SIMULATED MARS ROVER MODEL COMPETITION – THE PANDEMIA CHALLENGE

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Introduction: This is a sad and hopeful summary report about our annual Mars rover model competition, the Hungarian Competition of the Applied Engineering Sciences called Magyarok a Marson (Hungarians on Mars). We marked two dates for the competition last year 2020. The first was canceled because of the first wave of the pandemic, and the second date was in the end canceled by the Rector of the University on grounds of Government to regulations four days earlier because of the second wave. We plan continuously to run the competition live, but we called the competing teams to send videos, pictures and descriptions of the robot solutions with which they are already finished.

This is our duty to tell about the recent success of our young contestants despite the COVID–19 who will became attendants (and later supporters of the Competition) and have adapted themselves to the new situation of Pandemic.

We reported about the Competition in the previous years (Sipos, Vizi 2009-2020) [1,2,3,4,5,6,7,8,9] at the 40th-51th LPSC and at several conferences in Hungary, e.g. at H-SPACE 2016 - 2019 [10]

Teams participating in the competition in spite of COVID-19: We report about the first three teams who sent us they solutions online.

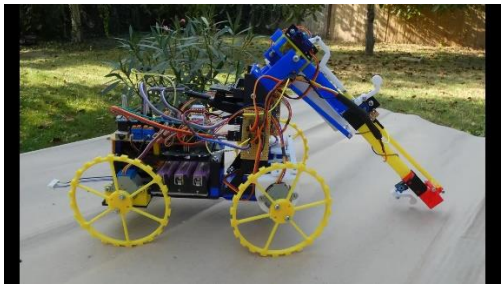
We defined the task for 2020 in our previous paper in detail [8] and the reason why the contest was delayed in 2019 [9]. The plan, to emphasize the mechanical and 3D knowledge and 3D printing, the story, to save Mark Watney, the task, to build and control a rover with manipulators and the connection of the movie to Hungary, where it recorded thirty percent.

Benefits: In the event of any special (terrible) condition, we must find some advantage, as in the case of COVID-19. We could have seen developing and test phases of groups.

In 2020 we do not distinguish between teams, every team is a winner, and we just report the results. However, we give a chance for everybody to vote by a special electing idea. For someone who wants to give a vote it is necessary to describe the selected team with ten sentences and to send it in email. Our software will search the key words (for example the color of the wheel of the rover, shape and so on) which must be found in the vote email and this way we can summarize the votes. Every identical description gives one vote and one time only. vote2020mam@gmail.com (solution because of COVID)

In 2020, we gave first prizes only and to all groups who did work and posted it online.

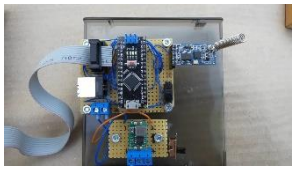
Team KissBé (small b): The 'winner' of the year 2020. The group includes elementary and high school members with a father who is a robotics teacher himself.

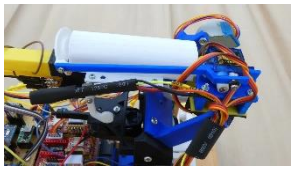


Robot features:

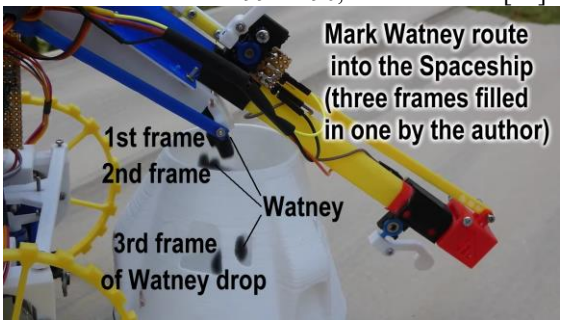
- 4 wheel drive (2 steerable)
- 3-cell LiPo battery 2000 mAh
- Sampling with a grab that collects samples in a storage container. At departure, the astronaut is in the tank, and the samples are placed here as well.
- Automatic sampling at the touch of a button
- The motors start automatically at acceleration
- Front laser rangefinder for spacecraft search
- 180 degree FPV camera
- The sampling lever is limited by two limit switches
- Control with 3 Arduinos: motor controller, central unit with HC-12 receiver, laser rangefinder unit
- Modular design, all parts are easy to replace

They used an Arduino HC-05 BASIC Nano 3.0 and HC-12 Radio module remote control the robot.

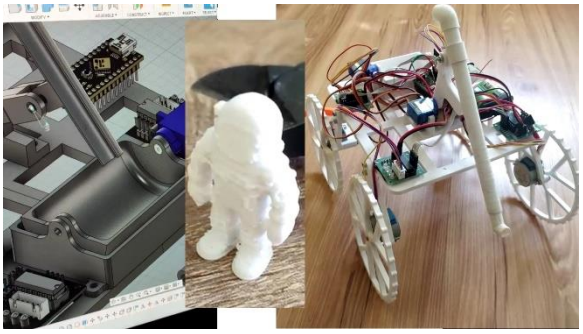




The collector arm (to save Mark Watney) moved by ToverPro MicroServo 99S G90, see the movie [11]



Squad DeltA2 – old foxes: The 'champion' of the Year. The first competitor started at 2010 as university student, he and his team members were well placed in the race during the past years.

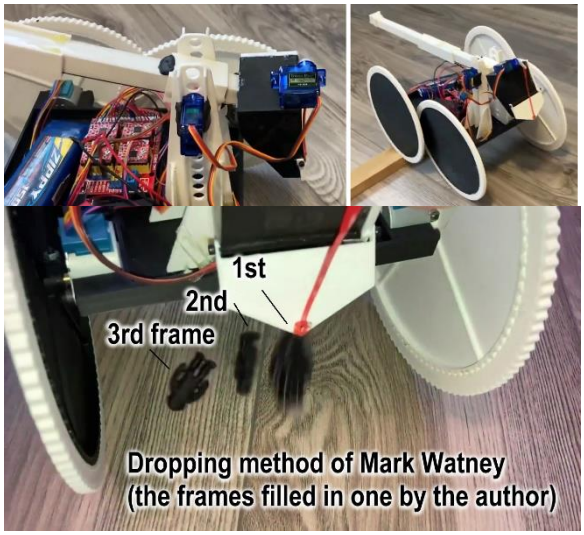


They also used Arduino sets. 28BYJ-48 Stepper Motor with ULN2003 Driver. They used Autodesk Fusion 360 to make their plans for 3D printing and for the whole design. They also printed the Spaceship of Watney.

Robotic arm programming and test phases at the computer before the Arduino Developing program screen. See the movie [12]

µ-troll group: The 'victorious' of the year. The team members were inspired by MMC Mars Mining Corporation – Rescube team [10] and these young people were taught by MMC. The group started in 2015 and since that time they have been among the top five rankings.

They used Arduino CNC-Shield panel and TowerPro sg90 servo motor with 180 degree rotation and ZIPPY Flightmax 1500mAh lithium ion accumulators for a real long-term stable moving. See the movie [13]



Conclusion: This season was the year of "a duty to rescue". A duty to save Mark Watney and a duty to rescue the Competition itself. The concept of the contest is to seek, to inspire, to start talented young people, engineers and of course to support them, who will have to become excellent organizers and investors in the field of Space Research and connected science. We must provide this opportunity even in the case of any hard conditions such as a pandemic.

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[12] Squad DeltA2: (2020) https://youtu.be/S9O-61KHj8o
[13] µ-troll group: (2020) https://youtu.be/ivxhrDbrKaw