

2019 IEEE International Conference on Space Mission Challenges for Information Technology (SMC-IT 2019)

**Pasadena, California, USA
30 July – 1 August 2019**



**IEEE Catalog Number: CFP19840-POD
ISBN: 978-1-7281-1546-7**

**Copyright © 2019 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:	CFP19840-POD
ISBN (Print-On-Demand):	978-1-7281-1546-7
ISBN (Online):	978-1-7281-1545-0

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

2019 IEEE International Conference on Space Mission Challenges for Information Technology (SMC-IT) **SMC-IT 2019**

Table of Contents

2019 IEEE International Conference on Space Mission Challenges for Information Technology

<p>The Planning Software Behind the Bright Spots on Ceres: The Challenges and Successes of Science Opportunity Analyzer</p> <p><i>Marcel Llopis (Jet Propulsion Laboratory), Carol Polanskey (Jet Propulsion Laboratory), Christopher Lawler (Jet Propulsion Laboratory), and Carolyn Ortega (Jet Propulsion Laboratory)</i></p>	1
<p>Quantifying the Effects of Gyroless Flying of the Mars Express Spacecraft with Machine Learning</p> <p><i>Matej Petkovic (Jožef Stefan Institute, Jožef Stefan International Postgraduate School), Luke Lucas (Mars Express, Mission Planning & Spacecraft Operations), Dragi Kocev (Jožef Stefan Institute, Jožef Stefan International Postgraduate School, Bias Variance Labs), Sašo Džeroski (Jožef Stefan Institute, Jožef Stefan International Postgraduate School), Redouane Boumghar (LibreSpace Foundation), and Nikola Simidjievski (Jožef Stefan Institute, Bias Variance Labs, University of Cambridge)</i></p>	9
<p>Multi-mission, Interactive 3D Visualization in a Web Browser for Robotic System and Space Flight Mission Development and Operations</p> <p><i>Marc Pomerantz (Jet Propulsion Laboratory), Andrew Boettcher (Jet Propulsion Laboratory), Michael Hans (Jet Propulsion Laboratory), Michael Sandoval (Jet Propulsion Laboratory), and Sean Wenzel (Jet Propulsion Laboratory)</i></p>	17
<p>Generating Transit Light Curves with Variational Autoencoders</p> <p><i>Douglas Woodward (Machine Learning and Assistive Technology Lab, Schmid College of Science and Technology, Chapman University), Elizabeth Stevens (Machine Learning and Assistive Technology Lab, Schmid College of Science and Technology, Chapman University), and Erik Linstead (Machine Learning and Assistive Technology Lab, Schmid College of Science and Technology, Chapman University)</i></p>	24

CGR-SPI: A New Enhanced Contact Graph Routing for Multi-source Data Communication in Deep Space Network	33
<i>Sangita Dhara (Indian Institute of Technology Kharagpur), Chakshu Goel (Indian Institute of Technology Kharagpur), Raja Datta (Indian Institute of Technology Kharagpur), and Sujoy Ghose (Indian Institute of Technology Kharagpur)</i>	
The Multi-mission Time Correlation System	41
<i>Stanley Cooper (Johns Hopkins Applied Physics Laboratory) and Michael R. Reid (Johns Hopkins Applied Physics Laboratory)</i>	
Fault-Tolerant Swarms	47
<i>Ivan Perez (National Institute of Aerospace), Alwyn Goodloe (NASA Langley Research Center), and William Edmonson (North Carolina A&T State University)</i>	
Interference-Free Contact Plan Design for Wireless Communication in Space-Terrestrial Networks	55
<i>Andreas Freimann (University of Würzburg), Timon Petermann (University of Würzburg), and Klaus Schilling (University of Würzburg)</i>	
A Machine Learning Approach to Modeling Satellite Behavior	62
<i>Kim Cates (KBR Inc.), Joe Coughlin (L3Harris), Geetha Ganji (KBR Inc.), and Rohit Mital (KBR Inc.)</i>	
Procedural Generation of 3D Planetary-Scale Terrains	70
<i>Ryan Vitacion (California State University, Northridge) and Li Liu (California State University, Northridge)</i>	
Autonomic & Apoptotic Computing Prototype; Providing Pre-Programmed Death of Cubesats for Avoiding Space JUNK	78
<i>Robbie Palmer (Ulster University) and Roy Sterritt (Ulster University)</i>	
Efficient Contact Graph Routing Algorithms for Unicast and Multicast Bundles	87
<i>Olivier De Jonckère (Technische Universität Dresden)</i>	
Effect of Link Disruption on BP/LTP over a Relay-based Communication Architecture for International Space Station	95
<i>Yan Zhou (Soochow University, P. R. China), Ruhai Wang (Lamar University), Lu Liu (Soochow University, P. R. China), Kanglian Zhao (Nanjing University), Wenfeng Li (Nanjing University), Xiangyu Lin (Beijing Institute of Spacecraft System Engineering), and Juan A. Fraire (Universidad Nacional de Cordoba - CONICET, Argentina)</i>	
Towards the Design of Space Missions with Optimal Accessibility via Relay Satellites	100
<i>Santiago M. Henn (Comisión Nacional de Actividades Espaciales (CONAE), Argentina), Juan A. Fraire (CONICET - Universidad Nacional de Córdoba, Argentina; Saarland University, Germany; Politecnico di Torino, Italy), Pablo C. Marino (Comisión Nacional de Actividades Espaciales (CONAE), Argentina), Maximiliano Fischer (Comisión Nacional de Actividades Espaciales (CONAE), Argentina), Andrea Bianco (Politecnico di Torino, Italy), and Holger Hermanns (Saarland University, Germany)</i>	
Energy Consumption of Bundle Protocol for Reliable File Delivery over Deep-Space Channels	106
<i>Lu Liu (Soochow University, P. R. China), Ruhai Wang (Lamar University), Yan Zhou (Soochow University, P. R. China), Wenfeng Li (Nanjing University), Yi Jin (Xi'an Branch of China Academy of Space Technology), and Juan A. Fraire (Universidad Nacional de Cordoba - CONICET, Argentina)</i>	

Complexity Analysis for Model-Based Fault Diagnosis Systems 112
Maurice Prather[✉] *Qngcp* *Ugnwkapu* *Tpe0*; *Ksenia Kolcio* (*Okean Solutions, Inc.*)

Author Index **121**