10th Workshop on Advanced Space Technologies for Robotics and Automation – ASTRA 2008

PROGRAMME

Day 1 - 11 November 2008

Session 1	**Status and Outlook in Programmes and R&D**
09:15	ESA Automation and Robotics R&D Overview *Visentin, G.* *Affiliation (Netherlands)*
09:40	Abstract Eurobot and Exploration Robotics *Schoonejans, P.* *ESA (Netherlands)*
10:05	Abstract Exploration Activities at the Canadian Space Agency *Piedboeuf, J.C.; Berinstain, A.; Kendall, D.; Leclerc, G.* *Canadian Space Agency (Canada)*
10:30	ESA Robotic Science Missions Overview *Falkner, P.* *ESA (Netherlands)*
10:55	Coffee break
Session 2	**Robotics in Human Exploration**
11:20	Abstract Analysing Human-Agent Teamwork *Fisher, M.1; Bordini, R.H.2; Sierhuis, M.3* *1University of Liverpool (United Kingdom); 2University of Durham (United Kingdom); 3RIACS (NASA Ames) (United States)*
11:45	Abstract Human-Robot Collaboration in a Planetary Settlement Setup: Collaborative Work, Interactions Design and Human Factors *Gancet, J.1; Weiss, A.2; Tscheligi, M.2; Ilzkovitz, M.1; Aked, R.1* *1Space Applications Services (Belgium); 2University of Salzburg (Austria)*
12:10	Abstract Centaur-type Service Robot Technology Assessment for Astronaut Assistant Development *Heikkilä, S.1; Didot, F.2; Halme, A.1* *1Helsinki University of Technology (Finland); 2European Space Agency (Netherlands)*
12:35	Abstract Multiple-ATV Scale Lunar Mobility - Operational Concept Study *Farhat, M.; Radziszewski, P.; Dupuis, E.; Allard, P.; Lamarche, T.* *Canadian Space Agency (Canada)*
13:00	Lunch
Session 3	**ExoMars I**
14:00	Overview of the ExoMars Rover Mission *Elfving, A.* *ESA*
14:25	Abstract Lesson Learned from ExoMars Locomotion System Test Campaign *Michaud, S.1; Hoepflinger, M.2; Lee, C.3; Thueer, T.2; Krebs, A.2; Despont, B.1; Gibbesch, A.4* *1Oerlikon Space AG (Switzerland); 2Swiss Federal Institute of Technologies, Zurich (Switzerland); 3von Hoerner & Sulger GmbH (Germany); 4DLR Institute of Robotics and Mechatronics (Germany)*
14:50	Abstract Description of the Locomotion Control Architecture on the ExoMars Rover Breadboard *Höpflinger, M.1; Pradalier, C.2; Thueer, T.2; Siegwart, R.2; Krebs, A.1* *1Federal Institute of Technology Zurich (Switzerland); 2Swiss Federal Institute of Technology (Switzerland)*
15:15	Abstract ExoMars Multi Rod Drill Development and Testing *Re, E.1; Magnani, P.1; Rizzi, F.1; Del Campo, F.2; Bahillo, J.C.2; Finotello, R.3; Ferrario, R.3* *1Selex Galileo (Italy); 2SENER (Spain); 3Tecnomare (Italy)*

15:40	Abstract Recent Progress in Designing the Sample Preparation and Distribution System of the ExoMars Mission *Hofmann, P.; Schulte, W.; Christoph, W.; von Heise-Rotenburg, R.* *Kayser-Threde GmbH (Germany)*
16:05	Coffee break
Session 4	**ExoMars II**
16:45	Abstract ExoMars Rover Operation Control Centre Design Concept and Simulations *Trucco, R.1; Trichilo, M.1; Martino, M.1; Franceschetti, P.2; Joudrier, L.3* *1ALTEC S.p.A. (Italy); 2Thales Alenia Space Italia (Italy); 3ESA/ESTEC (France)*
17:10	Abstract Surface Operation Requirements for the ExoMars Rover Vehicle Instrument Deployment Arm (IDA) *Barnes, D.; Tyler, L.* *Aberystwyth University (United Kingdom)*
17:35	Abstract ExoMars PanCam Field Test Report from the Arctic Mars Analogue Svalbard Expedition (AMASE) 2008 *Schmitz, N.1; Griffiths, A.2; Barnes, D.3; Coates, A.2; Michaelis, H.1; Jaumann, R.1; Hauber, E.1; Trauthan, F.1* *1German Aerospace Center, Institute of Planetary Research (Germany); 2Mullard Space Science Laboratory, University College London (United Kingdom); 3Space Robotics Group, Aberystwyth University (United Kingdom)*
18:00	**End of day 1**

Day 2 - 12 November 2008

	Session 5 **Aerial Robotics**	**Session 6** **Navigation and Localization**
08:50	Abstract Long Endurance Solar Airplanes - The Scaling Problems of Solar *Noth, A.; Engel, W.; Siegwart, R.* *ETH Zurich (Switzerland)*	Abstract Visual Odometry for Autonomous Localization on Mars *Souvannavong, F.1; Lemaréchal, C.1; Remetean, E.2; Rastel, L.2; Maurette, M.2* *1Magellium (France); 2Centre National d'Etudes Spatiales (France)*
09:15	Abstract ARMADA: Autorotation for Martian Descent and Landing *Graziano, M.1; Peters, T.1; Cadenas, R.1; Modenini, D.2; Tortora, P.3; Kervendal, E.4; Saggiani, G.M.2; Kohler, J.5* *1GMV (Spain); 2University of Bologna (Italy); 3University of Bologna (Iceland); 4EADS-Astrium (France); 5ESTEC (Netherlands)*	Abstract IARES Rover and One of its Localization Methods : The Cinemometer Method for Odometry Application *Pol, S.1; Benain, A.2; Llibre, M.3; Lambert, C.3; Maurette, M.1; Rastel, L.1* *1CNES (France); 2Magellium (France); 3ONERA (France)*
09:40	Abstract Auto-Rotation and its Application to Descent and Landing on Mars *Lutz, T.1; Noeding, P.1; Westerholt, U.1; Ransom, S.2* *1ASTRIUM Space Transportation (Germany); 2SRC (Germany)*	Abstract Landmarks Constellation Based Position Estimation for Spacecraft Pinpoint Landing *Pham, B.V.1; Lacroix, S.1; Devy, M.1; Phillipe, C.2; Reynaud, S.3; Devouassoux, Y.3* *1LAAS-CNRS (France); 2ESA (Netherlands); 3EADS-ASTRIUM (France)*
10:05	Abstract Solving the Landing Problem of Hopping Robots: The Elastic Cage Design *Fiorini, P.; Bovo, F.; Bertelli, L.* *University of Verona (Italy)*	Abstract Autonomous Over-The-Horizon Rover Navigation *Dupuis, E.1; Rekleitis, I.2; Bedwani, J.-L.3; Allard, P.1; Lamarche, T.1; Zhu, W.-H.1* *1Canadian Space Agency (Canada); 2McGill University (Canada); 3Université de Sherbrooke (Canada)*
10:30	Abstract EXOFLY: A Flapping Winged Aerobot for Autonomous Flight in Mars Atmosphere *Peeters, B.1, Mulder, M.2, Kraft, S.3, Leijtens, J.4, Zegers, T.5, Lentink, D.6; Lan, N.1* *1Ursa Minor (Netherlands); 2Delft University of Technology (Netherlands); 3Cosine*	Abstract A Vision and Behaviour Based Approach for Short-Range Autonomous Navigation of Planetary Rovers *Gao, Y.; Makhlouta, M.* *Surrey Space Centre (United Kingdom)*

	Research B.V. (Netherlands); 4TNO Science and Industry (Netherlands); 5Universiteit Utrecht (Netherlands); 6Wageningen Universiteit (Netherlands)	
10:55	Coffee break	
	Session 7 **Exoskeletons**	**Session 8** **Rover Locomotion**
11:20	Abstract HANDEXOS: Towards a Support Device for Hand Activities and Telepresence *Chiri, A.1; Giovacchini, F.2; Roccella, S.2; Vitiello, N.2; Cattin, E.2; Vecchi, F.2; Carrozza, M.C.2* *1Scuola Superiore Sant'Anna (Italy); 2ARTS Lab Scuola Superiore Sant' Anna Pisa (Italy)*	Abstract Simulation of Rover Locomotion on Sandy Terrain - Modeling, Verification and Validation *Krenn, R.; Hirzinger, G.* *German Aerospace Center (DLR) (Germany)*
11:45	Abstract ABLE, an Innovative Transparent Exoskeleton for the Upper-Limb *Colledani, F.; Garrec, P.; Measson, Y.; Perrot, Y.* *CEA (France)*	Abstract Development of Tractive Performance Prediction to Control Slippage for Flexible Wheel *Favaedi, Y.1; Pechev, A.2; Moxey, E.1* *1University of Surrey (United Kingdom); 2Surrey Space Centre (United Kingdom)*
12:10	Abstract The New Ergonomic X-Arm-II Exoskeleton *Schiele, A.1; Klaer, P.2; Seiberth, H.P.2; Neu, C.2; Engelmann, E.2* *1European Space Agency (Netherlands); 2University of applied science in Kaiserslautern (Germany)*	Abstract Modelling of Wheel-soil Contact for the EDRES Mobile Robot Simulator *Lhomme-Desages, D.1; Grand, Ch.1; Maurette, M.2* *1Institut des Systèmes Intelligents et de Robotique (France); 2Centre National d'Etudes Spatiales (France)*
12:35	Abstract Exostation: 7-DOF Haptic Exoskeleton and Virtual Slave Robot Simulator *Letier, P.1; Avraam, M.1; Veillerette, S.1; Motard, E.2; Verschueren, J-P.3* *1Universite Libre de Bruxelles (Belgium); 2Space Applications Services (Belgium); 3Micromega Dynamics (Belgium)*	Abstract Kinematic Analysis and Comparison of Rover Locomotion Performance *Thueer, T.; Siegwart, R.* *ETH Zurich (Switzerland)*
13:00	Lunch	
	Session 9 **Modelling and Simulation**	**Session 10** **Autonomy**
14:00	Abstract A Dynamic Library for Versatile Modeling of Free-Flying and Mobile Robotic Systems *Abiko, S.; Hirzinger, G.; Lampariello, R.* *German Aerospace Center (Germany)*	Abstract Autonomous and/or Interactive Constraints-based Software Reconfiguration for Planetary Rover *Montano, G.; McDermid, J.* *University of York (United Kingdom)*
14:25	Abstract Development of a Dynamic Mobile Robot Simulator for Astronaut Assistance *Heiskanen, P.; HeikkilÃ¤, S.; Halme, A.* *Helsinki University of Technology (Finland)*	Abstract On-Board Autonomy Via Symbolic Model-Based Reasoning *Roveri, M.1; Bozzano, M.1; Cimatti, A.1; Guiotto, A.2; Martelli, A.2; Tchaltsev, A.1; Yushtein, Y.3* *1Fondazione Bruno Kessler (Italy); 2Thales Alenia Spazio (Italy); 3European Space Agency / ESTEC (Netherlands)*
14:50	Abstract 3DROV - A Planetary Rover System Design, Simulation and Verification Tool, First Results and Perspectives *Kapellos, K.1; Joudrier, L.2; Poulakis, P.2* *1TRASYS Space (Belgium); 2ESA / ESTEC (Netherlands)*	Abstract Developing an Autonomous Science Capability for European Mars Missions *Woods, M.1; Shaw, A.1; Barnes, D.2; Pugh, S.2; Price, D.2; Long, D.3; Pullan, D.4* *1SciSys (United Kingdom); 2University of Aberystwyth (United Kingdom); 3University of Strathclyde (United Kingdom); 4University of Leicester (United Kingdom)*
15:15	Abstract Representing and Analysing the Kinematic Robustness of Robotic Planetary Systems	Abstract AVATAR: Operations of Ground-Based Robots from the ISS Using an Amateur Radio Link

	Hobbs, J.1; Rooney, J.2 *1JDH Innovation (United Kingdom); 2The Open University (United Kingdom)*	*Martin, E.; L'Archevêque, R.; Gemme, S.; Pellerin, T.; Dupuis, E.* *Canadian Space Agency (Canada)*
15:40	Abstract A Contact Dynamics Simulation Framework for Robotics *Gonthier, Y.; Lange, C.* *Canadian Space Agency (Canada)*	Abstract Autonomous Robot Exploration of Unknown Terrain: A Preliminary Model of Mars Rover Robot *Peniak, M.; Cangelosi, A.; Marocco, D.* *University of Plymouth (United Kingdom)*
16:05	Coffee break	
	Session 11 **Artificial Intelligence**	**Session 12** **Teleoperation**
16:45	Abstract Analysis in Robotic Autonomy for Future Planetary Exploration Missions *Quintana, M.1; Casals, A.2; Chester, E.1* *1Aerospace Research and Technology Centre (CTAE) (Spain); 2Technical University of Catalonia (Spain)*	Abstract Telemanipulation Extension to the DREAMS Ground Control Station *Didot, F.1; Kapellos, K.2* *1ESA (Netherlands); 2Trasys (Belgium)*
17:10	Abstract Innovative AI Technologies for Future ESA Missions *R-Moreno, M.D.1; Cesta, A.2; Kurien, J.3* *1Universidad de Alcala (Spain); 2ISTC-CNR (Italy); 3NASA (United States)*	Abstract Intelligent Teleoperation: Combining Simulation and Teleoperation *Fiorini, P.1; Botturi, D.1; Kruusmaa, M.2* *1University of Verona (Italy); 2Tallinn University of Technology (Estonia)*
17:35	Abstract Merging Planning, Scheduling & Verification - A Preliminary Analysis *Fratini, S.1; Cesta, A.1; Finzi, A.2; Orlandini, A.3; Tronci, E.4* *1ISTC-CNR (Italy); 2Univeristy of Naples Federico II (Italy); 3University of Rome "Roma Tre" (Italy); 4University of Rome "La Sapienza" (Italy)*	Abstract A Practical Demonstration of Advanced Teleoperation Techniques Applied to the Assembly of Payloads *Sanders, S.1; Rolfe, A.1; Wall, R.2* *1Oxford Technologies Ltd (United Kingdom); 2Astrium Satellites Ltd (United Kingdom)*
18:00	**End of day 2**	

Day 3 - 13 November 2008

	Session 13 **On-orbit Servicing**	**Session 14**
08:50	Abstract OLEV – An On-Orbit Servicing Program for Commercial Spacecrafts in GEO *Kaiser, C.1; Kugelberg, J.2; del Cura, J.-M.3; Eilertsen, B.4* *1Kayser-Threde GmbH (Germany); 2Swedish Space Corporation (Sweden); 3Sener (Spain); 4Orbital Satellite Services A.B. (Sweden)*	Abstract A Heavily Miniaturized Submersible - A Terrestrial Kickoff *Nguyen, H.; Jonsson, J.; Edqvist, E.; Kratz, H.; Thornell, G.; Sundqvist, J.* *Uppsala University (Sweden)*
09:15	Abstract On-orbit Exchange of Equipment for GEO Satellites *Cougnet, C.1; Gerber, B.1; Visentin, G.2* *1EADS Astrium (France); 2ESA/ESTEC (Netherlands)*	Abstract Design and Parameter Optimization of a Novel Reconfigurable Planetary Rover *Tao, J.; Li, X.; Hu, M.; Yu, X.; Deng, Z.* *Harbin Institute of Technology (China)*
09:40	Abstract Ground Tests for On-Orbit Servicing of a GEO Satellite Fleet *Heemskerk, C.1; Cougnet, C.2; Kapellos, K.3; Bruyninckx, H.4; Visentin, G.5* *1Dutch Space (Netherlands); 2Astrium ST (France); 3Trasys Space (Belgium); 4KU Leuven (Belgium); 5ESA ESTEC (Netherlands)*	Abstract Robot System Technologies for Space Exploration *Lappas, V.; Pechev, A.; Palmer, P.; Gao, S.; Gao, Y.; Vladimirova, T.; Saaj, M.; Moxey, E.; Sweeting, M.; Underwood, C.* *University of Surrey (United Kingdom)*

10:05	Abstract On-Orbit Servicing: Novel Algorithms for Motion Control of Robot Manipulators *Saaj, C.; Parsa, S.* *Surrey Space Centre (United Kingdom)*	Abstract Planetary Rovers Fitted with Omni-directional Wheels *Ransom, S.1; Kroemer, O.2; Lueckemeier, M.3* *1SRConsultancy (Germany); 2DLR Institute of Space Systems (Germany); 3Harting Electronics GmbH & Co Kg (Germany)*
10:30	Coffee break	
	Session 15 **Robotic Arms**	**Session 16** **Rover Systems in Harsh Environment**
11:20	Abstract DEXARM Engineering Model Development and Testing *Rusconi, A.1; Magnani, P.1; Campo, P.2; Chomicz, R.3; Magnani, G.4; Lambert, C.5; Gruener, G.6* *1Selex Galileo (Italy); 2SENER (Spain); 3Tecnomare (Italy); 4Politecnico di Milano (Italy); 5Oerlikon Space (Switzerland); 6CSEM (Switzerland)*	Abstract Experiences Gained from the Thermal Vacuum Tests of the Microrover Nanokhod *Klinkner, S.1; Lee, C.1; Wagner, C.1; Lengowski, M.2; Röser, H.2; Bourlier, P.3* *1von Hoerner & Sulger GmbH (Germany); 2Institut für Raumfahrtsysteme, Universität Stuttgart (Germany); 3Harmonic Drive AG (Germany)*
11:45	Abstract Advanced Motion-Force Controller for Space Arms: Experimental Results with the Ground Reference Model of Europa Mission *Terribile, A.1; Filippini, M.1; Grasso, T.1; Fusco, G.1; Olivieri, A.2; Pasquali, F.2; Mondellini, C.3* *1Tecnomare SpA (Italy); 2ASI (Italy); 3Selex Galileo (Italy)*	Abstract Verification and Validation Process on 3D Dynamics Simulation in Support of Planetary Rover Development *Schäfer, B.; Rebele, B.; Gibbesch, A.* *German Aerospace Center (DLR) (Germany)*
12:10	Abstract Modelling and Real-Time Simulation of Dexarm *Magnani, G.1; Porrati, P.2; Rizzi, G.3; Rocco, P.1; Rusconi, A.4* *1Politecnico di Milano (Italy); 2Politecnico di Milano, former student (Italy); 3IIS Jean Monnet, Mariano Comense (Italy); 4SelexGalileo Spa (Italy)*	Low Temperature Miniaturized Motion Control Chip Enabled by MEMS and Microelectronics *Bruhn, F.* *Affiliation (Sweden)*
12:35	Abstract Investigation of the Accuracy of a Machine Vision Robotic Arm System for Rendez-vous and Docking Operations *Valle, D.; Mollinedo, L.; Medina, A.* *GMV (Spain)*	
13:00	Lunch	
14:00	Additional presentation time for poster and exhibition session	
15:30	**Guided Tour to the Automation and Robotics Laboratory**	
	Poster Session ***(will remain on display during the whole workshop)***	
	Abstract Fabrication and Integration of Multi-Scale Compliant Elastomer Dry Adhesives with Climbing Robot Designs *Sameoto, D.1; Li, Y.1; Menon, C.1; Kohler, J.2* *1Simon Fraser University (Canada); 2ESA (Netherlands)* Abstract Experiences in Producing a Preliminary Navigation OBSW Prototype for the Exomars Rover Based on Edres *Odwyer, A.1; Correal Tezanos, R.1; Sánchez Prieto, S.2; Parra Espada, P.2* *1TCPsi (Spain); 2UAH (Spain)*	

Abstract
MrSPOCK: Generating a Planning System through a Timeline Representation Framework
Fratini, S.; Cesta, A.; Cortellessa, G.; Oddi, A.
ISTC-CNR (Italy)

Abstract
Visual Docking/Grasping System for Autonomous Robotic On-Orbit Satellite Servicing
Diaz, J.C.; Abderrahim, M.; Bensalah, C.
University Carlos III of Madrid (Spain)

Abstract
Realistic Image Generation for Testing Vision-Based Rover Autonomy
McCrum, M.; Parkes, S.; Dunstan, M.; Martin, I.
University of Dundee (United Kingdom)

Abstract
Robotics as Support to Formation Flying and Rendezvous&Docking Validation Test Benches
Mollinedo, L.; Valle, D.; Medina, A.
GMV (Spain)

Abstract
Strategy for Adaptive Rover Behavior Based on Experiment
Krebs, A.
ETHZ (Switzerland)

Abstract
New Compliant Mc- Kibben Actuator Driven by Pneumatic Actuators as a Hexapod Platform in Robotic Applications
Wedler, A.W.1; Denkena, D.E.2
1IFW- University of Hannover /DLR RM (Germany); 2Institute of Production Engineering and Machine Tools (Germany)

Abstract
The NTUA Space Robot Simulator: Design & Results
Papadopoulos, E.1; Paraskevas, I.2; Flessa, T.2; Kontolatis, I.2; Tortopidis, I.2
1National Technical University of Athens (Greece); 2NTUA (Greece)

Abstract
Automated On-board Model-based Diagnosis during Planetary Mission and Teleoperation
Kuijpers, E.A.1; van Gelder, P.2; Pietersma, J.2
1National Aerospace Laboratory NLR (Netherlands); 2Science & Technology (Netherlands)

Abstract
ExoMars Airbag Piercing Tests with a Cutting Mole
Krause, C.1; Mehls, C.1; Re, E.2; Richter, L.1; Izzo, M.2; Coste, P.3
1DLR (Germany); 2Galileo Avionica (Italy); 3ESA (Netherlands)

Abstract
A Vision and Behaviour Based Approach for Short-Range Autonomous Navigation of Planetary Rovers
Gao, Y.; Makhlouta, M.
Surrey Space Centre (United Kingdom)

Abstract
The Resilience Concept Validation by HiPeRCAR
Marra, P.A.
Affiliation (TBD)

Abstract
Design, Manufacturing and Integration of a Compact Tool Exchange Device for Space Robotics Applications
Gelmi, R.1; Rusconi, A.1; Vallini, L.1; Campo, P.2; Della Pieta', A.3; Schiele, A.4
1Selex Galileo (Italy); 2SENER (Spain); 3Tecnomare (Italy); 4ESA (Netherlands)

Microelectromechanical Inertial Measurement Unit Characterisation Towards Utilization for PlanetaryRover Localization
Albright, W.; Poulakis, P.; Joudrier, L.; Koehler, J.
ESA/ESTEC (Netherlands)

	Exhibits and Demos ***(will remain on display during the whole workshop)***
	Abstract EXOFLY: A Demonstrator of a Potential Flapping Winged Aerobot for Use in Mars Atmosphere *Remes, B.1, Mulder, J.A.1, Berkouwer, W.R.1, Lan, N.2* *1Delft University of Technology (Netherlands); 2Ursa Minor (Netherlands)* Abstract Exhibition and Demonstration of ABLE, an Innovative Transparent Exoskeleton for the Upper-Limb *Colledani, F.; Garrec, P.; Measson, Y.; Perrot, Y.* *CEA (France)* Abstract A New Actuator Technology for Classic Space Mechanisms and Robotics *Fernandez, D.1; Cabas, R.1; Moreno, L.2* *1ARQUIMEA (Spain); 2Universidad Carlos III de Madrid (Spain)* Abstract Exostation: 7-DOF Haptic Exoskeleton and Virtual Slave Robot Simulator *Letier, P.1; Avraam, M.1; Veillerette, S.1; Motard, E.2; Verschueren, J-P.3* *1Universite Libre de Bruxelles (Belgium); 2Space Applications Services (Belgium); 3Micromega Dynamics (Belgium)*