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From VMR to ReMY: Game concept awarded by Europlanet becomes Remote Mars Yard

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Abstract

VMR – Virtual Mars Rover, was a concept game proposed by a team later establishing a space startup: ABM Space sp. z o.o. in Poland. VMR was awarded by Europlanet Outreach Funding Scheme in 2011. The initial grant allowed concept development, and together with success of the team in robotic engineering contest University Rover Challenge (Magma team) contributed to attracting seed investor incubator and establishing of a space startup. Today ABM Space runs projects basing on ESA grants, related to Mars navigation, among others. ABM is a laureate of Airbus Merck KGaA Sustainable Exploration Prize 2017 for a solar sail concept. At Polish National RnD Center ABM runs a 500 000 EUR grant within GameINN programme. This is ReMY – Remote Mars Yard, a system combining virtual Mars simulator game, a physical Mars mockup and a physical robot, accessed through Internet. The scenario and gameplay model was largely taken from the original VMR concept.

1. System description

ReMY – Remote Mars Yard is a 40 cm 3D-printed, 6 wheeled rover installed on a Mars mockup terrain. The terrain is designed with aid of planetologists from Polish Academy of Sciences. Currently a 3 x 4 m mockup is available, but 4 new game-rooms 10 x 10 m are developed under GameINN grant. The terrain features numerous geological objects of interest, physically reflected in the relief or visible only in the virtual layer of ReMY software. This software comprises main server system with positioning system, object and scenario database and a web interface. The interface allows logging onto the rover through the Internet browser and performing a simulated Mars mission from any location. The mission bases on printed materials, including system manual, simple Mars geology handbook, "satellite imagery" of the mission site and description of the rover's science instruments. The physical rover has only a navigation camera on the mast and a science camera on a 2 degrees of freedom front arm. All relevant science instruments are simulated and reflected in the virtual interface. The interface streams video from the two cameras, and from a "lander" camera (external robot view), as well as gives robot telemetry (position, mission time). The telemetry allows pointing on an orientation map and displaying in a 3D pre-scanned mission site visualization.

Faults are simulated. The mission does not include Earth-Mars delay, it assumes operations are performed by the crew orbiting Mars in a manned space station and delay is limited to the native Internet delay. Operation is nearly real-time, performed in steps, with no autonomy.

Scenario requires learning process, creating a mission plan, training, actual mission and reporting. The goal of the game is to gather points for proper interpretation of orbital imagery, ground truth, making choices under time constraints, proper communicating within the team to exchange knowledge about the specificity of surveyed objects and selected science instruments. Time is a limited resource.

2. Pilot sessions

From 2016 pilot sessions on a 3 x 4 m mockup have been organized. 75 Polish schools performed missions during 3 semesters, in a competition form. It was co-organized by the Warsaw Copernicus Science Center and ESERO Polska – ESA's education office. Further demonstrations are organized for selected partners, such as science foundations, technological corporations (HR departments) and investors community. So far UK, US, Israel, Austria and Russia were the locations outside of Poland to participate.

3. Commercial target groups

Besides outreach profile the project is being commercialized. Education groups of around 8 students each are one area of interest, to be funded by public or private schemes supporting STEM, general space awareness or incentives to pursue specific education and career paths among communities (such as high-tech/industrial communities wishing to maintain local technology employment in a long-term perspective). This last group interfaces directly with a product for corporations, which can train their employee teams in communication, teamwork, flexibility and resource/time management in an attractive and original form. Entertainment gamers are the third group, important especially from community building perspective.

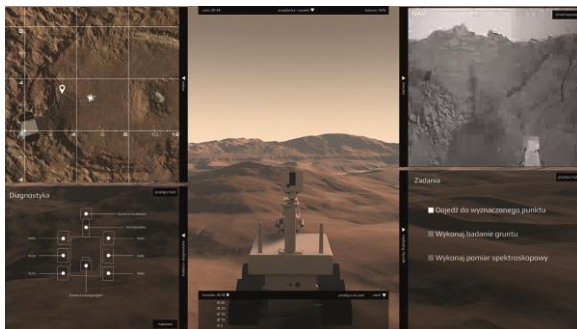Figure 1: ReMY rover on a mockup – older rover version.

Figure 2: New version web interface

4. Summary and Conclusions

ReMY is an innovative platform for education, training and entertainment. It features solid development potential for human resources and human-machine interfaces, as well as for 3D print and robotics in general. The architecture and approach allow to develop also other philosophies such as multiagent systems, navigation, multi-layered mapping, augmented reality and virtuality.

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