

2021 IEEE International Systems Conference (SysCon 2021)

**Virtual Conference
15 April – 15 May 2021**



**IEEE Catalog Number: CFP21SYT-POD
ISBN: 978-1-6654-4440-8**

**Copyright © 2021 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:	CFP21SYT-POD
ISBN (Print-On-Demand):	978-1-6654-4440-8
ISBN (Online):	978-1-6654-4439-2
ISSN:	1944-7620

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

TABLE OF CONTENTS

MAINTAINING THE CONSISTENCY OF SYSML MODEL EXPORTS TO XML METADATA INTERCHANGE (XMI)	1
<i>Holly A. H. Handley, Wael Khallouli, Jingwei Huang, William Edmonson, Nadew Kibret</i>	
ANALYSIS OF SOFTWARE TOOLS FOR MODEL-BASED GENERIC SYSTEMS ENGINEERING FOR ORGANIZATIONS BASED ON E-DECODE	9
<i>Marian Mistler, Nadine Schlueter, Manuel Löwer</i>	
A NOVEL APPROACH TO BEHAVIOR DESIGN FOR MODEL BASED SYSTEMS ENGINEERING APPLICATION USING DESIGN STRUCTURE MATRIX	17
<i>Aditya Akundi, Tzu-Liang Bill Tseng, Carmen N. Almeraz, Rocio J. Lopez-Terrazas, Hebin Luan</i>	
SYSTEM LEVEL KNOWLEDGE REPRESENTATION FOR COMPLEXITY	24
<i>Paola Di Maio</i>	
IDENTIFYING THE THEMATIC TRENDS OF MODEL BASED SYSTEMS ENGINEERING IN MANUFACTURING AND PRODUCTION ENGINEERING DOMAINS	29
<i>Aditya Akundi, Viviana Lopez, Tzu-Liang Bill Tseng</i>	
TRUSTED INTER-PROCESS COMMUNICATION USING HARDWARE ENCLAVES	33
<i>Newton C. Will, Tiago Heinrich, Amanda B. Viescinski, Carlos A. Maziero</i>	
ENABLING THE DIGITAL TRANSFORMATION OF THE WORKFORCE: A DIGITAL ENGINEERING COMPETENCY FRAMEWORK	40
<i>Adam Baker, Kara Pepe, Nicole Hutchison, Hoong Yan See Tao, Russell Peak, Mark Blackburn, Rabia Khan, Clifford Whitcomb</i>	
SOCIALSDN: DESIGN AND IMPLEMENTATION OF A SECURE INTERNET PROTOCOL TUNNEL BETWEEN SOCIAL CONNECTIONS.....	48
<i>Michael Lescisin, Qusay H. Mahmoud</i>	
EQUIVALENT CIRCUIT MODELING OF ALL-SOLID-STATE BATTERY BY USING DC-IR DATA.....	56
<i>Burak Celen, Ayse Cisel Aras, Markus Dohr, Thyagesh Sivaraman</i>	
A FAILURE PREDICTION MODEL FOR LARGE SCALE CLOUD APPLICATIONS USING DEEP LEARNING.....	62
<i>Mohammad S. Jassas, Qusay H. Mahmoud</i>	
DISTRIBUTED LEDGERS IN DEVELOPING LARGE-SCALE INTEGRATED SYSTEMS.....	70
<i>Michael F. Marchini</i>	
OPTIMIZATION OF DEEP REINFORCEMENT LEARNING WITH HYBRID MULTI-TASK LEARNING.....	78
<i>Nelson Vithayathil Varghese, Qusay H. Mahmoud</i>	
A PROPOSAL FOR SUCCESS CRITERIA AND CATEGORIZATION SYSTEM TO A TECHNOLOGY INTRODUCTION PROGRAM FOR OIL AND GAS INNOVATION PROJECTS.....	86
<i>Milton F. Chagas Junior, Gabriel T. Jesus, Irineu S. Yassuda, Feliciano Silva, Marcos Nóbrega, Pedro M. Sousa</i>	

THE ROLES OF MODELING AND SIMULATION IN ASSESSING SPACECRAFT INTEGRATION READINESS LEVELS	94
<i>Gabriel T. Jesus, Milton F. Chagas Júnior</i>	
ENERGY-AWARE TRAJECTORY PLANNING MODEL FOR MISSION-ORIENTED DRONE NETWORKS.....	99
<i>Ying Li, Chunchao Liang</i>	
CO ₂ EMISSIONS FORECASTING IN MULTI-SOURCE POWER GENERATION SYSTEMS USING DYNAMIC BAYESIAN NETWORK.....	106
<i>Talysson M. O. Santos, Jordão N. O. Júnior, Michel Bessani, Carlos D. Maciel</i>	
TOWARDS A COMBINATION OF MARTE AND ECOA.....	114
<i>Mathieu Muzellec, Paul Vivot, Rob Vingerhoeds, Pierre De Saqui-Sannes</i>	
NOVEL APPROACH IN LABELING DATA FOR CLASSIFICATION OF WARNING LEVEL WHILE DRIVING	122
<i>Ana Farhat, Ka C Cheok</i>	
THEMED ENTERTAINMENT IN THE AGE OF CORONAVIRUS	129
<i>Daniel Dunbar, Mo Mansouri</i>	
EVALUATING THE USE OF TECHNOLOGY READINESS LEVELS (TRLs) FOR CYBERSECURITY SYSTEMS	136
<i>Jeremy Straub</i>	
DEPLOYING DIFFERENT CLUSTERING TECHNIQUES ON A COLLABORATIVE-BASED MOVIE RECOMMENDER.....	142
<i>Dina Nawara, Rasha Kashef</i>	
A MODEL-BASED APPROACH TO DOCUMENT SOFTWARE TOOLCHAINS FOR SUPPORTING A SAFETY ANALYSIS	148
<i>Stephan Baumgart, Yin Chen, Rasmus Hamrén, Sasikumar Punnekkat</i>	
A LOW COST MODULAR RADIO TOMOGRAPHY SYSTEM FOR BICYCLE AND VEHICLE DETECTION AND CLASSIFICATION.....	155
<i>Marcus Haferkamp, Benjamin Sliwa, Christian Wietfeld</i>	
SYSTEM DESIGN OF THE RIFLEMAN OF THE FUTURE	162
<i>Vikram Mittal, Samuel Herbert, Gene Lesinski, James Enos</i>	
FLYING ROBOTS FOR SAFE AND EFFICIENT PARCEL DELIVERY WITHIN THE COVID- 19 PANDEMIC	170
<i>Manuel Patchou, Benjamin Sliwa, Christian Wietfeld</i>	
AUTOMATED EXTRACTION AND CLASSIFICATION OF SLOT MACHINE REQUIREMENTS FROM GAMING REGULATIONS.....	177
<i>Michael D. Prendergast</i>	
USING AHP TO CHOOSE OPTIMAL NUCLEAR POWER PLANT DESIGN	183
<i>Lauren Kiser, Luis Daniel Otero</i>	
MODELING AND SIMULATING FEDERATED DATABASES FOR EARLY VALIDATION OF FEDERATED SEARCHES USING THE BROKER-BASED SYSML TOOLBOX.....	188
<i>Sylvia Melzer, Stefan Thiemann, Ralf Möller</i>	

OFFENSIVE CYBER SECURITY TRAINER FOR PLATFORM MANAGEMENT SYSTEMS	194
<i>Jonathan Timmins, Scott Knight, Brian Lachine</i>	
NETWORK TRAFFIC FLOW BASED MACHINE LEARNING TECHNIQUE FOR IOT DEVICE IDENTIFICATION.....	202
<i>Imtiaz Ullah, Qusay H. Mahmoud</i>	
SYSTEMATIC MAPPING ON PREVENTION OF DDOS ATTACKS ON SOFTWARE DEFINED NETWORKS.....	210
<i>Alfredo Menezes Vieira, Rubens De Souza Matos Junior, Admilson De Ribamar Lima Ribeiro</i>	
MODELLING OF USING HALL MAGNETIC SENSOR FOR ENVIRONMENTAL MONITOR OF MICROMETER-SIZED MAGNETITE PARTICLES	218
<i>Hua Fan, Huajiang Xie, Jiangmin Mao, Jianming Liu, Xiaopeng Diao, Qi Wei, Quanyuan Feng</i>	
EFFICIENT TRAFFIC CLASSIFICATION USING HYBRID DEEP LEARNING	222
<i>Farnaz Sarhangian, Rasha Kashef, Muhammad Jaseemuddin</i>	
ANOMALY DETECTION TECHNIQUE FOR INTRUSION DETECTION IN SDN ENVIRONMENT USING CONTINUOUS DATA STREAM MACHINE LEARNING ALGORITHMS.....	230
<i>Admilson De Ribamar Lima Ribeiro, Reneilson Yves Carvalho Santos, Anderson Clayton Alves Nascimento</i>	
DESIGN OF A HUMAN CENTERED COMPUTING (HCC) BASED VIRTUAL REALITY SIMULATOR TO TRAIN FIRST RESPONDERS INVOLVED IN THE COVID-19 PANDEMIC	237
<i>J. Cecil, Sam Kauffman, Avinash Gupta, Vern McKinney, M. D. Miguel Pirela-Cruz</i>	
REAL-TIME EDGE PROCESSING DETECTION OF MALICIOUS ATTACKS USING MACHINE LEARNING AND PROCESSOR CORE EVENTS	244
<i>Rob Oshana, Mitchell A. Thornton, Eric C. Larson, Xavier Roumegue</i>	
A MODEL-DRIVEN FRAMEWORK FOR SECURITY LABS USING BLOCKCHAIN METHODOLOGY.....	252
<i>Moneeb Abbas, Muhammad Rashid, Farooque Azam, Yawar Rasheed, Muhammad Waseem Anwar, Maryum Humdani</i>	
A MODEL-DRIVEN FRAMEWORK FOR THE PREVENTION OF DOS ATTACKS IN SOFTWARE DEFINED NETWORKING (SDN).....	259
<i>Muhammad Usman Farooq, Muhammad Rashid, Farooque Azam, Yawar Rasheed, Muhammad Waseem Anwar, Zohaib Shahid</i>	
A MODEL BASED NEUROREHABILITATION (MBN) FRAMEWORK USING KINECT.....	266
<i>Zaeem Anwaar, Muhammad Rashid, Farooque Azam, Muhammad Waseem Anwar, Yawar Rasheed, Maryum Humdani</i>	
DESIGN STRATEGIES FOR INTEGRATING ARTIFICIAL INTELLIGENCE INTO SYSTEMS ENGINEERING ENVIRONMENT.....	272
<i>Leandro Batista, Bruno Monsuez</i>	
VITA1: AN UNMANNED UNDERWATER VEHICLE PROTOTYPE FOR OPERATION IN UNDERWATER TUNNELS.....	278
<i>Vitor A. M. Jorge, Pedro Daniel De Cerqueira Gava, Juan R. B. F. Silva, Thais M. Mancilha, Waldir Vieira, Geraldo José Adabo, Cairo L. Nascimento</i>	

(UN)ETHICAL SOFTWARE ENGINEERING: A CRITICAL REVIEW ABOUT SOFTWARE ENGINEERING IN FACE OF SECURITY REQUIREMENTS IN THE IOT/ IOE SOCIETY.....	286
<i>Fabiana Figueira Sanches Flores, Silvio Romero De Lemos Meira</i>	
MODEL-BASED SYSTEMS ENGINEERING APPLIED TO THE DETECTION AND CORRECTION OF OBJECT SLIPPAGE WITHIN A DEXTEROUS ROBOTIC HAND.....	294
<i>Charles A. Meehan, John S. Baras</i>	
SINGLE PACKET AS TRACEBACK AGAINST DOS ATTACKS.....	307
<i>Abdullah Yasin Nur, Mehmet Engin Tozal</i>	
SYSTEMS DESIGN FOR EEG SIGNAL CLASSIFICATION OF SENSORIMOTOR ACTIVITY USING MACHINE LEARNING	315
<i>Jacqueline Heaton, Sidney Givigi</i>	
APPLICATION OF STATISTICAL MACHINE LEARNING ALGORITHMS FOR CLASSIFICATION OF BRIDGE DEFORMATION DATA SETS.....	322
<i>Juan C. Avendano, Luis Daniel Otero, Carlos Otero</i>	
OPTIMIZATION OF SENSOR PLACEMENT IN A BRIDGE STRUCTURAL HEALTH MONITORING SYSTEM.....	329
<i>Juan C. Avendano, Luis Daniel Otero, Carlos Otero</i>	
METHOD FOR SELF-HEALING COURSE OF ACTION REVISION (SCOAR).....	334
<i>Paul C. Hershey</i>	
STRENGTHENING THE PRACTICAL CAPACITY OF STUDENTS: AN EDUCATIONAL CASE STUDY ABOUT TEACHING FEEDBACK IN ELECTRONICS CIRCUIT.....	340
<i>Hua Fan, Zonglin Li, Quanyuan Feng, Qi Wei</i>	
A SYSTEM FOR P300 DETECTION APPLIED TO VEHICLE NAVIGATION.....	345
<i>Riley Magee, Sidney Givigi</i>	
SEMANTIC MAPPING FROM SYSML TO FRP: TO ENABLE EXECUTABLE AND VERIFIABLE SYSTEMS DESIGN	353
<i>Jingwei Huang, Wael Khallouli, Handley Holly A. H., William Edmonson, Trisha Ahmed, Nadew Kibret</i>	
MBSE AND MDAO FOR EARLY VALIDATION OF DESIGN DECISIONS: A BIBLIOGRAPHY SURVEY	360
<i>Jean-Charles Chaudemar, Pierre De Saqui-Sannes</i>	
A GENERIC MODEL FOR PRIVACY-PRESERVING AUTHENTICATION ON SMARTPHONES.....	368
<i>Sepehr Keykhaie, Samuel Pierre</i>	
PERFORMANCE QUANTIFICATION AND HEART RATE ANALYSIS IN A REPEATED-TRIAL SIMULATION-BASED TRAINING TASK.....	375
<i>Imali T. Hettiarachchi, Samer Hanoun, Rakesh Veerabhadrapa, Dawei Jia, Simon Hosking, Asim Bhatti</i>	
MULTI-OBJECTIVE HETEROGENEOUS MULTI-ASSET COLLECTION SCHEDULING OPTIMIZATION WITH HIGH-LEVEL INFORMATION FUSION	382
<i>Joel Muteba Kande, Rami Abielmona, Moufid Harb, Jean Berger, Rafael Falcon, Emil Petriu</i>	

REQUIREMENTS FOR A SYSTEM MODEL IN THE CONTEXT OF DIGITAL ENGINEERING	390
<i>Ronald E. Giachetti, Warren Vaneman</i>	
INVESTIGATION OF REAL-TIME TASK SCHEDULING ON ROBOT FLEETS WITH RECONFIGURABLE ACTUATORS	397
<i>Trevor Robin Smith, Spencer Ploeger, Benjamin Dyer</i>	
TESTING THE APPLICATION OF SUPPORT VECTOR MACHINE (SVM) TO TECHNICAL TRADING RULES	402
<i>André R. Fonseca, Michel C. R. Leles, Mariana G. Moreira, Adriano S. Vale-Cardoso, Marcos V. L. Pereira, Elton F. Sbruzzi, Cairo L. Nascimento</i>	
USING RECURRENCE QUANTIFICATION ANALYSIS TO QUANTIFY THE PHYSIOLOGICAL SYNCHRONY IN DYADIC ECG DATA.....	410
<i>Rakesh Veerabhadrapa, Imali T. Hettiarachchi, Asim Bhatti</i>	
A CLUSTER-BASED AND DROP-AWARE EXTENSION OF RPL TO PROVIDE RELIABILITY IN IOT APPLICATIONS	418
<i>Maryam Shirbeigi, Bardia Safaei, Aliasghar Mohammadsalehi, Amir Mahdi Hosseini Monazzah, Jörg Henkel, Alireza Ejlali</i>	
INCORPORATING BEHAVIOR IN ATTRIBUTE BASED ACCESS CONTROL MODEL USING MACHINE LEARNING	425
<i>Majid Afshar, Saeed Samet, Hamid Usefi</i>	
INTEGRATION OF CONSTRAINT PROGRAMMING AND MODEL-BASED APPROACH FOR SYSTEM SYNTHESIS	433
<i>Yvars Pierre-Alain, Zimmer Laurent</i>	
A TRANSDISCIPLINARY SOCIO-TECHNICAL SYSTEMS APPROACH: WIRELESS SOLUTIONS FOR THE DIGITAL DIVIDE.....	441
<i>Shamsnaz Virani Bhada, Casey Canfield, Alexander Wyglinski</i>	
ENERGY CONSUMPTION EVALUATION OF LPWAN: A STOCHASTIC MODELING APPROACH FOR IOT SYSTEMS	446
<i>Diogo Lages, Eric Borba, Jean Araujo, Eduardo Tavares, Erica Sousa</i>	
A SOFTWARE MAINTENANCE METHODOLOGY: AN APPROACH APPLIED TO SOFTWARE AGING.....	454
<i>Jean Araujo, Carlos Melo, Felipe Oliveira, Paulo Pereira, Rubens Matos</i>	
WIRELESS AND AUTONOMOUS SAFETY-CRITICAL SYSTEM UTILIZING FEEDBACK.....	462
<i>Thomas Li, Akramul Azim</i>	
INFUSION COMPLEXITY: UNDERSTANDING THE NEED TO MEASURE INFUSION SUCCESS OF ADVANCED TECHNOLOGIES INTO COMPLEX SYSTEMS.....	470
<i>Cinda Chullen, Roshanak Nilchiani</i>	
HOW EMOJI AND WORD EMBEDDING HELPS TO UNVEIL EMOTIONAL TRANSITIONS DURING ONLINE MESSAGING	478
<i>Moeen Mostafavi, Michael D. Porter</i>	
EXPERIMENTAL VALIDATION OF A STEERING CONTROL SYSTEM USING AN ADAPTIVE FUZZY CONTROLLER AND COMPUTER VISION	486
<i>Thiago H. Sato, Sérgio R. Barros Dos Santos, André M. De Oliveira, Fábio A. M. Cappabianco, Sidney N. Givigi</i>	

PLANNING OF THE COORDINATION OF MULTIPLE QUADROTORS APPLIED TO THE TRANSPORT OF MATERIALS	494
<i>Walber Lima Pinto Junior, Luiz Eugênio Santos Araújo Filho, Cairo Lúcio Nascimento Júnior, Sérgio Ronaldo Barros Dos Santos, Wagner Chiepa Cunha</i>	
EKF-SLAM WITH AUTONOMOUS EXPLORATION USING A LOW COST ROBOT	501
<i>Larissa De Souza Pinto, Luiz Eugênio Santos Araújo Filho, Leonardo Mariga, Cairo Lúcio Nascimento Júnior, Wagner Chiepa Cunha</i>	
TRANSFER LEARNING ON THE EDGE NETWORKS	508
<i>Deepak Saggi, Akramul Azim</i>	
PERFORMANCE EVALUATION OF DISTRIBUTED SYSTEMS IN MULTIPLE CLOUDS USING DOCKER SWARM	516
<i>Nitin Naik</i>	
A MODEL BASED SYSTEMS ENGINEERING APPROACH FOR BEHAVIORAL RESPONSES TO ADVANCED QUANTITATIVE PRECIPITATION INFORMATION	522
<i>William Brooks, V. Chandrasekar, Greg Pratt, Rob Cifelli</i>	
A TALE OF TWO METRICS: POLLING AND FINANCIAL CONTRIBUTIONS AS A MEASURE OF PERFORMANCE	528
<i>Moeen Mostafavi, Maria Phillips, Yichen Jiang, Michael D. Porter, Paul Freedman</i>	
COMBATING DDOS ATTACKS WITH FAIR RATE THROTTLING	534
<i>Abdullah Yasin Nur</i>	
EXTENDING ISO26262 TO AN OPERATIONALLY COMPLEX SYSTEM.....	542
<i>Jennifer Dawson, Divya Garikapati</i>	
A GENERATIVE APPROACH FOR CREATING ECLIPSE SIRIUS EDITORS FOR GENERIC SYSTEMS.....	549
<i>Francesco Bedini, Ralph Maschotta, Armin Zimmermann</i>	
TIME OPTIMAL CONCURRENT DATA COLLECTION TREES FOR IOT APPLICATIONS	557
<i>Arvind Kumar, Rakesh Matam, Mithun Mukherjee</i>	
COGNITIVE REHABILITATION BASED PERSONALIZED SOLUTION FOR DEMENTIA PATIENTS USING REINFORCEMENT LEARNING	564
<i>M. H. K. R. Rathnayaka, W. K. C. R. Watawala, M. G. Manamendra, S. R. R. M. Silva, Dharshana Kasthurirathna, Thilini Jayalath</i>	
MACHINE LEARNING WITH SYSTEM/SOFTWARE ENGINEERING IN SELECTION AND INTEGRATION OF INTELLIGENT ALGORITHMS	570
<i>Jasser Alharbi, Siddhartha Bhattacharyya</i>	
AN INITIAL SET OF HEURISTICS FOR HANDLING ORGANIZATIONAL COMPLEXITY	577
<i>Dean Beale, Theo Tryfonas</i>	
DEPENDABILITY AND SUSTAINABILITY EVALUATION OF DATA CENTER ELECTRICAL ARCHITECTURES	585
<i>Kádna Camboim, João Ferreira, Carlos Melo, Jean Araujo, Fernanda Alencar, Paulo Maciel</i>	
SYSTEM EXECUTION PATH PROFILING USING HARDWARE PERFORMANCE COUNTERS	593
<i>Francis Giraldeau, Naser Ezzati-Jivan, Michel R. Dagenais</i>	

ENHANCING THE PERFORMANCE OF NETWORK TRAFFIC CLASSIFICATION METHODS USING EFFICIENT FEATURE SELECTION MODELS	601
<i>Farzana Alam, Rasha Kashef, Muhammad Jaseemuddin</i>	
MALWARE SYSTEM CALLS DETECTION USING HYBRID SYSTEM	607
<i>Yue Guan, Naser Ezzati-Jivan</i>	
IMPACT EVALUATION OF DDOS ATTACKS USING IOT DEVICES	615
<i>Ronierison Maciel, Jean Araujo, Carlos Melo, Paulo Pereira, Jamilson Dantas, Júlio Mendonça, Paulo Maciel</i>	
DOES THE COMPLEX SOS HAVE NEGATIVE EMERGENT BEHAVIOR? LOOKING FOR VIOLATIONS FORMALLY	623
<i>Ramakrishnan Raman, Yogananda Jeppu</i>	
PROVIDING DESIGNERS WITH AUTOMATED DECISION-MAKING WITHIN SYSML MODELS TO PROMOTE EFFICIENT MODEL-BASED SYSTEMS DESIGN.....	630
<i>Christos Kotronis, Anargyros Tsadimas, Mara Nikolaidou</i>	
DIALOGIC: INTERACTION-FOCUSED SPEAKER DIARIZATION	638
<i>R. Duke, A. Doholi</i>	
K-SHELL DECOMPOSITION OF AS LEVEL MULTIGRAPHS	646
<i>Abdullah Yasin Nur</i>	

Author Index