

ESA's Lunar Robotics Challenge. G.Visentin¹, B.Foing², R. Walker³, and A. Galvez⁴ - ^{1,2,3,4}European Space Agency, ^{1,2,3}P.O.Box 299 2200AG Noordwijk The Netherlands, ⁴8-10 rue Mario Nikis 75738 Paris Cedex 15 France

Abstract : As interest in exploration of the Moon soars among the world's space agencies, the European Space Agency (ESA), through its General Studies Programme, has challenged university students to develop a robotic vehicle that is capable of overcoming difficult terrain comparable to that at the lunar poles.

This paper will present the outcome of the challenge, which takes place in week 43 (20-26th October) 2008, i.e. right before the 2008 ICEUM10/LEAG conference.

Background There is compelling scientific evidence that there is hydrogen rich ore into the cold dark craters located at the poles of the Moon. The question whether this ore contains water or not, still waits for a more definitive answer. It is clear that for answering this question one needs to go down into these cold, dark craters.

To this purpose, engineers have postulated the use of a wide variety of robotics means (e.g. walking/hopping/rolling rovers, cable ways, tethered tumbleweeds, harpoons) which despite their basic different working principles have in common one characteristic: lack of experimental proof of the concept.

The ESA Lunar Robotics Challenge (LRC), has been conceived as a means to spark interest in robotic exploration, stimulate the discovery of new innovative ideas and investigate, in a practical way, several of these concepts at the same time.

Participants: In the Lunar Robotics Challenge, eight teams of University students have each designed, manufactured, integrated and tested a robot, engineered to complete the task of:

1. descending into a terrestrial analogue of lunar crater,
2. performing soil and rocks sampling and
3. returning the collected samples back out of the crater.

The competition focussed on the challenges imposed by locomotion in the extremely harsh environment of crater lunar surfaces

ESA has selected the 8 teams after a European wide call.

The eight teams have been selected from reputable European robotics research institutions, in order to provide the most diverse robotics means to complete the above task.

Venue of the competition: The LRC venue has been chosen to fulfil the following requirements:

1. Be Representative of many technical aspects of the real mission.
2. Present a degree of difficulty high enough to allow learning, but not to high to discourage participants
3. Be outdoor and fairly remote: it has to be a "field" experience
4. Have a mild and stable climate, to avoid risk of re-scheduling event
5. Be reachable in an affordable way from European Space Agency
6. Be scenically representative of a Moon-like environment.

After a survey of possible locations, ESA selected an area within the Park of Teide in the island of Tenerife, Canary Islands, Spain.

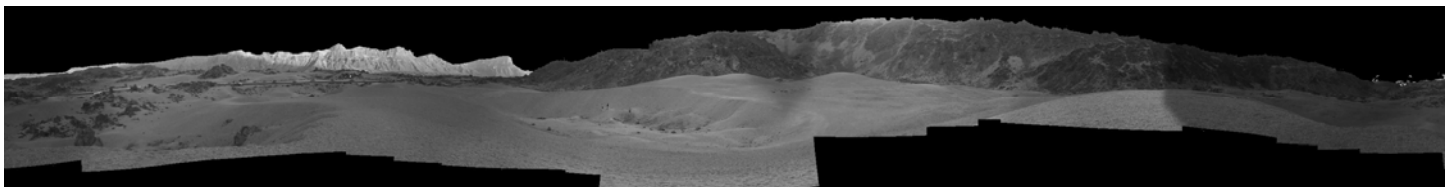


Figure 1: Panorama picture of the venue of the Lunar Robotics Challenge in full Moonlight