Communications in Computer and Information Science

1123

Commenced Publication in 2007
Founding and Former Series Editors:
Phoebe Chen, Alfredo Cuzzocrea, Xiaoyong Du, Orhun Kara, Ting Liu,
Krishna M. Sivalingam, Dominik Ślęzak, Takashi Washio, Xiaokang Yang,
and Junsong Yuan

Editorial Board Members

Simone Diniz Junqueira Barbosa

Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Rio de Janeiro, Brazil

Joaquim Filipe

Polytechnic Institute of Setúbal, Setúbal, Portugal

Ashish Ghosh

Indian Statistical Institute, Kolkata, India

Igor Kotenko

St. Petersburg Institute for Informatics and Automation of the Russian Academy of Sciences, St. Petersburg, Russia

Lizhu Zhou

Tsinghua University, Beijing, China

More information about this series at http://www.springer.com/series/7899

Guojun Wang · Md Zakirul Alam Bhuiyan · Sabrina De Capitani di Vimercati · Yizhi Ren (Eds.)

Dependability in Sensor, Cloud, and Big Data Systems and Applications

5th International Conference, DependSys 2019 Guangzhou, China, November 12–15, 2019 Proceedings



Editors
Guojun Wang
Guangzhou University
Guangzhou, China

Sabrina De Capitani di Vimercati
Università degli Studi di Milano
Milan, Italy

Md Zakirul Alam Bhuiyan b Fordham University New York, USA

Yizhi Ren (1)
Hangzhou Dianzi University
Hangzhou, China

ISSN 1865-0929 ISSN 1865-0937 (electronic) Communications in Computer and Information Science ISBN 978-981-15-1303-9 ISBN 978-981-15-1304-6 (eBook) https://doi.org/10.1007/978-981-15-1304-6

© Springer Nature Singapore Pte Ltd. 2019, corrected publication 2020

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd. The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Preface

The 5th International Conference on Dependability in Sensor, Cloud, and Big Data Systems and Applications (DependSys 2019) was held in Guangzhou, China, November 12–15, 2019, and was hosted by School of Computer Science, Guangzhou University. This conference series brings together new ideas, techniques, and solutions for dependability and its issues in sensor, cloud, and big data systems and applications.

The first and second DependSys were both held in Zhangjiajie, China (2015, 2016), the most beautiful place in the world, the third in Guangzhou, China (2017), and the fourth in Melbourne, Australia (2018). Following the style of the previous four successful conferences, DependSys 2019 provided a forum for individuals, academics, practitioners, and organizations who are developing or procuring sophisticated computer systems, and on whose dependability of services they need to place great confidence.

This year, the conference received 112 submissions from all over the world. All submissions were reviewed by at least three reviewers based on a high-quality review process. A total of 39 oral papers were presented at the conference and included in this Springer CCIS volume (i.e., an acceptance rate of 34.8%). The editors would like to thank the authors for their contributions and the reviewers for their thorough and constructive work contributing to the quality of the papers. In addition to the technical presentations, the program included a number of keynote speeches by world-renowned researchers. We are very grateful to the keynote speakers for their time and willingness to share their expertise with the conference attendees.

DependSys 2019 was made possible by the joint efforts of a large number of individuals and organizations worldwide. There is a long list of people who volunteered their time and energy to put together the conference and deserve special thanks. First and foremost, we would like to greatly acknowledge the guiding work of the Steering Committee Chairs, Prof. Jie Wu from Temple University, USA, and Prof. Md Zakirul Alam Bhuiyan from Fordham University, USA. We are also deeply grateful to all the Program Committee members for their time and efforts in reading, commenting, debating and finally selecting the papers.

We would like to offer our gratitude to General Chairs, Prof. Vincenzo Piuri, Prof. Witold Pedrycz, and Prof. Guojun Wang, for their tremendous support and advice in ensuring the success of the conference. Thanks also go to: Program Chairs: Md Zakirul Alam Bhuiyan, Sabrina De Capitani di Vimercati, and Yizhi Ren; Workshop Chairs: Debiao He, Kevin I-Kai Wang, and Syed Hassan Ahmed; Local Organizing Committee Chair: Jianer Chen; Publicity Chairs: Kuan-Ching Li, Saqib Ali, Yulei Wu, and Michele Nappi; Local Organizing Committee Chair: Jianer Chen; and Journal Special Issue Chairs: Kim-Kwang Raymond Choo, Chunhua Su, and Arcangelo Castiglione.

It is worth noting that DependSys 2019 was jointly held with the 7th International Conference on Smart City and Informatization (iSCI 2019). We encouraged all participants to explore the co-located conferences while in Guangzhou.

vi Preface

Finally, we would like to thank all the organizers, contributing authors, and attendees of DependSys 2019 for a lively and scientifically stimulating meeting. Hopefully, you also enjoyed the beautiful city of Guangzhou, China!

November 2019

Guojun Wang Md Zakirul Alam Bhuiyan Sabrina De Capitani di Vimercati Yizhi Ren Kim-Kwang Raymond Choo

Organization

General Chairs

Vincenzo Piuri University of Milan, Italy Witold Pedrycz University of Alberta, Canada Guojun Wang Guangzhou University, China

Program Chairs

Md Zakirul Alam Bhuiyan Fordham University, USA

Sabrina De Capitani di Universita degli Studi di Milano, Italy

Vimercati

Yizhi Ren Hangzhou Dianzi University, China

Program Vice Chairs

Track 1: Dependability and Security Fundamentals and Technologies

Qin Liu Hunan University, China

Karthigai Kumar Karpagam College of Engineering, India

Track 2: Dependable and Secure Systems

Guangjie Han Dalian University of Technology, China Mamoun Alazab Australian National University, Australia

Track 3: Dependable and Secure Applications

Zhiyuan Tan Edinburgh Napier University, UK Rasheed Hussain Innopolis University, Russia Thaier Hayajneh Fordham University, USA

Track 4: Dependability and Security Measures and Assessments

Md. Arafatur Rahman

Alireza Jolfaei

Aniello Castiglione

University Malaysia Pahang, Malaysia

Federation University Australia, Australia
University of Naples Parthenope, Italy

Program Committee

Track 1: Dependability and Security Fundamentals and Technologies

Qin Liu Hunan University, China

Karthigai Kumar Karpagam College of Engineering, India

Shaikh Arifuzzaman University of New Orleans, USA

Marco Guazzone University of Piemonte Orientale, Italy Subir Halder B. C. Roy Engineering College, India King Saud University, Saudi Arabia Mohammad Mehedi Hassan East Tennessee State University, USA Mohammad Asadul Hoque Federation University Australia, Australia Alireza Jolfaei Carlos Juiz University of the Balearic Islands, Spain

Hunan University of Science and Technology, China Xiong Li

Central South University, China Anfeng Liu

Changqing Luo Virginia Commonwealth University, USA

Sumesh Philip Illinois State University, USA

Vladimir Podolskiy Technical University of Munich, Germany Shawon S. M. Rahman The University of Hawaii-Hilo, USA University of Dhaka, Bangladesh Md. Abdur Razzague Shenzhen University, China Rukhsana Ruby Kouichi Sakurai Kyushu University, Japan Jagannath University, Bangladesh Selina Sharmin

M. Kamruzzaman Sikder Humber College, Canada

Embry-Riddle Aeronautical University, USA Houbing Song

Yulei Wu University of Exeter, UK Hunan University, China Guoqi Xie Yifan Zhang SUNY Binghamton, USA

Track 2: Dependable and Secure Systems

Guangjie Han Dalian University of Technology, China Australian National University, Australia Mamoun Alazab Xi'an Jiaotong-Liverpool University, China Muhammad Alam

Yuanguo Bi Northeastern University, USA

City University of Hong Kong, Hong Kong, China Sammy Chan

Multimedia University, Malaysia Wooiping Cheah Lien-Wu Chen Feng Chia University, Taiwan Northeastern University, USA Long Cheng

Long Cheng State Key Laboratory of Management and Control

for Complex Systems, China

Central South University, China Longjun Dong

Xiao-Jiang (James) Du Temple University, USA

Xiaopeng Fan Shenzhen Institutes of Advanced Technology, China

Haiguang Fang Capital Normal University, China Weiwei Fang Beijing Jiaotong University, China Zhejiang University, China Shibo He

Jiankun Hu University of New South Wales at the Australian

Defence Force Academy, Australia

Qiong Huang South China Agricultural University, China

Muhammad Imran King Saud University, Saudi Arabia Chinese Academy of Sciences, China Wenbin Jiang

Georgios Kambourakis University of the Aegean, Greece Arijit Karati National Sun Yatsen University, Taiwan

Marimuthu Karuppiah VIT University Vellore, India Gábor Kiss University óbuda, Hungry

Kenichi Kourai Kyushu Institute of Technology, Japan

Aohan Li Keio University, Japan

Chunxiao Li Zhejiang University of Technology, China Fan Li Beijing Institute of Technology, China

Jie Li Northeastern University, USA
Lu Li University of Derby, UK
Guilan Luo Dali University, China
Manuel Mazzara Innopolis University, Russia
Wang Miao University of Exeter, UK
Jianwei Niu Beihang University, China

Jonghyun Park Chonnam National University, South Korea

Al-Sakib Khan Pathan
Anand Paul
International Islamic University Malaysia, Malaysia
Kyungpook National University, South Korea

Gerardo Pelosi Politecnico di Milano, Italy

Yuexing Peng Beijing University of Posts and Telecommunications,

China

Lianyong Qi Qufu Normal University, China Varatharajan Ramachandran Bharath University, India

Yiqiang Sheng National Network New Media Engineering Research

Center, China

Mohammad Shojafar University of Padua, Italy

Lei Shu Guangdong University of Petrochemical Technology,

China

Yunchuan Sun Beijing Normal University, China

Apostolos Syropoulos Greek Molecular Computing Group, Greece

Bing Tang Hunan University of Science and Technology, China

Sana Ullah Polytechnic Institute of Porto, Portugal

Jiafu Wan South China University of Technology, China

Kun Wang Nanjing University of Posts and Telecommunications,

China

Lei Wang Dalian University of Technology, China Xiaonan Wang Changshu Institute of Technology, China

Yu Wang Guanzghou University, China Zumin Wang Dalian University, China

Xiaoling Wu Guangzhou Institute of Advanced Technology, China

Xiaofei Xing Guangzhou University, China Jinbo Xiong Fujian Normal University, China Hui Xu University of California, USA

Dequan Yang Beijing Institute of Technology, China

Panglong Yang PLA University of Science and Technology, China

Xindong You Hangzhou Dianzi University, China
Deze Zeng China University of Geosciences, China
Wenbo Zhang Shenyang Ligong University, China

Organization

X

Yunzhou Zhang Northeastern University, USA

Zhangbing Zhou China University of Mining and Technology, China

Chuan Zhu Hohai University, China

Zhifeng Zuo University of Electro-Communications, Japan

Track 3: Dependable and Secure Applications

Farhan Ahmad University of Derby, UK

Zhiyuan Tan Edinburgh Napier University, UK Rasheed Hussain Innopolis University, Russia Thaier Hayajneh Fordham University, USA

Mohiuddin Ahmed Edith Cowan University, Australia
Amjad Anvari-Moghaddam
William Buchanan Arcangelo Castiglione Edith Cowan University, Australia
Alborg University, Demark
Edinburgh Napier University, UK
University of Salerno, Italy

Christian Esposito University of Napoli Federico II, Italy

Franco Frattolillo University of Sannio, Italy

Luis Javier García Villalba Universidad Complutense de Madrid, Spain

Damien Hanyurwimfura
Peng Hao
University of Rwanda, Rwanda
Beihang University, China
University of Kent, UK
Fatima Hussain
University of Kent, UK
Royal Bank of Canada, Canada

Aruna Jamdagni Western Sydney University, Australia

Mian Jan Abdul Wali Khan University Mardan, Pakistan

Syed Muhammad Ahsan Innopolis University, Russia

Kazmi

Chaker Abdelaziz Kerrache University of Ghardaia, Algeria

Hasan Ali Khattak COMSATS, Pakistan

JooYoung Lee Innopolis University, Russia Shancang Li University of West England, UK

Xiong Li Hunan University of Science and Technology, China

Shujun Li University of Kent, UK

Entao Luo Hunan University of Science and Engineering, China

Weizhi Meng Technical University of Denmark, Demark

Naghmeh Moradpoor Edinburgh Napier University, UK

Mahmuda Naznin Bangladesh University of Engineering and Technology,

Bangladesh

Alma Oracevic Innopolis University, Russia

Paul Pang United Institute of Technology, New Zealand

Constantinos Patsakis University of Piraeus, Greece

Deepak Puthal University of Technology Sydney, Australia Farzana Rahman Florida International University, USA

Shalli Rani Chitkara University, India

Zeinab Rezaiefar Hanyang University, South Korea Imed Romdhani Edinburgh Napier University, UK Kashif Saleem King Saud University, Saudi Arabia Wei Shi Carleton University, Canada

Houbing Song Embry-Riddle Aeronautical University, USA

Traian Marius Truta Northern Kentucky University, USA

Alexandr Vasenev Netherlands Organisation for Applied Scientific

Research, The Netherlands

Kamal Z. Zamli University Malaysia Pahang, Malaysia

Nicola Zannone Eindhoven University of Technology, The Netherlands

Qingchen Zhang St. Francis Xavier University, Canada

Shaobo Zhang Hunan University of Science and Technology, China

Xuyun Zhang University of Auckland, New Zealand

Track 4: Dependability and Security Measures and Assessments

Md. Arafatur Rahman University Malaysia Pahang, Malaysia Alireza Jolfaei Federation University Australia, Australia Venki Balasubramanian Federation University Australia, Australia

Amin Beheshti Macquarie University, Australia Mohammad Asad Rehman University of Toronto, Canada

Chaudhry

Tooska Dargahi University of Salford, UK
Salvatore Distefano University of Messina, Russia
Angela Guercio Kent State University at Stark, USA

Mohammad Sayad

Haghighi

Abbas Haider National University of Sciences and Technology,

University of Tehran, Iran

Pakistan

Wenbin Jiang Huazhong University of Science and Technology,

China

Mohammad Mehedi Hassan King Saud University, Saudi Arabia Pouya Ostovari San Jose State University, USA Raiganj University, Raiganj, India

Biplob Ray Central Queensland University, Australia

Mubashir Husain Rehmani COMSATS Institute of Information Technology,

Pakistan

Genaina Rodrigues University of Brasilia, Brazil Amin Sakzad Monash University, Australia

Sattar Seifollahi Federation University Australia, Australia

Hossain Shahriar Kennesaw State University, USA

Shahab Shmshir Norges teknisk-naturvitenskapelige universitet,

Norway

Junggab Son Kennesaw State University, USA

Houbing Song Embry-Riddle Aeronautical University, USA Sona Taheri Federation University Australia, Australia

Muhamed Turkanovic University of Maribor, Slovenia

Muhammad Usman University of Surrey, UK

Xin-Wen Wu Indiana University of Pennsylvania, USA Chunsheng Zhu University of British Columbia, Canada

Workshop Chairs

Debiao He Wuhan University, China

Kevin I-Kai Wang The University of Auckland, New Zealand

Syed Hassan Ahmed Georgia Southern University, USA

Local Organizing Committee Chair

Jianer Chen Guangzhou University, China

Publicity Chairs

Kuan-Ching Li
Saqib Ali
Yulei Wu
Michele Nappi
Providence University, Taiwan
Guangzhou University, China
The University of Exeter, UK
Universita di Salerno, Italy

Publication Chair

Shuhong Chen Guangzhou University, China Guihua Duan Central South University, China

Journal Special Issue Chairs

Kim-Kwang Raymond The University of Texas at San Antonio, USA

Choo

Chunhua Su The University of Aizu, Japan Arcangelo Castiglione University of Salerno, Italy

Registration Chairs

Xiaofei Xing Guangzhou University, China Pin Liu Central South University, China

Conference Secretariat

Wenyin Yang Foshan University, China

Steering Committee

Jie Wu (Chair) Temple University, USA Md Zakirul Alam Bhuiyan Fordham University, USA

(Chair)

Guojun Wang Guangzhou University, China Vincenzo Piuri University of Milan, Italy

Jiannong Cao Hong Kong Polytechnic University, Hong Kong, China

Laurence T. Yang
Sy-Yen Kuo
National Taiwan University, Canada
Sy-Yen Kuo
National Taiwan University, Taiwan
Georgia State University, USA
A. B. M Shawkat Ali
Mohammed Atiquzzaman
Al-Sakib Khan Pathan
St. Francis Xavier University, Canada
National Taiwan University, USA
The University of Fiji, Fiji
University of Oklahoma, USA
Southeast University, Bangladesh

Kenli Li Hunan University, China

Shui Yu University of Technology Sydney (UTS), Australia Yang Xiang Swinburne University of Technology, Australia Kim-Kwang Raymond The University of Texas at San Antonio, USA

Choo

Kamruzzaman Joarder Federation University and Monash University,

Australia

Contents

Dependability and Security Fundamentals and Technologies	
Secrecy Outage Probability of Secondary System for Wireless-Powered Cognitive Radio Networks	3
Kun Tang, Shaowei Liao, Md. Zakirul Alam Bhuiyan, and Wei Shi	
CodeeGAN: Code Generation via Adversarial Training	18
Information Consumption Patterns from Big Data	31
DHS-Voting: A Distributed Homomorphic Signcryption E-Voting Xingyue Fan, Ting Wu, Qiuhua Zheng, Yuanfang Chen, and Xiaodong Xiao	40
Towards In-Network Generalized Trustworthy Data Collection for Trustworthy Cyber-Physical Systems	54
QoS Based Clustering for Vehicular Networks in Smart Cities Soumia Bellaouar, Mohamed Guerroumi, and Samira Moussaoui	67
Searchable Attribute-Based Encryption Protocol with Hidden Keywords	
in Cloud	80
Dependable and Secure Systems	
A Comparative Study of Two Different Spam Detection Methods Haoyu Wang, Bingze Dai, and Dequan Yang	95
Towards Privacy-preserving Recommender System with Blockchains Abdullah Al Omar, Rabeya Bosri, Mohammad Shahriar Rahman, Nasima Begum, and Md Zakirul Alam Bhuiyan	106
Integrating Deep Learning and Bayesian Reasoning	119

Assessing the Dependability of Apache Spark System: Streaming Analytics on Large-Scale Ocean Data	1
Janak Dahal, Elias Ioup, Shaikh Arifuzzaman, and Mahdi Abdelguerfi	-
On the Assessment of Security and Performance Bugs in Chromium Open-Source Project	1
Medical Image Segmentation by Combining Adaptive Artificial Bee Colony and Wavelet Packet Decomposition	1
Recommender System for Decentralized Cloud Manufacturing	
Gait Analysis for Gender Classification in Forensics	1
Hybrid Cloud Computing Architecture Based on Open Source Technology Amelec Viloria, Hugo Hernández Palma, Wilmer Cadavid Basto, Alexandra Perdomo Villalobos, Carlos Andrés Uribe de la Cruz, Juan de la Hoz Hernández, and Omar Bonerge Pineda Lezama	1
Dependable and Secure Applications	
Transportation and Charging Schedule for Autonomous Electric Vehicle Riding-Sharing System Considering Battery Degradation	2
Blockchain-Powered Service Migration for Uncertainty-Aware Workflows in Edge Computing	2
Towards the Design of a Covert Channel by Using Web Tracking Technologies	4
Dependable Person Recognition by Means of Local Descriptors of Dynamic Facial Features	2
From Data Disclosure to Privacy Nudges: A Privacy-Aware and User-Centric Personal Data Management Framework	2

A Socio-Technical and Co-evolutionary Framework for Reducing Human-Related Risks in Cyber Security and Cybercrime Ecosystems Tasmina Islam, Ingolf Becker, Rebecca Posner, Paul Ekblom, Michael McGuire, Hervé Borrion, and Shujun Li	277
Mobile APP User Attribute Prediction by Heterogeneous Information Network Modeling	294
Application of Internet of Things and GIS in Power Grid Emergency Command System	304
Visualized Panoramic Display Platform for Transmission Cable Based on Space-Time Big Data	314
Dependability and Security Measures and Assessments	
Optimal Personalized DDoS Attacks Detection Strategy in Network Systems	327
AI and Its Risks in Android Smartphones: A Case of Google Smart Assistant	341
A Light-Weight Framework for Pre-submission Vetting of Android Applications in App Stores	356
Nowhere Metamorphic Malware Can Hide - A Biological Evolution Inspired Detection Scheme	369
Demand Forecasting Method Using Artificial Neural Networks	383
Analyzing and Predicting Power Consumption Profiles Using Big Data Amelec Viloria, Ronald Prieto Pulido, Jesús García Guiliany, Jairo Martínez Ventura, Hugo Hernández Palma, José Jinete Torres, Osman Redondo Bilbao, and Omar Bonerge Pineda Lezama	392

Explainable Artificial Intelligence for Cyberspace

A New Intrusion Detection Model Based on GRU and Salient Feature Approach	405
Research on Electronic Evidence Management System Based on Knowledge Graph	416
Research on Security Supervision on Wireless Network Space in Key Sites Honghao Wu	426
Review of the Electric Vehicle Charging Station Location Problem Yu Zhang, Xiangtao Liu, Tianle Zhang, and Zhaoquan Gu	435
Structural Vulnerability of Power Grid Under Malicious Node-Based Attacks Minzhen Zheng, Shudong Li, Danna Lu, Wei Wang, Xiaobo Wu, and Dawei Zhao	446
Electric Power Grid Invulnerability Under Intentional Edge-Based Attacks Yixia Li, Shudong Li, Yanshan Chen, Peiyan He, Xiaobo Wu, and Weihong Han	454
Design and Evaluation of a Quorum-Based Hierarchical Dissemination Algorithm for Critical Event Data in Massive IoTs	462
Comparative Analysis on Raster, Spiral, Hilbert, and Peano Mapping Pattern of Fragile Watermarking to Address the Authentication Issue in Healthcare System	477
Correction to: On the Assessment of Security and Performance Bugs in Chromium Open-Source Project	C1
Author Index	487