TUESDAY 20 JUNE

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tr>
<td>08:00</td>
<td>Registration</td>
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<tr>
<td>09:00</td>
<td>Welcome</td>
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<tr>
<td></td>
<td>J. Gavira, ESA, Head of Mechatronics and Optics Division</td>
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<tr>
<td>09:15</td>
<td>ESA Robotics Overview</td>
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<td>G. Visentin, ESA, Head of Automation and Robotics Section</td>
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<tr>
<td>09:40</td>
<td>Clean Space</td>
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<td>L. Innocenti, ESA, Clean Space Initiative Manager</td>
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<tr>
<td>10:05</td>
<td>Robotics and Future Projects</td>
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<td>P. Schoonejans, ESA, Head of the Robotics &amp; Future Projects</td>
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<tr>
<td>10:30</td>
<td>Exomars Project Address</td>
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<td>P. Baglioni, ESA, ExoMars Rover Manager</td>
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<tr>
<td>10:55</td>
<td>Coffee Break</td>
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<tr>
<td>11:15</td>
<td>Plenary Session on Europe’s Space Agencies and Industry</td>
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<td>Room: Theaterzaal</td>
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<tr>
<td>11:15</td>
<td>CNES Robotics Activities: Perception and Autonomous Navigation</td>
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<td>for planetary missions</td>
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<td>M. Delpech, Centre National d’Études Spatiales - CNES</td>
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<td>11:40</td>
<td>Automation and Robotics in the German Space Program</td>
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<td>B. Sommer</td>
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<td>German Aerospace Center Space – DLR</td>
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<tr>
<td>12:30</td>
<td>Lunch</td>
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<tr>
<td>14:00</td>
<td>Session 1A: Planetary Robotics I</td>
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<td>Room: Theaterzaal</td>
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<tr>
<td>14:00</td>
<td>MURFI 2016 - from Cars to Mars: Applying Autonomous Vehicle Navigation</td>
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<td>Methods to a Space Rover Mission</td>
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<td>B. Yeomans, M. Gadd, D. Barnes, H. Porav, J. Dequaire, T. Wilcox, S.</td>
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<td>Kyberd, S. Venn, P. Newman</td>
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<td>Oxford Robotics Institute, United Kingdom</td>
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<td>14:25</td>
<td>Exomars Rover Control, Localisation and Path Planning in an Hazardous</td>
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<td>and High Disturbance Environment</td>
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<td>L. Bora, B. Nye, R. Lancaster, C. Barclay, M. Winter</td>
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<td>Airbus Defence And Space Ltd, United Kingdom</td>
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<td>14:50</td>
<td>Trajectory Control for Autonomous Planetary Rovers</td>
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<td>J. Filip¹, M. Azkarate², G. Visentin²</td>
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<td>¹ESA, Czech Republic ²ESA, TEC-MMA, Netherlands</td>
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<tr>
<td>15:00</td>
<td>Field Test on Remote Rover Operations and Dataset Collection on Lunar</td>
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<td>Analogue</td>
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<td>15:15</td>
<td>M. Pagnamenta</td>
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<td>European Space Agency ESA/ESTEC, The Netherlands</td>
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</table>
14:00 – 15:40  Session 1B: Sensors and Perception  
Room: Expo 1

14:00 - 14:25  Robust 3D Object Detection  
H. Shariff$, M.S.H. Prof. Dr. Hülzel$  
$¹German Aerospace Center (DLR), Germany ²Universität Bremen, Germany  
PAPER | PRESENTATION

14:25 - 14:50  Vision-Based Accurate Planetary Robotic Arm Placement  
A. Donchev$¹$, C. Murray$²$, Y. Gao$²$, A. Shaukat$²$, W. Albuskhanajer$²  
¹Airbus Defence And Space Ltd, United Kingdom ²University of Surrey, United Kingdom  
PAPER | PRESENTATION

J. Gancet$¹$, S. Govindaraj$¹$, M. Smisek$²$, Z. Marton$³$, R. Dominguez$³$, J. Hidalgo$³$, F. Souvannavong$⁴$, V. Bissonnette$⁴$, M. Post$⁴$, X.T. Yan$⁵$, S. Lacroix$⁵$, S. Kottah$⁶  
¹Space Applications Services NV, Belgium ²DLR, Germany ³DFKI, Germany ⁴Magellium, France ⁵University of Strathclyde, United Kingdom ⁶CNRS, France  
PAPER | PRESENTATION

15:15 - 15:40  Toward an Advanced Informational Framework to Improve Minimalist Visual Odometry  
J. Al hage$¹$, M. El Badaoui El Najjar$¹$, S. Mafra$¹$, F. Ruffier$¹  
¹CRISTAL, University of Lille 1, France ²PSA Peugeot Citroën, France ³Aix Marseille Univ, CNRS, ISM, Inst Movement Sci, Marseille 13009, France, France  
PAPER

15:40  Coffee Break

15:55 – 18:00  Session 2A: Active Debris Removal  
Room: Theaterzaal

15:55 - 16:20  Detailed validation of a throw-net simulator for Active Debris Removal and its use for capture of the Envisat satellite  
L. Cercos$¹$, A. Medina$¹$, S. Aziz$²$, K. Wormnes$²  
¹GMV, Spain ²European Space Agency ESA/ESTEC, The Netherlands  
PAPER | PRESENTATION

16:20 - 16:45  Grippers for capture Launch Adapter Rings of non-cooperative satellites for Active Debris Removal, Space Tug and On-Orbit Satellite Servicing Applications  
J. Jaworski$¹$, L. Dudek$¹$, M. Wolski$¹$, A. Mateja$¹$, M. Ziolkowski$¹$, P. Wittels$¹$, M. Labecki$¹  
¹PIAP Space, Poland ²Industrial Research Institute for Automation and Measurements PIAP, Poland  
PAPER

16:45 - 17:10  Design and Testing of a Full Scale Harpoon Capture System for Active Debris Removal  
A Wayman  
Airbus, United Kingdom  
PAPER

15:55 – 18:00  Session 2B: Human-Robot Interaction I  
Room: Expo 1

15:55 - 16:20  Development of Key Technologies Towards New Robotic Tele-Operation Capabilities  
A. Biggio$¹$, P. Pellegrino$¹$, R. Boaretto$¹$, F. Salvio$¹$, B. Bono$¹$, W. Carey$¹$, J. Grenaudeau$¹  
¹Thales Alenia Space Italia Spa, Italy ²DAUIN - Politecnico di Torino, Italy ³Five Owls Technology Limited, United Kingdom ⁴European Space Agency ESA/ESTEC, The Netherlands  
PAPER

16:20 - 16:45  Influence of Geometrical Correctness on Stereoscopic Viewing During Real-Time Telemanipulation  
S. Kimmer, A. Schiele  
European Space Agency ESA/ESTEC, The Netherlands  
PAPER
16:45 - 17:10  
SOLEUS: Ankle Foot Orthosis for Space Countermeasure with Immersive Virtual Reality  
1Space Applications Services, Belgium 2Institute of Aerospace Medicine (DLR), Germany 3Anybody Technology, Denmark 4Technalia, Spain 5European Space Agency ESA/ESTEC, The Netherlands

17:10 - 17:35  
Toward Scalable Intuitive Teleoperation of Robots for Space Deployment with the METERON SUPVIS  
Justin Experiment  
N.Y. Li, D. Leidner, P. Birkenkamp, B. Pleintinger, R. Bayer, T. Krüger  
1German Aerospace Center (DLR), Germany 2European Space Agency, Netherlands

17:35 - 18:00  
Real-Time Uncertainty Estimation for Vision-Aided Robot Teleoperation  
Ş. Vyas, T. K Krueger, Ş. Kimmer, A. Schiele  
1TU Delft, Netherlands 2Tele robotics and Haptics Laboratory, European Space Agency ESA/ESTEC, The Netherlands 3Faculty of Mechanical, Maritime and Materials Engineering, TU Delft, Netherlands

18:00 – 20:00  
Welcome Cocktail & Poster Session  
Room: Foyer  
PAPER

P01  
PMD Camera- and Hand-Eye-Calibration for On-Orbit Servicing Test Scenarios on the Ground  
K. Kilonovska, H. Benninghoff, K.H. Strobl  
German Aerospace Center, DLR, Germany

P02  
RCL-lab: Mobile Research Complex  
R. Yu. Dobretsov, E.G. Borisov, S.I. Matrosov  
RCL, Science & Technology Rover Company Ltd, Russian Federation

P03  
Design of a Hardware-in-the-Loop Simulation Testbed for the Camera and Lighting Unit of the European Robotic Arm  
M. Krainski, C. Englert, P.Y. Girardin, S. Aziz, V. Marwaha, F. Tagliapietra  
1European Space Agency ESA/ESTEC, The Netherlands 2Terma B.V., The Netherlands

P04  
Capture Capability Enhancement of a Grasping Device for Typical ADR Targets Through Biomimetic Dry Adhesives  
C. Trentlage, T. Stelzer, E. Stoll  
Technische Universität Braunschweig, Germany

P05  
Experimental Demonstration of the Nozzle Tool for In Orbit Refueling, Sapere Strong Research Project  
M. Ciarambino, M. Lavagna, M. Molina, A. Grimaldi, R. Cassanelli, A. Greco, A. Miotti  
GdC De Ceglia, 1Politecnico di Milano, Italy 2Leonardo S.p.A., Airborne and Space System Division, Space Line of Business, Italy 3Aerea S.p.A., Italy 4Technosprings Italia S.r.l, Italy

P06  
Onboard Autonomous Geological Identification of Rocks for Planetaryrovers  
A. Tettenborn, A. Ellery  
Carleton University, Canada

P07  
A Two Air - Ground Multi-Agent Robotic System  
E.G. Borisov, Mr. Matrosov, Mr. Dobretsov, Mr. Bogachev, Mr. Kucherenko, Mr. Vladykin, Dr. Zolotokrylin  
RCL, Science & Technology Rover Company Ltd, Russian Federation

P08  
PMOPS: The Planetary On-Board Planner  
I. A. Wallace, P. Rendell, M. Woods, D. Long  
1SCISYS, United Kingdom 2Kings College London, United Kingdom

P09  
Exploring and Exploiting Large Field-Trial Datasets for Perception and Simulation
P10 Robust Traction Control and Path Planning Algorithms for Planetary Micro-Rover Swarms
C.M. Saaj1, Dr. H. Ibrahim2
1University of Surrey, United Kingdom 2National Space Research and Development Agency, Nigeria

P11 Bridging the Gap Between Overall System Simulation and Finite Element Analysis - an eRobotics Approach
D.K. Kaufmann, M. Rast, J. Roßmann
RWTH Aachen University, Institute for Man-Machine Interaction (MMI), Germany

P12 Earth Analogue Testing and Analysis of Martian Duricrust Properties
C.M. Saaj, Dr. Lewinger, Dr. Comin, Dr. Matthews
University of Surrey, United Kingdom

P13 Ubiquitous User Interface Design for Space Robotic Operation
P. Birkenkampf, N.Y. Li, D. Leidner
German Aerospace Center (DLR), Germany

P14 Low Temperature Qualification of EEE parts on Exomars ADE Rover
J. Cueto, E. Torres, J. De Pablo, R. Regada, C. Vicente, J. Arnedo
Thales Alenia Space España, Spain

P15 The SatLeash Experiment: a Step Forward in Technology Development for Future Active Debris Removal Missions
V. Pesce, P. Lunghi, A. Bellanca, M. Lavagna
Politecnico di Milano, Italy.

P16 A Virtual Testbed for Optical Sensors in Robotic Space Systems - ViTOS
B. Sondermann, L. Atorf, M. Priggemeyer, J. Thieling, G. Grinshpun, M. Rast, J. Rossmann
RWTH Aachen University, Germany

P17 A Miniaturized Motion Controller Customization for Exploration
J. Bjurström1, H. Löfgren2, Dr. M. Gunnarsson1, Dr. G. Gruener1, H. R. Graf1, Dr. T. Müller2
1ÅAC Microtec AB, Sweden 2CSEM SA, Switzerland 3Maxon motor ag, Switzerland

P18 Motion Capabilities of a Passive Object Handled by Free-Floating Robotic Servicers
G. Rekleitis, E. Papadopoulos
National Technical University of Athens, Greece

P19 DEXROV Space Robotic Solutions Applied to Subsea Robotics
P. Weiss1, B. Chemisky2, T. Gobert1, J. Gancet2, S. Govindaraj2
1COMEX, France 2Space Applications Services NV., Belgium

P20 Servo-Visual Control for Grasping Space Objects Using Gecko Material
C.A. de Alba-Padilla, C. Trentlage, E.N. Stoll
TU Braunschweig / Institut für Raumfahrtsysteme, Germany

P21 Optimisation of the Locomotion Performance for Exploration Rover Systems Using a Highly Variable Chassis Platform
M. Nitz
University of Stuttgart, Institute of Space Systems, Germany
PAPER

P22  Mobility and Terrain Accessibility Analysis for HOPTER - an Underactuated Mobile Robot for Planetary Exploration
L. Wisniewski¹, J. Grygorczuk¹, P. Weclewski¹, D. Mege², J. Gurgurewicz³, M. Gritsevich⁴, J. Peltoniemi⁵, T. Zielinska⁶
¹Space Research Centre PAS, Poland ²Astronika Sp. z o.o., Poland ³Independent co-author, Poland ⁴Institute of Geological Sciences, Poland ⁵Finnish Geospatial Research Institute, Finland ⁶Warsaw University of Technology, Poland

PAPER

P23  The Bionic Structure and Motion Behavior of Unmanned Ground Vehicle
B. Su¹, Xingjie Liu¹, L. Mu¹, Z. Kang¹, S.I. Matrossov², V. Koutcherenko³
¹China North Vehicle research Institute, China ²RCL, Science & Technology Rover Company Ltd, Russian Federation

PAPER

P24  HI Mobility Locomotion Systems and Board Manipulators for Nuclear Robots Application
S. Vladykin¹, Mr. Bogachev¹, Mr. Kucherenko¹, Mr. Matrosov¹, Prof. Borisov¹, Dr. Dobretsov¹, Dr. Zolotokrylin¹, B Su², J Jiang²
¹RCL, Science & Technology Rover Company Ltd, Russian Federation ²China North Vehicle Research Institute, China
WEDNESDAY
21 JUNE

09:00 – 11:05  Session 3A: Field Testing
Room: Theaterzaal

09:00 - 09:25  The LUCID Field Test Campaign - Operations of a Rover in Lunar Near-Pole Conditions
C. Crespo¹, F. Gandía¹, J. Tomášek¹, S. Aziz², K. Kapellos³, J. Steiner⁴, J. Martínez-Frias⁵, S. Martini⁵, A. Guerra⁵, K. Buckley⁵
¹GMV, Spain ²European Space Agency ESA/ESTEC, The Netherlands ³Trasys, Belgium ⁴Joanneum Research, Austria ⁵IGEO, Spain
PAPER

09:25 - 09:50  Field Testing of a Cooperative Multi-Robot Sample Return Mission in Mars Analogue Environment
R.U. Sansolla, F. Cordes, L. Christensen, T. M. Roehr, T. Stark, S. Planthaber, M. Maurus, M. Mallwitz, E. A. Kirchner
DFKI - Robotics Innovation Center, Germany
PAPER ǀ PRESENTATION

09:50 - 10:15  DLR SpaceBot Camp - the Evolution of Germany’s Space Robotics Competition
T.P. Kaupisch, A. Arghir
DLR e.V., Germany
PAPER ǀ PRESENTATION

10:15 - 10:40  Exploration and Sample-Return Missions with a Walking Robot
G. Heppner
FZI Research Center for Information Technology, Germany
PAPER

10:40 - 11:05  Robex Demomission Overview: Live From the Lunar Analogue
A. Wedler¹, Vayugundla¹, Lehner¹, Schuster¹, S. Brunner¹, Stürzl¹, Dömel¹, Gmeiner¹, Vodermayer¹, Rebele¹, Grix¹, Bussmann¹, J. Reil¹, Willberg¹, Maier¹, Meusel¹, Steidle¹, MS Smisek¹, MH Hellerer¹, Knapmeyer¹, Sohl¹, Heffels¹, Witte¹, Lange¹, Rosta¹, Toth¹, Völkk¹, Kimpe¹, Kyr¹
¹German Aerospace Center (DLR), Germany ²DLR, Institute of Robotics and Mechatronics, Germany ³DLR, Germany ⁴Institute of Planetary Research (DLR-PF), Germany ⁵Institute of Space Systems (DLR-RY), Germany ⁶Institute of Space Operations and Astronaut Training (DLR RB), Germany ⁷Alfred Wegener Institute (AWI), Centre for Polar and Marine Research, Germany
PAPER

09:00 – 11:05  ESROCOS Workshop – part I
Room: Expo 1

09:00 – 09:20  ESROCOS: A Robotic Operating System for Space and Terrestrial Applications
M. Muñoz
GMV, Spain
PAPER

09:20 – 09:40  The Space Automation and Robotics General Controller (SARGON)
J. Ocón
GMV, Spain

09:40 – 10:00  A Model-Based Approach to Develop Robotics Applications with Component-Based Middlewares
G. Bardaro, M. Matteucci
Polimi, Italy

10:00 - 10:20  Towards a Nonfunctional Requirement Driven Approach to the Optimization of Software Systems for Robotics
B. Langpap¹, R. Drechsler²
¹Airbus / DFKI, Germany ²DFKI, Germany
PAPER
<table>
<thead>
<tr>
<th>Time</th>
<th>Session/Activity</th>
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<tr>
<td>10:20 – 10:40</td>
<td>Formal Validation of TASTE Designs with the BIP Framework</td>
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<td>I. Dragomir</td>
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<td>UGA, France</td>
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<td>10:40 – 11:05</td>
<td>ESROCOS Component Development Workflow</td>
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<td>M. Wirkus</td>
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<td>DFKI, Germany</td>
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<td>11:05</td>
<td>Coffee Break</td>
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<tr>
<td>11:20 – 13:00</td>
<td>Session 4A :Extraterrestrial Sampling I</td>
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<td>11:20 - 11:45</td>
<td>Sample Flow and Implications on Design and Testing for the SPDS Mechanism Chain on the ExoMars 2020 Rover</td>
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<td>R. Paul¹, D. Redlich¹, T. Tattusch¹, L. Richter¹, M. Thiel¹, F. Musso², S. Durrant³</td>
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<td>¹OHB System AG, Germany ²Thales Alenia Space Italy S.p.A., Italy ³European Space Agency ESA/ESTEC, The Netherlands</td>
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<td>11:45 - 12:10</td>
<td>Progress Report on Development of the ExoMars 2020 Sample Processing and Distribution Subsystem (SPDS)</td>
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<td>O. Richter, C. Bergemann, Q. Muehlbauer, R. Paul, D. Redlich</td>
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<td>OHB System AG, Germany</td>
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<td>12:10 - 12:35</td>
<td>Bioccontainment of Mars Samples Returning to Earth</td>
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<td>A. Fumagalli¹, B. Spagnoli², D. Indrigo³, A. Terribile³, J. Romsted³, S. Vijendran³, G. Kmink³</td>
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<td>¹Leonardo S.p.a, Italy ²Positech c/o Leonardo, Italy ³EniProgetti S.p.a., Italy ⁴European Space Agency, Netherlands</td>
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<td>12:35 - 13:00</td>
<td>PROSPECT: Sampling Tool Approaches for Lunar Icy Regolith</td>
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<td>M. Savoia¹, A. Rusconi¹, M. Peruzzotti¹, C. Panza¹, R. Fisackerly², J. Carpenter², S. Barber²</td>
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<td>¹Leonardo S.p.A., Italy ²Positech c/o Leonardo, Italy ³Infosolution c/o Leonardo, Italy ⁴European Space Agency ESA/ESTEC, The Netherlands ⁵The Open University, United Kingdom</td>
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<tr>
<td>11:20 – 13:00</td>
<td>ESROCOS Workshop – part II</td>
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<tr>
<td>11:20 – 11:45</td>
<td>Formal Models of a Space-Grade Robot Motion Software Stack</td>
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<td>H. Bruyninckx</td>
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<td>11:45 – 12:10</td>
<td>Integrating ROS Open-Source Robotics Software Framework in ESROCOS</td>
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<td>N. Tsiogkas</td>
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<td>K. Hoefflinger</td>
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<td>12:35 – 13:00</td>
<td>Seamless Integration of Reconfigurable Hardware into Robotic Development Process</td>
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<td>Moritz Schilling</td>
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<td>13:00</td>
<td>Lunch</td>
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<td>14:00 – 15:40</td>
<td>Session 5A: Planetary Robotics II</td>
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<td>14:00 - 14:25</td>
<td>Towards automated Soil preparation for Planetary Rovers - Methods for Reproducible Measurements in...</td>
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Regolith Simulants
R. Lichtenheld
German Aerospace Center, Germany

14:25 - 14:50 Overview of the 2016 Canadian Mars Sample Return Analogue Deployment and the Technology Behind
D. Gingras, Mr Allard, Mr Rocheleau, Mr Gemme, Mr Lamarche, Mr Picard
Canadian Space Agency, Canada

14:50 - 15:15 Preparations for Reduced Gravity Flights to Examine ExoMars Rover Wheel-Soil Interactions
K. Skonieczny, P. Niksirat, A.A. Forough Nassiraei
Concordia University, Canada

15:15 - 15:40 Sensing Techniques to Characterize Locomotion on Soils to be Traversed by a Rover
S. Michaud, G. Kruse, M. Karaoulis, D.A. de Lange, M. van Winnendael
1RUAG Space, Switzerland 2Stichting Deltares, The Netherlands 3European Space Agency / ESTEC, The Netherlands

14:00 – 15:40 Session 5B: Orbital Robotics
Room: Expo 1

14:00 - 14:25 On-Orbit Assembly of Large Structures Using Space Robots
F.L. Basmadji, T. Rybus, J. Sasiadek, K. Seweryn
1Space Research Centre of the Polish Academy of Sciences (CBK PAN), Poland 2Wroclaw University of Science and Technology, Poland 3Carleton University, Canada

14:25 - 14:50 Testing and Simulation of Contact During On-Orbit Operations
1Space Research Centre of Polish Academy of Sciences (CBK PAN), Poland 2Faculty of Power and Aeronautical Engineering, Warsaw University of Technology, Poland 3OHB System AG, Germany

14:50 - 15:15 Robotic Technologies for In-Space Assembly Operations
M. Roa, G.G. Dr. Grunwald, Dr. Dr. Wedler
DLR - German Aerospace Center, Germany

15:15 - 15:40 Mechanical, Thermal, Data and Power Transfer Types for Robotic Space Interfaces for Orbital and Planetary Missions - A Technical Review
W. Wenzel, R. Palazzetti, X.T. Yan, S. Bartsch
1DFKI GmbH, Germany 2University of Strathclyde, Engineering Faculty DMEM department, United Kingdom 3University of Strathclyde, United Kingdom

15:40 Coffee Break

15:55 – 18:00 Session 6A: Extraterrestrial Sampling II
Room: Theaterzaal

15:55 - 16:20 Ultrasonic Planetary Coring Drill: Overview and Results from Field Trial
K.J. Worrall, R. Timoney, P. Harkness
University of Glasgow, United Kingdom

15:55 – 18:00 Session 6A: Extraterrestrial Sampling II
Room: Theaterzaal

15:55 - 16:20 Ultrasonic Planetary Coring Drill: Overview and Results from Field Trial
K.J. Worrall, R. Timoney, P. Harkness
University of Glasgow, United Kingdom

PAPER | PRESENTATION
16:20 - 16:45  FFC Cambridge Process with Metal 3D Printing as Universal in-situ Resource Utilisation Technologies  
A. A. Ellery, P. Wanjara, M. Kirby, P. Lowing, I. Mellor, G. Doughty  
1Carleton University, Canada  
2National Research Council Canada, Canada  
3Renishaw Canada, Canada  
4Metalysis Ltd, United Kingdom  
PAPER | PRESENTATION

16:45 - 17:10  Parabolic Flight Test Campaign of a Breadboard of a Sampling Tool Mechanism for Low Gravity Bodies  
E. Ocerin, C. Ortega Juaristi, E. Ocerin Martinez, J. Romstedt, M. Carrera Astigarraga  
1AVS, Spain  
2European Space Agency ESA/ESTEC, The Netherlands  
PAPER

17:10 - 17:35  The Novel Sampling Tool for Low Gravity Planetary Bodies  
P. Pasko, K. Seweryn, W. Teper, G. Visentin, B. Zylinski  
1Space Research Centre of the Polish Academy of Sciences, Poland  
2European Space Agency ESA/ESTEC, The Netherlands  
PAPER

17:35 - 18:00  LUVMI: a Concept of Low Footprint Lunar Volatiles Mobile Instrumentation  
1Space Applications Services NV, Belgium  
2Technical University of Munich, Germany  
3Open University, United Kingdom  
4ÖHB, Germany  
5Dynamic Imaging Analytics, United Kingdom  
PAPER

17:35 - 18:00  Session 6B: Planning and Autonomy I  
Room: Expo 1

15:55 - 16:20  Rover Operational Simulator for EXomars - Task & Action Planning Simulator (ROSEX-TAPS)  
KK Kapellas, AM Merlo, CL Legnani, RP Pissard-Gibollet, NR Re, GZ Zoppi, LJ Joudrier  
1TRASYS, Belgium  
2Thales Alenia Space Italy, Italy  
3European Space Agency ESA/ESTEC, The Netherlands  
PAPER

16:20 – 16:45  Suppression of Chaotic Modes in Spacecraft with Asymmetric Actuator Constraints  
C.M.N. Velosa, K. Bousson  
1LAETA-UBI/AeroG Research Group, Portugal  
PAPER

16:45 - 17:10  Path Planning with Reconfigurable Rovers for Planetary Exploration  
J. Carlos, J. Ricardo Sánchez, M. Azkarate, A. Sánchez  
1University of Malaga, Spain  
2European Space Agency/ESTEC, The Netherlands  
PAPER | PRESENTATION

17:10 - 17:35  Optimised Collision-Free Trajectory and Controller Design for Robotic Manipulators  
A. Seddaoui, C.M. Saaj  
Surrey Space Centre, United Kingdom  
PAPER

17:35 - 18:00  Detailed description of the High-Level Autonomy Functionalities Developed for the ExoMars Rover  
M. Winter, S. Rubio, R. Lancaster, C. Barclay, N. Silva, B. Nye, L. Bora  
Airbus Defence and Space Ltd., United Kingdom  
PAPER | PRESENTATION

18:15  Boat to DINNER (departure from Scheltema)

19:30  Conference DINNER  
Location: De Burcht  
Address: Burgsteeg 13, 2312 JR Leiden
THURSDAY 22 JUNE

09:00 – 11:05 Session 7A: Mobility and Actuation
Room: Theaterzaal

09:00 - 09:25 Quadruped Robot Control Algorithm and its Field Test
J. Jiang¹, J. Guo¹, P. Xu¹, R. Dang¹, S.I. Matrossov², V. Koutcherenko³
¹China north vehicle research institute, China ²RCL. Science & Technology Rover Company Ltd, Russian Federation

09:25 - 09:50 RCL's Advanced High Mobility Locomotion Systems for Space Rovers and Special Robots
S.I. Matrossov², A.N. Bogachev¹, V.I. Kucherenko², SuBo Su², Lei Jiang², S.A. Vladykin³, E.G. Borisov¹, R.Yu. Dobrezov¹, O.V. Zolotokrylin³
¹RCL, Science & Technology Rover Company Ltd, Russian Federation ²China north vehicle research institute, China

09:50 - 10:15 Snake Robots for Space Applications
A.A. Transeth, M. Merz, G. Johansen, M. Bjerkeng
SINTEF Digital, Norway


10:40 - 11:05 Motor Driver with a Three Phase Current Measurement for a Medium Radiation Level
M. Maier¹, H.J. Sedlmayr², J. Reill³, M. Chalon³
¹Institute of Robotics and Mechatronics, Germany ²DLR, Institute of Robotics and Mechatronics, Germany

09:00 – 11:05 Session 7B: Planning and Autonomy II
Room: Expo 1

09:00 - 09:25 Introducing CCSDS Mission Operations Services to the METERON Operations Environment
M. Cardone¹, S. Bamfaste², M. Azkarate³, S. Martin³, M. Sarkarati¹, M. Merri⁴
¹Terma GmbH, Germany ²Serco Services GmbH, Germany ³HE Space Operations B.V., Netherlands ⁴European Space Agency ESA/ESOC, Germany

09:25 - 09:50 LabelMars.net: Driving Next-Generation Science Autonomy with Large High Quality Dataset Collection
I.A. Wallace¹, M. Woods¹, N. Read¹, S. Wright¹, K. Waumsley¹, S. Schwenzer¹, L. Joudrier¹
¹SCISYS, United Kingdom ²The Open University, United Kingdom ³European Space Agency, Netherlands

09:50 - 10:40 Autonomous Controllers and Frameworks for Space Missions: GOTCHA and ERGO
J. Ocón
GMV, Spain

11:05 Coffee Break

11:20 – 13:00 8A Human-Robot Interaction II
Room: Theaterzaal

11:20 - 11:45 Context-Aware Mission Control for Astronaut-Robot Cooperation
D. Leidner, PB Birkenkampf, N.Y. Lii
German Aerospace Center (DLR), Germany

PAPER
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<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Authors/Institutions</th>
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<tr>
<td>11:45</td>
<td>METEON SUPVIS-M - an Operations Experiment to Prepare for Future Human/Robotic Missions on the Moon and Beyond</td>
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<td>MOONWALK Astronaut-Robot cooperation during surface EVA</td>
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<td>12:10</td>
<td>ACTOR Control Station: A New Testbed for Rigorous Teleoperation Experiments</td>
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<td>J. Smisek, ESA / TU Delft, Netherlands</td>
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<td>11:45</td>
<td>Autonomous Multirobot Cooperation for Science-Driven Long-Range Hybrid Exploration and Navigation Missions</td>
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<td>Satellite Visual Tracking for Proximity Operations</td>
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<td>I. Lourakis, X. Zabulis</td>
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<td>Foundation for Research and Technology - Hellas, Greece</td>
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<td>11:45</td>
<td>Vision-Based Algorithm and Robust Filtering for State Estimation of an Uncooperative Object in Space</td>
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<td>V. Pesce, L. Losi, M. Lavagna</td>
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<td>Advancements of Vision Based Autonomous Planetary Landing Systems and Preliminary Testing by Means of a New Dedicated Experimental Facility</td>
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<td>Testing and Cross-Validation of On-Orbit Servicing System for Geo Spacecraft Refuelling</td>
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<td>14:00</td>
<td>Robotic Technological Operations for Re-Fuelling Satellite Servicing Missions</td>
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<td>B. Maediger, M. Doermer, R. Regele, V. Luebke, D. Wilde</td>
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<td>Motion and Parameter Estimation for the Robotic Capture of a Non-Cooperative Space Target Considering Egomotion Uncertainty</td>
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<td>H. Mishra, P. Schmidt</td>
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15:15 - 15:40  Analytical and Experimental Parameter Estimation for Free-Floating Space Manipulator Systems
O.-O. Christidi-Loumpasefski, C. Ntinos, E. Papadopoulos
National Technical University of Athens, Greece
PAPER | PRESENTATION

Session 9B: Planetary Robotics III
Room: Expo 1

14:00 - 14:25  On Impedance Control on Landing Mechanisms for Comets and Planets
Z. Mitros, S. Garyfallidis, E. Papadopoulos
National Technical University of Athens, Greece
PAPER

14:25 - 14:50  Some Ways of Giving the Mobility to the Landing Modules Intended for the Planet Surface Investigation
V.I. Kucherenko, Mr Bogachev RCL, Science & Technology Rover Company Ltd, Russian Federation
PAPER

14:50 - 15:15  Robotics with Colloidal Autonomous Systems
A. Chiolerio¹, M.B. Quadrelli²
¹Istituto Italiano di Tecnologia, Italy ²Jet Propulsion Laboratory, United States of America
PAPER | PRESENTATION

15:15 - 15:40  The DLR Rover Simulation Toolkit
M. Hellerer, S. Barthelmes, F. Buse
German Aerospace Center (DLR), Germany
PAPER | PRESENTATION

15:40 – 16:00  Conference Closure
Room: Theaterzaal
G. Visentin, M. Zwick
European Space Agency ESA/ESTEC, The Netherlands