



How to build a mini meteorological station for your school? – a project with a citizen science perspective

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Thermodynamics and electricity are part of the 10th grade physics curriculum in Romania, but the exciting questions of atmospheric physics and meteorology can be answered if we organize special activities. Linked these topics we can create many interesting learning opportunities and try new ways of teaching.

Our presentation is based on two school project and experiments that I used during the last school years in my classroom learning and practical outdoor activities with my Science Club students.

For school experiment, we built a fixed mini meteorological station and a flying device (cansat) with different sensors that determine the characteristics of the atmosphere, GPS, pollution sensor and CMOS camera.

The cansat unit (flying station) is elevated with a quadcopter at 400m altitude and is able to send pressure, temperature, humidity, air pollution and UV index data from different altitudes. The mini meteo station is fixed on the top of gym and collects permanently temperature, pressure, humidity, gas composition and UV index data. The collected data are processed and analysed on a regular basis and are used for various lesson topics. We plot on graphs the pressure, temperature and relative humidity data for different days or different hours of the day and we search relationship between the weather conditions and atmospheric characteristics.

Since then cansat is not easy to fly up every day, we use the flying unit when we are looking for a specific question. Then we compare the collected data from the two devices (cansat and fixed meteo station) at the same time but different altitude or location, so we can analyse the evolution of air parameters for a specified area.

Both units are Arduino microcontroller based devices, which are built using cheap and simple sensors. Our aim is to provide students with electronic knowledge, building skills, measurements techniques during the design and implementation activity.

Our measuring units are built such a way to send the collected data to a webserver and an LCD display. The LCD always shows the real-time information about the air, but the webserver records all measurements in a database. The webpage and database is easy to access and used at biology, geography or chemistry classes as well.

These activity help the students to understand easier some basic concepts of atmospheric physics and deepen their knowledge of thermodynamic. This creative process helps them understand the internal connection between the theory taught at physics and IT classes and those practical, technical applications.

The whole system is planned as a network of minimeteo stations. Students from other schools can get involved in the measurements with their own built devices and can upload their own measurement data to the webpage, so we could create a weather map for schools.