SEVERAL HUSAR ROVERS AROUND THE HUNVEYOR LANDER: SPECIFIC RESEARCH STRATEGY AND EDUCATIONAL MODEL SYSTEM OF UNIVERSITIES IN HUNGARY. ***S. Hegyi[1], B. Drommer[1], A. Hegyi[1], T. Biró[1], A. Kókány[1], Gy. Hudoba[2], G. Rudas[2], Zs. Kovács[3], T. Földi[4], Sz. Bérczi[5]***. [1]Pécs University, Dept. Informatics and G. Technology, H-7624 Pécs, Ifjúság u. 6. Hungary, (hegyis@ttk.pte.hu) [2]Budapest Polytechnik, Kandó Kálmán College of Engineering, H-6000, Székesfehérvár, Budai út, Hungary, [3]Berzsenyi College, Dept. Technology, H-9700 Szombathely, Károlyi G. tér 4, Hungary, [4]FOELDIX, H-1117 Budapest, Irinyi J. u. 36/b. Hungary, [5]Eötvös University, Inst. Of Physics, Dept of Materials Physics, Cosmic Materials Space Research Group, H-1117, Budapest, Pázmány P. s. 1/a, Hungary (berczi szani@ludens.elte.hu)

Introduction: New developments of the Husar rovers of Hunveyor-2 and Hunveyor-4 robot models are summarized. We are developing a strategy in which a family of various Husar-2 rovers work around the Hunveyor-2 university robot, similarly to the basic arrangement of Sojourner around Pathfinder. This system is also an educational work at Pécs University, Dept. Informatics and Technology where students build their own Husar-2 rovers. These are smaller and larger model-cars supported by onboard computer, camera and the robotic arm with tools. The new experiments on Husar-2 and Husar-4 are also planned for the Ice-Hunveyor experiments.

Husar-2b for students in Pécs: Husar2b is a specific development of the Husar-2 rover types focusing on the basic planetary surface activities. The rover contains a camera and a solar panel on its board placed on a model-car chassis. The drive is on the back wheels by electric engines, movements are controlled by the camera view through a wireless connection to the computer. It were used by 12K age students for roving among rocks and observing their surfaces. The camera transmits images with 30 frame/sec, and it has wireless connection with the computer (1200 MHz). On the impact-defense surface sensors are planned made by students (Husar-2b on Fig. 1.).

Fig. 1. Husar-2b for 12 K students. First level.

Husar-2a for college students in Pécs: The development of this larger rover focus on program-controlled direction of the rover. On a larger chassis Husar-2a has independent driving on all the four wheels. This fact allows a special movement direction. The rover can turn in a very narrow arc which is important to move to side direction objects. The wheels in one axis are connected by differential. The structural framework, the driving and the direction all have a left- and right-hand side symmetric structure.

The movements are directed through servo engines, which were originally designed for analogous direction, however, even 8 of these servos can be computer directed by a microcontroller. This microcontroller gets the position of the servos through RS 232 port of the computer.

Fig. 2. Husar-2a for college students. Second level. The DPA computer on the front of the rover.

The brain of the rover is a HP PDA computer which contains a WIFI card and is in contact with the terrestrial control computer. The computing capacity of the DPA is enough for this autonomous tasks. During

rover motion the coordinates of the target is given and the rover choose the track to it.

If the rover moves on a free test field then its position can be determined by a differential GPS. The receiver of the differential GPS is placed in the territory of the Pécs University. This position is given through the server of the geologists of the University. If the rover moves in the working room, or can not see the satellite, a transformed optical mouse can give increments to the DPA according to the rover motion.

Instruments: On the board of the rover the most important instrument is the robotic arm which has three degrees of freedom. The maximal length of extension is 30 cm, and the arm can lift up 500 g load at the most extended state. The arm has commutable tools. It will carry out a) measurements of soil strength, b) measuring the distance of the target rocks, and c) dust collecting package for Martian studies.

There are 2 cameras on board of the Husar-2 rover with VGA resolution. They were placed on the two sides of the rover. Both can be rotated toward the target objects and also, panoramic stereo images can be made with them. Such operation occurs in nature at cameleon's eyes.

Husar-4 for college students in Székesfehérvár: The development of this rover focus on the Ice-Hunveyor program.

Fig. 3. Hunveyor-4 for college students, prepared for Ice-Hunveyor measurements.

The rover has different sized front and back wheel pairs. Smaller back wheels are pulled only, the larger front wheels has drive by stepping motors. The rover will have T measuring sensor and ultrasound distance measurement. When move farther from Hunveyor-4 on the ice to observe micro-fissures it will contact with it by radio waves.

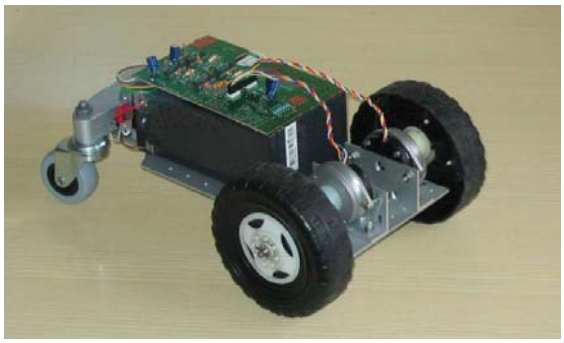

Fig. 4. Front view of Husar-4 made by Székesfehérvár college students. It is prepared for Ice-Hunveyor measurements, movements on clear ice surface.

Summary: We showed the new style of the arrangement of tasks of rovers around the Hunveyor lander, basically similar to the main program to that of Sojourner and Pathfinder, but rovers are multipled with specific tasks.

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