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PROPOSAL FOR THE DESIGN OF A HEXAPOD ROBOT WITH FLIGHT CAPABILITY FOR THE EXPLORATION OF DIFFICULT TERRAIN ON MARS

Abstract

Recent missions to Mars have used conventional wheeled robots (Rovers) to explore the Martian surface. However, this type of robot cannot easily access areas where the Martian terrain is uneven. Therefore, legged robots, such as hexapods, are a good option to cope with the difficult terrain. In particular, hexapods are particularly good compared to other legged robots because they offer greater ease of movement in difficult terrain, such as environments after natural disasters on Earth, due to their greater movement capacity and stability. Nevertheless, they are also insufficient to overcome certain obstacles that may be encountered on the Martian surface, such as descending from great heights, such as cliffs, or ascending steep elevated surfaces. To meet the need to access and explore new areas on the surface of Mars for scientific exploration, the design of a hexapod robot with flight capability is proposed. The latter will allow the robot to overcome obstacles that cannot be overcome by walking, or to travel long distances in a short time. In order to carry out this design, previous work on the design and implementation of hexapod robots on Earth, as well as drones and other robots with the ability to fly, has been used as a reference. Based on this, and taking into account the climatic conditions of the place where this robot will be used, the design of the mechanical and electronic structure and the programming that the robot will use during its two main operating modes (which are the focus of this research) have been carried out: Ground Displacement and Air Displacement. After the design of the robot, a technical data sheet was obtained, which includes its main characteristics such as dimensions, weight, mechanical and electronic components, operating parameters, among others. Additionally, a prototype of the robot was built in order to verify the terrestrial and aerial movement for which it was designed. .This technical data sheet and prototype serve as the basis for a future complete implementation of the robot, in which other functions specific to space exploration, such as weather sensors or soil sample collectors, are added.