

PROCEEDINGS OF SPIE

# ***Pattern Recognition and Tracking XXXI***

**Mohammad S. Alam**  
*Editor*

**27 April – 8 May 2020**  
**Online Only, United States**

*Sponsored and Published by*  
SPIE

**Volume 11400**

Proceedings of SPIE 0277-786X, V. 11400

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

Pattern Recognition and Tracking XXXI, edited by Mohammad S. Alam,  
Proc. of SPIE Vol. 11400, 1140001 · © 2020 SPIE · CCC  
code: 0277-786X/20/\$21 · doi: 10.1117/12.2572651

Proc. of SPIE Vol. 11400 1140001-1

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 [SPIDigitalLibrary.org](http://SPIDigitalLibrary.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 *Pattern Recognition and Tracking XXXI*, edited by Mohammad S. Alam, Proceedings of SPIE Vol. 11400 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

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

ISBN: 9781510635777  
ISBN: 9781510635784 (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](http://SPIE.org)

Copyright © 2020, 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 \$21.00 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/20/\$21.00.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

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

**SPIE. DIGITAL  
LIBRARY**

[SPIDigitalLibrary.org](http://SPIDigitalLibrary.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 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

---

**SESSION 1 NOVEL PATTERN RECOGNITION TECHNIQUES**

---

- 11400 03 **Adaptation of Koschmieder dehazing model for underwater marker detection** [11400-2]  
11400 05 **Evolutionary clustering for dynamic partitioning of transportation network** [11400-4]

---

**SESSION 2 TARGET TRACKING**

---

- 11400 06 **Transforming unstructured voice and text data into insight for paramedic emergency service using recurrent and convolutional neural networks** [11400-6]

---

**SESSION 3 NEURAL NETWORKS**

---

- 11400 09 **Vision system with deep learning classifiers for automatic quality inspection** [11400-9]  
11400 0A **Image denoising using convolutional neural network** [11400-10]  
11400 0B **Novel receipt recognition with deep learning algorithms** [11400-11]

---

**SESSION 5 PATTERN CLASSIFICATION**

---

- 11400 0I **Classification based on fast and robust approximations to order statistics** [11400-18]  
11400 0J **Real-time holographic heterodyne spatial filtering** [11400-19]  
11400 0K **Real-time holographic deconvolution for image differentiation** [11400-20]  
11400 0M **Emergent pattern detection algorithm for big data streams** [11400-22]

---

**SESSION 6 DEEP LEARNING**

---

- 11400 0N **Underwater exploration by AUV using deep neural network implemented on FPGA** [11400-23]  
11400 0O **Selection of CPU scheduling dynamically through machine learning** [11400-24]

11400 OP **Detection of moving human using optimized correlation filters in homogeneous environments**  
[11400-25]

---

**SESSION 7 TARGET DETECTION**

---

11400 OS **Adaptive high speed targets recognition systems controlled by the image's parameters**  
[11400-28]

11400 OU **SRVAE: super resolution using variational autoencoders** [11400-30]

11400 OV **Low-complexity DST approximation for VVC standard using particle swarm optimization**  
[11400-31]

---

**POSTER SESSION**

---

11400 OX **Comparative study on crowd counting with deep learning** [11400-35]