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EUROPEAN ROVER CHALLENGE AS A SOURCE OF MASSIVE DATASETS FOR RESEARCH ON
TELEOPERATION IN SPACE ROBOTICS.

Abstract

The paramount importance of teleoperation in space missions is undeniable. Therefore it is still a topic of active research. The subject might seem well explored, but the advent of new technologies redefines how we understand teleoperation. According to agencies' roadmaps [1], the next long term target for coordinated activity is orbit and the Moon. In both cases it is expected that the majority of operations will be under near-real-time supervision of an operator. For such applications, teleoperation includes all range of aspects from manual, joystick like, commanding, through rich operator awareness, to semi-autonomous operations. Our team is experienced in projects aimed at such challenges within ESA and EC activities e.g. RACER [2] or PRO-ACTS [3] and collected wide background experience from robotics for Earth applications. The European Rover Challenge (ERC) every year hosts approximately 40-60 teams of different backgrounds from all over the world. Teams compete in a number of different tasks involving navigation of wheeled platforms, science observations and sampling, deployment and collection of objects on the surface and complex manipulation. The ERC competitions allow us to gather substantial diversity of data products originating from a system that connects remotely competing teams with simulators and real, standardised rovers on the planetary analogous competition field. This system allows us also to introduce different constraints and real time processing to the exchanged data, supporting creation of specific conditions for competing teams. As of today, it is not practically possible to organise such a massive data generation based on any mission or single field trials. The ERC, as an annual project, can provide continuously improving datasets that could be used in classical as well as data-greedy (e.g. AI based) solutions design. The aim of this paper is to present the construction process and definition of the datasets from described competition and to focus on maximising research opportunities in any field related not only to teleoperation and engineering of such systems, but also to other domains such as sociology, psychology or ergonomics. We also include statistics of the dataset obtained during the 2021 edition of the ERC programme. [1] Richard Doyle and Richard Volpe SESSION: DAY 1: TRACK A: PLENARY i-SAIRAS2020 [2] P. Wittels at all RaCER: Determination of the maximum speed of the fast teleoperated rover for lunar exploration i-SAIRAS 2018 [3] Govindaraj S. Multi-Robot Cooperation for Lunar Base Assembly And Construction. i-SAIRAS 2020