

# **2022 IEEE 27th Pacific Rim International Symposium on Dependable Computing (PRDC 2022)**

**Beijing, China**

**28 November - 1 December 2022**



**IEEE Catalog Number: CFP22245-POD**  
**ISBN: 978-1-6654-8556-2**

**Copyright © 2022 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:	CFP22245-POD
ISBN (Print-On-Demand):	978-1-6654-8556-2
ISBN (Online):	978-1-6654-8555-5
ISSN:	1555-094X

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# 2022 IEEE 27th Pacific Rim International Symposium on Dependable Computing (PRDC) **PRDC 2022**

## Table of Contents

Message from the General Chair .....	x
Message from the Research Track Co-Chairs .....	xii
Message from the Industry Track Organizing Chairs .....	xiii
Message from the Fast Abstract Co-Chairs .....	xiv
Organizing Committee .....	xv
Steering Committee .....	xvi
Program Committee .....	xvii
External Reviewers .....	xix
Keynotes .....	xx
Sponsors .....	xxiv

## Best Paper Nominees

Safe Rust Code Recommendation Based on Siamese Graph Neural Network .....	1
<i>Xiuwen Lu (Fudan University, China), Zhicong Zhang (Fudan University, China), and Hui Xu (Fudan University, China)</i>	
Modeling and Evaluating the Effects of Jamming Attacks on Connected Automated Road Vehicles .....	12
<i>Mehdi Maleki (RISE Research Institutes of Sweden, Sweden), Mateen Malik (RISE Research Institutes of Sweden, Sweden), Peter Folkesson (RISE Research Institutes of Sweden, Sweden), Behrooz Sangchoolie (RISE Research Institutes of Sweden, Sweden), and Johan Karlsson (Chalmers University of Technology, Sweden)</i>	
Tracing Processing of Service Requests in Cloud Environments .....	24
<i>Yinqin Zhao (Tsinghua University, China), Chang Liu (Tsinghua University, China), Tao Yu (Tsinghua University, China), Long Wang (Tsinghua University, China; Zhongguancun Laboratory, China), Xuanqing Shi (Nanjing University of Aeronautics and Astronautics, China), Yong Yang (Peking University, China), Ying Li (Peking University, China), Zhengang Wang (Huawei Corporation, China), and Dongdong Shangguan (Huawei Corporation, China)</i>	

## Machine Learning Safety and Reliability

How Data Diversification Benefits the Reliability of Three-Version Image Classification Systems .....	34
<i>Mitsuho Takahashi (University of Tsukuba, Japan), Fumio Machida (University of Tsukuba, Japan), and Qiang Wen (University of Tsukuba, Japan)</i>	
Automating Safety Argument Change Impact Analysis for Machine Learning Components .....	43
<i>Carmen Carlan (fortiss GmbH, Germany), Lydia Gauerhof (Robert Bosch GmbH, Germany), Barbara Gallina (Mälardalen University, Sweden), and Simon Burton (Fraunhofer IKS, Germany)</i>	
Characterizing Deep Learning Neural Network Failures Between Algorithmic Inaccuracy and Transient Hardware Faults .....	54
<i>Sabuj Laskar (University of Iowa, USA), Md Hasanur Rahman (University of Iowa, USA), Bohan Zhang (University of Iowa, USA), and Guanyang Li (University of Iowa, USA)</i>	
SiMOOD: Evolutionary Testing Simulation with Out-Of-Distribution Images .....	68
<i>Raul Sena Ferreira (LAAS-CNRS, University of Toulouse, France), Joris Guerin (LAAS-CNRS, University of Toulouse, France), Jeremie Guiochet (LAAS-CNRS, University of Toulouse, France), and Helene Waeselynck (LAAS-CNRS, University of Toulouse, France)</i>	

## Critical Infrastructure Security

Enhanced Software Development Process for CubeSats to Cope with Space Radiation Faults .....	78
<i>David Paiva (CISUC, University of Coimbra, Portugal), Raffael Lima (COENE, INPE, Brazil), Manoel Carvalho (COENE, INPE, Brazil), Fátima Mattiello-Francisco (COEPE, INPE, Brazil), and Henrique Madeira (CISUC, University of Coimbra, Portugal)</i>	
A Heterogeneous Redundant Architecture for Industrial Control System Security .....	89
<i>Zhihao Dai (University of Warwick, United Kingdom), Matthew Leeke (University of Warwick, United Kingdom), Yulong Ding (Southern University of Science and Technology, China), and Shuang-Hua Yang (Southern University of Science and Technology, China)</i>	
Random Bad State Estimator to Address False Data Injection in Critical Infrastructures .....	98
<i>Giulio Masetti (ISTI-CNR, Italy), Silvano Chiaradonna (ISTI-CNR, Italy), Leonardo Robol (University of Pisa, Italy; ISTI-CNR, Italy), and Felicita Di Giandomenico (ISTI-CNR, Italy)</i>	
Towards a Dependable Energy Market: Proof of Authority in a Blockchain-Based Peer-to-Peer Microgrid .....	109
<i>Joe Hewett (University of Warwick, United Kingdom), Mark Etman (University of Warwick, United Kingdom), Robbie Marseglia (University of Warwick, United Kingdom), Tomas Mella Pickersgill (University of Warwick, United Kingdom), and Matthew Leeke (University of Warwick, United Kingdom)</i>	

## Software and Network Security

Performance and Security Evaluation of a Moving Target Defense Based on a Software-Defined Networking Environment .....	119
<i>Minjune Kim (University of Queensland, Australia), Jin-Hee Cho (Virginia Tech, USA), Hyuk Lim (Korea Institute of Energy Technology (KENTECH), Republic of Korea), Terrence J. Moore (US Army Research Lab., USA), Frederica F. Nelson (US Army Research Lab., USA), and Dan Dongseong Kim (University of Queensland, Australia)</i>	
On the Evaluation of Three Pre-Injection Analysis Techniques for Model-Implemented Fault-and Attack Injection .....	130
<i>Peter Folkesson (RISE Research Institutes of Sweden, Sweden), Behrooz Sangchoolie (RISE Research Institutes of Sweden, Sweden), Pierre Kleberger (RISE Research Institutes of Sweden, Sweden), and Nasser Nowdehi (Volvo AB, Sweden)</i>	
Security Modeling and Analysis of Moving Target Defense in Software Defined Networks .....	141
<i>Júlio Mendonça (University of Luxembourg, Luxembourg), Minjune Kim (University of Queensland, Australia), Rafal Graczyk (University of Luxembourg, Luxembourg), Marcus Völp (University of Luxembourg, Luxembourg), and Dan Dongseong Kim (University of Queensland, Australia)</i>	
A Software Vulnerability Dataset of Large Open Source C/C++ Projects .....	152
<i>José D’Abruzzo Pereira (University of Coimbra, CISUC, DEI, Portugal), João Henggeler Antunes (University of Coimbra, CISUC, DEI, Portugal), and Marco Vieira (University of Coimbra, CISUC, DEI, Portugal)</i>	

## Fault Tolerance and Resilience

AnoDe: A Log-Based Self-Supervised Framework to Detect Scrubber Failures in SRAM-FPGA .....	164
<i>Trishna Rajkumar (KTH Royal Institute of Technology, Sweden) and Johnny Öberg (KTH Royal Institute of Technology, Sweden)</i>	
Understanding the Resiliency of Cloud Storage Services .....	172
<i>Archita Ghosh (Indian Institute of Science, India) and J Lakshmi (Indian Institute of Science, India)</i>	
Reliability Analysis of Multi-State System Based on Irrelevance Coverage Model .....	184
<i>Kangning Song (Wuhan University of Technology, China), Siwei Zhou (Wuhan University of Technology, China), Luyao Ye (Wuhan University of Technology, China), Piaoyi Liu (Wuhan University of Technology, China), Jing Tian (Wuhan University of Technology, China), and Jianwen Xiang (Wuhan University of Technology, China)</i>	
Are UAVs' Flight Controller Software Reliable? .....	194
<i>Anamta Khan (University of Coimbra, Portugal), Naghmeah Ivaki (University of Coimbra, Portugal), and Henrique Madeira (University of Coimbra, Portugal)</i>	

## Software and Network Security

Developing a GPT-3-Based Automated Victim for Advance Fee Fraud Disruption .....	205
<i>Joe Hewett (University of Warwick, United Kingdom) and Matthew Leeke (University of Warwick, United Kingdom)</i>	
HERB+: Evolving an Industrial-Strength Privacy Preserving Machine Learning Framework .....	212
<i>Qianying Liao (University of Coimbra, Portugal), Alexandre Cortez Santos (University of Coimbra, Portugal), Bruno Cabral (University of Coimbra, Portugal), João Paulo Fernandes (University of Porto, Portugal), and Nuno Lourenço (University of Coimbra, Portugal)</i>	

## Industry Track

An Industrial Approach for Model-Based Reliability-Oriented System Design .....	224
<i>Juan Manuel Morote (Universidad de Castilla-La Mancha, Spain), Jose Luis de la Vara (Universidad de Castilla-La Mancha, Spain), Giovanni Giachetti (Universidad de Castilla-La Mancha, Spain; Universidad Andrés Bello, Chile), Clara Ayora (Tree Technology, Spain), and Luis Alonso (The REUSE Company, Spain)</i>	
Model-Based Generation and Analysis Toolset of Fault Trees With Heterogeneous Failure Events .....	230
<i>Nicolas Rapin (CEA, France), Boutheina Bannour (CEA, France), and Morayo Adedjouma (CEA, France)</i>	
Examining the Utility of Differentially Private Synthetic Data Generated using Variational Autoencoder with Tensorflow Privacy .....	236
<i>Bo-Chen Tai (CITI, Academia Sinica, Taiwan), Szu-Chuang Li (Tamkang University, Taiwan), Yennun Huang (CITI, Academia Sinica, Taiwan), and Pang-Chieh Wang (ICL, ITRI, Taiwan)</i>	
Signature of Electrical System Reliability Used Inside Aircraft .....	242
<i>Emad Kareem Mutar (Directorate of Education Babylon, Iraq)</i>	

## Fast Abstract Track

Towards Building Secure and Reconfigurable Virtual Networks on Multi-Tenant Data Centers .....	248
<i>Jinwoo Kim (Kwangwoon University, South Korea) and Jaehyun Nam (Dankook University, South Korea)</i>	
Comparison of Meta-Heuristic Algorithms for Task Scheduling in Distributed Stream Processing .....	252
<i>Dohan Kim (Kyungpook National University, South Korea), Aming Wu (Kyungpook National University, South Korea), and Young-Woo Kwon (Kyungpook National University, South Korea)</i>	
Stuck-at Fault Tolerance in DNN using Statistical Data .....	256
<i>Tomohiro Ishii (Chiba University, Japan) and Kazuteru Namba (Chiba University, Japan)</i>	
Extracting Network Knowledge and Monitoring Network Status on Cloud Container Platforms .....	258
<i>Yinqin Zhao (Tsinghua University, China) and Long Wang (Tsinghua University, China)</i>	

Progressive Evolution Scheme with Socialization Swarm for Privacy Blockchain ..... 261  
*Daoqi Han (Beijing University of Posts and Telecommunications, China),  
Tao Yu (Tsinghua University, China), and Yueming Lu (Beijing  
University of Posts and Telecommunications, China)*

**Author Index** ..... 265