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COMPLEX MANOEUVRES FOR THE WHEEL-ON-LEG PLANETARY ANALOGUE MAMMOTH ROVER

Abstract

The MAMMOTH rover is a 16 degree of freedom wheel-on-leg robotic platform that provides increased mobility as compared with conventional planetary exploration rovers. This platform is capable of omni-directional driving, changing its height, footprint reconfiguration and clambering over obstacles. The multiple locomotion modes available to the MAMMOTH rover enable it to navigate over challenging terrain such a unstructured rocks or through soft sandy soil.

To facilitate this high degree of mobility the motion model of the robot is presented. The model is based on a recursive kinematic propagation technique that is both fast and allows for the straightforward application of various motion constraints. This motion model is manipulated to form various complex manoeuvres such as rowing, walking and inch-worming; each critical in navigation tasks over unstructured terrain. Experimental results that validate each of the complex manoeuvres with the physical MAMMOTH rover system are presented. These results evaluate the motion model and also highlight the energy usage of the platform during each manoeuvre. Experimental results demonstrating the efficacy of each manoeuvre in challenging terrain are also provided.

Lastly, a live demonstration of the MAMMOTH rover will be given to better highlight the capabilities of the system to the symposium audience.