Project of the planetary terrain analogs research for technology development and education in geodesy and image processing.

Mikhail Semenov (1), Nikolay Gavrushin (1), Mikhail Bataev (1), Maxim Kruzhkov (1), Juergen Oberst (1,2)

(1) MIIGAiK, MExLab, Moscow, Russian Federation (semenov1220@gmail.com), (2) Deutsches Zentrum für Luft- und Raumfahrt (German Aerospace Center) Berlin, Germany

Abstract

The MIIGAiK Extraterrestrial Laboratory (MExLab) is currently finalizing the development the robotic mobile science platform MExRover, designed for simulating rover activities on the surface of earth-type planets and satellites. In the project, we develop a hardware and software platform for full rover operation and telemetry processing from onboard instruments, as a means of training undergraduate and postgraduate students and young scientists working in the field of planetary exploration.

1. Introduction

The main aim of the project is to provide the research base for image processing development and geodesy survey. Other focus is the development of research programs with participation of students and young scientists of the University, for digital terrain model creation for macro- and microrelief surveying. MExRover would be a bridge from the old soviet Lunokhod experience to the new research base for the future rover technology development support.

2. Rover design

The design of the rover and its instrument suite allows acquiring images and navigation data satisfying the requirements for photogrammetric processing.

The high-quality color panoramas as well as DTMs (Digital Terrain Models) will be produced aboard and could be used for the real-time track correction and environment analysis. A local operator may control the rover remotely from a distance up to 3 km and continuously monitor all systems.

The MExRover has a modular design, which provides maximum flexibility for accomplishing different tasks with different sets of additional equipment weighing up to 15 kg. The framework can be easily disassembled and fit into 3 transport boxes, which allows transporting them on foot, by car, train or plane as a the ordinary luggage.

The imaging system included in the present design comprises low resolution video cameras, high resolution stereo camera, microphone and IR camera. More instruments are planned to be installed later as auxiliary equipment, such as: spectrometer, odometer, solar radiation sensor, temperature sensor, wind sensor, magnetometer and radiation detector.

The first version of the MExRover is operational and now is in testing process. We are open to proposals of mutual exploitation of MExRover platform for science, education and outreach purposes.

3. Specification

Dimensions W×L×H 600×1000×400/1700 mm
Maximum weight 60 kg
Payload weight 20 kg
Cruising range 3 km
Mean velocity 1 km/h