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Planetary rover robotics experiment in education: carbonate rock collecting experiment of the Husar-5 rover

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Introduction: The new experiment for the Husar-5 educational space probe rover consists of steps of the technology of procedure of finding carbonate speci-mens among the rocks on the field. 3 main steps were robotized: 1) identification of carbonate by acid test, 2) measuring the gases liberated by acid, and 3) magnetic test.
Construction of the experiment: The basis of the robotic realization of the experiment is a romote-controlled rover which can move on the field. Onto this rover the mechanism of the experiments were built from Technics LEGO elements and we used LEGO-motors for making move these experiments. The operation was coordinated by an NXT-brick which was suitable to programming. Fort he acetic-test the drops should be passed to the selected area. Passing a drop to a locality: From the small holder of the acid using densified gas we pump some drop onto the selected rock. We promote this process by pumpig the atmospheric gas into another small gas-container, so we have another higher pressure gas there. This is pumped into the acid-holder.
The effect of the reaction is observed by a wireless onboard camera
In the next step we can identify the the liberated gas by the gas sensor. Using it we can confirm the liberation of the CO_2 gas without outer observer.
The third step is the controll of the paramagnetic properties.. In measuring this feature a LEGO-compass is our instrumentation. We use a electric current gener-ated magnet.

During the measurements both the coil and the gas-sensor should be positioned to be near to the surface. This means, that a lowering and an uplifting machinery should be constructed.

Summary: The sequence of the measurement is the following. 1) the camera – after giving panorama images – turns toward the soil surface, 2) the dropping onto the rock surface 3) at the same time the gas-sensor starts to move down above the rock 4) the compass sensor also moves down on the arm which holds both the gas-sensor and the compass-sensor 5) evaluation of the gas-sensor data 6) if CO_2 is present the magnet-test begins, therefore the rovers moves forward into a good position for the coil lowering 7) after magnetization the rover moves backward in order to be in the position that the compass-sesnsor can measure the angle. 8) the last 2 operations are repeated in a small turned position of the rover 9) final calculation of the paramagnetic measurement 10) summary of the 3 tests