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STUDY ON THE CONCEPTUAL DESIGN OF MANNED LUNAR ROVERS ACCORDING TO THE RUGGED HIGHLAND

Abstract

Early landing sites are mostly flat terrain. With the development of landing technology on the lunar surface, landing terrains become more and more complicated and challenging, extending from at mare to the boundary between mare and highland, even to rugged highland. Extreme environment exploration vehicles are designed and they have the corresponding abilities of self-assembly, variable configuration, combined detection and complex terrain adaptability. They can carry out scientic missions independently or remotely-controlled. The design of extreme environment exploration vehicles is inspired by spiders and honeycomb. The design concepts are adopted, including intelligent chassis, modular structure, integrated function and universal interface. Their power supply derives from lithium battery, solar array or charging robot. They can fold when their legs bend. They can crawl when their legs extend. They can roll when wheels are installed to the end of their legs. They can bounce when their legs adduct. Hexagonal honeycomb is imitated to design the vehicle body, and it possesses the features of combination. A hexagonal power module composed by 6 batteries, is mounted on the chassis base. Its body can rotate freely on their chassis base to observe surrounding environment. According to different task characteristics and topographical features, the extreme environment exploration vehicles are assembled into various robots, such as spider robots, centaur intelligent robots, erect intelligent robots and miniaturized robots. Spider robots can evolve into payload vehicles, communication vehicles and situ analysis vehicles. Centaur intelligent robots are used to smooth lunar surface. Erect intelligent robots are used to replace the battery module for other robots. Miniaturized robots are used to construct a flexible parabolic antenna support bracket. When the extreme environment exploration vehicle is in distress, the only vehicle can bounce over the obstacle, and their mechanical arms imitate human arms to save each other together. Furthermore, it can use its flying claw to crawl steep. Jetpack can be installed on the outside of its body or burdened by the astronauts. In the flight process, rovers or astronauts have a broader perspective to observe, and also can reach the highlands and other extreme terrains. Extreme environment exploration vehicles are used to detect special environment as special soldiers. They can help astronauts release from a predicament and fully guarantee the safety of astronauts.