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Measuring planetary field parameters by scattered cubes from the Husar-5 rover: educational space probe construction for a field work mission with great number of 5 cm sized sensorcube units launched from the rover.

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1. Introduction

The Hunveyor-Husar project tries to keep step with the main trends in the space research, in our recent case with the so called MSSM (Micro Sized Space-Mothership) and NPSDR (Nano, Pico Space Devices and Robots). [1]Of course, we do not want to scatter the smaller probe-cubes from a mothership, but from the Husar rover, and to do it on the planetary surface after landing.

2. The "Micro"-SensorCubes

The edge size of the cubes are planned to be 5 centimetres. From the 6 faces of the cube 4 should be covered by solar panels. The vortices of the cube should be rounded off (for example a small spherical shell segment should cover them), in order to the better rolling on the surface. The sensors and the electronic equipment should be placed ont he surface and inside the cube. The cubes would be scatterred on the surface therefore it is worthy to measure and to map that kind of parameters which are non-uniform on the surface. We plan to include inside the cubes a Hall-sensor to measure the magnetic field, a pressure sensor to measure the atmospheric pressure, and a vapor content and a temperature sensor, too. The communication with the Husar rover (or the landing unit Hunveyor) should be organized through a Bluetooth. The „brain" of the cubes should be an AVR microcontroller, which synchronizes the measurements and the transportation of the data.

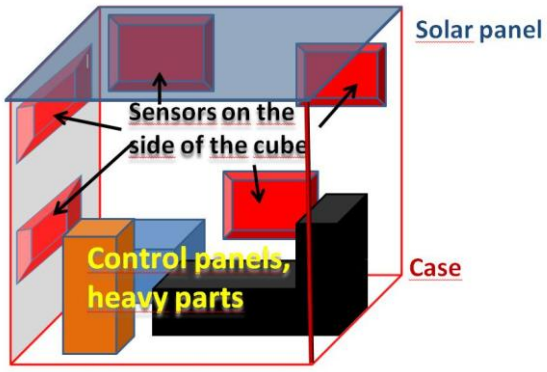

Figure 1: the SensorCube

3. The Ejection Event

The ejection of the cubes is planned to be done by a spring mechanism. We should like to see the connection between the cube data and the locality of that cube, therefore the ejection should be solved in the following way: cubes should be ejected to the left and to the right, alternately. It would be important to eject the cubes almost the same distance from the path of the rover, left and right. Therefore the ejecting arm should be moved by a motor in a plane perpendicular to the path. Using an 2-axial acceleration measuring system we arrange the that way, that in the left and the right position the arm should eject cubes in the arm position 45 degrees to the horizontal plane.

The Husar rover will receive a half circle tube for bracing from an small weight but strong enough material. This half circle should help the rover in standing up, if it turn over during the ejection event.
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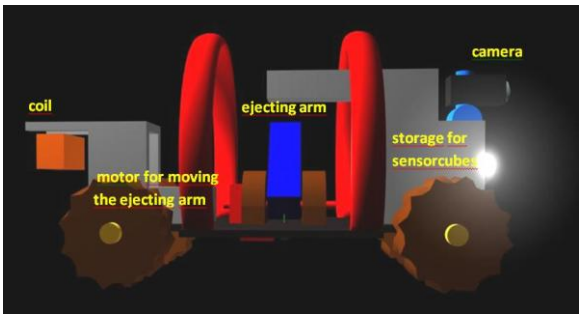

Figure 2: the HUSAR-rover

4. The Mission

The mission would be carried out in the following way. The rover starts from the lander and advances forward with a uniform speed. (By its distance sensor the rover observes the obstacles and tries to bypass them). This way the pathway of the rover can be traced and the positions of the cubes can be estimated. After covering a unit distance the rover stops, it make leveling the ejection subsystem, and lifts up a cube to the 45 degrees height and launch it left. Again lifts a cube and launch it to the right. During the stops the rover measures local gravity. The gravity sensor should not be built to the cubes, because it probably does not change in this distance.

5. Summary and Conclusions

In this abstract we report about a new type of mission planned by students. The sensorcube is not ready yet, but the students have got a lot of experience about the problems connecting of constructing a space-probe.

References

[1] Vizi P.G., Bérczi, Sz., Horváth I., Horváth A.F, Vizi J.Cs.: APPLICATION OF THE FLEET OF MICRO SIZED SPACE-MOTHERSHIPS (MSSM) WITH NANO, PICO SPACE DEVICES AND ROBOTS (NPSDR) FOR LIFE SIGNAL SEARCH ON DDS SITES USING GLOBAL DIGITAL DUNE DATABASE OF MARS 46th Lunar and Planetary Science Conference (2015) 2788.pdf