Canadian Space Robotic Systems for Exploration

M. Daly, C. Sallabarger
MD Robotics, Canada
Mobile Servicing System
MDR Robotics Progression

Leveraging $2B in know-how

System Comprises:
- Ground Segment
- Flight Segment
  - 1 Avionics Package
  - Software
  - Flight Support Equipment
- 6 Joints
- 2 Booms
- 1 Cable Harness
- Mass 10 kg
- Power 35 to 50 W peak
- Reach 2.8 m
- 1 End Effector
- 1 Digging Tool

Planetary Robotic Manipulator
Lunar Missions

Commercial and Agency Missions

Mars Rover Projects

Mini and Micro Rovers

Polar Rovers

Mid-Latitude Rovers
Mars Sampling Projects

Drilling, Sample Manipulation and Processing
- MSL
- Scout
- Others

Mars Early Sample Return

Yaw
Pitch 1
Pitch 2
Pitch 3
Micro Mars Missions

LIDAR for Rover Vision

- Lidar can provide significant advantages over stereo-based cameras for environment sensing
- Can provide operational advantages
- Study is being conducted to combine camera-like science return with navigational data advantages
MD Robotics and Optech are working on the space-based Rendezvous Laser Vision System (“RELAVIS”) as a joint product. RELAVIS consists of three components:

- 3D Scanning Laser Rangefinder
- Object Recognition and Pose Estimation Processing
- CMOS Imaging Camera

LIDAR is an ideal tool for acquisition and tracking an orbited sample - Premier.
More Than Robotics

- MDR is also working on instruments for Mars and other applications
- These include:
  - Rover-class GPRs
  - LIDARs for dust-devil detection and boundary layer monitoring
  - Instruments for bore-hole logging

Conclusions

- MDR is leveraging its robotics experience and investing in technologies for space exploration
- Significant international participation is ongoing in this area
- Current projects in rovers, manipulators, vision, drills, sample preparation and instruments