PROCEEDINGS OF SPIE

Global Intelligence Industry Conference (GIIC 2018)

Yueguang Lv Editor

22–24, May 2018 Beijing, China

Organized by Division of Information and Electronic Engineering of CAE (China) Chinese Society for Optical Engineering (China) Beijing Economic Technological Development Area (China)

Sponsored by Chinese Academy of Engineering (China)

Published by SPIE

Volume 10835

Proceedings of SPIE 0277-786X, V. 10835

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

Global Intelligence Industry Conference (GIIC 2018), edited by Yueguang Lv, Proc. of SPIE Vol. 10835, 1083501 · © 2018 SPIE · CCC code: 0277-786X/18/\$18 · doi: 10.1117/12.2514318

Proc. of SPIE Vol. 10835 1083501-1

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.

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 *Global Intelligence Industry Conference (GIIC 2018)*, edited by Yueguang Lv, Proceedings of SPIE Vol. 10835 (SPIE, Bellingham, WA, 2018) Seven-digit Article CID Number.

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

ISBN: 9781510622999 ISBN: 9781510623002 (electronic)

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 Copyright © 2018, 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. 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/18/\$18.00.

Printed in the United States of America.

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



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 seven-digit CID article numbering system structured as follows:

- The first five 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 Authors
- ix Conference Committee
- xi Introduction

ARTIFICIAL INTELLIGENCE

| 10835 02 | Research and application of predictive function control based on adjustment coefficient [10835-1] |
|----------|--|
| 10835 03 | Contour detection using an improved holistically nested edge detection network [10835-2] |
| 10835 04 | Biometric method to improve super resolution structure on AI and deep learning [10835-40] |
| 10835 06 | Single-sample learning method and a type of brain activation function [10835-55] |
| 10835 07 | Human action recognition using Kinect multimodal information [10835-66] |
| 10835 08 | A survey of the application of deep learning in computer vision [10835-68] |
| 10835 09 | Fault diagnosis for automotive assembly based on optical coordinate data and machine learning [10835-69] |
| 10835 0A | Violence detection based on three-stream convolutional networks [10835-72] |
| 10835 OB | Automatic human hallmark recognition based on visual words [10835-75] |

INTELLIGENT MANUFACTURING

| 10835 OC | Automatic measurement technology for equipment assembly accuracy of spacecraft AIT process [10835-3] |
|----------|--|
| 10835 OD | Automatic measurement method of large scale satellite antenna in planar near-field test [10835-5] |
| 10835 0E | Research on aircraft digital shape measurement data fusion method [10835-6] |

| 10835 OF | An error correction model based on neural network for laser displacement sensor [10835-23] |
|----------|---|
| 10835 0G | Detection v-defect in 20° wedge by laser ultrasound technique [10835-33] |
| 10835 OH | Rotationally asymmetric figure measurement of optical flat using rotational shear phase measuring deflectometry [10835-38] |
| 10835 01 | A novel automated approach for noise detection in interference fringes pattern images using feature learning [10835-56] |
| 10835 OJ | Vision system measuring remote target based on unmanned aerial vehicle [10835-57] |
| 10835 OK | Schlieren visualization of leaky guided waves in a liquid immersion plate [10835-60] |
| 10835 OL | Delay time calculations for testing transverse defects of cylindrical surface artefacts with phased array ultrasonic [10835-63] |
| 10835 OM | Research on accelerated durability test of photovoltaic hollow modules [10835-64] |

INTELLIGENT UNMANNED SYSTEMS

| 10835 ON | UAV-based application for electromagnetic compatibility testing [10835-7] |
|----------|---|
| 10835 00 | Bathymetric data processing based on denoising autoencoder Wasserstein generative adversarial network [10835-9] |
| 10835 OP | Multi-sensor and multi-target task allocation method based on improved firefly algorithm [10835-11] |
| 10835 0Q | Unmanned optical warning system for drones [10835-12] |
| 10835 OR | Free space propagation loss simulation analysis of aeronautical radio navigation station [10835-14] |
| 10835 OS | Research of image compression influence on SAR ATR based on an efficient CNN architecture [10835-17] |
| 10835 OT | Keyframe-based stereo visual-inertial SLAM using nonlinear optimization [10835-19] |
| 10835 OU | A brain computer interface control system based on cloud platform for Minitype UAVs [10835-20] |
| 10835 OV | Variable structure guidance with auto-generated impact angle constraint based on fuzzy strategy [10835-21] |
| 10835 0X | Research on the unmanned intelligent monitoring platform of geographical conditions [10835-24] |

- 10835 0Y Influence of intelligent unmanned system on the development of intelligent measuring [10835-25]
- 10835 0Z An overview of SLAM [10835-26]
- 10835 10 A MEMS random error analysis method fused with genetic algorithm [10835-27]
- 10835 11 Research on recognition and tracking technology for a fully autonomous and agile response anti LLS-target system [10835-28]
- 10835 12 A new approach for SAR baseband Doppler centroid estimation [10835-29]
- 10835 13 An improved phase gradient autofocus approach for stripmap SAR imaging [10835-30]
- 10835 14 **Research on the modeling method of UAV swarm operation in cyberspace** [10835-31]
- 10835 15 Optimization simulation of aeromagnetic detection based on COMSOL multiphysics [10835-32]
- 10835 16 Ground vehicles cooperative task area allocation for survivability improvement [10835-35]
- 10835 17 Mission oriented self-organizing network methodology of UAV [10835-39]
- 10835 19 Simulation-based analysis of bounding box localization algorithm for wireless sensor network [10835-43]
- 10835 1A Research on intelligent target recognition technology for integrated reconnaissance/strike UAV [10835-44]
- 10835 1B Research and implementation of SAR simulator based on adaptive synchronization technology [10835-45]
- 10835 1C Research of adaptive error correction for multi-channel SAR receiver [10835-47]
- 10835 1D A fast Doppler beam sharpening approach based on short time FFT [10835-50]
- 10835 1E A high-resolution ground moving target imaging method based on motion compensation [10835-51]
- 10835 1F Fast and high-accuracy systematic calibration of inertial devices based on IMU off-axis transposition [10835-52]
- 10835 1G Research on the fast calibration method of MEMS gyroscope [10835-53]
- 10835 1H Research on servitization based on UAV avionics system [10835-58]
- 10835 11 First experimental results of the C band SAR and ground support system [10835-59]

- 10835 1J Target feature enhancement of SAR image based on discrete shearlet transform [10835-61]
- 10835 1K Research on the key technologies of unmanned cluster to sea combat [10835-62]
- 10835 1L Operation method of electronic warfare UAV [10835-65]
- 10835 1M The UAV safety control based on cognition guidance [10835-67]
- 10835 1N Summary of key technologies of combat intelligent unmanned aerial vehicle [10835-73]
- 10835 10 The development of counter-unmanned aerial vehicle technologies [10835-74]
- 10835 1P Internal polyhedron configuration energy self-sufficient system for sphere mobile platform [10835-77]
- 10835 1Q Research on key technologies of simulated training system for large ground control station of UAS [10835-78]
- 10835 1S The Multi-UAV cooperative target tracking simulation system [10835-80]

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five 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.

Bian, Shaofeng, 00 Cai, Yefan, Ol Cao, Feng, 07 Cao, Ge, 1C Chai, Ligun, OF Chana, Zhena, 03 Chen, Chang, OT Chen, Wei, 0B Chen, Xiaocen, 1F Chen, Yangyi, 15 Chen, Yazhou, ON Chen, Yongbing, 00 Cheng, Yunfei, 08, 0A Cheng, Erwei, ON Cheng, Haoyu, 1M Cheng, Qian, 0K Dai, Ning, 1P Ding, Quanxin, 04 Dong, Liang-ci, OV Dong, Shiyun, 06 Du, Junlin, OY E., Kewei, OH Fu, Jun, 10, 1G Gao, Duanyang, 00, 10, 1G Gu, Hairui, 10 Gu, Tao, 17 Guan, Lili, OF Guo, Chunjie, 04 Guo, Fang, OJ Guo, Hongcao, OX Guo, Jundong, 1C Guo, Li Li, 0E Guo, Xiaojun, 15, 19 Guo, Zheng, 1B, 1C Guo, Zijia, 11 Han, Guoqing, OQ Han, Hongxiang, 1G Han, Qing-bang, OG, OK, OL Han, Song, OS, 1B He, Yuhang, OF Hu, Chun-ling, 07 Hu, Jian-Gen, 02 Hu, JianMin, 11 Hu, Ruigin, OC Hu, Shuhong, 1P Huang, Hanqiao, 1M Hui, Bin, 03 Jia, Jing, OG, OK, OL Jia, Lili, OB

Jiang, Huanhuan, 1A Jiang, Kai, 1A Jiang, Xue-ping, OK, OL Jin, Bo, OZ Jing, Xueping, 0G Kang, Minyang, 1H Lan, Weiqi, OT Li, An, 10 Li, Bingfei, 1K Li, Dahai, OH Li, Ge, 1P Li, Jing, OH Li, Kun, OH Li, Qiang, OF Li, Quan, 02 Li, Wei, 07 Li, Xinyi, 1P Li, Yuankai, OR Lian, Guofu, 0J Liang, Fei, OR Liang, Jinbo, Ol Liu, Bidan, 12, 13, 1E Liu, Chang, 12, 13, 1D, 1E Liu, Changhua, 1Q Liu, Hong, 1Q Liu, Hua, 04 Liu, Jingyu, 11 Liu, Keya, 11 Liu, Qi, OE Liu, Shangkuo, OH Liu, Wenbin, OB Liu, Xiao, 0D Liu, Yu Song, OE Liu, Yuexia, 08, 0A Long, Changyu, OC, OD Long, Teng, 16 Lu, Hongbo, 1P Luo, Haibo, 03 Luo, Zhi-Hao, 02 Man, Keshuang, OA Miao, Jisong, 1F Pan, Jeng-Shyang, OJ Pan, Zhigang, 1J Pan, Zhuo, 11, 1J Qian, Ziqing, 1P Qin, Xuebin, 0U Ren, Yuan, 1F Ruan, Guowei, 0D

Shang, Wei, OV

Shao, Qiongling, 1F Si, Guangya, 14 Song, Qiudong, 0Q Su, Long, 1A Su, Shaojing, 15, 19 Su, Ye, 02 Sui, Xin, 1N Sun, Xiaoyong, 15 Tan, Junyang, 06 Tang, Chao, 07 Tang, Kai, OX, OY Tao, Li, OD Wan, Daoming, OF Wang, Xiao-feng, 07 Wang, Chao, 1D, 1E Wang, Chen, 1F Wang, Chunjie, 0S Wang, Dawei, 1N, 1O Wang, Dong, 0M Wang, Gang, OU Wang, Helong, 04 Wang, Kexiang, 17 Wang, Lei, OT Wang, Li, 0M Wang, Mei, OU Wang, Pei, 1S Wang, Pengxiang, OP Wang, Qi, 13, 1D, 1E Wang, Shengyin, 16 Wang, Shuo, 1H Wang, Wu, 08, 0A Wang, Xiao-feng, 07 Wang, Yanfei, 0S, 12, 13, 1B, 1C, 1D, 1E, 1I, 1J Wang, Yanzheng, 14 Wang, Yibo, 1N Wang, Yunhui, 1H, 1L Wang, Zhengfeng, OH Wang, Zhi Hai, OE Wang, Zhu, 16 Wu, Chao, 1S Wu, Peng, 19 Wu, Tao, 1A Xia, Dan, 06 Xiong, Jun-hui, OV Xu, Binshi, 06 Xu, Guangtong, 16 Xu, Jian, OR Xu, Zheng, 03, 0K Xue, Bing, 1H, 1L Xue, Xun, OH Yang, Baichun, 10 Yang, Feng, OP, OZ Yang, Kai, 10 Yang, Kun, 1N Yao, Zhao, 1N Ye, Pingfan, OR Yi, Wangmin, OC, OD Yin, Feng, 02 Yin, Zongdi, OQ Yu, Xiangyang, Ol

Yue, Yun-fei, OL Zeng, Xuan, 09 Zhan, Xueli, 1D, 11, 1J Zhan, Zhijuan, 1H, 1K, 1L Zhang, Bing, OX, OY Zhang, Dongxiao, ON Zhang, Lei, 10 Zhang, Lin, OU Zhang, Litao, OP Zhang, Miao-hui, 07 Zhang, Qi, 11 Zhang, Ruichen, 00, 10 Zhang, Wei, 1P Zhang, Wenqi, 10 Zhang, Yang, 14 Zhang, Yizhai, OP Zhao, Jianke, OH Zhao, Tao, OV Zheng, Litao, OP Zheng, Meiyun, 1M Zheng, Xueli, 17 Zhou, Huan, 1M Zhou, Liwei, 04 Zhou, Qing, 1K Zhou, Wei, 1S Zhou, Xun, 1N Zhou, Yan, OH Zhu, Honghao, 06 Zhu, Hua, OT Zhu, Meng, 0Q Zhu, Yong, 16

Conference Committee

Conference Chairs

Ji Zhou, Chinese Academy of Engineering (China) Guozhi Liu, Chinese Academy of Sciences (China) Zuoning Chen, Chinese Academy of Engineering (China) Huettl Reinhart, Deutsche Akademie der Technikwissenschaften (Germany) Yunhe Pan, Chinese Academy of Sciences (China) Heguan Wu, Chinese Academy of Sciences (China) Guofan Jin, Tsinghua University (China) Guangjun Zhang, Southeast University (China) Yueguang Lv, Chinese Academy of Engineering (China) Xiangli Bin, Chinese Academy of Sciences (China) John Dewar, LaTrobe University (Australia) Lin Li, University of Manchester (United Kingdom) Magnus Breidne, Royal Swedish Academy of Engineering Science (Sweden) Min Gu, RMIT University (Australia) Shi-wan Lin, American Industrial Internet Alliance (United States)

Technical Committee

Wen Gao, Peking University (China) Nanning Zheng, Xi'an Jiaotong University (China) Weimin Bao, China Aerospace Science and Technology Corporation (China) Zuyan Xu, Technical Institute of Physics and Chemistry, CAS (China) Songlin Zhuang, Shanghai University of Science and Technology (China) Tianyou Chai, Northeastern University (China) Deyi Li, Institute of China Electronic System Engineering (China) Bohu Li, China Aerospace Science and Industry Corporation Ltd. (China) Chun Chen, Zhejiang University (China) Tianran Wang, Shenyang Institute of Automation, CAS (China) Jianguan Yao, Tianjin University (China) Junhao Chu, Shanghai Institute of Technical Physics, CAS (China) Chena Wu, Tsinahua University (China) Manging Wu, China Electronics Technology Group Corporation (China) Jiancheng Fang, Beihang University (China) You Zheng, Tsinghua University (China) **Ru Huang**, Peking University (China) Wei Huang, Northwestern Polytechnical University (China) Wei Wang, China Aerospace Science and Technology Corporation (China)

Huaming Wang, Beihang University (China)
Lijun Wang, Changchun Institute of Optics, Precision Mechanics, and Physics, CAS (China)
Bangkui Fan, Beijing Institute of Information Technology (China)
Qionghai Dai, Tsinghua University (China)

Introduction

We had the great honor of organizing the Global Intelligent Industry Conference 2018. It was a great pleasure for us to greet the more than 2000 participants from many different countries attended. We firmly believe this conference will become an important international event in the field of AI technology.

The Global Intelligent Industry Conference 2018 was sponsored by the Chinese Academy of Engineering and was organized by the Division of Information and Electronic Engineering of CAE, Chinese Society for Optical Engineering, Beijing Economic Technological Development Area.

The purpose of this conference is to provide a forum for the participants to report and review innovative ideas and up-to-date progress and developments and discuss novel approaches to application in the AI field. It is sincerely hoped that the research and development in the AI field will be promoted, and international cooperation sharing the common interest will be enhanced.

On behalf of other co-chairmen, and the organization committee, we would like to thank our sponsors and cooperation organizers for all they have done for this conference. Thanks also to all the authors for their contributions to the proceedings, to all of the participants and friends for their interest and efforts in helping us to make this conference possible, to the program committee members for their effective work and valuable advice, and to the secretariat and SPIE staff for their tireless efforts and outstanding service in preparing and publishing the proceedings.

Yueguang Lv