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# OBELIX: A RECONFIGURABLE AND INNOVATIVE MOBILITY SYSTEM FOR AN ASTRONAUT ON THE SURFACE OF THE MOON

**Abstract**

Scientific community sees the Moon as one of the best laboratories to develop technologies and innovations for future long term missions towards it or farther away on Mars. Humanity is about to come back there for the first time since the last Apollo mission in 1972, and such a feat brings its set of challenges. The goal is not only to explore, but also to launch long term missions that must overcome the local conditions and become self-sufficient and sustainable through basecamp designs. NASA announced 2026 to be the beginning of these bases through the Artemis program and will need, thanks to the help of many collaborators, new solutions and ways to live for humans to adapt to this specific environment. Innovative mobility solutions are one of the topics of interest as it will be a major milestone in the exploration of the Moon and will be a big help for future crews. It also comes with safety challenges and threats that one must consider when designing them.

Within the frame of the "Move on the Moon" contest organized by the CNES (French Space Agency), the team composed of 10 students from the ISAE-Supaero worked for a year to elaborate an innovative solution for a mobility system on the Moon, transporting one astronaut. The project OBELIX, named with the same spirit as ASTERIX (first French satellite ever launched), proposes a reconfigurable innovative design and technology, to move on the surface of our natural satellite, as well as to charge the batteries.

This paper will provide a preliminary study of a locomotion system, optimized for the issues future lunar missions will face. The main drivers of the analysis include the capability to provide efficient

mobility in low gravity with an optimized charging method and minimum power consumption to ease extended surface exploration. The analysis also considers the challenges linked to the mobility environment like the asperity of the regolith soil and the irregular terrain. Motion in the South Pole is targeted, where potential sites of interest have been identified by the International Space Exploration Coordination Group for the Artemis program especially. Finally, as crew safety is a priority, the system explores the possibility of merging autonomous driving algorithms already tested in exploration rovers with manual driving performed by the crew when onboard the vehicle.