Wheeled to Quadruped Transforming Robot

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The aim of this project is to determine how having two methods of movement (wheels and legs) affects the movement capabilities of a robot. First, a robot with both wheeled and quadruped systems was designed. Then, the velocity in different terrains of each movement type and the ability to transform in each terrain were measured. After this, the results were analyzed to determine any benefits gained by the inclusion of both systems. The results of the experiment show that the robot is, overall, able to transform between systems in all terrains in which transformation was tested. The wheels were able to move the robot in only two terrains, the concrete control and playa terrains, with an average velocity of 0.547 m/s and 0.515 m/s, respectively. In contrast, the legs successfully moved the robot in all terrains they were tested in, with the average velocity ranging from 2.48x10^-2 m/s going downhill in mountainous terrain to 3.64 x10^-3 m/s in the semi-mountainous terrain. As the results show an increase in traversable terrains with the addition of the legs and an increase in traversing velocity with the addition of the wheels, two movement systems increase the movement capabilities of a robot. Additionally, the ability of the robot to transform in the tested terrains indicates that the robot would be able to change between them to use the ideal movement method for each terrain, demonstrating the benefit of having both. This information can be applied to robotics movement to create multi-terrain robots that are able to move in a variety of terrains in the most efficient manner.

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