Effect of Internal Actuation on the Mobility of Wheeled Robots on Unstructured Terrain

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Improving the mobility of wheeled robots operating on unstructured terrain is a challenging task that can be approached in different ways. Enhanced mobility results in the vehicle being able to successfully negotiate slopes and obstacles, expanding the range of missions that can be undertaken and reducing the risk of losing or damaging the robot. This goal is directly related to optimizing the way in which traction force is developed at the wheel-terrain contact interfaces. Several strategies to achieve this objective, including traction control algorithms and reconfiguration, have been proposed in the literature. In this work, internal actuation is explored as a means to obtain better mobility on soft and irregular terrain. The use of this technique is demonstrated with a rover prototype in two manoeuvres, namely slope climbing on soft terrain and negotiation of a step obstacle. Results show that internal actuation can be used to improve the behavior of the vehicle, for optimum mobility on soft and irregular terrain.