SIMULATED MARS ROVER MODEL COMPETITION 2012-2013

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Introduction:
This is a report about the organization and management of the Simulated Mars Rover Competition events of 2012 and 2013. www.magyarokamarson.hu ([1] ‘Hungarians on Mars’). This is an annual, traditional competition of applied engineering sciences for eight years now. We covered it in our earlier works before (Sipos et al. 2009-2011) [2,3,4] and (Vizi 2012) [5] the 40\textsuperscript{th}–43\textsuperscript{rd} Lunar and Planetary Science Conferences in 2009-2012. As usual, we reported about the gathered experience and results usually at the place of the tournament in II. Rákoskai Ferenc High School, Kispest, Budapest, Hungary in 2010 and the new place Déli Misska High School, Szeged, Hungary in 2012 and 2013. Organizers of the competition are independent persons and organizations who work together with High Schools and enthusiastic sponsors. The founder and the main organizer of the competition from the beginning has been Mr. Attila SIPOS electrical engineer.

Discussion:
Ideas: To get more and more experience is one of the most important things nowadays and in each year and so it when we offer another challenge. In order to achieve the automation and to simulate time of signal spreading, human commands to robots must be delayed by 10 seconds in 2013. The jury machine works now automatically, only results are important, but there are experienced members in the jury and among them the author of the present paper.

Mission 2012
2012 results “This year we found spider-like organisms on Mars (or on other planetary target) which reproduce themselves from eggs. It can be dangerous for us if they multiply themselves. According to our reconnaissances if we can occupy their oviposition places by putting our “eggs”, then we can win. Our robots must go on foot, because if we do so, the spider-like organism does not want to attack us. If we use wheels, then they immediately attack us.”

Limitations: Going on foot and jumping were allowed, but flying was impossible (because of thin atmospheres or quick winds). Size and weight were limited for robots, the maximum diameter was 12 cm, while the mass could be maximum 2 kg. In case of any collision the mission was needed to be restarted, furthermore necessary to take care of other robots.

Mission: One mission could last max 20 minutes for four teams. Robots fight against the enemy and had to have more scores than the other groups. The scores came from better oviposition places from 12 to 108 points. Missions started with a draw and after it they continued by earned scores. Three rounds of matches gave the final result.

Control: Human commands had to be delayed for 15 seconds. The track was visible for the teams as in 2011 (because of cost limitations and it is easy to get pictures from robots nowadays).

The main scientific goal in 2012: The main scientific goal in 2012 was to implement legs for robots: to learn mechanical knowledge or to involve more mechanical engineers into design and competition. During years competitions were mainly electrical engineers and IT specialists. They should invite mechanical engineers or should acquire mechanical knowledge to build stepping robots, e.g. hexapods.

Planetary research specific features: Different objects, like layers were be placed on top of each other on the plotting board to make the task difficult enough to reach and to climb the targets.

Virtualization: Like described before, organizers make virtual traces for races already months before the date of the competition in this year also. http://magyarokamarson.hu/virtu/[10]

Teams came from: Budapest Univ. of Technology and Economics (BME), Óbudai Univ., Kando Faculty of Electrical Engineering; Faculty of Informatics of Univ. of Debrecen (UniDed); Computer Science Department in Konyo Eszterhazy; Óbudai Univ. (ELTE) Institute of Physics; Department of Material Physics, and other team members from the Dept. Informatics; Pécs Univ. - Dept. Informatics and G. Technology; Széchenyi István Technical High School, Székesfehérvár; UNIKE (former National Defense Univ, ZMNE) Mics and Doctoral School of Military Sciences etc.

Conclusion: As a summary, it can be said that competitors have to be capable of designing, developing and constructing complex robots, and moving them by driving from wheel and caterpillar (2006-2008) through amphibious (2009) and elevator climbers (2010) legs (2012) balanced double wheels (2013). During competitions a lots of sensors, manipulators and tricks were used. We hope that a prize will be awarded thanks to the gratitude of our sponsors, media covers our events, and competitors join the work of Universities and research institutes. One of them made the first independent Hungarian satellite, Masai-1 and since February 2012 Masai-1 has been orbiting the Earth.

References: [1] SIPOS, Attila et al. (2006-)
[10] SIPOS, Attila, Double Wheel: http://youtu.be/1FRMqEElw9s