

2017 6th International Conference on Space Mission Challenges for Information Technology (SMC-IT 2017)

**Alcala de Henares, Spain
27-29 September 2017**



**IEEE Catalog Number: CFP17840-POD
ISBN: 978-1-5386-3463-9**

**Copyright © 2017 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP17840-POD
ISBN (Print-On-Demand):	978-1-5386-3463-9
ISBN (Online):	978-1-5386-3462-2

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

6th IEEE International Conference on Space Mission Challenges for Information Technology

SMC-IT 2017

Table of Contents

Message from the General Chair.....	ix
Conference Organization.....	x
Reviewers	xi

Session 1a - Space Robotics

New Capabilities for Deep Space Robotic Exploration Enabled by Disruption Tolerant Networking	1
<i>E. Jay Wyatt, Konstantin Belov, Scott Burleigh, Julie Castillo-Rogez, Steve Chien, Loren Clare, and Joe Lazio</i>	
Adding Uncertainty to an Object Detection System for Mobile Robots	7
<i>Alejandra C. Hernández, Clara Gómez, Jonathan Crespo, and Ramón Barber</i>	
Towards an Anisotropic Fast Marching Method Applied to the Path Planning Task for Mars Rovers	13
<i>Santiago Garrido, Fernando Martin, David Alvarez, and Luis Moreno</i>	
Integration of an Automated Hierarchical Task Planner in ROS Using Behaviour Trees	20
<i>José Ángel Segura-Muros and Juan Fernández-Olivares</i>	
MEDA Instrument Processing and Data Management for the Mars2020 Mission	26
<i>Jose F. Moreno Alvarez, Jose A. Rodriguez Manfredi, Christina Diaz, Francisco Torrero Merino, and Antonio Peña Godino</i>	
Using Extremophile Behavior to Identify Biological Targets of Opportunity	33
<i>Keith Evan Schubert, Ritchie Cai, Ernesto Gomez, and Penelope J. Boston</i>	

Session 1b - Space Engineering

Solar Orbiter Observing Plans for Understanding the Physics of Solar Energetic Particles: Definition and Simulation	38
<i>Laura Rodríguez-García, Anik De Groof, Sebastián Sánchez Prieto, Andrew Walsh, David Williams, Yannis Zouganelis, Jayne Lefort, Raúl Gómez-Herrero, and Javier Rodríguez-Pacheco</i>	
Sharing Telemetry across Organizations and Systems	44
<i>Michela Muñoz Fernandez, James K. Rice, Dan Smith, and Ron Jones</i>	
Attitude Control of Small Probes for De-Orbit, Descent and Surface Impact on Airless Bodies Using a Single PWM Thruster	50
<i>Michael Gillham and Gareth Howells</i>	
Using Simulation and the NSGA-II Evolutionary Multi-Objective Algorithm in the Design of a Compact Dual-Band Equatorial Helix Antenna	56
<i>Javier Moreno, Ivan Gonzalez, and Daniel Rodriguez</i>	
Computer Security as an Engineering Practice: A System Engineering Discussion	61
<i>Robert M. Beswick</i>	

Session 2a - Machine Learning and Big Data

Telemetry Anomaly Detection System Using Machine Learning to Streamline Mission Operations	70
<i>Michela Muñoz Fernández, Yisong Yue, and Romann Weber</i>	
Machine Learning in Spacecraft Ground Systems	76
<i>Zhenping Li</i>	
Machine Learning for Spacecraft Operations Support - The Mars Express Power Challenge	82
<i>Luke Lucas and Redouane Boumghar</i>	
Predicting Thermal Power Consumption of the Mars Express Satellite with Machine Learning	88
<i>Martin Breskvar, Dragi Kocov, Jurica Levatić, Aljaž Osojnik, Matej Petković, Nikola Simidjevski, Bernard Ženko, Redouane Boumghar, and Luke Lucas</i>	

Session 2b - Autonomy and Autonomous Systems

Defining Metrics for Autonomous Controllers Assessment	94
<i>Pablo Muñoz, Amedeo Cesta, Andrea Orlandini, and María D. R-Moreno</i>	
Evolutionary Computation for the ARIEL Mission Planning Tool	101
<i>Alvaro Garcia-Piquer, Juan C. Morales, Josep Colomé, and Ignasi Ribas</i>	

Sensor Planning System for the Space Situational Awareness (SSA) Project	107
<i>Tomás de la Rosa, Raquel Fuentetaja, Daniel Borrajo, and Carlos Linares López</i>	
DREMS-OS: An Operating System for Managed Distributed Real-Time Embedded Systems	114
<i>Abhishek Dubey, Gabor Karsai, Aniruddha Gokhale, William Emfinger, and Pranav Kumar</i>	

Space-Terrestrial Internetworking Demonstration Workshop Session

DtnSim: Bridging the Gap between Simulation and Implementation of Space-Terrestrial DTNs	120
<i>Juan A. Fraire, Pablo Madoery, Fernando Raverta, Jorge M. Finochietto, and Raoul Velazco</i>	
Introducing Contact Plan Designer: A Planning Tool for DTN-Based Space-Terrestrial Networks	124
<i>Juan A. Fraire</i>	
Simulation Environment for Network Coding Research in Ring Road Networks	128
<i>Olivier De Jonckère, Jean Chorin, and Marius Feldmann</i>	
Implementation of (O-)CGR in The ONE	132
<i>A. Berlati, S. Burleigh, C. Caini, F. Fiorini, J.J. Messina, S. Pozza, M. Rodolfi, and G. Tempesta</i>	

Processors and On-Board Computers Status and Trends Workshop Session

LEON Processor Devices for Space Missions: First 20 Years of LEON in Space	136
<i>Jan Andersson, Magnus Hjorth, Fredrik Johansson, and Sandi Habinc</i>	

Augmented, Virtual, and Mixed Realities Workshop Session

A Virtual Reality Mission Planner for Mars Rovers	142
<i>Fernando Ropero, Pablo Muñoz, María D. R-Moreno, and David F. Barrero</i>	

Poster Session

A Quality-Increasing Development Process for LEO Satellite Software	147
<i>Marius Feldmann, Felix Walter, Ricardo Böhm, Jean Chorin, Olivier De Jonckère, Thomas Hareau, Maximilian Nitsch, and Heiko Ritter</i>	
Space Weather Conditions during the Galaxy 15 and Telstar 401 Satellites Anomalies	149
<i>Consuelo Cid, Elena Saiz, Judith Palacios, Antonio Guerrero, and Yolanda Cerrato</i>	

SEU and SEFI Protection for DDR3 Memories in a Xilinx Zynq-7000 FPGA	151
<i>A. Cóbreces, J. Tabero, A. Regadío, A. Sánchez-Macián, P. Reviriego,</i>	
<i>and J.A. Maestro</i>	
Author Index	154