10 Years of the Simulated Mars Rover Model Competition. SIPOS, Attila[1], VIZI, Pal Gabor [2*], [1]Competition of Applied Engineering Sciences, Hungary siposattila@magyarokamarson.hu, [2]MTA Wigner RCP H-1121 BUDAPEST, Konkoly Th. 29-33. vizi.pal.gabor@wigner.mta.hu.

Introduction: 10 Years of the Simulated Mars Rover Model Competition - This is a report about the success, organization and management of the Simulated Mars Rover Model Competition events from 2006 to 2015.

Ideas: Challenge is the engine of evolution. The young grow old and replenishment is needed. Knowledge is not born with us. The empowering of skills can be speeded up by a forced evolution in competitions. Where do today's teenagers get that little spark that will start them on the difficult but interesting scientific course?

Each year we take significant efforts to organize and implement this traditional competition of applied engineering sciences. Ten years of success - www.magyarokamarson.hu. ('Hungarians on Mars'). We presented our previous works (Sipos et al 2009-2015) [1,2,3,4,5] at the 40th-46th Lunar and Planetary Science Conferences. Contestants came from more than twenty participant technical high schools, secondary grammar schools, universities and doctoral schools.

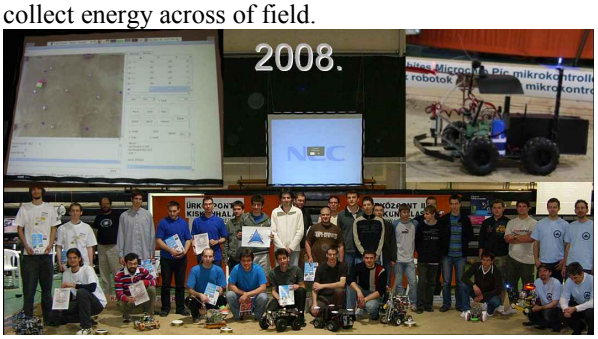
Simulation and Realization: Organizers and authors of this article prepared CGI and physical simulations of the dashboard, robots and race and communicated them before the date of competitions. Importance for researching and developing is to reach the capability to supply a good emulation environment before any mission, first at our competition and next in a wide spectrum of space and planetary environments. The method is entertaining-and educational to get the attention of possible younger competitors also and similar to a sci-fi trailer. [6][7]

Missions: Each year the most important task is to command the robots with automatism. In order to become a winner automatic devices are to be used.

2006-2010: One rover was on the stage. The actual goal of the competition can be achieved by building a moving device (usually a rover) with manipulators. The track is an 8x8 square meter sized field of special material and tracks, different during years. Controlling of rovers was necessary from behind of a folding screen and using a delay to simulate the distances between planets.

2006: Competitors had to build a rover which starts from either corner of the field to reach the target crater at the opposite other corner and to collect debris or soil of the crater.

2007: Competitors had to search power cubes to collect energy across of field.



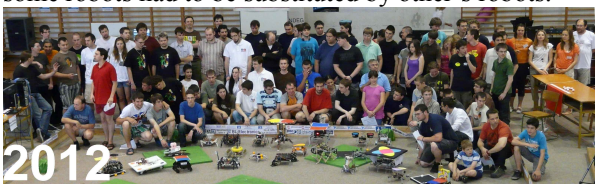
2008: Competitors had to collect liquid material.

2009: The goal of this year could be achieved by building an amphibian rover with sensors, manipulators and advanced communication.

2010: To reach the target place and to read and send back to base a DNA sequence represented by a 16 character display and to collect soil, and to carry and put the specimen into the harbor where a space-elevator model was. The end of the mission was to reach the top of the space-elevator.

2011-2016: *More than one rover was on the stage* from this year on due to the increased and large number of competitors and full mission time was not enough to complete the contest one by one.

2011: The mission was to reach and occupy marked places on one's own field and to try to occupy other marked places on the fields of other competitors, thus some robots had to be substituted by other's robots.



2012: Spider like robots occupied pyramid like targets by "eggs" and pushed down other's eggs.

2013: Doubled wheel robots in an 8mx8m labyrinth placed own magnetic eggs and eggs taken from others.

2014: All skills to be used as before additionally with a hovercraft to simulate the micro gravitation in 2D.

2015: This 10th year anniversary was special, we organized an additional event in spring - a seminar - where competitors presented their solutions used previously on plotting boards. In the autumn of 2015 in the '9.5th contest' all skills were required as previously, in addition robots were necessary to build in situ on spot during the time of the competition from materials available locally. It symbolized the necessity of how local materials should be used for the energy-efficient performance of the missions in a remote place.

Conclusion: Competitors have to be capable of designing, developing and constructing complex autonomous robots, and moving them by driving from wheel and caterpillar, through amphibians, elevator climbers, legs, balanced double wheels and air cushion. Organizers and participants of the competition have written several publications and uploaded hundreds of videos to sharing sites.

References:

[1] SIPOS,A., VIZI,P.G.: (2009) LPSC40 #2519 ; http://www.lpi.usra.edu/meetings/lpsc2009/pdf/2519.pdf [2] SIPOS,A., VIZI,P.G.: (2010) LPSC41 #2649 ; http://www.lpi.usra.edu/meetings/lpsc2010/pdf/2649.pdf [3] SIPOS,A., VIZI,P.G.: (2011) LPSC42 #2014 ; http://www.lpi.usra.edu/meetings/lpsc2011/pdf/2014.pdf [4] SIPOS,A., VIZI,P.G.: (2013) LPSC 44 #2850 ; http://www.lpi.usra.edu/meetings/lpsc2013/eposter/2850.pdf [5] SIPOS,A., VIZI,P.G.: (2015) LPSC 46 #2602 http://www.hou.usra.edu/meetings/lpsc2015/eposter/2602.pdf
[6] VIZI, P.G.: TrailerHd2013:youtu.be/12nfduYfBOE
[7]VIZI,P.G.:TrailerHd2015:youtu.be/wKHDJr5An1A