

PROCEEDINGS OF SPIE

International Conference on Machine Vision, Detection, and 3D Imaging Technology (MVDIT 2026)

**Qiang Wu
Jun Chu**
Editors

**15–17 May 2026
Nanchang, China**

Organized by
Macao Technology and Cultural Exchange Association (Macao, China)

Sponsored by
Nanchang Hangkong University (China)

Published by
SPIE

Volume 14305

Proceedings of SPIE 0277-786X, V. 14305

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

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.

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 *International Conference on Machine Vision, Detection, and 3D Imaging Technology (MVDIT 2026)*, edited by Qiang Wu, Jun Chu, Proc. of SPIE 14305, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9798902327134

ISBN: 9798902327141 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2026 Society of Photo-Optical Instrumentation Engineers (SPIE).

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 fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center 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.

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

Paper Numbering: A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE 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	<i>Conference Committee</i>
xi	<i>Introduction</i>

INTERNATIONAL CONFERENCE ON MACHINE VISION, DETECTION, AND 3D IMAGING TECHNOLOGY (MVDIT 2026)

14305 02	Early rapid monitoring system of overflow and leakage and its application [14305-44]
14305 03	Research on anomalous fluid detection method of confined vibrating screen [14305-32]
14305 04	Real-time wellhead cuttings acquisition and monitoring system incorporating YOLOv8 image segmentation and 3D morphology analysis [14305-43]
14305 05	Dynamic characteristic testing of fluorine-free environmental circuit breaker drive system [14305-2]
14305 06	Research on the development and practical application of an intelligent management system for coal yards in thermal power plants [14305-4]
14305 07	Finite element analysis and lightweight simulation of vehicle drive axle housing [14305-27]
14305 08	Research on structural reinforcement and optimization technology for openings in the wing-body fairing of large civil aircraft based on 3D modeling and finite element simulation [14305-38]
14305 09	A PCB defect detection method integrating genetic K-means algorithm and lightweight attention mechanism [14305-14]
14305 0A	Research on intelligent detection method for chip micro-defects based on improved YOLOv11 [14305-31]
14305 0B	WGF-RTDETR: a real-time transformer for industrial safety monitoring with frequency domain optimization [14305-17]
14305 0C	Research on UAV recognition algorithm based on meta-learning and scene features [14305-3]
14305 0D	ACC-YOLO: a mobile glass cover surface defect detection algorithm based on an improved YOLOV5 [14305-1]
14305 0E	Registration method for weak-geometry point clouds from fringe projection profilometry by 2D matching and modulation-based adaptive weighting [14305-41]
14305 0F	A study on a hierarchical diagnostic model for rice blast based on UAV multispectral remote sensing [14305-7]

- 14305 OG **Design of a laboratory component warehousing system based on machine vision**
[14305-26]
- 14305 OH **LDF-SLAM: lightweight decoupled architecture-based robust localization for UAVs in indoor constrained environments** [14305-16]
- 14305 OI **A study on EEG-based motor imagery classification using an attention-ST-CNN-GRU hybrid model** [14305-10]
- 14305 OJ **A study on an improved concentric circle algorithm for SAR echo simulation based on GPU parallel acceleration** [14305-8]
- 14305 OK **Development of a tracking gimbal based on unmanned aerial vehicle (UAV) visual recognition** [14305-6]
- 14305 OL **GLCE: global-local channel enhancer for fine-grained e-commerce image-text retrieval**
[14305-33]
- 14305 OM **BrainTumor CNN: brain tumor classification via transfer learning and ResNet-18** [14305-35]
- 14305 ON **Design of an intelligent baby carriage monitoring system based on machine vision and multisensor fusion** [14305-42]
- 14305 OO **An automatic delineation self-configuring nnU-Net for HR-CTV in cervical brachytherapy**
[14305-23]
- 14305 OP **An enhanced DEIM-based method for target detection in complex field environments**
[14305-28]
- 14305 OQ **Optical-flow-aided laser speckle digital image correlation for non-contact dynamic displacement measurement** [14305-11]
- 14305 OR **TVRF-ECA: tri-view residual fusion network with efficient channel attention for seismic fault identification** [14305-5]
- 14305 OS **A multiscale 3D facial geometric reconstruction method based on hierarchical three-branch residual fusion** [14305-25]
- 14305 OT **Human behavior recognition in videos based on multifeature fusion** [14305-40]
- 14305 OU **AIGC-driven visual semantic analysis of terracotta warriors in user-generated short videos**
[14305-19]
- 14305 OV **Metro security prohibited item detection based on YOLOv8n-SPPCSPC-BiFPN** [14305-30]
- 14305 OW **Improved YOLO11n-P2-ECA method for real-time detection of small targets and occluded personnel in mountain search and rescue UAV images** [14305-29]

- 14305 0X **Unweighted BPF algorithm in the backprojection for straight line scanning computed tomography** [14305-15]
- 14305 0Y **DR image quality optimization of Ti alloy additive manufacturing parts based on dark channel technology** [14305-12]
- 14305 0Z **PIDFormer: enhancing PIDNet with bi-level routing attention and hybrid attention fusion for real-time semantic segmentation** [14305-13]
- 14305 10 **Implementation of a real-time small-object detection algorithm for low-computing edge deployment** [14305-18]
- 14305 11 **Adaptive clutter filtering based on spatiotemporal features of ultrasound blood flow** [14305-36]
- 14305 12 **Research on the preparation of micro-nano hierarchical structure superhydrophobic surfaces by laser-electrodeposition composite method** [14305-39]
- 14305 13 **Research on cross-modal generalization of medical image segmentation based on ResUNet optimization** [14305-34]