2016 11th System of Systems Engineering Conference (SoSE 2016)

Kongsberg, Norway
12 – 16 June 2016

IEEE Catalog Number: CFP16SOS-POD
ISBN: 978-1-4673-8728-6

Copyright © 2016 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 publication is a representation of what appears in the IEEE Digital Libraries. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number: CFP16SOS-POD
ISBN (Print-On-Demand): 978-1-4673-8728-6
ISBN (Online): 978-1-4673-8727-9

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

Table of Contents

A Co-Design Approach for Embedded Control Software of Cyber-Physical Systems....1
Jan Broenink; Peter-Jan Vos; Zhou Lu; Maarten M. Bezemer

A Decade of Teaching Systems Engineering to Bachelor Students....6
G. Maarten Bonnema; Ilanit Lutters-Weustink; Juan Jauregui Becker

A Framework for Technology Assessment from Different Scientific Viewpoints: Preliminary Report....12
Hao Liang; Charles E. Dickerson; Donna Champion; David Battersby

A Multi-core Context-Aware Management Architecture for Mixed-Criticality Smart Building Applications....17
Alexandros Dimopoulos; George Bravos; George Dimitrakopoulos; Mara Nikolaidou; Vassilis Nikolopoulos; Dimosthenis Anagnostopoulos

A New Small-World Network Model for Instant Messaging Chat Network....23
Jinting Guan; Meishuang Tang; Guangzao Huang; Wenbing Zhu; Sun Zhou; Guoli Ji

A Reference Architecture for the Development of Socio-Cyber-Physical Condition Monitoring Systems....28
Hans Fleischmann; Johannes Kohl; Jörg Franke

A reflection on the use of A3 architecture overview in designing Wave Energy Converters....34
Gerrit Muller; Emilie Aune; Henrik Lind

A Standards-based Approach for Domain Specific Modelling of Smart Grid System Architectures....40
Christian Neureiter; Mathias Uslar; Dominik Engel; Goran Lastro

A Systematic Investigation of Tools in Model Based System Engineering for Embedded Systems....46
Muhammad Rashid; Muhammad Waseem Anwar

An Architecture for Stewarding Enterprises....52
Brian E. White; L. McCaughin

An Integration Strategy for Controls and Computing Systems at a large Particle Accelerator based Research Facility....58
Thilo Friedrich; Daniel Piso Fernández

Analysis of the Information Needs of an Autonomous Hauler in a Quarry Site....64
Sara Dersten; Peter Wallin; Joakim Fröberg; Jakob Axelsson

Architecture and System-of-Systems Design for Integrated Missile Defense....70
James Kilian; Tod Schuck

Architecture study of an Energy Microgrid....76
Ravi Patel; Daniel Selva; Walter Paleari

Are stakeholders in the constituent systems SoS aware? Reflecting on the current status in multiple domains....84
Gerrit Muller

Autonomous Robotic Fish for a Swarm Environment....89
Luke Kiebert; Matthew Joordens

Bi-objective shortest path problem with one fuzzy cost function applied to dangerous goods transportation on a road network....95
Roberto Sacile

Blended education for systems architecting: Evaluation of the initial blended course version....100
Gerrit Muller; Joris van den Aker; Herman Postema

Building a HIS supervision Metamodel....106
Farid Lahboube; Ounsa Roudiès; Nissrine Souissi

Challenges in the Modelling of SoS Design Alternatives with MBSE....112
Marco Di Maio; George Dimitrios Kapos; Niklas Klusmann; Charles Allen

Checking the Architectural Feasibility of Systems-of-Systems using Formal Descriptions....117
Milena Guessi; Flavio Oquendo; Elisa Nakagawa

Coalition Command and Control - Simulation Interoperation as a System of Systems....123
John Mark Pullen; Ole Martin Mevassvik

Combinatorial Models For Heterogeneous System Composition and Analysis....129
Saigopal Nelaturi; Vadim Shapiro; Johan de Kleer

Conceptual Reasoning in the Development of Particle Accelerator Control Systems: A case study on controls for a novel accelerator design....135
Thilo Friedrich

DATASEM: A Simulation Suite for SoSE Management Research....141
Richard Turner; Alice E. Smith; Jeffrey Smith; Levent Yilmaz; Donghuang Li; Saicharan Chada; Alexey Tregubov

Development of the xTAN method for Cyber Physical Systems (CPS) under electromagnetic environment....147
Olivier Maurice; Kambiz Therani; Philippe Durand

Efficient Distributed Algorithm for Scheduling Workload-Aware Jobs on Multi-Clouds....153
Seyed Ali Miraftabzadeh; Paul Rad; Mo Jamshidi

Engineering the Smarts: An Illustration of the Disconnect between Control Engineering and AI....161
Michael Borth; Martijn Hendriks

Enhancing safety of transport by road by on-line monitoring of driver emotions....166
Roberto Sacile

Enhancing Systems Engineering by Scenario-based Anticipation of Future Developments....170
Iris Graessler; Julian Hentze; Philipp Scholle

Externalities and Peer Effects of Collective Adoption in Networks....175
Arash O.E. Vesaghi; Mo Mansouri

Formal Methods for a System of Systems Analysis Framework Applied to Traffic Management....181
Charles E. Dickerson; Siyuan Ji; Rosmira Roslan

Formally Describing the Software Architecture of Systems-of-Systems with SosADL....187
Flavio Oquendo

Fuzzy - Genetic Algorithm Approach to Generate an Optimal Meta-Architecture for a Smart, Safe & Efficient City Transportation System of Systems....193
Rahul Alaguvelu; David M Curry; Cihan H Dagli

Fuzzy Fault Tree Analysis of Conventional Propellant Temperature Control System....199
LinLin Du; Qiang Li

Gaining and Keeping Overview of Complex RTDI Projects with the DEWI Assessment and Monitoring Framework (DEWI-Frame)....204
Joachim Hillebrand; Michael Karner; Werner Rom

Generalized Hough Transform For Object Classification in the Maritime Domain....210
Pornrerk Rerkngamsanga; Murali Tummala; James Scrofani; John C. McEachen

Handling Commercial, Operational and Technical Uncertainty in the Early Stage of Offshore Ship Design....216
Jose Garcia Agis; Sigurd Solheim Pettersen; Carl Fredrik Rehn; Ali Ebrahimi

How to stimulate SoSE engineers to develop soft skills? How effective is a lecture in Non-Verbal Communication?....222
Gerrit Muller; Lia Charite

Impact Assessment of Cyber Attacks: A Quantification Study on Power Generation Systems....228
Unal Tatar; Hayretdin Bahsi; Adrian Gheorghe

Increased Functionality of an Underwater Robotic Manipulator....234
Benjamin Champion; Mo Jamshidi; Matthew Joordens

Interface Design in Cyber-Physical Systems-of-Systems....240
Bernhard Frömel

Kinect with ROS, interact with Oculus: Towards Dynamic User Interfaces for Robotic Teleoperation....248
Michael Mortimer; Ben Horan; Matthew Joordens

Leadership Under Conditions of Complexity....254
Brian E. White

Logical Representation of Maintenance Procedures for Verification and Analysis....260
Sean Reed; Magnus Löfstrand

Managing Complexity: Theory and Practice....266
George Rzevski

MAS based Approach to HEMS Modeling: Application of Social Interaction Mechanism to Demand-side Dynamics....272
Dong Joo Kang; Sunju Park

Matlab2cpp: a Matlab-to-C++ code translator....278
Geir Yngve Paulsen; Jonathan Feinberg; Xing Cai; Bjørn Nordmoen; Hans Petter Dahle

MBSE Driven Approach for Defining Problem Domain....283
Donatas Mazeika; Aurelijus Morkevicius; Aiste Aleksandraviciene

Measuring Tool Chain Interoperability in Cyber-physical Systems....289
Didem Gürdür; Fredrik Asplund; Jad El-khoury

Model-based Interoperability Solutions for the Supervision of Smart Gas Distribution Networks....293
Ahmed Ahmed; Mathias Kleiner; Lionel Roucoules; Rèmy Gaudy; Bertrand. Larat

Model-Based Requirements and Properties Specifications Trends for Early Design Verification of Embedded Systems....298
Muhammad Rashid; Muhammad Waseem Anwar; Farooque Azam; Muhammad Kashif

Model-Based Systems Product Line Engineering with Physical Design Variability for Aircraft Systems....305
Mole Li; Alan Grigg; Lin Guan; Charles E. Dickerson

Models Composition in FORM-L: Study of Complex Socio-Cyber-Physical Systems and Large Scale Systems of Systems....311
Thuy Nguyen

Moving Towards Standardization for System of Systems Engineering....317
Garry Roedler; Judith S. Dahmann

On the impact of emergent properties on SoS security....323
Marco Mori; Tommaso Zoppi; Andrea Ceccarelli; Andrea Bondavalli

Ontology-Based Collaboration in Multi-Robot System: Approach and Case Study....329
Alexander Smirnov; Alexey Kashevnik; Sergey Mikhailov; Mikhail Mironov; Mikhail Petrov

Operation, Safety and Human: Critical Factors for the Success of Railway Transportation....335
Mohammad Rajabalinejad; Leo van Dongen; Alberto Martinetti

π-Calculus for SoS: A Foundation for Formally Describing Software-intensive Systems-of-Systems....341
Flavio Oquendo

Proposed Testbed for the Modeling and Control of a System of Autonomous Vehicles....347
Joaquin Labrado; Berat Alper Erol; Jacqueline Ortiz; Benjamin Champion; Patrick J Benavidez; Mo Jamshidi

Recall Enhancement with Gaze Guiding: Performance Support and Error Reduction in Dual Tasks....353
Barbara Frank; Annette Kluge

Service Architectures for Product and Production Availability: A System of Systems Approach....359
Mathias Johanson; Lennart Karlsson

Simplifying Solving Complex Problems....365
Joseph Kasser; Yang-Yang Zhao

Simulation for a Coevolved System-of-Systems Meta-Architecture....371
George Muller; Cihan H Dagli

Singapore's Smart Nation Program - Enablers and Challenges....377
Eng Seng Chia

SmartDisability: A Smart System of Systems approach to Disability....382
Paul Whittington; Huseyin Dogan

SOFL-based Dependency Graph Generation for Scheduling....388
Zhuo Cheng; Haitao Zhang; Yasuo Tan; Yuto Lim

Sustainable Mobility Leveraging on 5G Mobile Communication Infrastructures in the Context of Smart City Operations....N/A
George Dimitrakopoulos

Systems Thinking: Foundations for Enhancing System of Systems Engineering....394
Charles Keating; Adrian Gheorghe

The nuts and bolts of systems....400
Joseph Kasser

Towards Trustworthy Smart Cyber-Physical-Social Systems in The Era of Internet of Things....406
Jingwei Huang; Mamadou Seck; Adrian Gheorghe

Self-organising supply networks: a case study of the SA mining industry....412
Larissa Statsenko; Vernon Ireland; Alex Gorod; Mo Mansouri

Transition from closed system to Internet of Things: A Study in Standardizing Building Lighting Systems....417
Emi Mathews; Gerrit Muller

Typology Dimensions for Classifying SoSE Problem Spaces....423
Stephen Cook; Jaci Pratt

Use Case based Approach for an Integrated Consideration of Safety and Security Aspects for Smart Home Applications....429
Jan-Peter Nicklas; Michel Mamrot; Petra Winzer; Daniel Lichte; Stefan Marchlewitz; Kai-Dietrich Wolf

Use of evidential reasoning for eliciting Bayesian subjective probabilities in human reliability analysis....435
Khalifa Abujaafar; Zhuohua Qu; Zaili Yang; Jin Wang; Salman Nazir; Kjell Ivar Øvergård

Useful Deviations for Deviation Management Information Systems: From pulse methodology to a generic description....441
Onur Kaya; Dag Bergsjö

Using Data Driven Documents (D3) to Explore a Whole Ship Model....447
John Calleya; Henrique Gaspar; Rachel J Pawling; Christopher Ryan

Using the View Model to Contextualize and Explain System-of-Systems Architecture Models....453
Joachim W. Walewski; Jürgen Heiles

Value perception of an offshore crane using electrical- vs. hydraulic main machinery system....459
Elisabeth Masdal Hovden; Maria Varpen Unhjem; Henrique Gaspar

Wicked problems: Wicked solutions....465
Joseph Kasser; Yang-Yang Zhao