
*Design Simulation of Lunar Exploration and ISRU Prototype Vehicles and Mission Scenarios*

LEAG-SSR 2005 Conference, Oct 27, 2005
DigitalSpace

Who are we?

DigitalSpace: ten years in the real-time 3D field in support of integrated modeling and simulation and multi-user virtual environments. Six years working with NASA.
What do we build?

The “Digital Spaces” (DSS) platform is 100% open source (freely available to NASA, contractor community) and adopted at a number of universities.
First projects for NASA:
Brahms Virtual Environments, modeling work practices and human/robotic activities in Mars analogues
NASA ARC, USRA/RIACS (1999-2005)
ISS Medical Contingency Training (2004)
SimEVA
STS-114 CMG Changeout training visualization for Neutral Buoyancy Laboratory, JSC (2004)
SuperBots
“intelligent tether” (2005)
Lunar “staging rack”
for Telerobotic Outpost Preparation
(for Raytheon 2004-05)
SBA Concept Visualization:
A Staging Rack for Lunar base tele-robotic preparation

Launch, deployment & test of Staging Rack

Lunar orbit component deployment

Components deployed to Staging Rack bays

Lunar base tele-robotic preparation
ESAS Lunar Architecture Modeling
Universal Model Repository
Other ESAS Lunar Architecture Modeling:
Spacecraft elements, public domain models available
DigitalSpace's 2006-2007 Lunar Telerobotics Rapid Prototyping Design Simulation Project
Phase I (Spring 2005) Design Simulation Prototype of CSM’s Concept Lunar Bucket Wheel Excavator
Phase II Example: Lunar Bucket Wheel Excavator in simulated ISRU Scenario
Phase II example: RLEP2 Concept Design Visualization

RLEP 2 Hardware Architecture

Communications Relay Satellite
- Deployed from lander
- Allows S-band communications with surface assets
- Stores data and telemeters to Earth

Crater Rim Exploration
- Common Lander Configuration
  - Delivers rover and supports rim science experiments
  - Executes throttleable RL-10 derived cryogenic propulsion system
  - Executes precision soft landing capability
  - Additional payload capacity for other contributors (crater rim rover, power infrastructure payloads)
  - Emplaces navigation beacon

Crater Rim Exploration Payload
- Map potential outpost site
- Characterize constant sunlight
- Determine geotechnical properties of regolith
- Radiation/reduced gravity experiments

Crater Floor Exploration
- Evolvable Rover Concept
  - Deployed from lander and traverses into crater
  - SRG powered for long mission life
  - Operates autonomously in dark, cold crater environment
  - Executes technologies for future system development

Rover Payload
- Characterize dark, cold trap environment
- Thorough exploration for water
- Geotechnical study of regolith
- Determine volatiles, sample composition, physical states, quantities, extent
Phase II example: RLEP2 Concept Design Visualization

Lunar mobility trades for LREP2 rovers and other vehicles
Phase II example: RLEP2 Concept Design Visualization

Rover enters dark regions in Shackleton Crater, Lunar South Pole
DigitalSpace’s 2006-2007 Lunar Telerobotics Rapid Prototyping Design Simulation Project

So join the team...
DigitalSpace’s 2006-2007 Lunar Telerobotics Rapid Prototyping Design Simulation Project

...and...
...get back to the Moon first (and smarter)
...virtually!
Sign up for the evaluator/advisor team on the 2006-2007 Lunar Telerobotics Design Prototyping Project today by contacting: Bruce Damer/PI, bdamer@digitalspace.com

Download the Virtual Bucket Wheel Excavator today at:
http://projects.digitalspaces.org/bwe/
Id: bwe_project
Pwd: qeza93ma
Thank you