

2011 IEEE Fourth International Conference on Space Mission Challenges for Information Technology

(SMC-IT 2011)

**Palo Alto, California, USA
2 – 4 August 2011**



IEEE Catalog Number: CFP11840-PRT
ISBN: 978-1-4577-0712-4

Fourth IEEE International Conference on Space Mission Challenges for Information Technology

SMC-IT 2011

Table of Contents

Message from the General Chair	viii
Welcome from the Steering Committee.....	ix
Message from IEEE Computer Society Sponsors.....	x
Organization.....	xi
Reviewers.....	xiii

Session 1 - Reliable Software

The Case for Software Health Management	3
<i>Ashok N. Srivastava and Johann Schumann</i>	
Building a Safety Case for a Safety-Critical NASA Space Vehicle Software	
System	10
<i>Martin S. Feather and Lawrence Z. Markosian</i>	
System-Software Co-Engineering: Dependability and Safety Perspective	18
<i>Y. Yushein, M. Bozzano, A. Cimatti, J.-P. Katoen, V.Y. Nguyen, Th. Noll,</i>	
<i>X. Olive, and M. Roveri</i>	

Session 2 - Autonomy & Automation

State-Based Scheduling via Active Resource Solving	29
<i>Paul Morris, John Bresina, Javier Barreiro, Michael Iatauro, and Tristan Smith</i>	
A Planning and Scheduling Service for the ULISSE Platform	35
<i>Amedeo Cesta, Simone Fratini, Riccardo Rasconi, and Andrea Orlandini</i>	
A New Approach to Autonomous Onboard Mission Replanning Using	
Orthogonal Array Design	43
<i>Yosuke Fukushima and Makoto Mita</i>	

Session 3 - Cybersecurity & Networks

An Application Security Framework for SOA-Based Mission Data Systems	53
<i>Daniel Fischer, Mehran Sarkarati, Mariella Spada, Thomas Michelbach, Wenzel Urban, and Christian Tueffers</i>	
A DTN-Based Multiple Access Fast Forward Service for the NASA Space Network	61
<i>David J. Israel, Faith Davis, and Jane Marquart</i>	

Session 4 - Small Spacecraft & Systems

PolySat's Next Generation Avionics Design	69
<i>Greg Manyak and John M. Bellardo</i>	
Integrated Software and Sensor Health Management for Small Spacecraft	77
<i>Johann Schumann, Ole J. Mengshoel, and Timmy Mbaya</i>	
Software Productivity of Field Experiments Using the Mobile Agents Open Architecture with Workflow Interoperability	85
<i>William J. Clancey, Michael Lowry, Robert Nado, and Maarten Sierhuis</i>	

Session 5 - Reliable/Software Systems

Programming Models and Development Software for a Space-Based Many-Core Processor	95
<i>Stephen P. Crago, Dong-In Kang, Mikyung Kang, Robert Kost, Karandeep Singh, Joseph Suh, and John Paul Walters</i>	
Piloting on the Edge: Approaches to Flight Control Solutions	103
<i>Kalmanje Krishnakumar, Vahram Stepanyan, and Jonathan Barlow</i>	
NASA Technology Transfer System	111
<i>David A. Maluf, Takeshi Okimura, and Mohana Gurram</i>	

Session 6 - Autonomy & Robotics

Toward a CSP-Based Approach for Energy Management in Rovers	121
<i>Daniel Díaz, María D. R-Moreno, Amedeo Cesta, Angelo Oddi, and Riccardo Rasconi</i>	
A Cognitive Architecture and Simulation Environment for the Ptinto Robot	129
<i>Pablo Muñoz, María D. R-Moreno, Pablo Gallego, and Bonifacio Castaño</i>	
Human-Rating for Automated and Robotic Systems	137
<i>Lynn Baroff, Charlie Dischinger, and David Fitts</i>	

Session 7 - Mission Operations

Transforming the Operations Paradigm of Space Exploration	147
<i>Matthew J. Leonard and Lynn E. Baroff</i>	
A COTS (Commercial off the Shelf) Based Approach to Plug-and-Play Launch Control Systems: Based on a Record, Retrieve, Analyze, Visualize and Respond Pattern Approach	152
<i>Paul Giangarra and Bruce Semple</i>	
Streamlining Space Training Mission Operations with Web Technologies: An Approach to Developing Integral Business Applications for Large Organizations	159
<i>Karen Au, Samuel Santiago, Richard Papasin, May Windrem, and Tristan Le</i>	

Session 8 - Vision & Human Systems

Intelligent Systems Technologies for Human Space Exploration Mission Operations	169
<i>Ernest E. Smith and David J. Korsmeyer</i>	
Large Terrain Modeling and Visualization for Planets	177
<i>Steven Myint, Abhinandan Jain, Jonathan Cameron, and Christopher Lim</i>	
There is Nothing so Practical as a Good Theory	184
<i>Christopher Landauer</i>	
A Method Integrating Human Visual Attention and Consciousness of Radar and Vision Fusion for Autonomous Vehicle Navigation	192
<i>Tao Wang, Jingmin Xin, and Nanning Zheng</i>	
Author Index	199