

Lecture Notes in Electrical Engineering

Volume 474

Board of Series editors

Leopoldo Angrisani, Napoli, Italy
Marco Arteaga, Coyoacán, México
Samarjit Chakraborty, München, Germany
Jiming Chen, Hangzhou, P.R. China
Tan Kay Chen, Singapore, Singapore
Rüdiger Dillmann, Karlsruhe, Germany
Haibin Duan, Beijing, China
Gianluigi Ferrari, Parma, Italy
Manuel Ferre, Madrid, Spain
Sandra Hirche, München, Germany
Faryar Jabbari, Irvine, USA
Janusz Kacprzyk, Warsaw, Poland
Alaa Khamis, New Cairo City, Egypt
Torsten Kroeger, Stanford, USA
Tan Cher Ming, Singapore, Singapore
Wolfgang Minker, Ulm, Germany
Pradeep Misra, Dayton, USA
Sebastian Möller, Berlin, Germany
Subhas Mukhopadhyay, Palmerston, New Zealand
Cun-Zheng Ning, Tempe, USA
Toyoaki Nishida, Sakyo-ku, Japan
Bijaya Ketan Panigrahi, New Delhi, India
Federica Pascucci, Roma, Italy
Tariq Samad, Minneapolis, USA
Gan Woon Seng, Nanyang Avenue, Singapore
Germano Veiga, Porto, Portugal
Haitao Wu, Beijing, China
Junjie James Zhang, Charlotte, USA

About this Series

“Lecture Notes in Electrical Engineering (LNEE)” is a book series which reports the latest research and developments in Electrical Engineering, namely:

- Communication, Networks, and Information Theory
- Computer Engineering
- Signal, Image, Speech and Information Processing
- Circuits and Systems
- Bioengineering

LNEE publishes authored monographs and contributed volumes which present cutting edge research information as well as new perspectives on classical fields, while maintaining Springer’s high standards of academic excellence. Also considered for publication are lecture materials, proceedings, and other related materials of exceptionally high quality and interest. The subject matter should be original and timely, reporting the latest research and developments in all areas of electrical engineering.

The audience for the books in LNEE consists of advanced level students, researchers, and industry professionals working at the forefront of their fields. Much like Springer’s other Lecture Notes series, LNEE will be distributed through Springer’s print and electronic publishing channels.

More information about this series at <http://www.springer.com/series/7818>

James J. Park · Vincenzo Loia
Gangman Yi · Yunsick Sung
Editors

Advances in Computer Science and Ubiquitous Computing

CSA-CUTE 17



Springer

Editors

James J. Park
Department of Computer Science
and Engineering
Seoul University of Science and Technology
Seoul
Korea (Republic of)

Vincenzo Loia
Department of Business Science
University of Salerno
Salerno
Italy

Gangman Yi
Department of Multimedia Engineering
Dongguk University
Seoul, Soul-t'ukpyolsi
Korea (Republic of)

Yunsick Sung
Department of Multimedia Engineering
Dongguk University
Seoul, Soul-t'ukpyolsi
Korea (Republic of)

ISSN 1876-1100

ISSN 1876-1119 (electronic)

Lecture Notes in Electrical Engineering

ISBN 978-981-10-7604-6

ISBN 978-981-10-7605-3 (eBook)

<https://doi.org/10.1007/978-981-10-7605-3>

Library of Congress Control Number: 2017961793

© Springer Nature Singapore Pte Ltd. 2018, corrected publication 2018

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, express 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.

Printed on acid-free paper

This Springer imprint is published by Springer Nature

The registered company is Springer Nature Singapore Pte Ltd.

The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Message from the CSA 2017 General Chairs

International Conference on Computer Science and its Applications (CSA 2017) is the 9th event of the series of international scientific conference. This conference will take place at Taichung, Taiwan, on December 18–20, 2017. CSA 2017 will be the most comprehensive conference focused on the various aspects of advances in computer science and its applications. CSA 2017 will provide an opportunity for academic and industry professionals to discuss the latest issues and progress in the area of CSA. In addition, the conference will publish high-quality papers which are closely related to the various theories and practical applications in CSA. Furthermore, we expect that the conference and its publications will be a trigger for further related research and technology improvements in this important subject. CSA 2017 is the next event in a series of highly successful International Conference on Computer Science and its Applications, previously held as CSA 2016 (8th Edition: Bangkok, Thailand, December 2016), CSA 2015 (7th Edition: Cebu, Philippines, December 2015), CSA 2014 (6th Edition: Guam, December 2014), CSA 2013 (5th Edition: Da Nang, December 2013), CSA 2012 (4th Edition: Jeju, November 2012), CSA 2011 (3rd Edition: Jeju, December 2011), CSA 2009 (2nd Edition: Jeju, December 2009), and CSA 2008 (1st Edition: Australia, October 2008).

The papers included in the proceedings cover the following topics: mobile and ubiquitous computing, dependable, reliable and autonomic computing, security and trust management, multimedia systems and services, networking and communications, database and data mining, game and software engineering, grid and scalable computing, embedded system and software, artificial intelligence, distributed and parallel algorithms, Web and Internet computing and IT policy and business management.

Accepted and presented papers highlight new trends and challenges of computer science and its applications. The presenters showed how new research could lead to novel and innovative applications. We hope you will find these results useful and inspiring for your future research. We would like to express our sincere thanks to Steering Chairs: James J. (Jong Hyuk) Park (SeoulTech, Korea), Yi Pan (Georgia State University, USA), Han-Chieh Chao (National Ilan University, Taiwan),

Young-Sik Jeong (Dongguk University, Korea), and Vincenzo Loia (University of Salerno, Italy). Our special thanks go to the Program Chairs like Yunsick Sung (Dongguk University, Korea), Arun Kumar Sangaiah (VIT University, India), Mu-Yen Chen (National Taichung University of Science and Technology, Taiwan), Houcine Hassan (Universitat Politècnica de València, Spain), Wei Song (North China University of Technology, China), all program committee members, and all the additional reviewers for their valuable efforts in the review process, which helped us to guarantee the highest quality of the selected papers for the conference.

We cordially thank all the authors for their valuable contributions and the other participants of this conference. The conference would not have been possible without their support. Thanks are also due to the many experts who contributed to making the event a success.

Gangman Yi
Kim-Kwang Raymond Choo
Ka Lok Man
Victor Leung
Ching-Hsien Hsu
CSA 2017 General Chairs

Message from the CSA 2017 Program Chairs

Welcome to the 9th International Conference on Computer Science and its Applications (CSA 2017), which will be held in Taichung, Taiwan, on December 18–20, 2017. CSA 2017 will be the most comprehensive conference focused on the various aspects of advances in computer science and its applications.

CSA 2017 provides an opportunity for academic and industry professionals to discuss the latest issues and progress in the area of computer science. In addition, the conference contains high-quality papers which are closely related to the various theories and practical applications in computer science. Furthermore, we expect that the conference and its publications will be a trigger for further related research and technology improvements in this important subject. CSA 2017 is the next event in a series of highly successful International Conference on Computer Science and its Applications, previously held as CSA 2016 (8th Edition: Bangkok, Thailand, December 2016), CSA 2015 (7th Edition: Cebu, December 2015), CSA 2014 (6th Edition: Guam, December 2014), CSA 2013 (5th Edition: Da Nang, December 2013), CSA 2012 (4th Edition: Jeju, November 2012), CSA 2011 (3rd Edition: Jeju, December 2011), CSA 2009 (2nd Edition: Jeju, December 2009), and CSA 2008 (1st Edition: Australia, October 2008).

CSA 2016 contains high-quality research papers submitted by researchers from all over the world. Each submitted paper was peer-reviewed by reviewers who are experts in the subject area of the paper. Based on the review results, the program committee accepted papers.

For organizing an International Conference, the support and help of many people is needed. First, we would like to thank all authors for submitting their papers. We also appreciate the support from program committee members and reviewers who carried out the most difficult work of carefully evaluating the submitted papers.

We would like to give my special thanks to Steering Chairs: James J. (Jong Hyuk) Park (SeoulTech, Korea), Yi Pan (Georgia State University, USA), Han-Chieh Chao (National Ilan University, Taiwan), Young-Sik Jeong (Dongguk University, Korea), and Vincenzo Loia (University of Salerno, Italy). Our special thanks go to the Program Chairs: Gangman Yi (Dongguk University, Korea), Kim-Kwang (Raymond Choo, The University of Texas at San Antonio, USA),

Ka Lok Man (Xi'an Jiaotong-Liverpool University, China), Victor Leung (The University of British Columbia, Canada), Ching-Hsien Hsu (Chung Hua University, Taiwan). We would like to express special thanks to committee members for their timely unlimited support.

Yunsick Sung
Arun Kumar Sangaiah
Mu-Yen Chen
Houcine Hassan
Wei Song
CSA 2017 Program Chairs

Organization

Honorary Chair

Doo-soon Park

Soonchunhyang University, Korea

Steering Chairs

James J. Park (Chair)

Yi Pan

Han-Chieh Chao

Young-Sik Jeong

Vincenzo Loia

SeoulTech, Korea

Georgia State University, USA

National Ilan University, Taiwan

Dongguk University, Korea

University of Salerno, Italy

General Chairs

Gangman Yi

Kim-Kwang Raymond Choo

Ka Lok Man

Victor Leung

Ching-Hsien Hsu

Dongguk University, Korea

The University of Texas at San Antonio, USA

Xi'an Jiaotong-Liverpool University, China

The University of British Columbia, Canada

Chung Hua University, Taiwan

Program Chairs

Yunsick Sung

Arun Kumar Sangaiah

Mu-Yen Chen

Houcine Hassan

Wei Song

Dongguk University, Korea

VIT University, India

National Taichung University of Science
and Technology, Taiwan

Universitat Politècnica de València, Spain

North China University of Technology, China

Program Vice-chairs

Deok Gyu Lee

Fei Hao

Neil Y. Yen

Seowon University, Korea

Shaanxi Normal University, China

The University of Aizu, Japan

International Advisory Board

Mo-Yuen Chow

Simon James Fong

Michael Hwa Young Jeong

Shu-Ching Chen

Mohammad S. Obaidat

Kyungeun Cho

Enrique Herrera-Viedma

Sherali Zeadally

Jordi Mongay Batalla

Wanlei Zhou

Sethuraman Panchanathan

Yueh-Min Huang

North Carolina State University, USA

University of Macau, Macau, China

Kyung Hee University, Korea

Florida International University, USA

Monmouth University, USA

Dongguk University, Korea

University of Granada, Spain

University of Kentucky, USA

National Institute of Telecommunications, Poland

Deakin University, Australia

Arizona State University, USA

National Cheng Kung University, Taiwan

Publicity Chairs

Daewon Lee

Byoungwook Kim

Sangil Choi

Seokyeong University, Korea

Korea University, Korea

Ajou University

Program Committee

Andrew Kusiak

Cho-Chin Lin

Eunyoung Lee

Jae Joon Lee

M. Dominguez Morales

Tzung-Pei Hong

Alok Desai Bringham

Yao-Nan Lien National

Javier Martinez Torres

The University of Iowa, USA

National Ilan University, Taiwan

Dongduk University, Korea

Ajou University, Korea

University of Seville, Spain

National University of Kaohsiung, Taiwan

Young University, USA

Chengchi University, Taiwan

Centro Universitario de la Defensa Zaragoza,
Spain

Schulz Frank

Marco Listanti

Mir Nader F.

SAP Research, Germany

DIET, Roma, Italy

San Jose State University, USA

Ivanova Malinka	Technical University of Sofia, Bulgaria
Sun-Yuan Hsieh	National Cheng Kung University, Taiwan
Hoon Choi	Chungnam National University, Korea
Yue-Shan Chang	National Taipei University, Taipei
Alexey Rodionov	Institute of Computational Mathematics and Mathematical Geophysics, Russia
Don-Lin Yang	Feng Chia University, Taiwan
Evi Syukur	University of New South Wales, Australia
Hideyuki Sotobayashi	Aoyama Gakuin University, Japan; MIT, USA
Hiroyuki Tomiyama	Nagoya University, Japan
Jie Shen	University of Michigan, USA
Liu Chuan-Ming	National Taipei University of Technology, Taipei
Maytham Safar	Kuwait University, Kuwait
Pereira Ana Isabel	Polytechnic Institute of Braganca, Portugal
Somchai Chatvichienchai	University of Nagasaki, Japan
Stephan Chalup	Heidelberg University, Germany
Yu Chang Wu	Chung Hua University, Taiwan
Mohammed Chadli	University of Picardie Jules Verne MIS (EA 4290), France
Choon Ki Ahn	School of Electrical Engineering Korea University, Seoul, Korea
Hamid Reza Karimi	Department of Mechanical Engineering via La Masa 1, 20156 Milan, Italy
Ardagna Claudio	University of Milan, Italy

Message from the CUTE 2017 General Chairs

On behalf of the organizing committees, it is our pleasure to welcome you to the 12th International Conference on Ubiquitous Information Technologies and Applications (CUTE 2017), which will be held in Taichung, Taiwan, on December 18–20, 2017.

This conference provides an international forum for the presentation and showcase of recent advances on various aspects of ubiquitous computing. It will reflect the state of the art of the computational methods, involving theory, algorithm, numerical simulation, error and uncertainty analysis, and/or novel application of new processing techniques in engineering, science, and other disciplines related to ubiquitous computing.

The papers included in the proceedings cover the following topics: ubiquitous communication and networking, ubiquitous software technology, ubiquitous systems and applications, ubiquitous security, privacy and trust. Accepted papers highlight new trends and challenges in the field of ubiquitous computing technologies. We hope you will find these results useful and inspiring for your future research.

We would like to express our sincere thanks to Steering Chairs: James J. (Jong Hyuk) Park (SeoulTech, Korea), Doo-Soon Park (Soonchunhyang University, Korea), Hsiao-Hsi Wang (Providence University, Taiwan), Laurence T. Yang (St. Francis Xavier University, Canada), Hai Jin (Huangzhong University of Science and Technology, China), Chan-Hyun Youn (KAIST, Korea), Jianhua Ma (Hosei University, Japan), Mingyi Guo (Shanghai Jiao Tong University, China), and Weijia Jia (City University of Hong Kong, Hong Kong). Our special thanks go to the Program Chairs: Joon-Min Gil (Catholic University of Daegu, Korea), Neal N. Xiong (Colorado Technical University, USA), Yunsick Sung (Dongguk University, Korea), Jin Wang (Yangzhou University, China), Yu-Wei Chan (Providence University, Taiwan). We would also like to express our cordial thanks to the program committee members for their valuable efforts in the review process, which helped us to guarantee the highest quality of the selected papers for the conference.

Finally, we would thank all the authors for their valuable contributions and the other participants of this conference. The conference would not have been possible without their support. Thanks are also due to the many experts who contributed to making the event a success.

Sanghoon Kim
Yi Pan
Luis Javier Garcia Villalba
Yu-Chen Hu
Che-Lun Hung
Jason C. Hung
Gangman Yi
CUTE 2017 General Chairs

Message from the CUTE 2017 Program Chairs

Welcome to the 12th International Conference on Ubiquitous Information Technologies and Applications (CUTE 2017), which will be held in Taichung, Taiwan, on December 18–20, 2017.

The purpose of the CUTE 2017 conference is to promote discussion and interaction among academics, researchers, and professionals in the field of ubiquitous computing technologies. This year, the value, breadth, and depth of the CUTE 2017 conference continue to strengthen and grow in importance for both the academic and industrial communities. This strength is evidenced this year by having the highest number of submissions made to the conference.

For CUTE 2017, we received a lot of paper submissions from various countries. Out of these, after a rigorous peer review process, we accepted only high-quality papers for CUTE 2017 proceeding, published by the Springer. All submitted papers have undergone blind reviews by at least two reviewers from the technical program committee, which consists of leading researchers around the globe. Without their hard work, achieving such a high-quality proceeding would not have been possible. We take this opportunity to thank them for their great support and cooperation.

Finally, we would like to thank all of you for your participation in our conference and also thank all the authors, reviewers, and organizing committee members. Thank you and enjoy the conference!

Joon-Min Gil
Neal N. Xiong
Yunsick Sung
Jin Wang
Yu-Wei Chan
CUTE 2017 Program Chairs

Organization

Honorary Chairs

Young-Sik Jeong
Chuan-Yi Tang

Dongguk University, Korea
Providence University, Taiwan

Steering Committee

James J. Park (Leading Chair)
Doo-Soon Park
Hsiao-Hsi Wang
Laurence T. Yang
Hai Jin

SeoulTech, Korea
Soonchunhyang University, Korea
Providence University, Taiwan
St. Francis Xavier University, Canada
Huangzhong University of Science
and Technology, China
KAIST, Korea
Hosei University, Japan
Shanghai Jiao Tong University, China
City University of Hong Kong, Hong Kong

General Chairs

Sanghoon Kim
Yi Pan
Luis Javier Garcia Villalba
Yu-Chen Hu
Che-Lun Hung
Jason C. Hung
Gangman Yi

Hankyong National University, Korea
Georgia State University, USA
Universidad Complutense de Madrid, Spain
Providence University, Taiwan
Providence University, Taiwan
Oversea Chinese University, Taiwan
Dongguk University, Korea

Program Chairs

Joon-Min Gil	Catholic University of Daegu, Korea
Neal N. Xiong	Colorado Technical University, USA
Yunsick Sung	Dongguk University, Korea
Jin Wang	Yangzhou University, China
Yu-Wei Chan	Providence University, Taiwan

Program Vice-chairs (PVC)

Neil Y. Yen	The University of Aizu, Japan
Danda B. Rawat	Howard University, USA
Incheon Paik	University of Aizu, Japan
Q. Shi	Liverpool John Moores University, UK
Sayed Chhattan Shah	Hankuk University of Foreign Studies Korea, Korea
Jungho Kang	Soongsil University, Korea
Jaehwa Chung	Korea National Open University, Korea
Jun-ho Huh	Catholic University of Pusan, Korea
Muhammad Khurram Khan	King Saud University, Kingdom of Saudi Arabia
Jinho Park	Soongsil University, Korea
Hang-Bae Chang	Chung-Ang University, Korea
Eunseo Lee	Andong National University, Korea
Choonki Ahn	Korea University, Korea
Christos Kalloniatis	University of the Aegean, Greece
Eunmi Choi	Kookmin University, Korea
Hwamin Lee	Soonchunhyang University, Korea
Naveen Chilamkurti	La Trobe University, Australia
Dae-Sung Moon	ETRI, Korea
Chang-Sun Shin	Sunchon National University, Korea
Min Choi	Chungbuk National University, Korea
Aniello Castiglione	University of Salerno, Italy
Eunyoung Lee	Dongduk Women's University, Korea
KwangMan Ko	Sangji University, Korea
Yoo-Joo Choi	Seoul Media Institute of Technology, Korea
Okyoen Yi	Kookmin University, Korea
Hae-Yeoun Lee	Kumoh National Institute of Technology, Korea
Jung-Won Lee	Ajou University, Korea
Dongwon Jeong	Kunsan National University, Korea
Hsuan-Fu Wang	Chung Chou University of Science and Technology, Taiwan

International Advisory Committee

Witold Pedrycz	University of Alberta, Canada
Seok Cheon Park	Gachon University, Korea
C. S. Raghavendra	University of Southern California, USA
Im-Yeong Lee	Soonchunhyang University, Korea
HeonChang Yu	Korea University, Korea
Hai Jin	Huazhong University of Science and Technology, China
Nammee Moon	Hoseo University, Korea
Byeong-Seok Shin	Inha, Korea
Dong-Ho Kim	Soongsil, Korea
Shu-Ching Chen	Florida International University, USA
Keun Ho Ryu	Chungbuk National University, Korea
JaeKwang Lee	Hannam University, Korea
Victor Leung	University of British Columbia, Canada
Yoo-jae Won	Chungnam National University, Korea
Yang Xiao	University of Alabama, USA
Chao-Tung Yang	Tung Hai University, Taiwan

Publicity Chairs

Seokhoon Kim	Soonchunhyang University, Korea
Deok Gyu Lee	Seowon University, Korea
Kyoung-Soo Lim	ETRI, Korea
Hyun-Woo Kim	Dongguk University, Korea
Seokhong Min	SystemBank, Korea

Industrial Workshop Chairs

Jungho Kang	Soongsil University, Korea
Sung Chul Yu	LG Hitachi Co. Ltd., Korea

Local Arrangement Chairs

Chih-Hung Chang	Providence University, Taiwan
Tsan-Ching Kang	Providence University, Taiwan

Program Committee

Bo-Chao Cheng	National Chung-Cheng University, Taiwan
Chang Yao-Chung	National Taitung University, Taiwan
Dumitru Roman	SINTEF/University of Oslo, Norway
Eunmi Choi	Kookmin University, Korea
Imad Saleh	University of Paris 8, France
Jin-Hee Cho	U.S. Army Research Laboratory, USA
Jong-Myon	Kim University of Ulsan, Korea
Kwang Sik	Chung Korea National Open University, Korea
Chen Uei-Ren	Hsiuping University of Science and Technology
Damien Sauveron	University of Limoges, France
Dugki Min	Konkuk University, Korea
Hae-Yeoun Lee	Kumoh National Institute of Technology, Korea
Hariharan Shanmugasundaram	Pavendar Bharathidasan College of Engineering and Technology, India
HwaMin Lee	Soonchunhyang University, Korea
Jun-Ki Min	Korea University of Technology and Education, Korea
Keun Ho Ryu	Chungbuk National University, Korea
Ki Yong Lee	Sookmyung Women's University, Korea
Lai Kuan-Chu	National Taichung University, Taiwan
Lam-for Kwok	City University of Hong Kong, Hong Kong
Loh Woong-Kee	Sungkyul University, Korea
Milan Markovic	Banca Intesa ad Beograd, Serbia
Pinaki A Ghosh	Atmiya Institute of Technology and Science, India
Pyung-Soo Kim	Korea Polytechnic University, Korea
Soo-Hyun Park	Kookmin University, Korea
Toshiyuki Kamada	Aichi University of Education, Japan
Wookey Lee	Inha University, Korea
Yong Ik Yoon	Sookmyung Women's University, Korea
Hong-Wook Huh	Pusan National University, Republic of Korea
Won-Jong Kim	Texas A&M University, USA

Contents

**An Examination of the Effect of the Contextual UI Design
Quality of Mobile Shopping Applications on the Loyalty of
Users to the Applications** 1
Wonjin Jung

Securing Intelligent Vehicular Ad Hoc Networks: A Survey 6
Wedad Ahmed and Mourad Elhadef

An Approach of Test Case Generation for Spreadsheet Cells 15
Bo Yang and Qian Yu

**Bearing Fault Diagnosis Based on Convolutional Neural Networks
with Kurtogram Representation of Acoustic Emission Signals** 21
Alexander Prosvirin, JaeYoung Kim, and Jong-Myon Kim

CHMM-Based Classification of Dynamic Textures 27
Yulong Qiao, Na Li, Yufei Wang, and Wei Xi

**Survey of On-Line & Block Programming Language-Scratch:
On Perspective of Educational Achievements** 35
Jeong Ah Kim and Dae Young Ko

**A Study on Lightweight Mutual Authentication Protocol
Based on Simple Operation** 41
Yong-Woon Hwang and Im-Yeong Lee

**Performance Analysis of Spark-DLF: Spark Based Distributed
Deep Learning Framework for Article Headline Generation** 47
Akhmedov Khumoyun, Yun Cui, Myoungjin Kim, and Lee Hanku

Robust Cartoon Zero-Watermark Algorithm Based on NSST 53
YuChao Sun and De Li

Robust Animation Zero Watermarking Based on Visual Cryptography and Complete Complementary Code 60
De Li and LiHua Cui

Secure Multicast Using Proxy Re-encryption in IoT Environment 66
SuHyun Kim and ImYeong Lee

Fast Provisioning Service in Shared-Storage Based VDI According to User’s Type 71
Dae-Won Kim, Soo-Cheol Oh, Jae-Geun Cha, Ji-Hyeok Choi, Sun-Wook Kim, and Seong-Woon Kim

Design of Smart Cattle Shed System Based on BLE Beacon to Improve Power Consumption 77
Seung-Su Yang, Young-Hwan Jang, Yong-Wan Ju, and Seok-Cheon Park

Design of TensorFlow-Based Proactive Smart Home Managers 83
Min-Hyung Park, Young-Hwan Jang, Yong-Wan Ju, and Seok-Cheon Park

Design of Effective Indexing Technique in Hadoop-Based Database 90
Jae-Sung Shim, Young-Hwan Jang, Yong-Wan Ju, and Seok-Cheon Park

Transformation of EEG Signal for Emotion Analysis and Dataset Construction for DNN Learning 96
Yeahoon Kwon, Yiyang Nan, and Shin-Dug Kim

Impact of Passive UHF RFID Reader Antenna Locations for Immobile Object Localization 102
Jae Sung Choi

Development of 3D Surface Shape Analysis System Using White Light Scanning Interference 108
Yong-Tae Jeon, Hyun Lee, and Jae Sung Choi

Life Log Collection and Analysis System Using Mobile Device 114
Yunjin Nam, Dongkyoo Shin, and Dongil Shin

Introduction of an Interactive Growing Robot/Toy for Babies 120
Jiyong Kim, Hyunsu Jeong, Azure Pham, Changhyeon Lee, Thiha Soe, Pilwoo Lee, Mingui Lee, Seong-Woo Kim, and Juhyun Eune

Multiclass Data Classification Using Multinomial Logistic Gaussian Process Model 126
Wanhyun Cho, Soonyoung Park, and Sangkyoon Kim

Implementation of Redundant Digital Excitation Control System Algorithm 131
Hoon-Gi Lee and Hie-Sik Kim

Improving Top-K Contents Recommendation Performance by Considering Bandwagon Effect: Using Hadoop-Spark Framework 137
Suk-kyoon Kang and Kiejin Park

A Method for Replacing Protective Relay at Kanudi Power Plant and Validation 143
Hoon-Gi Lee and Hie-Sik Kim

A Critical Review on Operation and Management System of Doping Control Officer in Korea Anti-Doping Agency 149
Seung-Hoon Lee and Chang-Hyeok Seok

The Issues of Media and Public Ethics on Doping Problems 155
Seung-Hoon Lee and Chang-Hyeok Seok

Seamless Reconfiguration of Virtual Dedicate Network Based on Software Defined Network 161
Yong-hwan Kim, Ki-Hyeon Kim, Joon-Min Gil, and Dongkyun Kim

Design and Implementation of Digital Doorsign System Based on E-paper Display 168
Bong-Ki Son and Jaeho Lee

A Novel for Light-Weighted Indoor Positioning Algorithm with Hybridizing Trilateration and Fingerprinting Method Considering Bluetooth Low Energy Environment 174
Jaeho Lee and Bong-Ki Son

Design of Beacon-Based Positioning System Using RF and Sound Wave in Smartphone 180
Hyun-Seong Lee, Seung-Hyeon Lee, Jae-Gwang Lee, and Jae-Kwang Lee

A Study on the Designing of a Laboratory Accident Cognition Model Using Smart Sensor Based Decision Tree 187
Ki-Su Yoon, Seung-Hyeon Lee, Jae-Pil Lee, and Jae-Kwng Lee

Positioning Model Design Using Beacon and Geomagnetic Sensor of Smartphone 192
Jae-Gwang Lee, Seung-Hyeon Lee, and Jae-Kwang Lee

A Design of Scheduling Program for Diabetic Patients: A Software Engineering Approach 198
Jeong-Hoon Choi, Jun-Ho Huh, and Sunghyun Weon

A Simulated Infiltration Test for Network in Virtual Environment Using VMware Virtualization Technique 204
Guk-IL Kim and Jonghyeon Kim

Development of Network Cyber Attack Training Curriculum for Security Staff 210
Guk-IL Kim and Jonghyeon Kim

A Design of Portable Continuous Passive Joint Mobilization Equipment System 215
Do Yeon Jeon, Young Hyo Kim, Ha Yeon Park, Jun-Ho Huh, and Hyeok Gyu Kwon

Delivering Historical Information Shown in Korean TV Drama Over Smart TV 221
Jisun Byun

An Efficient Clustering Technique for Unstructured Data Utilizing Latent Semantic Analysis 227
Yonghoon Kim and Mokdong Chung

An Improving Algorithm of Generator Reactive Power Reserves Calculation Considering Effective Generators in IEEE-39 System 233
Moonsung Bae and Byongjun Lee

Load Loss Coefficient and Power Loss Tracing in Power Systems 240
Moonsung Bae and Byongjun Lee

A Power Generation Rescheduling Method Under Power Flow Constraints Using Power Flow Tracing 248
Moonsung Bae and Byongjun Lee

The Effect of the Intrinsic Quality of UI of Mobile Apps on the Behavioral Intention to Use the Apps 253
Wonjin Jung

Consideration of Privacy Risk Assessment of the My Number in the Financial Industry in Japan 258
Sanggyu Shin, Yoichi Seto, Kei Sakamoto, and Mayumi Sasaki

VANETs-Based Intelligent Transportation Systems: An Overview 265
Sarah Baras, Iman Saeed, Hadeel A. Tabaza, and Mourad Elhadeef

Designing Network-Attached Storage Architecture for Small and Medium Enterprise Applications 274
Andy Shui-Yu Lai and Anson Man-Sing Ma

Limited Constraint Problems Reasoning on Computer Based on “And/Or” Tree 280
Danyang Cao, Lina Duan, Xue Gao, and Lei Gao

Impact of the Selection of a Communication Tool on the Effectiveness of Media Outputs About the Results of Science and Research 287
Zuzana Bouckova and Blanka Klimova

TCP Performance of CSMA/CA Wireless Networks in Different MCS and PPP Settings	293
Soohyun Cho	
Expected Patch Log Likelihood Based on Multi-layer Prior Information Learning	299
ShunFeng Wang, JiaCen Xie, YuHui Zheng, Tao Jiang, and ShuHang Xue	
Decentralized E-Voting Systems Based on the Blockchain Technology	305
Jen-Ho Hsiao, Raylin Tso, Chien-Ming Chen, and Mu-En Wu	
Reputation-Based Trust Evaluation Mechanism for Decentralized Environments and Its Applications Based on Smart Contracts	310
Kun-Tai Chan, Raylin Tso, Chien-Ming Chen, and Mu-En Wu	
Password-Based Authenticated Key Exchange from Lattices for Client/Server Model	315
Yi-Siou Jheng, Raylin Tso, Chien-Ming Chen, and Mu-En Wu	
Ocean Adventure Cell Phone Adventure Game Design and Implementation	320
Xingquan Cai and Chao Chen	
Analysis of Thermocline Influencing Factors Based on Decision Tree Methods	328
Chengquan Hu, Yu Gou, Tong Zhang, Kai Wang, Lili He, and Yu Jiang	
Thermocline Analysis Based on Entropy Value Methods	335
Chengquan Hu, Yu Gou, Tong Zhang, Kai Wang, Lili He, and Yu Jiang	
Design and Implement of Intelligent Insole System	341
Ruisheng Li, Bin Ma, Lili He, and Jin Wang	
Fitness Sport Data Recording System Design and Implementation on Smart Phone	346
Xingquan Cai and Runbo Cai	
Construction of High Resolution Thermocline Grid Data Sets	353
Chengquan Hu, Tong Zhang, Jin Wang, Yu Gou, Kai Wang, Hongtao Bai, and Yu Jiang	
Service Identification Framework for Systems of Systems Based on MPLS Technology	359
Sahel Alounch, Dhiah el Diehn I. Abou-Tair, Ala Khalifeh, and Roman Obermaisser	

FPGA Based Face Detection Using Local Ternary Pattern Under Variant Illumination Condition 365
Jin Young Byun and Jae Wook Jeon

Finding Similar Microblogs According to Their Word Similarities and Semantic Similarities 371
Yuan Wang

An Improved Trust Model Based on Time Effect. 376
Zhichao Yin, Hui Zhang, Chunyong Yin, and Jin Wang

Text Classification Algorithm Based on SLAS-C 382
Zhichao Yin, Jun Xiang, Chunyong Yin, and Jin Wang

A Ground Segmentation Method Based on Gradient Fields for 3D Point Clouds 388
Hoang Vu, Hieu Trong Nguyen, Phuong Chu, Seoungjae Cho, and Kyungeun Cho

Recognizing the Adhesion Hollow Characters Based on the Closed Cutting Algorithm 394
Chunyong Yin, Kaiwen Zhu, Lian Xia, and Jin Wang

Ensemble R-FCN for Object Detection. 400
Jian Li, Jianjun Qian, and Yuhui Zheng

A Design of Evolutionary Personal Information Partner Based on Software as a Service 407
Yifeng Han, Hongbiao Gao, and Jingde Cheng

A New Method of Arm Motion Detection Based on MEMS Sensor 413
Kai Wang, Chengquan Hu, Lili He, Fenglin Wei, and Yu Jiang

Fitness Device Based on MEMS Sensor 420
Fenglin Wei, Chengquan Hu, Lili He, Kai Wang, and Yu Jiang

A Security Framework for Systems-of-Systems 427
Dhiah el Diehn I. Abou-Tair, Sahel Alounch, Ala Khalifeh, and Roman Obermaisser

A PSO Based Coverage Hole Patching Scheme for WSNs 433
Jin Wang, Chunwei Ju, Hye-jin Kim, R. Simon Sherratt, and Sungyoung Lee

A Novel Feature-Based Text Classification Improving the Accuracy of Twitter Sentiment Analysis 440
Yili Wang, Le Sun, Jin Wang, Yuhui Zheng, and Hee Yong Youn

System Information Comparison and Analysis Technology for Cyber Attacks	446
Hyeonsu Youn, Duhoe Kim, Yong-Hyun Kim, Dongkyoo Shin, and Dongil Shin	
A Study on Comparison of KDD CUP 99 and NSL-KDD Using Artificial Neural Network	452
Hyunjung Ji, Donghwa Kim, Dongkyoo Shin, and Dongil Shin	
The Application of Augmented Reality Based on Body Parts Recognition	458
JianFeng Hou, Wei Song, and MengXuan Li	
A Novel Subspace Super-Pixel Based Low Rank Representation Method for Hyperspectral Denoising	464
Le Sun, Yili Wang, Jin Wang, and Yuhui Zheng	
A Chinese Handwriting Word Segmentation Method via Faster R-CNN	470
Zelun Zhang, Jin Liu, and Chenkai Gu	
Aspect Based Sentiment Analysis for Online Reviews	475
Lamei Xu, Jin Liu, Lina Wang, and Chunyong Yin	
Chinese Anaphora Resolution Based on Adaptive Forest	481
Yunqing Zhao, Jin Liu, and Chunyong Yin	
Construction and Application of Fuzzy Ontology	487
Li Lin, Jin Liu, and Yuhui Zheng	
Generating Realistic Chinese Handwriting Characters via Deep Convolutional Generative Adversarial Networks	494
Chenkai Gu, Jin Liu, and Lei Kong	
Hadoop Based Parallel Deduplication Method for Web Documents	499
Junjie Song, Jin Liu, and Yuhui Zheng	
Ontology Construction Based on Deep Learning	505
Jianan Wang, Jin Liu, and Lei Kong	
Personal Attributes Extraction in Chinese Text Based on Distant-Supervision and LSTM	511
Wenxi Yao, Jin Liu, and Zehuan Cai	
Web Pages Ranking with Domain Ontology	516
Mingji Zhou, Jin Liu, and Yuhui Zheng	
Simulation-Based Reliability Improvement Factor for Safety-Critical Embedded Systems	522
Jongwhoa Na and Dongwoo Lee	

SBraille: A New Braille Input Method for Mobile Devices	528
Soonhyong Lee, Ji Su Park, and Jin Gon Shon	
Confirmation Delay Prediction of Transactions in the Bitcoin Network	534
Beltran Fiz, Stefan Hommes, and Radu State	
Failure Analysis in Safety Critical Systems Using Failure State Machine	540
Anit Thapaliya, Daehui Jeong, and Gihwon Kwon	
Simple and Low-Cost Heartbeat-Based Dual Modular Redundant Systems for Wireless Sensor Networks	546
Jongwhoa Na, Dongwoo Lee, Munkh Zorigbold, Dongmin Lee, and Sungyup Moon	
Hidden Markov Model for Floating Car Trajectory Map Matching . . .	553
Chengbo Song and Xuefeng Yan	
Simulation Game System: A Possible Way to Realize Intelligent Command and Control	560
Xin Jin	
Experiential Interaction Modeling for Virtual Training of Ultra-High Voltage Power System and Its Application	566
Jian Shao, Wei Liu, Wei Dai, Shengkun Ma, Qun Li, Ji Wang, Jian Chen, and Neal Xiong	
Analysis on the Technology of the Internetwork Comprehensive Testing	573
Zhengxian Wei, Mingqi Fan, Min Song, Hongbin Wang, and Zhe Zhang	
Analysis and Inspiration to Intelligent Command and Control	579
Tingting Li	
Exploratory Search for Learning: Finding the Concept with Minimal Cognitive Load	586
Zhuyin Xue, Zhen Hu, and Yunhai Jia	
Predicting the Metro Passengers Flow by Long-Short Term Memory	591
Zhen Hu, Yi Zuo, Zhuyin Xue, Wenting Ma, and Guilin Zhang	
Research on Hierarchical Aggregation Method for Situation Assessment	596
Xiaoxuan Wang and Zhenyi Zhao	

The Testing Execution Mechanism on Internetware Oriented Flow Dynamic Building 603
Min Song, Ying Song, Zhengxian Wei, Hongbin Wang, and Albert M. K. Cheng

A Model and Application of Collaborative Simulation Training System for Substation Based on Virtual Reality 610
Wei Dai, Wei Liu, Xin-dong Zhao, Jian Shao, Qun Li, Sheng-kun Ma, Neal Xiong, and Chang-nian Lin

A Model-Based Transformation from SCR Specification Models into Altatica3.0 Design Models 617
Jun Hu, Mingming Wang, Weijun Zhang, and Wanqian Li

Simulation and Verification of Software Architecture for Loosely-Coupled Distributed System 624
Shen Jun, Shen Xuan, Gao Wen, and Zhang Yong

Research on Hybrid Storage Method of Massive Heterogeneous Data for Mobile Environment 631
Shanshan Wu and Fan Yi

User Targeting SaaS Application Interworking Service Framework Using Complex Context and Rule-Matrix. 641
Jong-Jin Jung, Yun Cui, and Myungjin Kim

A Framework for Preventing Illegitimate e-Prescribing Practices 648
Deuk-Hun Kim and Jin Kwak

Research on Horizontal Damage Zone Airspace of Ship-to-Air Missile Under Cooperative Operation 654
Yitao Wang, Huayang Wang, Haiming Liang, and Liying Wang

Key Issues of Military Simulation and Analysis System 661
Yitao Wang, Huayang Wang, Xinye Zhao, Kedi Huang, and Haiming Liang

A Study on the Comparison of “Internet+” Paradigm and Means and the Analysis and Evaluation of Its Typical Development Path 669
Chao Geng, Shiyou Qu, Guoqiang Shi, Baocun Hou, Mei Wang, Tingyu Lin, Yingying Xiao, and Zhengxuan Jia

Stripe Noise Correction for Infrared Imaging System Using Neural Network Theory 677
Junqi Bai, Chuanwen Chang, and Wen Liu

A Smart Indoor Gardening System Using IoT Technology 683
Byoungwook Min and Sung Jun Park

A User-Defined Code Reinforcement Technology Based on LLVM-Obfuscator	688
Xue Yao, Bin Li, and Yahong Sun	
An iPOJO Components-Based Workflow Architecture in Ubiquitous Cloud Environments	695
Xipu Zhang, Choonhwa Lee, Bleza Takouda, and Ryu Giha	
An Effective Framework for Identifying Good XML Feedback Fragments	701
Minjuan Zhong, Bei Ji Zou, Lei Wang, Shumei Liao, and Naixue Xiong	
Minimum-Cost Consensus Models for Group Decision Making Under Intuitionistic Fuzzy Environment	708
Yuanyuan He, Chengshan Qian, and Neal N. Xiong	
Research on Ontology-Based Data Fusion	714
Shun Wang, Da-zhou Kang, Yan-hui Li, Zhe Zhang, and Zheng-xian Wei	
An Effective High Resolution Rainfall Estimation Based on Spatiotemporal Modeling	721
Qiuming Kuang, Xuebing Yang, Wensheng Zhang, Guoping Zhang, and Naixue Xiong	
A General and Effective Network Failure Ant Colony Algorithm Based on Network Fault Location Methods	727
Ruan Ling, Liu Changhua, and Wang Yuling	
Study on Smart Automated Sales System with Blockchain-Based Data Storage and Management	734
Minjae Yoo and Yoojae Won	
Pairwise Relation Analysis and Quality Estimation of Classical Chinese Poetry in Ancient Korea	741
Shohrukh Bekmirzaev, Byoung-Chan Lee, and Tae-Hyong Kim	
A Parallel Adaptive Circumference Method with OpenMP	748
Hongtao Bai, Jinwei Fang, Fengxu Zhang, and Xiaomeng Sun	
Maximum Stack Memory Monitoring Method Assisted by Static Analysis of the Stack Usage Profile	756
Kiho Choi, Seongseop Kim, Moon Gi Seok, Jeonghun Cho, and Daejin Park	
Design of Nonlinear Data-Based Wellness Content Recommendation Algorithm	766
Young-Hwan Jang, Seung-Su Yang, Hyung-Joon Kim, and Seok-Cheon Park	

User Modeling Based on Smart Media Eye Tracking Depending on the Type of Interior Space 772
Hyejin Song and Nammee Moon

Frame Rate Control Buffer Management Technique for High-Quality Real-Time Video Conferencing System. 777
SangHyong Kim and Yoojae Won

Method to Modify the Hex of Android Manifest File in Android Apps for Dynamic Analysis 784
Suhwoo Lee, Junhoo Park, and Jaecheol Ryou

An Implementation of Unidirectional Security Gateway to Guarantees Inter-VTS Exchange Service Security. 790
Yong-Kyun Kim and Seoung-Hyeon Lee

Implementation of NFC-Based Smart-Drug Information Management System. 795
Kyeong-Rae Cho and Tae-Bok Yoon

DSS-SL: Dynamic Signage System Based on SDN with LiFi Communication for Smart Buildings 805
Pradip Kumar Sharma, Byoung Wook Kwon, and Jong Hyuk Park

A Study of Service Quality in Multi Cloud Computing 811
Sangdo Lee and Yongtae Shin

Research on Cloud-Based on Web Application Malware Detection Methods 817
Ki-Hwan Kim, Dong-IL Lee, and Yong-Tae Shin

Study on Customer Rating Using RFM and K-Means 823
Hyunjung Ji, Gyeongil Shin, Dongil Shin, and Dongkyoo Shin

Scalable Distributed Temporal Reasoning 829
Jonghoon Kim and Incheol Kim

An Efficient Algorithm for Influence Maximization Based on Propagation Path Analysis 836
Wei Liu, Xin Chen, Bolun Chen, Jin Wang, and Ling Chen

Data Stream Clustering Algorithm Based on Bucket Density for Intrusion Detection 846
Chunyang Yin, Lian Xia, and Jin Wang

A Study on Subsequence Similarity Join in Time Series Data Using MapReduce 851
Kyoungyun Park, Hee Sun Won, and Keun Ho Ryu

A Practical Study on Data Logger for Gas Industry 860
Jeong Seok Oh

Operational Reliability Analysis of Guided Weapon Systems 865
Ju-seok Ha and Kyung-mo Kim

**The Direction of Information Security Control Analysis Using
Artificial Intelligence** 872
Sangdo Lee and Yongtae Shin

Anonymous Signature with Signer-Controlled Opening Capability 878
Sungwook Eom and Jun-Ho Huh

**Group Signature with Signer-Controlled Opening Capability:
Separate Token Generator** 883
Sungwook Eom and Jun-Ho Huh

**The Personal Information Overloads Effect Information Protective
Responses in the Internet of Thing (IoT) Era** 888
Won-Hyun So and Ha-Kyun Kim

**Development of Virtual Workbench to Solve Computational
Science Problem** 895
Yejin Kwon, Inho Jeon, Sik Lee, Kumwon Cho, and Jerry H. Seo

**A Design and Implementation of the CoAP Adaptor
for Communication Between DDS-Based Adaptors
and External Devices** 901
Gil-Tak Oh, Moon-Ki Back, and Kyu-Chul Lee

**Data Set Construction and Performance Comparison of Machine
Learning Algorithm for Detection of Unauthorized AP** 910
Doyeon Kim, Dongkyoo Shin, and Dongil Shin

Distributed Approach for the Security of P2P Wireless Network 915
Chunyong Yin, Nimenya Stacey, Tatiana Moreira Beita, and Jin Wang

Build Chinese Language Model with Recurrent Neural Network 920
Li Lin, Jin Liu, Zhenkai Gu, Zelun Zhang, and Haoliang Ren

**Pedestrian-Safe Smart Crossing System Based on IoT
with Object Tracking** 926
KwangEun An, Sung Won Lee, Young Ju Jeong, and Dongmahn Seo

Management and Measurement of Firm Smart Business Capability . . . 932
Chui Young Yoon

**Study on Malicious Code Behavior Detection Using Windows Filter
Driver and API Call Sequence** 938
Kangsik Shin and Yoojae Won

**A Study on Optimal Warranty Period for Repairable
Weapon Systems** 944
Ju-seok Ha and Kyung-mo Kim

**A Development on the SaaS Cloud Scientific Computing Platform
for Education and Research in Nanoscience** 951
Inho Jeon, Jin Ma, Jerry H. Seo, Jongsuk Ruth Lee, Kumwon Cho,
and Hoon Ryu

EEG Based Smart Driving for Intelligent Accident Management 957
Byung Wook Kwon and Jong Hyuk Park

**DOTP-AaaS: Dynamic One Time Password Matching-Based
Authentication as a Service** 962
Nam Yong Kim, Kyung Yeob Park, and Jong Hyuk Park

The Study on Data of Smart Home System as Digital Evidence 967
Jung Hyun Ryu, Seo Yeon Moon, and Jong Hyuk Park

A Solution for Reducing Redistribution Costs of HAIL 973
Taehyuk Kim, Minseok Lee, Doo Ho Choi, and Taek-Young Youn

**New User Management Technique in Storage Services
for Stronger Privacy** 979
Taek-Young Youn and Ku-Young Chang

Gesture-Based User Interface Design for UAV Controls 985
Jeonghoon Kwak and Yunsick Sung

**Communication System of e-Navigation Between Vessel and Shore
Utilizing Representational State Transfer at Sea** 990
Teahoon Koh, Yonghoon Kim, Kamyoun Park, Jeongho Lee,
and Kyungryong Seo

**Continuous-Time Estimation Filtering with Incorporation
of Temporary Model Uncertainty** 998
Pyung Soo Kim

**Advertise Based Adaptive Model for IoT Device in Network
Virtualization Environment** 1004
YunHee Kang, Younhoon Park, Jonghee Yoon, and KwngMan Ko

**Design and Implementation of a Wearable Device for the Blind
by Using Deep Learning Based Object Recognition** 1008
Bongjae Kim, Hyeontae Seo, and Jeong-Dong Kim

**A Preference Based Recommendation System Design
Through Eye-Tracking and Social Behavior Analysis** 1014
Heyjin Song and Nammee Moon

**Design of Consumer Behavior Analysis by Region Through Reflecting
Social Atmosphere Based on SNS** 1020
Jinah Kim and Nammee Moon

Glove Type Air Mouse Powered by Kalman Filtering and Complementary Filtering 1026
Jae Sung Choi, Won Jun Byoun, Ji Su Park, Min Hyung Lee, Ye Seul Kang, and Hyun Lee

An Indoor Positioning System Using RSSI and BSSID 1031
Sunmin Lee and Nammee Moon

IoT-Based VR Service Model to Improve Exercise Capacity 1037
Jeong-Dong Kim, Min-Gyu Park, Do-Yeon Ki, Bum-Hee Cho, Gil-Yong Lee, and Bongjae Kim

Traffic Prediction System Utilizing Application and Control of Environmental Information 1043
Yonghoon Kim and Mokdong Chung

Multi-screen Patterns and Multi-device Experiences in a Multi-screen Ecosystem 1051
Geun-Hyung Kim

Software Defined Personal Area Network for Secure and Efficient File Management 1057
Young-Hoon Park and Kwangman Ko

A Study on Resource Scaling Scheme for Energy Efficiency in Cloud Datacenter 1066
A-Young Son and Eui-Nam Huh

A Machine Learning Approach to Classification of Case Reports on Adverse Drug Reactions Using Text Mining of Expert Opinions 1072
Hyon Hee Kim and Ki Yon Rhew

Multi-scale Surface Curvature Based on Mesh Simplification 1078
Jaeyong Lee, Kyong-Ah Kim, and Yoo-Joo Choi

The microComponent and Its Extension Patterns for Flexible Reuse of Software Artifacts 1084
Doohwan Kim and Jang-Eui Hong

Using Code Skeleton Patterns for Open Source Reuse 1091
Seungwoo Nam, Doohwan Kim, and Jang-Eui Hong

Toward Offline Contents Based Software R&D Support System 1097
Suntae Kim, Joongi Hong, Seounghan Song, Sangchul Choi, JeongAh Kim, Jae-Young Choi, and Young-Hwa Cho

Ubiquitous Authentication and Authorization Mechanism for Enterprise Resources Acquisition 1102
Mei-Yu Wu, Chih-Kun Ke, and Ming-Ru Lee

Visualization Approach for R&D Monitoring – A Tracking of Research Contents Changes Perspective 1108
Jae-Young Choi, Jong-Won Ko, Suntae Kim, and Young-Hwa Cho

Hybrid Sensing and Behavior-Aware in Pedestrian Hazard Detection 1114
Svetlana Kim and YongIk Yoon

Internet Articles Classification by Industry Types Based on TF-IDF . . . 1121
Jonghun Cha and Jee-Hyong Lee

Adaptive Opportunistic Routing over DTMANETS: Proposals and Issues. 1126
Javid Ali, Raja Wasim Ahmad, Tahir Maqsood, Junaid Shuja, Yungwey Chong, Soongohn Kim, and KwngMan Ko

Accelerated Purge Processes of Parallel File System on HPC by Using MPI Programming 1134
Min-Woo Kwon, JunWeon Yoon, TaeYoung Hong, and ChanYeol Park

Path Privacy Preservation Using Threshold Secret Sharing via Distributed Obfuscators in Directions Search 1141
Mihui Kim

A QoE Based Trustable SDN Framework for IoT Devices in Mobile Edge Computing 1147
Hamid Tahaei, Kwangman Ko, Wonjeong Seo, and Suchong Joo

Cross-Cultural Touch-Based SNS Interface Design for the Elderly . . . 1153
Fanny Febriani Susilo, Jung-Ho Lee, Ji-Hyung Park, and Jung-Min Park

A Framework for Blockchain Based Secure Smart Green House Farming 1162
Akash Suresh Patil, Bayu Adhi Tama, Youngho Park, and Kyung-Hyune Rhee

System for the Researcher Map to Promote Convergence Research . . . 1168
Sangwon Hwang, Kangwon Seo, Woncheol Ryu, and Youngkwang Nam

The Congestion Control Model for Unmanned Aircraft System Traffic Management 1174
Jung-In Choi, Seung-Hyun Seo, and Taenam Cho

Towards Recovering Fault Traceability Links by Using Information Retrieval Technique 1180
Seungsuk Baek, Jung-Won Lee, and Byungjeong Lee

Multi-level Key Establishment with Space-Time Graphs for Delay Tolerant Networks 1186
Jinyeong Kang and Inwhae Joe

**Defect Management Method for Content-based Document Artifact
Test in Software R&D Project** 1192
Dusan Baek, Jong-Hwan Shin, Byungjeong Lee, and Jung-Won Lee

**An Analysis of Online Learning Tools Based on Participatory
Interaction: Focused on an Analysis of the Minerva School Case** 1199
Dae Hyun Lee, Yen-Woo You, and Yong Kim

A New Direction-Based Routing Protocol in WSNs 1207
Kyeong Mi Noh, JiSu Park, and Jin Gon Shon

**Fast Animation Crowds Using GPU Shaders and
Motion Capture Data** 1213
Mankyu Sung

**Association-Based Process Integration for Compliance with Core
Standards in Development of Medical Software** 1220
DongYeop Kim, Ye-Seul Park, Byungjeong Lee, and Jung-Won Lee

**Ventricular Arrhythmia Classification Based on High-Order
Statistical Features of ECG Signals** 1227
Sunghyun Moon and Jungjoon Kim

**Compression and Variable-Sized ECC Scheme for the Reliable Flash
Memory System** 1232
Kijin Kim and Seung-Ho Lim

**A Keyword-Based Big Data Analysis for Individualized Health
Activity Using Keyword Analysis Technique: A Methodological
Approach Using National Health Data** 1237
SangDo Lee, Hoanh-Su Le, and Jun-Ho Huh

**Reliability and Control Theory: An Integration Approach
for Safety Analysis** 1244
Anit Thapaliya and Gihwon Kwon

**An Extended Hierarchical Safety Analysis
for Software-Intensive System** 1250
Daehui Jeong and Gihwon Kwon

**Toward Providing Automatic Program Repair
by Utilizing Topic-Based Code Block Similarity** 1257
Youngjun Jeong, Kyeongsic Min, Geunseok Yang, Jung-Won Lee,
and Byungjeong Lee

**Comparing IO Visor and Pcap for Security Inspection of Traced
Packets from SmartX Box** 1263
Muhammad Ahmad Rathore, Aris Cahyadi Risdianto, Taekho Nam,
and JongWon Kim

Building the De-obfuscation Platform Based on LLVM 1269
JiHun Kim, Kwangman Ko, and Jonghee M. Youn

**Understanding Automated Continuous Integration for Containerized
Smart Energy IoT-Cloud Service** 1275
Chorwon Kim, Seungryong Kim, and JongWon Kim

**Comparing the Effectiveness of SFMEA and STPA in
Software-Intensive Railway Level Crossing System** 1281
Tung La-Ngoc and Gihwon Kwon

Vision-Based Humanoid Robot Control Using FIR Filter 1289
Kwan Soo Kim, Hyun Ho Kang, Sung Hyun You, and Choon Ki Ahn

**Prototype Implementation of Site Visibility Framework Employing IO
Visor-Based Packet Tracing** 1295
Taekho Nam and JongWon Kim

ICN Based Disaster Area Network Platform 1301
Masashi Katsumata

**Single-Camera Vision-Based Vein Biometric Authentication and
Heart Rate Monitoring via Infrared Imaging Analysis** 1307
Jae Hyun Han, Jinman Kim, and Eui Chul Lee

**Analysis of Agenda Prediction According to Big Data Based Creative
Education Performance Factors** 1314
Ji-Hoon Seo, EunMi Cho, and Kil-Hong Joo

**Multimedia Design Approaches by Just Noticeable Difference (JND)
of Audiovisual Modalities** 1320
Suhhee Yoo and Mincheol Whang

**Usability Improvement of Life-Logging Contents Based
on Gamification Factors** 1326
Sojung Kwak and Jieun Kwon

**The Relationships Between Behavioral Patterns and Emotions
in Daily Life** 1332
Hyunwoo Lee, Ayoung Cho, Youseop Jo, and Mincheol Whang

**Automated Verification Method of Korean Word Handwriting
Using Geometric Feature** 1340
Woohyuk Jang, Sehee Kim, Yoonkyoung Kim, and Eui Chul Lee

**Correlation Analysis Between Environmental Sound
and Human Emotion** 1346
Min Woo Park, Hyeonsang Hwang, and Eui Chul Lee

Image-Based Malware Classification Using Convolutional Neural Network 1352
Hae-Jung Kim

Classification of Web Content by Category Generation in Social Life Logging 1358
Youngho Jo, Heajin Kim, Hana Lee, and Mincheol Whang

Intrusion Detection in High-Speed Big Data Networks: A Comprehensive Approach 1364
Kamran Siddique, Zahid Akhtar, and Yangwoo Kim

Embodied Emotion Recognition System 1371
Ayoung Cho, Hyunwoo Lee, Hyeonsang Hwang, Youseop Jo, and Mincheol Whang

Patterns of Cardiovascular and Behavioral Movements in Life-Logging According to Social Emotions 1377
Hana Lee, Youngho Jo, Heajin Kim, and Mincheol Whang

Deep Representation of Raw Traffic Data: An Embed-and-Aggregate Framework for High-Level Traffic Analysis 1383
Woosung Choi, Jonghyeon Min, Taemin Lee, Kyeongseok Hyun, Taehyung Lim, and Soonyoung Jung

A Study on Traffic Signal Waiting Model Using Queuing Theory 1391
JoongHoon Lee, HyuckJoong Yoon, and Tae-Sun Chung

Service Aware Orchestration for Dynamic Network Slicing in 5G Networks 1397
Jeongyun Kim

Improved Schedulability Analysis of Fixed-Priority for Mixed-Criticality Real-Time Multiprocessor Systems 1403
Namyong Jung and Jinkyu Lee

Analysis of the Elements of Future Development of Korean Style Software Education Through the Opinion Mining Technique 1410
Ji-Hoon Seo and Kil-Hong Joo

Comparison of 2D&3D Performances of Facial Feature Analysis Using RGB-D Vision Sensor 1416
Kunyoung Lee and Eui Chul Lee

The Two Dimensional Model of Social Emotion Based on Social Life Logging 1422
Heajin Kim, Youngho Jo, Hana Lee, and Mincheol Whang

**Design of Zigbee-BLE Gateway Direct Communication System
for Smart Home Environment** 1428
Jae-Sung Shim, Hyung-Joon Kim, Nam-Uk Lee, and Seok-Cheon Park

**Design of Automatic Source Code Generation Based on User
Pattern Definition** 1434
Seung-Su Yang, Hyung-Joon Kim, Nam-Uk Lee, and Seok-Cheon Park

**Design of TDD-Based Automation System for Android Application
Test Automation** 1440
Min-Hyung Park, Hyung-Joon Kim, Young-Hwan Jang,
and Seok-Cheon Park

**Convolutional Neural Network Based Serial Number Recognition
Method for Indian Rupee Banknotes** 1445
Unsoo Jang and Eui Chul Lee

**Emotion Recognition Through Cardiovascular Response in Daily Life
Using KNN Classifier** 1451
Youseop Jo, Hyunwoo Lee, Ayoung Cho, and Mincheol Whang

Location Privacy for HIP Based Internet of Things 1457
Kyung Choi and Mihui Kim

**Ubiquitous Learning and Digital Badges in the Age of
Hyper-connectivity** 1464
Yoonil Auh and Heejung Raina Sim

Private Data Protection of Android Application 1470
Jinseong Kim and Im Y. Jung

**Erratum to: An Efficient Clustering Technique for Unstructured
Data Utilizing Latent Semantic Analysis** E1
Yonghoon Kim and Mokdong Chung

Author Index 1477