PROCEEDINGS OF SPIE

AOPC 2015: Image Processing and Analysis

Chunhua Shen Weiping Yang Honghai Liu Editors

5–7 May 2015 Beijing, China

Organized by
Chinese Society for Optical Engineering (China)
Photoelectronic Technology Committee, Chinese Society of Astronautics (China)
Science and Technology on Low-light-level Night Vision Laboratory (China)

Sponsored by Chinese Society for Optical Engineering (China)

Technical Co-sponsor and Publisher SPIE

Volume 9675

Proceedings of SPIE 0277-786X, V. 9675

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

AOPC 2015: Image Processing and Analysis, edited by Chunhua Shen, Weiping Yang, Honghai Liu, Proc. of SPIE Vol. 9675, 967501 · © 2015 SPIE · CCC code: 0277-786X/15/\$18 · doi: 10.1117/12.2222128

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 AOPC 2015: Image Processing and Analysis, edited by Chunhua Shen, Weiping Yang, Honghai Liu, Proceedings of SPIE Vol. 9675 (SPIE, Bellingham, WA, 2015) Six-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic) ISBN: 9781628419009

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 © 2015, 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/15/\$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 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

- ix Author Index
- xiii Conference Committee
- xv Introduction

IMAGE PROCESSING AND ANALYSIS

9675 02	Automatic identification of lunar craters based on feature points dynamic supply method [9675-1]
9675 03	Using near infrared light for deep sea mining observation systems [9675-9]
9675 04	A compact planar multi-broad band monopole antenna for mobile devices [9675-14]
9675 05	LED-based digital hologram reconstruction by compressive sensing [9675-16]
9675 06	Noise analysis and signal-to-noise ratio model of gain modulation laser imaging [9675-19]
9675 07	Aircraft target onboard detecting technology via Circular Information Matching method for remote sensing satellite [9675-20]
9675 08	High-accuracy mathematical fitting to calculation the atmospheric transmittance of infrared radiation [9675-21]
9675 09	Research on technology of target real-time detection under sea-sky background [9675-22]
9675 0A	The Implementation of non-uniformity correction in multi-TDICCD imaging system [9675-23]
9675 OB	Image deconvolution under Poisson noise using SURE-LET approach [9675-25]
9675 OC	UPRE-variant: a novel criterion for parametric PSF estimation [9675-26]
9675 OD	A novel approach to blind deconvolution based on generalized Akaike's information criterion [9675-27]
9675 OE	Effect of severe image compression on face recognition algorithms [9675-28]
9675 OF	Speeding up Boosting decision trees training [9675-29]
9675 OG	Separability oriented fusion of LBP and CS-LDP for infrared face recognition [9675-30]
9675 OH	Face recognition using multiple maximum scatter difference discrimination dictionary learning [9675-31]
9675 OI	A robust multi-frame image blind deconvolution algorithm via total variation [9675-34]

9675 OJ	Improved restoration algorithm for weakly blurred and strongly noisy image [9675-40]
9675 OK	Real-time infrared image acquisition and display system based on PCI Express and its interfacial design [9675-41]
9675 OL	A multi-characteristic based algorithm for classifying vegetation in a plateau area: Qinghai Lake watershed, northwestern China [9675-42]
9675 OM	A coarse-to-fine automatic and robust registration method for multi-source remote sensing images based on Harris and phase information [9675-43]
9675 ON	Simulating method study on stray light noise out of sunlight baffle of star tracker [9675-49]
9675 00	Check and modification of GlobeLand30 with MODIS NDVI [9675-51]
9675 OP	Development and application of the alteration mineral information extraction system based on ASTER data [9675-54]
9675 OQ	Research on dimensional measurement method of mechanical parts based on stereo vision [9675-55]
9675 OR	Constant false alarm rate algorithm for the dim-small target detection based on the distribution characteristics of target coordinates [9675-59]
9675 OS	Fast randomized Hough transformation track initiation algorithm based on multi-scale clustering [9675-62]
9675 OT	K-means clustering-spiral searching model to solve the rough or accurate obstacle avoidance [9675-64]
9675 OU	The imaging spectrometer based on dual photoelastic modulator of unequal retardation amplitudes [9675-68]
9675 OV	A design of three-stage addressing sweep frequency signal generator [9675-69]
9675 OW	A design of DDS single-frequency signal generator based on phrase jitter technology to reduce scattering noise $[9675-70]$
9675 OX	Color image super-resolution reconstruction based on POCS with edge preserving [9675-71]
9675 OY	Real-time blind image deconvolution based on coordinated framework of FPGA and DSP [9675-77]
9675 OZ	Automatic tracking algorithm based on Kalman filter and scale and orientation adaptive mean shift for a moving object [9675-81]
9675 10	A new method of multispectral image processing with camouflage effect detection [9675-82]

9675 11	Study on key techniques for camera-based hydrological record image digitization [9675-84]
9675 12	Target detection method based on supervised saliency map and efficient subwindow search [9675-85]
9675 13	Remote sensing image classification based on block feature point density analysis and multiple-feature fusion [9675-86]
9675 14	High-orbit satellite reflection surface geometry information estimation using photometric measurement method [9675-87]
9675 15	Blurred face recognition by fusing blur-invariant texture and structure features [9675-89]
9675 16	Color image enhancement based on HVS and MSRCR [9675-90]
9675 17	Optimum threshold selection method of centroid computation for Gaussian spot [9675-91]
9675 18	Color filter array demosaicing: an adaptive progressive interpolation based on the edge type [9675-92]
9675 19	Restoration of motion blurred image with Lucy-Richardson algorithm [9675-93]
9675 1A	An efficient background modeling approach based on vehicle detection [9675-96]
9675 1B	Infrared image segmentation using HOG feature and kernel extreme learning machine [9675-98]
9675 1C	Detection of dual-band infrared small target based on joint dynamic sparse representation [9675-99]
9675 1D	A space-based infrared image detection algorithm of background rigid motion [9675-100]
9675 1E	Temporal detection method of infrared multiscale target using recursive sparse recovery [9675-101]
9675 1F	Fast and accurate extraction algorithm for center of cross-line based on two windows scanning [9675-102]
9675 1G	Warship detection in smoke screen interference based on region of interest for CMAC-prediction [9675-103]
9675 1H	The method of infrared image simulation based on the measured image [9675-104]
9675 11	Method of curved surface abnormal holes vision measurement based on high precision turntable [9675-106]
9675 1J	An improved Gabor enhancement method for low-quality fingerprint images [9675-107]
9675 1K	Research on the optimal selection method of image complexity assessment model index parameter [9675-108]

9675 1L	Mean-shift tracking algorithm based on adaptive fusion of multi-feature [9675-110]
9675 1M	CW-THz image contrast enhancement using wavelet transform and Retinex [9675-111]
9675 1N	The registration of star image in multiple cameras [9675-112]
9675 10	A CMOS high speed imaging system design based on FPGA [9675-113]
9675 1P	Misguided resistance using extended Kalman filter for imaging seeker [9675-114]
9675 1Q	Survey of evaluation methods in image complexity of target and background [9675-115]
9675 1R	A modified star map identification method suitable for astronomical camera [9675-116]
9675 1S	Coarse-to-fine wavelet-based airport detection [9675-117]
9675 1T	A new method to extract stable feature points based on self-generated simulation images [9675-118]
9675 1U	Laser one-dimensional range profile and the laser two-dimensional range profile of cylinders [9675-119]
9675 1V	Pixel-level analysis of calibration precision for the space-based infrared camera [9675-120]
9675 1W	Elderly fall detection using SIFT hybrid features [9675-121]
9675 1X	Comparison of site calibration and cross calibration of Gao Fen (GF)-1 Wide Field of View (WFV) [9675-123]
9675 1Y	The approach of optical target recognition via compressive sensing theory [9675-124]
9675 1Z	Study on pixel matching method of the multi-angle observation from airborne AMPR measurements [9675-126]
9675 20	Parallax handling of image stitching using dominant-plane homography [9675-129]
9675 21	Method on camouflaged target recognition using the angle of ellipsometry [9675-130]
9675 22	The research on binocular stereo video imaging and display system based on low-light CMOS [9675-132]
9675 23	A new method of inshore ship detection in high-resolution optical remote sensing images [9675-134]
9675 24	Research on HDR image fusion algorithm based on Laplace pyramid weight transform with extreme low-light CMOS $[9675\text{-}137]$
9675 25	3D shape modeling by integration visual and tactile cues [9675-138]
9675 26	Infrared small target detection with complex background based on image layer and confidence analysis [9675-141]

9675 27	Color contrast enhancement method of infrared polarization fused image [9675-144]
9675 28	Comparison and evaluation of PnP algorithms of monocular vision [9675-146]
9675 29	Research on the data processing method for the spatially modulated imaging polarimeter $[9675\text{-}147]$
9675 2A	A method of image multi-resolution processing based on FPGA + DSP architecture [9675-152]
9675 2B	Ballistic target tracking algorithm based on improved particle filtering [9675-156]
9675 2C	Camera calibration method of binocular stereo vision based on OpenCV [9675-158]
9675 2D	Tone mapping infrared images using conditional filtering-based multi-scale retinex [9675-159]
9675 2E	Adaptive enhancement of sea surface targets in infrared high dynamic range image [9675-160]
9675 2F	Automated visual inspection of brake shoe wear [9675-162]
9675 2G	A real-time visual inspection method of fastening bolts in freight car operation [9675-163]
9675 2H	Maximum projection and velocity estimation algorithm for small moving target detection in space surveillance [9675-165]
9675 21	Track extraction of moving targets in astronomical images based on the algorithm of NCST-PCNN [9675-166]
9675 2J	Infrared small target's detection and identification with moving platform based on motion features [9675-167]
9675 2K	A fast moving object detection method based on 2D laser scanner and infrared camera [9675-172]
9675 2L	Multi-focus image fusion based on improved spectral graph wavelet transform [9675-177]
9675 2M	Camera self-calibration method based on two vanishing points [9675-179]
9675 2N	Adaptive detail enhancement for infrared image based on bilateral filter [9675-181]
9675 20	Fresnel domain double-phase encoding encryption of color image via ptychography [9675-182]
9675 2P	Three-dimensional optical encryption based on ptychography [9675-183]
9675 2Q	Indirect visual cryptography scheme [9675-184]
9675 2R	Infrared dim small target detection algorithm based on NSCT and SVD [9675-186]

9675 2S	Temporal high-pass filter nonuniformity correction algorithm based on guided filter for IRFPA [9675-187]
9675 2T	An automatic recognition method of pointer instrument based on improved Hough transform [9675-191]
9675 2U	Automatic restoration of motion blurred image based on frequency and cepstrum domain [9675-192]
9675 2V	Infrared target detection based on surfacelet transform and total variation [9675-194]
9675 2W	A real-time automatic contrast adjustment method for high-bit-depth cameras based on histogram variance analysis [9675-195]
9675 2X	Fast infrared dim and small target tracking [9675-198]
9675 2Y	Algorithms research of airborne long linear multi-elements whisk broom remote sensing image geometric correction [9675-199]
9675 2Z	Performance evaluation of image enhancement methods for objects detection and recognition [9675-200]
9675 30	Ship detection for high resolution optical imagery with adaptive target filter [9675-202]
9675 31	Automating 3D reconstruction using a probabilistic grammar [9675-204]
9675 32	Parsing optical scanned 3D data by Bayesian inference [9675-205]
9675 33	Reliable clarity automatic-evaluation method for optical remote sensing images [9675-206]
9675 34	Study on high resolution and high repeatability target localization algorithm in development of national level standard [9675-207]
9675 35	An improved image sharpness assessment method based on contrast sensitivity [9675-208]
9675 36	Analysis on correlation imaging based on fractal interpolation [9675-212]
9675 37	Neural cell image segmentation method based on support vector machine [9675-213]
9675 38	A stereo matching handling model in low-texture region [9675-214]
9675 39	An improved stereo based on effective cost aggregation [9675-215]
9675 3A	A novel method of target recognition based on 3D-color-space locally adaptive

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.

Gong, Cailan, 0L

Gong, Guanyuan, 29

An, Wei, 1E An, Yongquan, 02 Bai, Jian, OJ Bai, Lianfa, 38, 39, 3A Bi, Chao, 11 Bo, Pina, 11 Bu, Kuichen, 1P Cai, Tiefeng, 2Z Cao, Jianzhong, 10 Cao, Xiangai, 04 Cao, Zhiguo, 15 Chang, Zheng, 2D Chen, Anhong, 1Y Chen, Dong, 1J Chen, Lin, 1M Chen, Qian, OS, 36 Chen, Xingfeng, 1Z Chen, Yangin, 1Q Chen, Zhan-qi, 2B Chen, Zhi, 2H Chen, Zhibin, 1F Chen, Zhimin, 2L Cheng, Kuanhong, 2S Cheng, Yun, 0A Cong, Mingyu, 1V Cui, Guangzhen, 10 Ding, Meng, 2K Dong, Jiwen, 0E, 0H Dong, Qiqi, 18 Dong, Shuai, 2E Dong, Xiaona, 2C Du, Bin, 09 Du. Lin. 1N. 2l Du, Yaling, 23 Duan, Jin, 1K, 1Q Duan, Shaoli, 2M Fan, Muwen, OV, OW Fan, Xiaopena, 2Z Fan, Xinnan, 0Q Fang, Jianguo, 11 Fang, Tian, 2T, 2U Fei, Xiao-Liang, OR Feng, Jun, 13 Feng, Junhui, 1L Fu, Qiaoyan, 1X Gao, Chao, 1W

Gao, Xiangtao, 11

Gao, Xiaoyu, 2T, 2U Geng, Hao, 1J Gong, Lei, 1U Gong, Qiaoxia, 2M Gong, Yanjun, 1U Gu. Guohua, 0S, 36 Guan, Haowen, 1V Guan, Wen, 24 Guo, Hong, 22 Guo, Qing-hua, 1A Guo, Yongcai, 1W Han, Jiaojiao, 2V Han, Jing, 38, 39, 3A Han, Rui, 09 Han, Zhixue, 0A Hao, Shijing, 1V Hao, Yingming, 2Z Hei, Baogin, 33 Hong, Jin, 1Z Hou, Weizhen, 1Z Hu, Jianghua, 10 Hu, Jinlong, 11 Hu, Qi-fan, 1M Hu, Qifeng, 23 Hu, Qing-ping, 08 Hu, Yong, 0L Hua, Liang-hong, 08 Huang, Yan-hua, 21 Huang, Yao, 34 Huang, Ying-Xue, 1M Hui, Bin, 2D Jia, Yan, 2J Jiang, Baotan, 2H Jiang, Chuan-xian, 0Z Jiang, Nan, 28 Jiang, Ning, 12 Jiang, Yaping, 13 Jiang, Yueda, OT Jiang, Yunqiu, 23 Jin, Weiqi, 22, 24 Ju, Hongbin, 30 Kong, Jun, 1D Lai, Rui, 2S, 2V Leng, Hanbing, 2N Li, Bailing, 36 Li, Bing, OK Li, Cheng, 1S, 20 Li, Fanming, 0K

Li, Fugui, 1P

Li, Guangming, 1Q Li, Hai, 05 Li, Haichao, 0M Li, Hang, 0Y, 26 Li, Hengjian, OE, OH Li, Jia, 2L, 2N Li, Jicheng, 1C, 1J Li, Jing, 19 Li, Jingjin, 0N Li, Ke-wu, 0U Li, Li, 07 Li, Li, 22, 24 Li, Long, OL Li, Man, 39 Li, Miao, 1E Li, Ming, 00 Li, Sheng-hong, 2Y Li, Shengyang, 33 Li, Shijin, 11, 13 Li, Sining, 06 Li, Tuo, 2O, 2P, 2Q Li, Xiao, 2R Li, Xiao-yang, 2B Li, Xin, 03 Li, Xinyang, 17 Li, Xuxu, 17 Li, Yan, 1D Li, Yingchun, 1N Li, Yu feng, 16 Li, Yuanyuan, 26 Li, Yueping, 28 Li, Yueqiang, 09 Li, Yujie, 03 Li, Zhao-zhao, 21 Li, Zheng, 1D Li, Zhengqiang, 1Z Li, Zhifeng, 0C Liang, Erjun, 2M Liang, Hua-Wei, 1M Liang, Ying, 0X Liang, Ying, 1B Liang, Yu, 0X Liao, Anping, 00 Liu, Gang, 2R Liu, Guodong, 0G Liu, Hongjun, 0Y Liu, Jiaqi, 0B, 0C Liu, Jiaqi, 3A Liu, Jie, 1R Liu, Li, 1X Liu, Liang, 1H Liu, Meiying, 1R Liu, Qianshun, 01, 0J Liu, Songtao, 12 Liu, Xiaomin, 2M Liu, Yang, 1R Liu, Zhao Hui, 18, 19

Liu, Zhihui, OV, OW Liu, Zhiwen, 33 Lona, Fei, 1T Long, Yunli, 1E Lou, Shuli, 1H Lu, Hongqiang, 2A, 2J Lu, Huimin, 03 Lu. Jun. 2W Lu, Shengfang, 2F Lu, Shuning, 1X Lu. Wei. 06 Lu, Xiaowei, 1C Luo, Haibo, 2D Lyu, Laipeng, 11 Ma, Junyong, 2H Ma, Weiwei, OL Ma, Yan-hua, 2Y Ma, Yi, 38 Man, Yiyun, 0M Meng, Gang, 0B, 0C Meng, Peng, 0L Miao, Yue, 0T Ming, Delie, 1T, 23 Mu, Yuqiang, 1Y Nan, Guo, 2F, 2G Ni, Man, 2R Ning, Xiao-lei, 2B Niu, Shiwei, 37 Pan, Ming, 25, 31, 32 Pan, Zhiqiang, 1X Pang, Zhaofeng, 1S, 20 Peng, Shu, 00 Peng, Xiaohan, 2A Qi, Lin, 2E Qian, Kun, 2X Qian, Wei-xian, OR, OS Qian, Xiaofei, 1K Qiao, Liang, 20, 2P Qiao, Mingrui, 10 Qie, Lili, 1Z Qin, Bangyong, 33 Qin, Hanlin, 2L, 2N, 2R, 2S, 2V Qin, Lei, 10 Qin, Mengze, 1F Qin, Tianmu, 0N

Ren, Dongwei, 1C Ren, Jiancun, 1H Ren, Kan, 0R, 37 Rong, Shenghui, 2S, 2V, 2X Serikawa, Seiichi, 03 Shang, Ren, 33 Shen, Haodong, 0Q Shi, Caicheng, 1G Shi, Tingting, 1X Shi, Yishi, 2O, 2P, 2Q Shi, Zhiguang, 1C Song, Li-mei, 1A Song, Yan, 1F

Qin, Yi, 05

Qiu, Su, 24

Liu, Zhen, 29

Liu, Zhen, 2F

Liu, Zhenxing, 12

Song, Zhenfei, ON Xie, Zhihua, 0G Xiong, Hanwei, 25, 31, 32 Sun, Bin, 1Z Xu, Bin, 2Y Sun, Huavan, 21 Sun, Xiaobing, 1Z, 29 Xu, Chenxi, 25, 31, 32 Xu, Ershuai, 0N Sun, Xiaosong, 1Y Sun, Zejun, 2K Xu, Hua, 1Z Tang, Guojian, 1Y Xu, Jun, 25, 31, 32 Xu, Li, 2T, 2U Tang, Hong, 10 Tang, Linbo, 20 Xu, Lingyun, 2D Tang, Xinyi, 1D Xu, Mengmeng, 2M Tian, Jinwen, 1T Xu, Taohu, 21 Tian, Yan, 35 Xu, Wen, 1X Tian, Yongzhi, 2M Xue, Feng, OB, OC, OD Tu, Zhipeng, 06 Xue, Jianru, 2H Wan, Minjie, 0S Xue, Rong kun, 16 Wang, Bingjian, 2R, 2X Xue, Yaoke, 1R Wana, Caixia, 17 Xue, Zi, 34 Wang, Dong, 0A Yan, Jing, OB Wang, Ende, 1L Yan, Xiang, 2L, 2N Wang, Haiyong, ON Yan, Xiaoke, 1G Wang, Han, 1Z Yang, Chuping, 05 Wang, Hongtao, 09 Yang, Fan, 27 Wang, Hu, 1R Yang, Jianmin, 03 Wang, Huawei, 10 Yang, Jikong, 04 Wang, Jia-yan, 1A Yang, Kai, 1L Wang, Liping, 11 Yang, Rihong, OP Wang, Liqiang, 26 Yang, Tie-jun, OZ Wang, Luping, 1B Yang, Weifeng, 29 Wang, Mingjun, 1U Yang, Xiubo, 2P, 2Q Wang, Peng-cheng, OR, OS Yang, Zhuo, OT Wang, Rui, 0X Yao, Bin, 04 Wang, Shiyun, 09 Yao, Dalei, 2H Wang, Shuai, 1N Yao, JunEn, 2G Wang, Shuigen, 1S Yin, Shiming, 2X Wang, Wei, OP Yin, Yili, 35 Yu, Feihong, 0I, 0J Wang, Weichen, 34 Wang, Xiaoxiao, 1W Yu, Kun, 1V Wang, Yali, 20, 2P Yu, Ying, 1Y Wang, Yao-li, 0U Yuan, Tao, OP Wang, Ze, 0Y Zang, Huaping, 2M Wang, Zhaoba, 02 Zeng, Lina, 2K Wang, Zhi-bin, 02, 0U Zeng, Qingjie, 2N, 2S, 2X Zhai, Guofang, 0A Wei, Zhenzhong, OF Wen, Desheng, 1R, 2H Zhan, Di, 11 Wen, Ting-dun, 0U Zhang, Dayong, 06 Wen, Yan, 2H Zhang, Guangjun, 2F Wen, Zhigang, 2R Zhang, Jun, 2P Zhang, Li, 35 Weng, Jiawen, 05 Zhang, Luping, 1B Wu, Chuanchao, 02 Wu, Wen-Yuan, 21 Zhang, Min, 1M Xi, Jiang-tao, 1A Zhana, Qi, 26 Xia, Guo, 0I, 0J Zhang, Rui, OU Xiao, Bo, 1K, 1Q Zhang, Shen, OZ Xiao, Huachao, 07 Zhang, Shixue, 14 Zhang, Tianci, 2K Xiao, Wenjian, 1F

Xiao, Yang, 15

Xie, Chen, 27

Xiao, Yanghui, 1L

Xie, Ruobing, 22

Xie, Xiaokang, 15

Zhang, Tinghua, 1N, 21

Zhang, Weiwei, 00

Zhang, Wenwen, 36

Zhang, Xiao-hui, 08

Zhana, Xiaofana, 2M

Zhang, Xuewu, 0Q

Zhang, Yang, 13

Zhang, Yi, 38, 39, 3A

Zhang, Yin, 1V

Zhang, Zhuo, 0Q

Zhao, Baojun, 1S, 20

Zhao, Dong, 2S, 2V

Zhao, Hong, 1P

Zhao, Hui, 1R

Zhao, Jun, 2W

Zhao, Min, 0B, 0C

Zhao, Peilong, 0E

Zhao, Ying, 2R, 2V

Zheng, Chao, 0F

Zheng, Qinhong, 04

Zheng, Xinyan, 00

Zhi, Xiyang, 0D

Zhong, Sheng, 2A, 2J

Zhong, Wanzhen, 2C

Zhong, Xiaoqing, 04

Zhou, Bin, 1T

Zhou, Haiyang, Ol, OJ

Zhou, Hua, OY

Zhou, Huixin, 2L, 2N, 2R, 2S, 2V, 2X

Zhou, Jinwei, 1C, 1J

Zhou, Liang, 19

Zhou, Luchun, 0V, 0W

Zhou, Quan, 07

Zhou, Wei, 0P

Zhou, Yiyu, 1E

Zhou, Zhuoyun, 0Q

Zhu, Feng, 2Z

Zhu, Mengyu, 15

Zhu, Yanyong, 0H

Zhu, Yong, 11

Zhu, Yong, 1K, 1Q

Zhuansun, Xiao-bo, 21

Zong, Jingguo, 2L

Zou, Hua, OT

Zou, Xu, 2J

Zou, Yan, 24

χij

Conference Committee

Conference Chairs

Guangjun Zhang, Beihang University (China)

Byoungho Lee, Seoul National University (Korea, Republic of)

Conference Co-Chairs

Desheng Jiang, Wuhan University of Technology (China)

Hequan Wu, Chinese Academy of Engineering (China)

Huitao Fan, Aviation Key Laboratory of Science and Technology on Infrared Detector (China)

Junhao Chu, Shanghai Institute of Technical Physics, CAS (China)

Jannick Rolland, University of Rochester (United States)

Lin Li, The University of Manchester (United Kingdom)

Lijun Wang, Changchun Institute of Optics, Fine Mechanics and Physics, CAS (China)

Min Gu, Swinburne University of Technology (Australia)

Qiming Wang, Institute of Semiconductors, CAS (China)

Wei Wang, Beijing Institute of Aerospace Control Devices of CASC (China)

Yue Hao, Xidian University (China)

Zheng You, Tsinghua University (China)

Program Committee

Andreas Tünnermann, Friedrich-Schiller-Universität Jena (Germany)

Baiou Guan, Jinan University (China)

Bin Xiangli, Shanghai Engineering Center for Microsatellites (China)

Byoungho Lee, Seoul National University (Korea, Republic of)

Buwen Cheng, Institute of Semiconductors, CAS (China)

Chun Tang, Institute of Applied Electronics, CAEP (China)

Chunhua Shen, The University of Adelaide (Australia)

Chueh Ting, Tianjin Jinhang Institute of Technical Physics (China)

Daniel Jaque, Universidad Autónoma de Madrid (Spain)

Dae Wook Kim, The University of Arizona (United States)

Dawei Zhang, University of Shanghai for Science and Technology (China)

Honghai Liu, University of Portsmouth (United Kingdom)

Haimei Gong, Shanghai Institute of Technical Physics, CAS (China)

Jannick Rolland, University of Rochester (United States)

Jinxue Wang, SPIE

Jin Lu, Tianjin Jinhang Institute of Technical Physics (China)

Jianping Chen, Shanghai Jiaotong University (China)

Junpeng Guo, The University of Alabama in Huntsville (United States)

Kevin P. Thompson, Synopsys, Inc. (United States)

Lan Jiang, Beijing Institute of Technology (China)

Lin Li, Beijing Institute of Technology (China)

Ligong Zheng, Changchun Institute of Optics, Fine Mechanics and Physics, CAS (China)

Lijun Wang, Changchun Institute of Optics, Fine Mechanics and Physics, CAS (China)

Lin Li, The University of Manchester (United Kingdom)

Min Gu, Swinburne University of Technology (Australia)

Minghui Hong, National University of Singapore (Singapore)

Minlin Zhong, Tsinghua University (China)

Nanjian Wu, Institute of Semiconductors, CAS (China)

Satoshi Kawata, Osaka University (Japan)

Shibin Jiana, AdValue Photonics, Inc. (United States)

Sen Han, University of Shanghai for Science and Technology (China)

Suijian Xue, National Astronomical Observatories, CAS (China)

Tsutomu Shimura, The University of Tokyo (Japan)

Weibiao Chen, Shanghai Institute of Optics and Fine Mechanics, CAS (China)

Wei Wang, Beijing Institute of Aerospace Control Devices of CASC (China)

Weiping Yang, National University of Defense Technology (China)

Xiaocong Yuan, Shenzhen University (China)

Yang Ni, New Imaging Technologies (France)

Yanbiao Liao, Tsinghua University (China)

Yongcai Guo, Chongaina University, Ministry of Education (China)

Yongchun Xie, China Academy of Space Technology (China)

Yong Bi, Academy of Opto-electronics, CAS (China)

Yong Cheng, Wuhan Ordnance Non-Commissioned Officers Academy (China)

Zhiping Zhou, Peking University (China)

Session Chairs

- Weiping Yang, National University of Defense Technology (China)
- 2 **Bill Moran**, The University of Melbourne (Australia)
- 3 **Chunhua Shen**, The University of Adelaide (Australia)
- 4 Honghai Liu, University of Portsmouth (United Kingdom)

Introduction

Applied Optics and Photonics, China (AOPC2015) is the annual conference of the Chinese Society for Optical Engineering, and it is also the largest academic and industrial event in the field of optical and optoelectronic technology in China. The AOPC2015 organization committee intended to build a cohesive platform for academic exchanges, industry exhibitions, and corporate negotiations. The conference had 7 themes, which included 22 technical conferences and 600 technical presentations. We sincerely hope that the research and development of optoelectronic technology was promoted, and that the international cooperation of the optical and optoelectronic industry was enhanced.

AOPC2015 was sponsored by the Chinese Society for Optical Engineering; SPIE, the Optical Society, the European Optical Society, and the Optical Society of Korea were technical co-sponsors. There were also 28 cooperating organizations that supported the conference. We received a total of 1,219 contributions from more than 15 countries, including: the United States, the United Kingdom, Germany, France, Spain, Australia, Canada, Mexico, Brazil, Japan, Republic of Korea, Thailand, Singapore, Russian Federation, and China. Nearly 700 submissions were accepted for the *Proceedings of SPIE*, and over 150 invited talks and papers were suggested to be published in Journals indexed by SCI and Ei. After careful discussion, we selected five plenary speeches, which were presented by famous scientists from the United States, the United Kingdom, Republic of Korea, Japan, and China. There were 205 invited talks in 12 of the technical conferences. On behalf of the organization committee of AOPC, I express thanks to all of the invited speakers and authors for their contributions to and support of the conference.

To celebrate the International Year of Light 2015, we set up 12 display boards highlighting IYL in the exhibition area on the first level. These display boards were to educate the public about light and the applications of light in society.

Finally, on behalf of Prof. Songlin Zhuang, the other co-chairs, and the organization committee of AOPC, I would like to heartily thank our sponsors and cooperating organizations for all they have done for the conference. I thank all of the participants and friends for their interest and efforts in helping us make the conference a success. I also thank the program committee for their effective work and valuable advice—especially the AOPC2015 secretariat and the SPIE staff for their tireless effort and outstanding services in preparing the conference and publishing the proceedings.

Again, we extend our warmest greetings to you and hope you had a pleasant and exciting stay in Beijing!

Guofan Jin