SIMULATED MARS ROVER MODELL COMPETITION 2010-2011. SIPOS, Attila[1] VIZI, Pál Gábor[2], [1]siposattila@magyarokamarson.hu, [2]RMKI KFKI. H-1121 BUDAPEST, Konkoly Th. 29-33. vizip@rmki.kfki.hu.

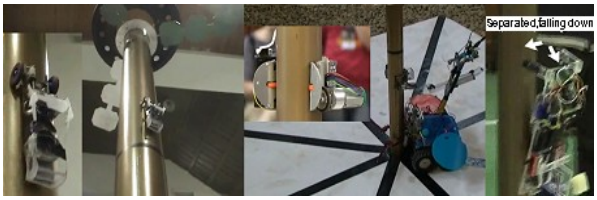
Introduction: This is a report about the organization and management of the Simulated Mars Rover Competition events of 2010 and 2011. www.magyarokamarson.hu [1] (Hungarians on Mars). This is a traditional competition of applied engineering sciences for six years now. We covered it in our paper 2519.pdf and 2649.pdf before the 40th and 41st Lunar and Planetary Science Conference (2009, 2010). We also reported the collected experience and results usually at the place of the tournament in II. Rákóczi Ferenc High School, Kiskunhalas, Hungary and Obuda University, Budapest, Hungary in year 2010. Organizers of the competition are independent persons and organizations who work together with High Schools and enthusiastic sponsors. The founder of the competition is Mr. SIPOS, Attila electrical engineer.

Discussion:

Ideas: To get more experience is one of the most important things nowadays and in each year when we give another challenge. The field of competition is hidden from direct visibility. Competitors must use video transmission and remote control, in addition the navigation must be delayed by 15 seconds to simulate time of spreading of the signal. The jury works mainly automatically, only results are important, but there are experienced members in the jury and among them the author of this paper.

Mission 2010: The main goal was to reach the target place and there to read and send back to base a DNA sequence represented by a 16 character display inside a model of a small creature. Additional goals were to collect "soil" specimen beneath a model of plant, and to carry and put the specimen into the Mars space-harbor where there was a space-elevator model as we gave information in 2649.pdf of 41st LPSC (2010) and as could be seen on preliminary simulation video [2].

Competitors usually used a rover and a separate elevator machine and had problems with connections.



The absolute winner solution was a light weight rover (amphibian ready) with an additional self moving motor

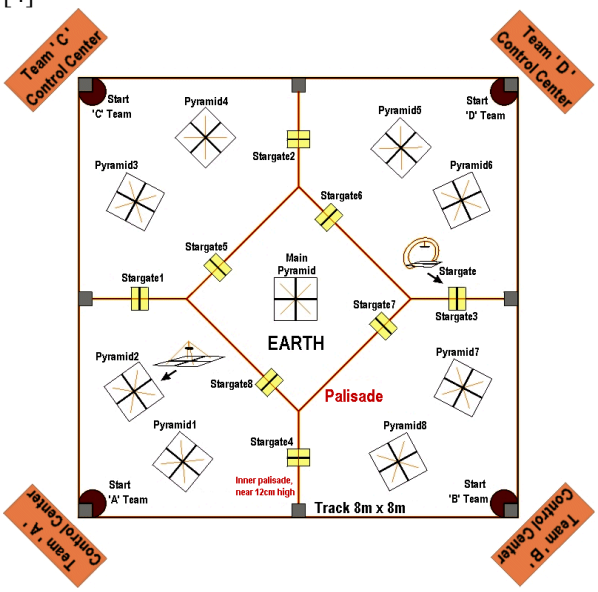
for the space elevator rod. The frame of the vehicle was made from balsa wood which is an especially light material for models. The rover had full self control. The winner team members activated the handy remote control only during rover's bad self decisions and in case of emergency, which was visible from the team's control center through video pictures and from signals of sensors, occurred only two times(!) during their mission time. Applause burst out when the rover has collected all of samples and successfully connected into the space elevator rod and has risen majestically. [3]

Mission 2011: The actual goal of the competition in 2011 is more than earlier, when only one rover was on the stage. The new goal can't be achieved only by building a usual rover with sensors and advanced communication, but several rovers must work at one time on the stage. The surface will be smoother than before but logically and strategically far more advanced. The idea came from the high number of competitors because they increased rivalry. When we are developing robots for a distant unreachable destination, like other planets, we are thinking about small and easy robots working individually and with each other at the same time. It is logical to launch abundantly a lot at the same time. The mission is mainly easily understandable: there is a difficult given goal, but this can be achieved in different ways and routes.. In addition the better robot can substitute the other one to reach that common goal.

It is similar to win against an - we can call it - 'enemy' but during fighting against the enemy every independent 'defender' is in competition with others. Who is the better one? To damage a robot by another one is strictly prohibited. This situation gives a good field of research to study both the temporary cooperation and later the competition of separately developed and evolved micro robots, similarly like in robot ant projects. All robots must be working irrespectively and in same time in cooperation to reach the best result. Ro-

bots are working mainly independently but can be controlled by their developers, as usual.

The field of competition can be seen in the picture. [4]



During the multi-round competition results are saved by computers of organizers and are visible in graphic form on the screens of projectors.

This year we remove the big palisade wall from competitors because nowadays everybody can use video transmission and it is apparently cheaper but other tasks require the remaining money. The 15 seconds delay in case of human command remains and must be visible at the control center of the teams. In case of automatism, software generated command on board of the rover can work continuously. During the competition all rovers are reparable according to the new 'abundant' micro robot concept. In case of enough robots they can substitute each other and we simulate this substitution when we leave to repair the robots.

Several devices will be supported by organizers during this year like the deployed gates and pyramids with sensors and electronics like some standard sensors must be the same for equal opportunities. Communication between teams and robots can be through any cordless device - like Bluetooth, Wi-Fi and other mainly industrial standard - communication due to expected high electric smog and the environment will be similar like in the industry or on a distant planet without the shielding feature of the Earth.

Finally, we need to say why the competition had to be reconfigured. The reason is the last 42 candidate teams. If we hadn't reconfigured the race, we wouldn't have to complete the competition during a single day and we wouldn't have planned the new micro rover and robot cooperation and competition concept.

Teams: For the past five years there were several teams, high school and university departments have been trying to complete challenges and some of them were effective. Students successfully started or finished Ph.D. studies. Teams came form: Budapest University of Technology and Economics (BME); Óbuda University (former Budapest Tech (BMF)) Kando Faculty of Electrical Engineering; Faculty of Informatics of University of Debrecen (UniDeb); Computer Science Department in Károly Eszterházy; Eötvös University (ELTE) Institute of Physics, Department of Material Physics, and other team member from Dept. Informatics; Pécs University - Dept. Informatics and G. Technology; Széchenyi István Technical High School, Székesfehérvár; Miklós Zrínyi National Defense University (ZMNE) MSc and Doctoral School of Military Sciences.

Prizes: Prizes and donations are given by sponsors mainly in cash and in electronic or computer devices and the full price of the competition is usually one million HUF which is nearly 5000$.

Media: A lot of documentation can be found increasingly in the media and across the Internet first of all on the main website of magyarokamarson.hu and for example on the web page of Hungarian Astronomical Society and archive.galileowebcast.hu [5], and on youtube.com by author „siposattila" [6].

Conclusion: The simulated Mars Rover Model Competition is still widening and reached the goal to train new experts. They can join the work of Universities and research institutes. We are continuously working to organize and manage future competitions with new goals. The cooperation is also growing between organizers and high schools, universities and doctoral schools.

References:

[1] SIPOS, Attila et al. (2006-) www.magyarokamarson.hu [2] VIZI, Pál Gábor (2010) Küldetés animáció (Mission animation) http://www.youtube.com/watch?v=2vO7AgGn-3I
[3] SIPOS, Attila (2010) Magyarok a marson (Hungarians on Mars) http://www.youtube.com/watch?v=3O3HDZ3uzN0 author "siposattila" [4] SIPOS, Attila (2010) Mission 2011 http://www.magyarokamarson.hu/index_elemei/kuldetes2011.html [5] VIZI, Pál Gábor (2009) archive.galileowebcast.hu and *www.mcse.hu.,mediatar* http://www.mcse.hu/index.php?option=com_mediatar&task=show&archID=0473&Itemid=338 [6] SIPOS, Attila (2006-) www.youtube.com author "siposattila"