

# PROCEEDINGS OF SPIE

[SPIDigitalLibrary.org/conference-proceedings-of-spie](https://SPIDigitalLibrary.org/conference-proceedings-of-spie)

## Front Matter: Volume 9902

**SPIE.**

# PROCEEDINGS OF SPIE

## ***Fourth International Conference on Wireless and Optical Communications***

**Maode Ma**  
**William Arrasmith**  
**Peng Li**  
*Editors*

**4–6 June 2016**  
**Beijing, China**

*Hosted by*  
University of Science and Technology Beijing (China)

*Sponsored by*  
University of Electronic Science and Technology of China (China)  
Chongqing University (China)

*Published by*  
SPIE

**Volume 9902**

Proceedings of SPIE 0277-786X, V. 9902

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Fourth International Conference on Wireless and Optical Communications, edited by Maode Ma, William Arrasmith, Peng Li  
Proc. of SPIE Vol. 9902, 990201 · © 2016 SPIE · CCC code: 0277-786X/16/\$18 · doi: 10.1117/12.2263874

Proc. of SPIE Vol. 9902 990201-1

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at [SPIEDigitalLibrary.org](http://SPIEDigitalLibrary.org).

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:

Author(s), "Title of Paper," in *Fourth International Conference on Wireless and Optical Communications*, edited by Maode Ma, William Arrasmith, Peng Li, Proceedings of SPIE Vol. 9902 (SPIE, Bellingham, WA, 2016) Six-digit Article CID Number.

ISSN: 0277-786X  
ISSN: 1996-756X (electronic)  
ISBN: 9781510601550

Published by

**SPIE**

P.O. Box 10, Bellingham, Washington 98227-0010 USA  
Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445  
[SPIE.org](http://SPIE.org)

Copyright © 2016, Society of Photo-Optical Instrumentation Engineers.

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at [copyright.com](http://copyright.com). Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/16/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

**SPIE. DIGITAL LIBRARY**  
[SPIEDigitalLibrary.org](http://SPIEDigitalLibrary.org)

---

**Paper Numbering:** *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a six-digit CID article numbering system structured as follows:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

# Contents

vii	<i>Authors</i>
ix	<i>Conference Committee</i>
xi	<i>Introduction</i>

---

## OPTICAL COMMUNICATION AND SYSTEMS

---

9902 02	<b>Performance of DP-QDQ compared with DP-16QAM, DP-64QAM and DP-256QAM [9902-6]</b>
9902 03	<b>Close-form expression of one-tap normalized LMS carrier phase recovery in optical communication systems [9902-8]</b>
9902 04	<b>Research on advanced modulation formats of high-speed optical communication system [9902-9]</b>
9902 05	<b>Modeling of visible light channel based on matrix reconstruction [9902-10]</b>
9902 06	<b>Modified <math>\mu</math>-law companding for LED nonlinearity alleviation in DCO-OFDM VLC system [9902-30]</b>
9902 07	<b>Design of optical transmitting antenna with enhance performance in visible light communication [9902-33]</b>
9902 08	<b>Adaptive channel estimation for soft decision decoding over non-Gaussian optical channel [9902-34]</b>

---

## WIRELESS SENSOR NETWORKS

---

9902 09	<b>A multiple-source consecutive localization algorithm based on quantized measurement for wireless sensor network [9902-18]</b>
9902 0A	<b>S-TSP: a novel routing algorithm for in-network processing of recursive computation in wireless sensor networks [9902-21]</b>
9902 0B	<b>ESAM: Endocrine inspired Sensor Activation Mechanism for multi-target tracking in WSNs [9902-24]</b>
9902 0C	<b>Design of online monitoring and forecasting system for electrical equipment temperature of prefabricated substation based on WSN [9902-35]</b>
9902 0D	<b>Context driven content centric networking for smart buildings [9902-39]</b>

---

## MOBILE COMMUNICATION AND WIRELESS TECHNOLOGIES

---

- 9902 OE **Extracting fingerprint of wireless devices based on phase noise and multiple level wavelet decomposition** [9902-1]
- 9902 OF **A smartphone-based platform to test the performance of wireless mobile network and preliminary findings** [9902-14]
- 9902 OG **Spectrum sensing algorithm based on autocorrelation energy in cognitive radio networks** [9902-19]
- 9902 OH **Near-field self-interference cancellation and quality of service multicast beamforming in full-duplex** [9902-22]
- 9902 OI **A spectrum sensing algorithm based on the ES-DOA estimation** [9902-32]
- 9902 OJ **Spectrum handoff algorithm with imperfect spectrum sensing in cognitive radio networks** [9902-37]

---

## IMAGE PROCESSING AND APPLICATIONS

---

- 9902 OK **The method for detecting small lesions in medical image based on sliding window** [9902-29]

---

## ELECTRONIC AND COMMUNICATION ENGINEERING

---

- 9902 OL **The scheme and research of TV series multidimensional comprehensive evaluation on cross-platform** [9902-2]
- 9902 OM **Very compact quad band-notched UWB monopole antenna** [9902-4]
- 9902 ON **Constant envelope chirped OFDM power efficiency** [9902-5]
- 9902 OO **Differential network coding for two-way relay networks with massive arrays** [9902-7]
- 9902 OP **Robust visual tracking via adaptive kernelized correlation filter** [9902-11]
- 9902 OQ **Multi-pair two-way massive MIMO AF relaying with ZFR/ZFT beamforming and imperfect CSI over Ricean fading channels** [9902-12]
- 9902 OR **An improved sphere-decoding algorithm for V-BLAST system** [9902-13]
- 9902 OS **A network monitor for HTTPS protocol based on proxy** [9902-16]
- 9902 OT **FMCW CSAR Doppler shifting correction and the layover phenomenon analysing a new received signal model** [9902-17]
- 9902 OU **Channel estimation based on quantized MMP for FDD massive MIMO downlink** [9902-23]

- 9902 0V **Conditional pulse nulling receiver for multi-pulse PPM and binary quantum coding signals** [9902-25]
- 9902 0W **EMD-WVD time-frequency distribution for analysis of multi-component signals** [9902-28]
- 9902 0X **Achievable degrees of freedom of MIMO two-way relay interference channel with delayed CSIT** [9902-36]
- 9902 0Y **A radar clutter suppression method based on fuzzy reasoning** [9902-40]
- 9902 0Z **An IPv6 routing lookup algorithm using weight-balanced tree based on prefix value for virtual router** [9902-42]
- 9902 10 **Design and implementation of temperature and humidity monitoring system for poultry farm** [9902-43]
- 9902 11 **Reducing error vector magnitude of OFDM signals using threshold vector circle method** [9902-44]
- 9902 18 **Frame synchronization of satellite based on AIS signals** [9902-27]



# Authors

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Adil Mahdi, Omar, 0B  
Al-Mayouf, Yusor Rafid Bahar, 0B  
Anjum, M. R., 0N  
Bai, Xuesong, 0L  
Bao, Xiao-min, 0J  
Bu, Qing, 0Y  
Cai, Hua-jie, 0U  
Chai, Jianping, 0L  
Chai, Yunzi, 0W  
Chang, Chun, 02  
Chen, Lingjiang, 0Z  
Chen, Tian, 0V  
Chu, Hao, 09  
Dida, Mussa A., 0N  
Fang, Zhaoxi, 0O  
Fibriani, Charitas, 10  
Geng, Xinli, 0F  
Guo, Peng, 0A  
Guo, Yao-ting, 0U  
Han, Guilai, 0K  
Hao, Huan, 0N  
Huang, Benxiong, 02  
Huang, Gengsheng, 0R  
Huang, Sheng, 08  
Huo, Jiahao, 05  
Idris, Mohd Yamani Idna, 0B  
Jacobsen, Gunnar, 03  
Jia, Ning, 04  
Jia, Yue, 0D  
Jiao, Yuan, 0K  
Khan, Suleman, 0B  
Kong, Song, 0E  
Kuang, Dang, 07  
Li, Bin, 02  
Li, Fenghua, 0S, 0Z  
Li, Jie, 03  
Li, Lingzhi, 0M  
Li, Qingyun, 0X  
Li, Ruoyao, 0Y  
Li, Shaoqian, 0X  
Liang, Min, 0D  
Liao, Qingmin, 0P  
Lin, Jincal, 04  
Liu, Huan-lin, 08  
Liu, Tangxing, 0Y  
Liu, Tiegeng, 03  
Liu, Wei, 05  
Liu, Xuefeng, 0A  
Liu, Yangxin, 0S  
Lu, Huimin, 06, 07  
Lyu, Bo, 0D  
Ma, Bin, 0J  
Ma, Shexiang, 18  
Miao, Hongxia, 0C  
Miao, Tao-tao, 08  
Miao, Xuejiao, 0C  
Pang, Zeping, 0O  
Popov, Sergei, 03  
Purnomo, Hindriyanto Dwi, 10  
Purwoko, Angga, 10  
Qi, Weiran, 0C  
Qin, Xiaowei, 0F  
Qu, Yi, 0T, 0U  
Ran, Tao, 0N  
Ren, Shengwei, 0G  
Sadiyah, Ulfa, 10  
Shao, Pengfei, 0O  
Shao, Shihai, 0H  
Shen, Jing, 0R  
Shi, Yinjia, 06  
Somya, Ramos, 10  
Song, Depeng, 0T  
Sun, Xiaoli, 0Q  
Sun, Zhuo, 0E  
Tang, Tingfang, 0A  
Tang, Youxi, 0H  
Tu, Ji, 0D  
Wahab, Ainuddin Wahid Abdul, 0B  
Wang, Bing-he, 0U  
Wang, Bo, 0P  
Wang, Desheng, 0P  
Wang, Dong, 11  
Wang, Jiangzhou, 0I  
Wang, Jianping, 06, 07  
Wang, Jingqi, 11  
Wu, Chengdong, 09  
Wu, Fei, 0H  
Wu, Gang, 0X  
Wu, Ling, 0M  
Wu, Qingqing, 11  
Wu, Wen, 11  
Xia, Yingqing, 0M  
Xiang, Jing-song, 08  
Xiao, Xuanxuan, 0C  
Xie, Xian-zhong, 0J  
Xie, Yuehui, 0T  
Xu, Hao, 0F  
Xu, Kui, 0Q



Xu, Tianhua, 03  
Xu, Zhengguang, 02  
Xue, Yongfei, 0R  
Yan, Chaowen, 06  
Yan, Kaili, 05  
Yan, Kuo, 0C  
Yang, Yangzhao, 0D  
Ye, Lei, 0M  
Yin, Fulian, 0L  
Zhang, Chunlei, 11  
Zhang, Dongmei, 0Q  
Zhang, Li, 0G  
Zhang, Lingcui, 0S  
Zhang, Qiaoduo, 0Z  
Zhang, Shibing, 0G  
Zhang, Xudong, 0W  
Zhang, Yimo, 03  
Zhao, Dawei, 18  
Zhao, Weichen, 0E  
Zheng, Hui, 0R  
Zheng, Wen, 0O  
Zhou, Hongjun, 0L  
Zhou, Shuguang, 0S, 0Z  
Zhou, Xian, 05  
Zhu, Bing, 0V  
Znaid, Ammar Abu, 0B  
Zuo, Yuan, 0V

# Conference Committees

## *Advisory Committee*

**Yang Xiao**, The University of Alabama (United States)  
**Song Jian**, Tsinghua University (China)  
**William Arrasmith**, Florida Institute of Technology (United States)

## *Conference Chairs*

**Gang Feng**, University of Electronic Science and Technology of  
China (China)  
**Maode Ma**, Nanyang Technological University (Singapore)

## *Program Chairs*

**Yawgeng A. Chau**, Yuan Ze University (Taiwan)  
**Mohamed El-Tarhuni**, American University of Sharja (United Arab Emirates)  
**Guofeng Zhao**, Chongqing University of Posts and Telecommunications  
(China)  
**Peng Li**, Chongqing University (China)

## *Session Chairs*

- 1 Mobile Communication and Wireless Technology  
**Zhaoxi Fang**, Zhejiang Wanli University (China)
- 2 Communication and Information System  
**Maode Ma**, Nanyang Technological University (Singapore)
- 3 Optical Communication and Signal Processing Technology  
**William Arrasmith**, Florida Institute of Technology (United States)



## Introduction

This volume contains some of the work presented at the Fourth International Conference on Wireless and Optical Communications (IWOC), which was held 4-6 June, 2016, in Beijing, China, and hosted by University of Science and Technology Beijing (USTB).

ICWOC provides a scientific platform for both local and international scientists, engineers, and technologists who work in all aspects of wireless and optical communications. In addition to the contributed papers, internationally known experts from several countries were also invited to deliver plenary and keynote speeches.

The volume includes 36 selected papers which were submitted to the conference from universities, research institutes, and industries. Each contributed paper has been peer-reviewed by reviewers including organizing and advisory committee members as well as other experts in the field from different countries. The proceedings present the newest research results and findings in the field of wireless and optical communications, which cover the following five specific areas: mobile communication and wireless technology, wireless sensor networks, optical communication and systems, electronic and communication engineering, and image processing and applications.

Much of the conference's success is due to topic coordinators who have devoted their expertise and experience in promoting and coordinating the activities for the organization and operation of the conference. The coordinators of various session topics have devoted a considerable amount of time and energy to soliciting papers from relevant researchers for presentation at the conference.

The chairpersons of the different sessions played an important role in conducting the proceedings of the session in a timely and efficient manner and on behalf of the conference committee, we express sincere appreciation for their involvement. The reviewers of the manuscripts, those who by tradition remain anonymous, have also been very helpful in efficiently reviewing the manuscripts and providing valuable comments well within the time allotted to them. We express our sincere and grateful thanks to all reviewers.

**Maode Ma**

