about this in school. During the Project Week students make targeted observations with telescopes, take or download (NASA, ESA database) photos of sunspots and determine the sun's differential rotation. At the same time, they use astrophotographs to determine the diameter and dimensions of the Moon or one of the planets, as well as the chemical composition of various celestial objects. Later these photos are used to teach Kepler's laws, rotational motion, or other mechanical or magnetics topics.

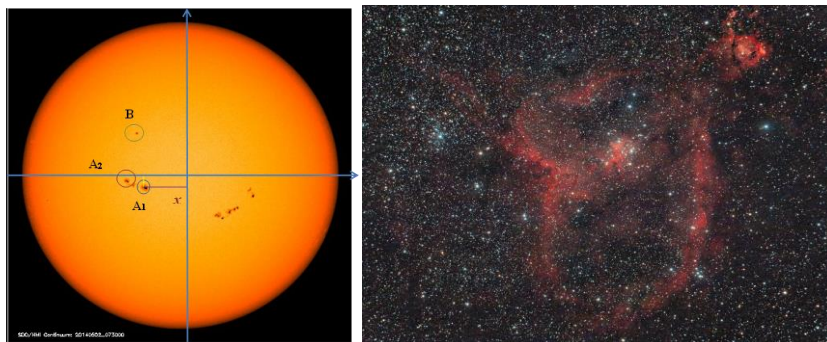


Fig. 1. a). Study the sunspots; b). Heart nebula (S-ZS. Anett photography).

## Arduino applications

The Arduino microcontroller is another intriguing tool for students that the compulsory curriculum does not provide opportunities to study. Therefore, in physics projects, they learn how to design and build devices that measure air pressure, temperature, light intensity, and humidity. The data collected during the measurements are then used to process biology or geography topics, for different student-research projects.

During the planning and construction process, they acquire circuit knowledge and engineering skills and get to know the basics of applied IT and 3D design programs. These open up new opportunities for them to apply their acquired knowledge in a new environment and thereby discover something new.

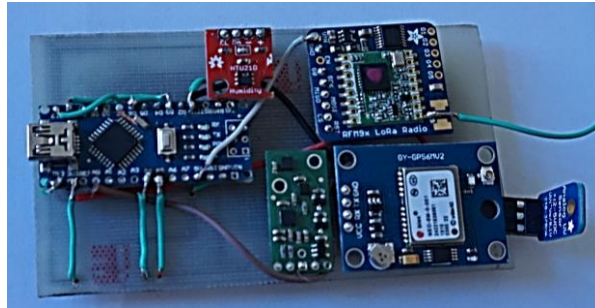


Fig. 2. Arduino measuring device (by Mikó CanSat team).

These new learning situations help the development of students' personalities in such a way that they are able to meet the challenges of the 21st century, think creatively, communicate easily and work well in a team.

## References

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