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THE POSITION AND ORIENTATION MEASUREMENT TECHNOLOGY IN THE LUNAR ROVER TEST

Abstract

In order to test the position and orientation's certainty performance and movement control performance, this paper designed a Lunar Rover tracking measurement scheme.

Firstly, the measurement system structure and the fundamental are introduced. A laser radar scanner is used to scan the simulated moon ground area, and produced a set of DEM datum. An indoor GPS measurement system is used to capture the real-time position and the orientation of the Lunar Rover. A software system is designed to integrate the measurement datum of the DEM and the real-time coordinate and orientation, display in 3D model, and analyze the performance.

Then, the test site coordinate system establishment scheme, the Lunar Rover coordinate establishment scheme and tracking measurement scheme were designed. Some measurement targets are set around the simulated moon ground area and create the global coordinate system. Some indoor GPS sensors are aligned on the lunar rover to build the target coordinate system which defined the rover. The Laser Radar scans the ground area and the targets around the ground, the DEM datum is translated reference to the global coordinate system. Four indoor GPS laser transmitters are fixed around the ground and the laser can cover the whole area. The location relationship between the indoor GPS and the global coordinate system is built by measuring the targets around the ground. The real-time position of the sensors on the rover is captured by indoor GPS, and the relationship between the target coordinate system and the global coordinate system is calculated.

Then, based on the measurement system, the Rover's ground verifying test is processed. The real-time position and orientation are measured. The velocity and acceleration are calculated. The photo captured by the camel on the rover is compared with the DEM datum, the trajectory generation and the navigation ability is analyzed with the measurement datum.

Finally, analyzed the precision of the test measurement system and drew some conclusions.