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Author: Mr. Daniel Sors Raurell
LEEM-UPM, Spain

Mr. Tariq Al-Marahleh Montes
LEEM, Spain
Ms. Sandra Bonillo Rey
Universitat Politecnica de Catalunya (UPC), Spain
Mr. Alberto Rodríguez Mitre
LEEM-UPM, Spain
Mr. Vidal Baudet Jarque
UPM, Spain

INTERDISCIPLINARY DESIGN TOWARDS A RACK MOTION LUNAR MICRO-ROVER

Abstract

The Google Lunar X-PRIZE has emerged with the objective of proving to the world that the Moon is reachable either for university students with low-budget research facilities, small enterprises or non-profit organizations. Through multipurpose payloads, students all over the world have been challenged to design a fully functional micro-rover that will explore the lunar surface without wheels and a scientific experiment or technological demonstration to be carried out at the Moon's surface. As a result, unconventional and innovative designs including challenging mobility systems are being developed and will set the path for future missions to our natural satellite.

An interdisciplinary team of engineers specialized in the technical fields of aerospace, electronics, telecommunications and robotics from the leading Spanish universities has been set up. In order to reach the main objective of the mission the team has been divided in different specific sub teams according to expertise and geographic location enhancing the final performance. The team itself is interconnected by means of an internet platform that enables brainstorming meetings, as well as file sharing, specific task datasheets and calendar with target deadlines within others. The team has leaded the efforts towards a cubic micro-rover which inflates a bigger spherical shape structure through a pressurized gas mini tank. Having the mass center displaced at the lower part of the main body and due to an electric motor that engages a linear flexible gear around the inner part of the transparent sphere, the micro-rover will be able to move around any irregular surface. Following this first design, independent mobility and solar cell charging will be possible as well as some data acquisition including temperature, photos, relative position and other data that will be automatically transmitted to the main control unit station.

This paper will review the rationale behind this project, highlighting the potential of a national interdisciplinary workgroup for the design and future assembly of a Moon micro-rover with the mission of empowering science, technology, education and research in the Moon field. It will also describe the development achieved so far and the roadmap for establishing a broader international cooperation towards a possible Moon micro-rover.