

# 2023 The 16th International Conference on Machine Vision (ICMV 2023)

Yerevan, Armenia  
November 15-18, 2023  
Hybrid Conference

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**Russian-Armenian University**

Address:

Armenia, Yerevan, Hovsep Emin. Str 123

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# Welcome Address

With great pleasure, we are welcoming you to 2023 The 16th International Conference on Machine Vision (ICMV 2023), be held in Yerevan, Armenia during November 15-18, 2023.

The unique idea behind the conference is to provide an opportunity for leading academicians, scientists, researchers and industry professionals from around the world to network and have scientific discussion on the latest advancements in the interlinked domains of machine vision and its research benefits for each other's domain progress. It will address multiple topics and issues of interest in the areas of machine vision by practical exposure in the form of specialized sessions, poster presentations, plenary sessions and renowned speeches from the leading practitioners reinforcing the upcoming challenges to be faced and their potential solutions.

After several rounds of review procedure, the program committee accepted those abstracts to be presented on conference, and papers to be published in conference proceedings. We wish to express our sincere appreciation to all the individuals who have contributed to the conference in various ways. Special thanks to Genral Chair-Prof. Dmitry Nikolaev, Institute for Information Transmission Problems, Russia, Prof. Vladimir Arlazarov, Federal Research Center "Computer Science and Control" of Russian Academy of Sciences, Russia, Prof. Mikayel Avanesyan, Russian-Armenian University, Armenia, for whose full support, make many delegates be able to reach Armenia to join this conference! Thanks also extended to our committee members for their thorough review of all the submissions, which is vital to the success of the conference, and to the members in the organizing committee and the volunteers who had dedicated their time and efforts in planning, promoting, organizing and helping the conference.

The conference is high lightened by 2 Keynote Speeches, 1 Invite speech and 1 Tutorial, they are delivered by:

Prof. Ehrenfried Zschech, DeepXscan GmbH, Germany;

Prof. Valery V. Tuchin, Saratov State University, Russia;

Dr. Flavio Piccoli, University of Milano, Italy;

Prof. Wolfgang Osten, University of Stuttgart, Germany

Known as the Pink City, Yerevan is a fascinating place to explore impressive architecture and beautiful parks. It is the capital city of Armenia and is rich in cultural attractions. This compact city is very walkable, making it easy to see a variety of attractions in a single trip. Here you'll find many churches, museums, and examples of Soviet-era architecture. In between these older structures, there are lots of modern cafés and shops to visit. You will never be short of things to do in the city of Yerevan.

It will be so amazing and exciting to welcome you in Yerevan. Sincerely we wish you will enjoy this city and have a nice experience on this conference!

ICMV 2023 Organizing Committee

15-18 November, 2023

## CONFERENCE COMMITTEES

### International Advisory Chair

Antanas Verikas, *Halmstad University, Sweden*

### General Chairs

Wolfgang Osten, *University of Stuttgart, Germany*

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Cyril Ivanov, *IITP & Smart Engines PIO, Russia*

Udo Birk, *University of Applied Sciences of the Grisons, Switzerland*

#### Local Organizing Chairs

Parkev Avetisyan, *Russian-Armenian University, Armenia*

Arman Darbinyan, *Russian-Armenian University, Armenia*

**Technical Committees**

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Haluk Küçük, *Lake Superior State University, USA*  
Evaldas Vaičiukynas, *Kaunas University of Technology, Lithuania*  
Mounîm A. El-Yacoubi, *Institut Polytechnique de Paris, France*  
Mouna Baklouti, *Nationnal School of Engineering of Sfax, Tunisia*  
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Assia Kourgli, *LTIR, Bab-Ezzouar, Algérie*  
Ridha Ejbali, *University of Gabes, Tunisia*  
Sergii Mashtalir, *Kharkiv National University of Radio Electronics, Ukraine*  
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Mukku Nisanth Kartheek, *GITAM University, India*  
Amine Bohi, *CESI LINEACT Laboratory, France*

Thomas Schmid, *Leipzig University, Germany*

Ali Idri, *Mohammed V University in Rabat, Morocco*

Manjunath Joshi, *DAIICT, India*

Zhang Mengchao, *Shandong University of Science and Technology, China*

## CONFERENCE VENUE

### FOR ONSITE PRESENTERS

- ❖ **Conference Venue**
- ◆ Russian-Armenian University
- ◆ Address: Armenia, Yerevan, Hovsep Emin. Str 123

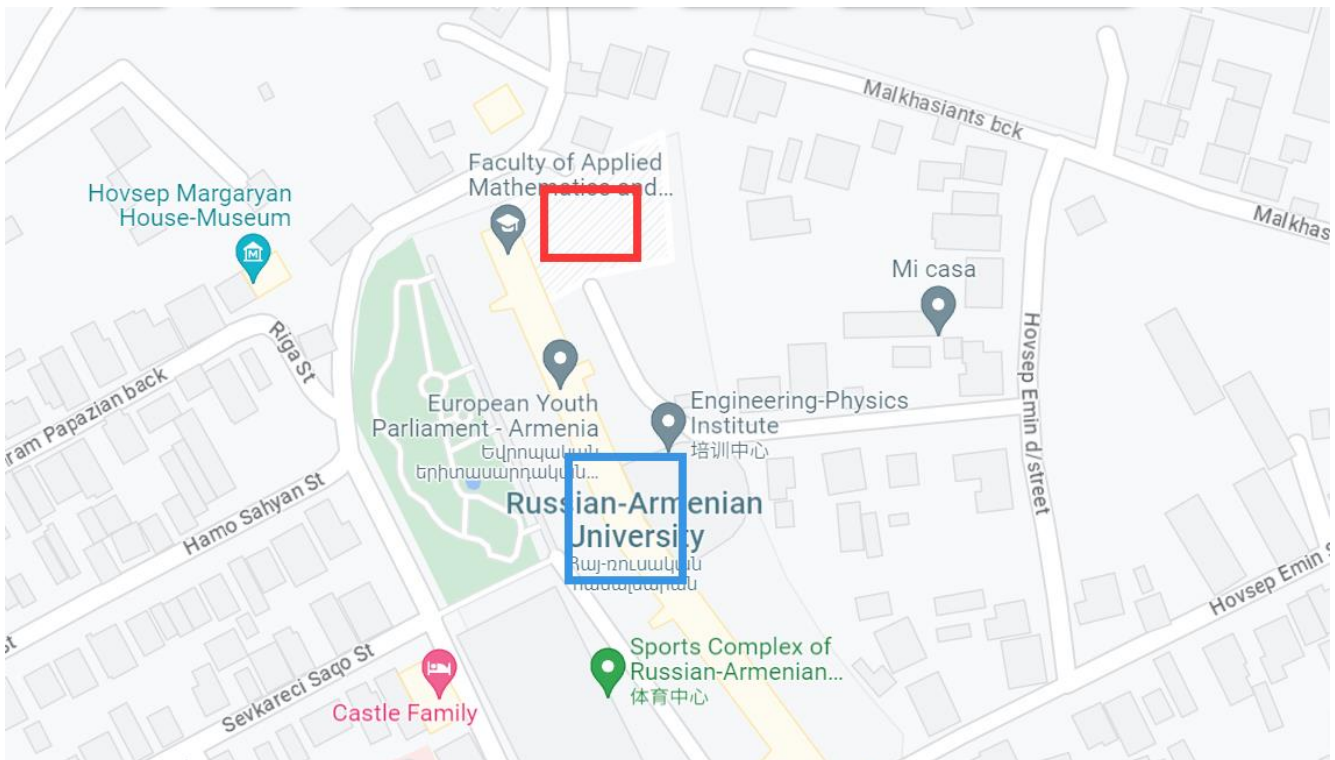
- ❖ **Sign-in**
- ◆ Spot: 1F, Old Building
- ◆ Time: 10:00-15:30, November 15, 2023

- ❖ **Conference Rooms**

Building	Level	Conference Rooms	Nov. 15	Nov. 16	Nov. 17	Nov. 18
Old	3F	Blue Hall	----	❖	----	----
New	7F	Piotrovsky Hall	----	❖	❖	----
New	7F	Orbeli Hall	----	❖	❖	----

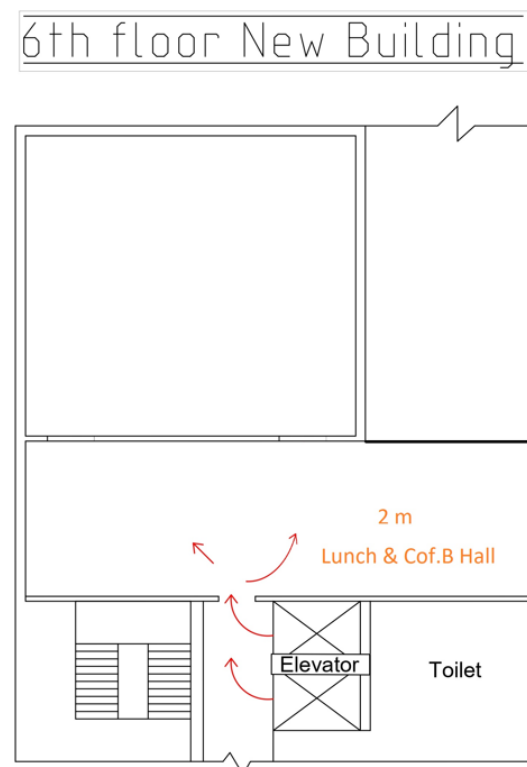
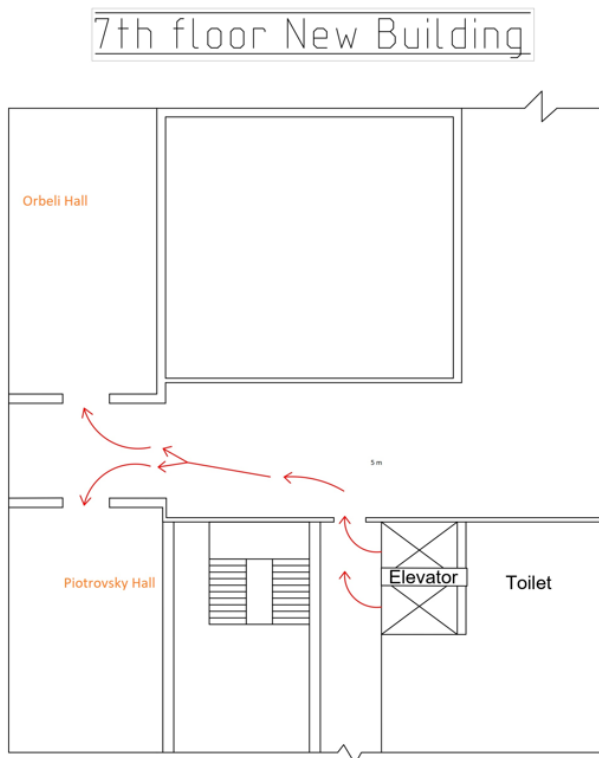
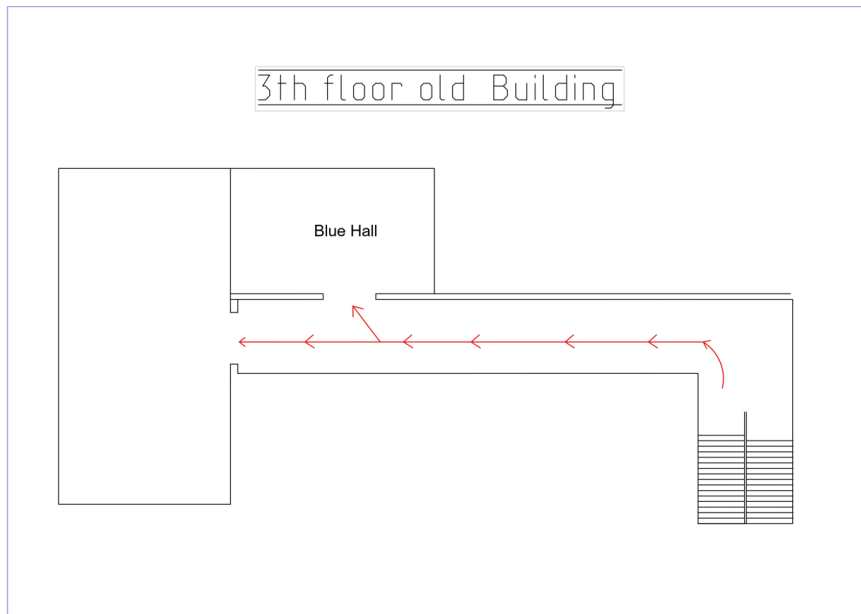
❖onsite meeting room available; ----onsite meeting room unavailable

### Campus Map:



- New Building
- Old Building

## Floor Map:



- ❖ **Blue Hall:** Opening Ceremony, Keynote & Invite Speeches, Tutorial
- ❖ **Piotrovsky Hall:** Sessions. (Nov. 16-17)
- ❖ **Orbeli Hall:** Sessions (Nov. 16-17)
- ❖ Lunch & coffee breaks on Nov. 16 is same floor of Blue Hall, Lunch & coffee breaks on Nov. 17 on 6F of new building
- ❖ Onsite meeting rooms not available on Nov. 18.



## Transportation

- ❖ **From Zvartnots International Airport**
  - ◆ By Taxi: 15 KM, takes 30-40 Mins.

## Time Zone

- ❖ **Yerevan Time: UTC +4**

## Weather

- ❖ **November**
  - Average Low  
3°C

Average High  
16°C

## Emergency Call

All types of Emergency Situations: 911(English)

Police:102

Fire:101

Ambulance: 103

(Information above from internet)

## GUIDELINES

### FOR ONSITE PRESENTERS

#### ❖ Oral Presentation

- ◆ Each oral presentation is with 20 Mins time slot, including 15 Mins presentation and 5 Mins for questions from the audience.
- ◆ Your punctual arrival and active involvement in each session will be highly appreciated.
- ◆ Get your Presentation PPT slides, or PDF files prepared in advance and backed up.
- ◆ Laptop, projector & screen, laser sticks will be provided in the meeting room for presentation use.

#### ❖ Poster Presentation

- ◆ Poster size: 0.6m width X 0.8m height
- ◆ Poster to be printed and brought to conference site by presenter self.
- ◆ At least 1 author to stand by the poster during the Poster session, which is not only to present your work, but also to answer questions from the audience.

#### ❖ More Tips:

- ◆ Please take all your belongings when leaving meeting room.
- ◆ Conference Organizers do not provide accommodation, please reserve your hotel room in advance.
- ◆ Receipt will be emailed to you after the conference.

### FOR ONLINE ORAL PRESENTERS

#### ❖ Online Platform--Zoom

- ◆ Install Zoom tool on your device (<https://zoom.us/download>), join the meeting by click the Zoom link or insert the meeting ID, with audio and video on.
- ◆ For presenters: Rename yourself with "Session No.+Paper ID+Name", such as "S1+C001+Name".
- ◆ For Keynote/invite Speaker or Session Chair, please rename as "KN/SC+Name".
- ◆ Laptop with stable internet connection (wired connection preferred).
- ◆ Headsets or earphones are recommended to be used during presentation to avoid howling.
- ◆ Keep muted when the other presenters speaking until your turn to present, then you could unmute yourself.
- ◆ Only oral choice for online presentations.
- ◆ Certificate and receipt will be emailed to you after the conference.

#### ❖ Time Zone

- ◆ Whole conference scheduled in **Yerevan Time: UTC+4**
- ◆ Please make sure your device time is set to correct time zone.

#### ❖ Online Presentation

- ◆ Each online oral presentation is with 15 Mins time slot, including 10 Mins presentation and 5 Mins for questions from the audience.

#### ❖ Recording

- ◆ Plenary session and online sessions will be recorded, your proper behavior and appearance will be appreciated. Only staff

will record the video, presenters will not be allowed to record.

❖ **Zoom Meeting ID**

Zoom Online Room	Meeting ID	Zoom Link
Room A	822 8073 6008	<a href="https://us02web.zoom.us/j/82280736008">https://us02web.zoom.us/j/82280736008</a>
Room B	838 9575 1172	<a href="https://us02web.zoom.us/j/83895751172">https://us02web.zoom.us/j/83895751172</a>

❖ **Online Zoom Test**

Time   Nov. 15	Room A Zoom ID: 822 8073 6008
10:00-12:00	Test

## AGENDA OVERVIEW

### Day 1 | November 15, 2023

Yerevan Time	Activity	Venue
10:00-12:00	Online Test	Zoom ID: 822 8073 6008
10:00-15:30	Sign in & Conference Materials Collection	1F, Old Building

### Day 2 | November 16, 2023

Yerevan Time	Activity		Venue
09:00-09:15	<b>Opening Ceremony</b>	<b>Host:</b> <a href="#">Vladimir Arlazarov</a> , Federal Research Center “Computer Science and Control” of RAS	Blue Hall Zoom ID: 822 8073 6008
		<b>Opening Remarks:</b> <a href="#">Wolfgang Osten</a> University of Stuttgart	
		<b>Welcome Address:</b> <a href="#">Mikayel H. Avanesyan</a> Russian-Armenian University	
		<b>Program Address:</b> <a href="#">Dmitry Nikolaev</a> Institute for Information Transmission Problems, RAS; HSE University	
09:15-10:00	<b>Plenary Session</b>	<b>Keynote Speech 1: High-resolution X-ray Imaging – Challenges to Experiment and Data Analysis</b> <a href="#">Ehrenfried Zschech</a> DeepXscan GmbH	
10:00-11:30	<b>Group Photo &amp; Morning Break</b>		
10:30-11:15	<b>Plenary Session</b>	<b>Host:</b> <a href="#">Wolfgang Osten</a> , University of Stuttgart <b>Keynote Speech 2: Advanced Biomedical Imaging and Tomography at Tissue Optical Clearing</b> <a href="#">Valery Tuchin</a> Saratov State University	Blue Hall Zoom ID: 822 8073 6008
11:15-11:45		<b>Invite Speech: From Black-Box to White-Box Image Enhancement: Leveraging Deep Learning and User-Centric Adaptation</b> <a href="#">Flavio Piccoli</a> University of Milano	
11:45-11:55		<b>Short Speech (online):</b> <a href="#">Victor A. Soifer</a> Samara University	
12:00-13:30	<b>Lunch</b>		
13:30-14:30	<b>Tutorial</b>	<b>Host:</b> <a href="#">Dmitry Nikolaev</a> , Institute for Information Transmission Problems, RAS; HSE University <b>Topic: Preparation and Applications of Nanomaterials</b> <a href="#">Wolfgang Osten</a> University of Stuttgart	Blue Hall Zoom ID: 822 8073 6008
14:30-15:10	<b>Coffee Break &amp; Poster Session</b>		Blue Hall

15:10-17:30	<b>Oral Session 1:</b> Camera-Based and Mobile Recognition	Orbeli Hall
	<b>Oral Session 2:</b> Advanced Imaging and Tomography	Piotrovsky Hall
17:45-19:30	<b>Dinner</b>	

### Day 3 | Nov. 17, 2023

Yerevan Time	Activity	Venue
09:30-11:50	<b>Oral Session 3:</b> Document Analysis, Recognition, and Forgery Detection: Pioneering Solutions for the Digital Age	Orbeli Hall
09:30-12:30	<b>Oral Session 4:</b> Computer Optics Journal	Piotrovsky Hall Zoom ID: 822 8073 6008
12:10-13:30	<b>Lunch</b>	
13:30-15:50	<b>Oral Session 5:</b> Machine Vision for Autonomous Vehicles and Intelligent System	Orbeli Hall
15:50-16:40	<b>Drink Closing</b>	

### Day 4 | Nov. 18, 2023

Yerevan Time	Activity	Venue
09:30-11:30	<b>Oral Session 6:</b> Image Detection and Classification	<b>Online Only</b> Zoom ID: 822 8073 6008
13:00-15:00	<b>Oral Session 7:</b> Image Analysis Methods and Technologies Based on Machine Learning Models	
09:30-11:30	<b>Academic Visit</b>	RAU

## KEYNOTE SPEAKER

Yerevan Time	09:15-10:00, November 16, 2023	Onsite Room	Blue Hall
Zoom ID	822 8073 6008	Zoom Link	<a href="https://us02web.zoom.us/j/82280736008">https://us02web.zoom.us/j/82280736008</a>

**Ehrenfried Zschech**

DeepXscan GmbH, Germany

**Speech Title: High-resolution X-ray Imaging – Challenges to Experiment and Data Analysis**

**Abstract:** High-resolution X-ray imaging provides nondestructive characterization capabilities on opaque objects, observing features with sizes across a range of length scales, down to several 10 nanometers using lens-based transmission X-ray microscopy (TXM). Multi-scale X-ray computed tomography (XCT), characterized by a sample thickness / resolution value of  $\sim 10^3$ , and subsequent 3D data reconstruction is an efficient approach to study the 3D morphology of natural and engineered hierarchically structured systems and materials. Because of the ability of micro-XCT and nano-XCT to reveal structural characteristics and materials' microstructure, they are potential imaging techniques for micro- und nano-structured objects (microchips), advanced multi-component materials (composites and skeleton materials) as well as biological objects (diatoms or mollusk shells). In this talk, multi-scale imaging of the 3D morphology of a novel, hierarchically structured transition-metal-based electrocatalytic system for water splitting, applying laboratory high-resolution multi-scale XCT, will be demonstrated.

Lens-based TXM and nano-XCT have been demonstrated at synchrotron radiation (SR) beamlines but also in the laboratory, with 24/7 tool access. Since the photon flux of laboratory X-ray sources is several orders of magnitude less compared to synchrotrons, image analysis including denoising is needed to get high-quality 3D information of the object. While XCT is pushed further into the micro- and nanoscale, the mitigation of artefacts caused by thermomechanical instability of tool components and object motion, by center of rotation misalignment and by inaccuracy in the detector position require computational efforts, e.g. the application of deep convolutional neural networks. Therefore, 3D reconstruction methodologies are needed that consider unavoidable misalignment and object motion during the data acquisition, in order to obtain high-quality 3D images [1,2].

[1] E. Topal et al., BMC Mater. 2, 1 (2020), Sci. Rep. 10, 1 (2020)

[2] K. Bulatov et al., Nanomaterials 11, 2524 (2021)

**Bio.:** *Ehrenfried Zschech is CTO and Co-Founder of deepXscan GmbH, Dresden, Germany. His responsibilities include research and innovation in the field of high-resolution X-ray imaging and the development of customized solutions for a broad range of applications including advanced packaging for microelectronics. He is member of the European Academy of Science (EurASc) and of ACATECH Germany. Ehrenfried Zschech had several management positions at Airbus in Bremen, at Advanced Micro Devices in Dresden and at Fraunhofer. He holds honorary professorships for Nanomaterials at Brandenburg University of Technology Cottbus-Senftenberg and for Nanoanalysis at Dresden University of Technology. Ehrenfried Zschech was awarded with the FEMS European Materials Gold Medal in 2019.*

## KEYNOTE SPEAKER

Yerevan Time	10:30-11:15, November 16, 2023	Onsite Room	Blue Hall
Zoom ID	822 8073 6008	Zoom Link	<a href="https://us02web.zoom.us/j/82280736008">https://us02web.zoom.us/j/82280736008</a>

**Valery Tuchin**

Saratov State University, Russia

**Speech Title: Advanced Biomedical Imaging and Tomography at Tissue Optical Clearing**

**Abstract:** Principles and novelties in the field of tissue optics in context of tissue optical clearing (TOC) will be presented. New fields of clinical applications for optical imaging, monitoring of drug delivery, effective antitumor and antimicrobial phototherapy, optical communication with implants in the human body, and laser therapy and nanosurgery will be discussed.

TOC is based on temporal suppression of tissue light scattering using immersion optical clearing agents (OCAs) [1-4], which make the living tissue to be reversibly transparent in a wide spectral range from deep UV to terahertz, providing a higher imaging depth and a better contrast in optics, CT and MRI.

1. L. Oliveira and V. V. Tuchin, The Optical Clearing Method: A New Tool for Clinical Practice and Biomedical Engineering, Springer Nature Switzerland AG, Basel, 2019 – 177 p.
2. V. V. Tuchin, D. Zhu, and E. A. Genina (Eds.), Handbook of Tissue Optical Clearing: New Prospects in Optical Imaging, Taylor & Francis Group LLC, CRC Press, Boca Raton, FL, 2022 – 688 p.
3. V.V. Tuchin, E.A. Genina, E.S. Tuchina, A.V. Svetlakova, Y.I. Svenskaya, Optical clearing of tissues: issues of antimicrobial phototherapy and drug delivery, Advanced Drug Delivery Reviews 180 (1), 114037 (2022).
4. I.S. Martins, H.F. Silva, E.N. Lazareva, N.V. Chernomyrdin, K.I. Zaytsev, L.M. Oliveira, and V.V. Tuchin, Measurement of tissue optical properties in a wide spectral range: a review [Invited], Biomedical Optics Express, 14 (1), 249-298 (2023).

**Bio.:** **Valery V. Tuchin** is the corresponding member of the Russian Academy of Sciences, Head of the Department of Optics and Biophotonics and Director of the Science Medical Center of Saratov State University. He is also works with several other research centers of RAS and universities. His research interests include biophotonics, biomedical optics, and nanobiophotonics. He is a Honored Scientist of Russia, Fellow of SPIE and OPTICA, Distinguished Professor of Finland, recipient of SPIE Educator Award, Joseph W. Goodman Book Writing Award (OPTICA/SPIE), Michael S. Feld Biophotonics Award (OPTICA), Chime Bell Award of the Chinese province of Hubei, the D.S. Rozhdestvensky Medal and the S.I. Vavilov Medal of the Russian Optical Society, and the A.M. Prokhorov Medal of the Russian Academy of Engineering Sciences.

## INVITE SPEAKER

Yerevan Time	11:15-11:45, November 16, 2023	Onsite Room	Blue Hall
Zoom ID	822 8073 6008	Zoom Link	<a href="https://us02web.zoom.us/j/82280736008">https://us02web.zoom.us/j/82280736008</a>



## Flavio Piccoli

University of Milano, Italy

### Speech Title: From Black-Box to White-Box Image Enhancement: Leveraging Deep Learning and User-Centric Adaptation

**Abstract:** Image enhancement is a critical field that spans machine vision and human-user applications. This presentation centers on the concept of black-box image enhancement, driven by deep learning techniques, and the transformative journey towards white-box solutions and user-centric adaptation.

**Black-Box Image Enhancement:** Explore the traditional approach of black-box image enhancement, where sophisticated algorithms often operate as opaque processes, making it challenging to understand, customize, or personalize their outputs. This introductory section will set the stage for the evolution to more transparent and user-centric approaches.

**White-Box Image Enhancement:** Delve into the power of interpretable approaches, where the output can be further adapted to the needs of the user. Understand how these advanced methods can be harnessed to bring transparency and interpretability to the previously black-box enhancement techniques.

**User-Centric Adaptation:** Uncover strategies for adapting image enhancement algorithms to user preferences and flavors. Learn how the combination of deep learning and user-centric adaptation can transition image enhancement from a black-box and white-box processes into personalized algorithms, offering users the ability to customize and personalize image outputs, ultimately enhancing the visual experience for both machines and humans.

**Bio.:** *Flavio Piccoli is an Assistant Professor of Computer Science in the Department of Excellence in Informatics, Systems and Communication at the University of Milano-Bicocca. He is also an associate member of the Imaging and Vision Lab (IVL), directed by Prof. Raimondo Schettini.*

*From 2019 to 2023 he was a postdoctoral research fellow at the Italian National Institute of Nuclear Physics (INFN) and the University of Milano-Bicocca. In 2019, he received the degree of Doctor of Philosophy degree (PhD) in Computer Science with a thesis focused on automatic quality inspection. In 2014, he received his master's degree in Computer Science with a thesis focused on face analysis methods. He spent a period abroad at the Computer Vision Center (CVC) laboratory of the Universitat Autònoma de Barcelona (UAB), in the Learning and Machine Perception (LAMP) research group directed by Prof. Joost van de Weijer.*

*His main research interests are in the field of artificial intelligence, machine and deep learning, computer vision, image enhancement, remote sensing, and automatic quality inspection. He has authored several scientific papers in indexed and high Scopus-scoring journals and conferences. He is an associate editor of the SPIE Journal of Electronic Imaging and Frontiers in Artificial Intelligence. He is currently teaching the course "Advanced Computational Techniques for Big Imaging and Signal Data" for the innovative inter-university master's degree course in Artificial Intelligence for Science and Technology, jointly organized by the University of Milan, the University of Pavia and the University of Milano-Bicocca.*



## SHORT SPEECH

Yerevan Time	11:45-11:55, November 16, 2023	Onsite Room	Blue Hall
Zoom ID	822 8073 6008	Zoom Link	<a href="https://us02web.zoom.us/j/82280736008">https://us02web.zoom.us/j/82280736008</a>

**Victor A. Soifer**

Samara University, Russia

**Bio.:** Academician of RAS Victor Soifer, Dr.Sc. (1979), PhD (1971), President of Samara National Research University, the chief researcher of the IPSI RAS –Branch of the FSRC “Crystallography and Photonics” RAS and the Editor-in-Chief of Computer Optics. He is a SPIE-and IAPR-member. He is the author and coauthor of more than 700 scientific publications, 10 books, and 50 author’s certificates and patents. General research areas: diffractive optics and nanophotonics, image analysis, pattern recognition, computer vision, and artificial intelligence.

Web of Science: <https://www.webofscience.com/wos/author/record/C-3088-2017>

Scopus ID: <https://www.scopus.com/authid/detail.uri?authorId=36836834300>

ORCID: <https://orcid.org/0000-0003-4239-4389>

## TUTORIAL

Yerevan Time	13:30-14:30, November 16, 2023	Onsite Room	Blue Hall
Zoom ID	822 8073 6008	Zoom Link	<a href="https://us02web.zoom.us/j/82280736008">https://us02web.zoom.us/j/82280736008</a>



## Wolfgang Osten

University of Stuttgart, Germany

### Speech Title: On the Meaning and Partial Misuse of Some Frequently Applied Terms in Optical Sensor Technologies

**Abstract:** Optical sensor technologies both coherent and no-coherent are gaining continuously more importance in all industrial and public branches. That is a consequence of their unique features such as the non-contact and high speed interaction with the object under inspection, the largely free scalability of the dimension of the probing tool, the high resolution of the data, and the diversity of information channels of the light field. With the progress of production technologies and the innovation of new products with outstanding features the challenges to all kind of inspection devices are dramatically increasing. In this tutorial we turn our attention to the discussion of terms that are currently used very common but that are causing an expectation that is not (yet) really realistic. To them belong such frequently used terms such as “artificial intelligence”, “autonomous vehicles”, “superresolution”, “digitization” and “holography”. We try to make clear what is meant when using these terms, we show the potential but also the challenges on example of selected applications. Overall, this paper is not a scolding against the partly inflationary use of these terms. On the contrary, it is an attempt to objectify the discussion in order to avoid frustration when the excessive expectations fail again.

**Bio.:** *Wolfgang Osten* received the MSc/Diploma in Physics from the Friedrich-Schiller-University Jena in 1979. From 1979 to 1984 he was a member of the Institute of Mechanics in Berlin working in the field of experimental stress analysis and optical metrology. In 1983 he received the PhD degree from the Martin-Luther-University Halle-Wittenberg for his thesis in the field of holographic interferometry. From 1984 to 1991 he was employed at the Central Institute of Cybernetics and Information Processes ZKI in Berlin making investigations in digital image processing and computer vision. Between 1988 and 1991 he was heading the Institute for Digital Image Processing at the ZKI. In 1991 he joined the Bremen Institute of Applied Beam Technology (BIAS) to establish and to direct the Department Optical 3D-Metrology till 2002. Since September 2002 he has been a full professor at the University of Stuttgart and director of the Institute for Applied Optics. From 2006 till 2010 he was the vice rector for research and technology transfer of the Stuttgart University where he is currently the vice chair of the university council. His research work is focused on new concepts for industrial inspection and metrology by combining modern principles of optical metrology, sensor technology and image processing. Special attention is directed to the development of resolution enhanced technologies for the investigation of micro and nano structures.

## Oral Session 1

### S1 / Camera-Based and Mobile Recognition

Yerevan Time	15:10-17:30, Nov. 16, 2023	Onsite Room	Orbeli Hall
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**Chair: Konstantin Bulatov**, *Federal Research Center "Computer Science and Control" of RAS*

Time	ID	Presenter	Affiliation
15:10-15:30	S1-1	Aya Saad	Sintef Ocean
15:30-15:50	S1-2	Elena Limonova	Smart Engines Service LLC, FRC CSC RAS
15:50-16:10	S1-3	Anastasiia V. Vlasova	Cognitive Pilot
16:10-16:30	S1-4	Konstantin Lihota	Smart Engines
16:30-16:50	S1-5	Dmitry Pavliuchenkov	Moscow Institute of Physics and Technology
16:50-17:10	S1-6	Nargiza Z. Valishina	Smart Engines Service LLC
17:10-17:30	S1-7	Dmitry Sidorchuk	The Institute for Information Transmission Problems

#### Details

ID	Title and Authors
S1-1	StereoYolo+DeepSORT: A Framework to Track Fish from Underwater Stereo Camera in Situ Aya Saad, Stian Mjelde Jakobsen, Morten Bondø, Mats Aarsland Mulelid, Eleni Kelasidi
S1-2	Quantization Method for Bipolar Morphological Neural Networks Elena Limonova, Michael Zingerenko, Dmitry Nikolaev, Vladimir Arlazarov
S1-3	Methods for Non-Intrusive Out-Of-Distribution Images Detection Anastasiia V. Vlasova, Aleksandr Yu. Shkanaev, Dmitry L. Sholomov
S1-4	Threshold U-Net: Speed Up Document Binarization with Adaptive Thresholds Konstantin Lihota, Alexander Gayer, Vladimir Arlazarov
S1-5	Training of Binary Neural Network Models Using Continuous Approximation Dmitry Pavliuchenkov, Anton Trusov, Elena Limonova
S1-6	Fast Keypoint Filtering for Feature-Based Identity Documents Classification on Complex Background Nargiza Z. Valishina, Alexander V. Gayer, Natalya S. Skoryukina, Vladimir V. Arlazarov
S1-7	CADCP: A Method for Chromatic Haze Compensation on Remotely Sensed Images D. S. Sidorchuk, M. A. Pavlova, D. O. Kushchev, M. A. Selyugin, I. P. Nikolaev, D. A. Bocharov

## Oral Session 2

### S2 / Advanced Imaging and Tomography

Yerevan Time 15:10-17:30, Nov. 16, 2023 Onsite Room Piotrovsky Hall

**Chair: Ehrenfried Zschech, DeepXscan GmbH, Germany**

Time	ID	Presenter	Affiliation
15:10-15:30	S2-1	Danil Kazimirov	Smart Engines Service LLC
15:30-15:50	S2-2	Tuan Aqeel Bohoran	Nottingham Trent University
15:50-16:10	S2-3	Marina Chukalina	Smart Engines Service LLC
16:10-16:30	S2-4	Alexandr Motyko	Saint Petersburg Electrotechnical University "LETI"
16:30-16:50	S2-5	Mikhail Shutov	Smart Engines Service LLC, Moscow, Russia
16:50-17:10	S2-6	Daniil Reutskii	Institute for Information Transmission Problems
17:10-17:30	S2-7	Vyacheslav Zhdanovskiy	NVI Research LLC

#### Details

ID	Title and Authors
S2-1	Robust Automatic Rotation Axis Alignment Mean Projection Image Method in Cone-Beam and Parallel-Beam CT Danil Kazimirov, Anastasia Ingacheva, Alexey Buzmakov, Marina Chukalina, Dmitry Nikolaev
S2-2	Embracing Uncertainty Flexibility: Harnessing a Supervised Tree Kernel to Empower Ensemble Modelling for 2D Echocardiography-Based Prediction of Right Ventricular Volume Tuan Aqeel Bohoran, Polydoros N. Kampaktis, Laura McLaughlin, Jay Leb, Serafeim Moustakidis, Gerry P. McCann, Archontis Giannakidis
S2-3	Segmentation of Human Olfactory Bulb Glomeruli on its Phase-Contrast Tomographic Images with Neural Networks Aleksandr Smolin, Marina Chukalina, Inna Bukreeva, Olga Junemann, Alessia Cedola, Michela Fratini, Dmitry Polevoy, Sergei Saveliev, Andrey Yamaev, Dmitry Nikolaev
S2-4	Method of Color Image Formation Taking into Account the Human Perception Features Alexandr Motyko, Nataliia Obukhova, Alexandr Pozdeev, Konstantin Smirnov
S2-5	CT Metal Artifacts Simulation under X-Ray Total Absorption Mikhail Shutov, Marat Gilmanov, Dmitry Polevoy, Alexey Buzmakov, Anastasia Ingacheva, Marina Chukalina, Dmitry Nikolaev
S2-6	Spectral Filters Design for a Better Hyperspectral Reconstruction Daniil Reutskii, Egor Ershov
S2-7	Efficient Single- and Multi-DNN Inference Using TensorRT Framework Vyacheslav Zhdanovskiy, Lev Teplyakov, Philipp Belyaev

## Oral Session 3

### S3 / Document Analysis, Recognition, and Forgery Detection: Pioneering Solutions for the Digital Age

Yerevan Time	09:30-11:50, Nov. 17, 2023	Onsite Room	Orbeli Hall
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**Chair:** Vladimir Arlazarov, Federal Research Center "Computer Science and Control" of RAS

Time	ID	Presenter	Affiliation
09:30-09:50	S3-1	Konstantin Suloev	Smart Engines Service LLC
09:50-10:10	S3-2	Lada Tolstenko	Smart Engines Service LLC
10:10-10:30	S3-3	Artem Sher	Moscow Institute of Physics and Technology
10:30-10:50	S3-4	Bursikov A.D.	Smart Engines Service LLC
10:50-11:10	S3-5	Aleksandr Chuiko	Smart Engines Service LLC
11:10-11:30	S3-6	Yulia Chernyshova	FRC CSC RAS
11:30-11:50	S3-7	Daniil Matalov	Smart Engines Service LLC, FRC CSC RAS

#### Details

ID	Title and Authors
S3-1	SAIGAN: Arbitrary Length and Out-of-Vocabulary Handwriting Synthesis Preserving Geometrical Annotation Konstantin Suloev, Yulia Chernyshova, Alexander Sheshkus
S3-2	Detection of Fingers in Document Images Captured in Uncontrolled Environment Lada Tolstenko, Irina Kunina
S3-3	FARA: Fast and Accurate RFDoc Descriptor Approximation Artem Sher, Anton Trusov, Mikhail Maksimenko, Nikita Arlazarov, Elena Limonova
S3-4	Building an Optimal Document Authentication System Bursikov A.D., Usilin S.A., Kunina I. A.
S3-5	Copy-Move Document Image Forgery Detection and Localization based on JPEG Clues Aleksandr Chuiko, Konstantin Bulatov, Daniil Tropin
S3-6	Multilanguage ID Document Images Synthesis for Testing Recognition Pipelines Yulia Chernyshova, Konstantin Suloev, Vladimir Arlazarov
S3-7	Enhanced Multiple-Instance Pruning for Learning Soft Cascade Detectors Daniil P. Matalov, Vladimir V. Arlazarov

## Oral Session 4

### S4/ Computer Optics Journal

Yerevan Time	09:30-12:30, Nov. 17, 2023	Onsite Room	Piotrovsky Hall
Zoom ID	822 8073 6008	Zoom Link	<a href="https://us02web.zoom.us/j/82280736008">https://us02web.zoom.us/j/82280736008</a>

**Chair (online): Viktor Soifer, Samara University**

Time	ID	Presenter	Affiliation
09:30-09:50	S4-1	Anton Trusov	Moscow Institute of Physics and Technology
09:50-10:10	S4-2	Alexandr Ershov	Smart Engines
10:10-10:30	S4-3	Sushovan Jena	IIT Mandi
10:30-10:50	S4-4	Daria Ershova	Smart Engines Service LLC
10:50-11:10	S4-5	Olga Chaganova	Institute for Information Transmission Problems, RAS
11:10-11:30	S4-6	Irina Kunina	Smart Engines Service LLC
11:30-11:50	S4-7	Yamaev Andrei Viktorovich	Smart Engines
11:50-12:10	S4-8	Volkov Vladislav Vladimirovich	Institute for Information Transmission Problems
12:10-12:30	S4-9	Baboshina V	North-Caucasus Federal University

#### Details

ID	Title and Authors
S4-1	Uncertainty-based Quantization Method for Stable Training of Binary Neural Networks Anton Trusov, Dmitry Putintsev, Elena Limonova
S4-2	Unfolder: Fast Localization and Image Rectification of a Document with a Crease from Folding in Half Ershov A.M., Tropin D.V., Limonova E.E., Nikolaev D.P., Arlazarov V.V.
S4-3	Multi-Class Anomaly Detection Methods on Edge Device using Knowledge Distillation and Quantization Sushovan Jena, Arya Pulkit, Kajal Singh, Anoushka Banerjee, Sharad Joshi, Ananth Ganesh, Dinesh Singh, Arnav Bhavsar
S4-4	YOLO-Barcode: Towards Universal Real-Time Barcode Detection on Mobile Devices Ershova D.M., Gayer A.V., Bezmaternykh P.V., Arlazarov V.V.
S4-5 (online)	Applied Aspects of Modern Non-Blind Image Deconvolution Methods O.B. Chaganova, A.S. Grigoryev, D.P. Nikolaev, I.P. Nikolaev
S4-6	Verification of Color Characteristics of Document Images Captured in Uncontrolled Conditions Irina Kunina, Olga Padas, Olga Kolomytseva
S4-7	Neural Network Based Monitoring Reconstruction Yamaev Andrei Viktorovich
S4-8 (online)	Neural Network Algorithm for Optical-SAR Image Registration based on a Uniform Grid of Points Volkov V.V., Shvets E.A.
S4-9 (online)	Neural Network Recognition System for Video Transmitted through a Binary Symmetric Channel Baboshina V, Orazhev A, Lyakhov P, Boyarskaya E

## Oral Session 5

### S5/ Machine Vision for Autonomous Vehicles and Intelligent System

Yerevan Time

13:30-15:50, Nov. 17, 2023

Onsite Room

Orbeli Hall

Chair: **Wolfgang Osten**, *University of Stuttgart*

Time	ID	Presenter	Affiliation
13:30-13:50	S5-1	Erdem Akagunduz	Middle East Technical University Graduate School of Informatics
13:50-14:10	S5-2	Mikhail Chekanov	Institute for Information Transmission Problems, Evocargo LLC
14:10-14:30	S5-3	Erdem Akagunduz	Middle East Technical University Graduate School of Informatics
14:30-14:50	S5-4	Dmitry Nikolaev	Institute for Information Transmission Problems, RAS; HSE University
14:50-15:10	S5-5	Michael Zingerenko	Smart Engines Service LLC
15:10-15:30	S5-6	Kirill Muravyev	Federal Research Center "Computer Science and Control" of RAS
15:30-15:50	S5-7	Alexandra Zhabitskaya	Smart Engines Service LLC

#### Details

ID	Title and Authors
S5-1	Sequence Models for Drone vs Bird Classification Fatih Cagatay Akyon, Erdem Akagunduz, Sinan Onur Altinuc, Alptekin Temizel
S5-2	L-shape Fitting Algorithm for 3D Object Detection in Bird's-Eye-View in an Autonomous Driving System Mikhail Chekanov, Oleg Shipitko
S5-3	EANet: Enhanced Attribute-Based RGBT Tracker Network Abbas Türkoglu and Erdem Akagunduz
S5-4	Search for Image Quality Metrics Suitable for Assessing Images Specially Precompensated for Users with Refractive Errors Nafe Alkzir, Iliia Nikolaev, Dmitry Nikolaev
S5-5	Bipolar Morphological YOLO Network for Object Detection Michael Zingerenko, Elena Limonova
S5-6	Maintaining Topological Maps for Mobile Robots Muravyev K, Yakovlev K
S5-7	HoughToRadon Transform: New Neural Network Layer for Features Improvement in Projection Space Alexandra Zhabitskaya, Alexander Sheshkus, Vladimir L. Arlazarov

## Oral Session 6

### S6/ Image Detection and Classification

Yerevan Time 09:30-11:30, Nov. 18, 2023 Online Only Zoom ID: 822 8073 6008

#### Chair:

Time	ID	Presenter	Affiliation
09:30-09:45	S6-1	Thanh Dang	R&D laboratory, Sun Asterisk
09:45-10:00	S6-2	Shubham Kumar Dubey	Indian Institute of Technology
10:00-10:15	S6-3	Martin Pape	Fraunhofer IPK
10:15-10:30	S6-4	Soumya A	Indian Institute of Technology Hyderabad
10:30-10:45	S6-5	Matthias Hermann	HTWG Konstanz
10:45-11:00	S6-6	Mahtab Jamali	Malmö University
11:00-11:15	S6-7	Jan Lehr	Fraunhofer IPK
11:15-11:30	S6-8	Sivaji Retta	AnimalEYEQ

#### Details

ID	Title and Authors
S6-1	sMoBYAL: Supervised Contrastive Active Learning for Image Classification Thanh Dang, Thanh Nguyen, Huy Trinh, Linh Doan, Toan Pham
S6-2	False Positive Elimination In Object Detection Methods For Videos Shubham Kumar Dubey, J V Satyanarayana, C Krishna Mohan
S6-3	Limitations of anomaly detection: Beyond which size defects can be reliably recognized Jan Lehr, Martin Pape, Jan Philipps, Felix Scholler, Jörg Krüger
S6-4	Multi-Class Object Classification using Deep Learning Models in Automotive Object Detection Scenarios Soumya A, Linga Reddy Cenkeramaddi, Chalavadi Vishnu, Krishna Mohan C
S6-5	Incremental One-Class Learning using Regularized Null-Space Training for Industrial Defect Detection Matthias Hermann, Georg Umlauf, Bastian Goldücke, Matthias O. Franz
S6-6	Specialized Indoor and Outdoor Scene-specific Object Detection Models Mahtab Jamali, Paul Davidsson, Reza Khoshkangini, Martin Georg Ljungqvist, Radu-Casian Mihailescu
S6-7	Insights of Anomaly Detection: How Does Polluted Training Data Influence Performance Jan Lehr, Martin Pape, Samuel Günther, Jörg Krüger
S6-8	CattleDeSegNet: A Joint Approach to Cattle Denoising and Interpretable Segmentation Sivaji Retta, Ramarajulu Srinivasan, Shawn Tan



## Oral Session 7

### S7/ Image Analysis Methods and Technologies Based on Machine Learning Models

Yerevan Time

13:00-15:00, Nov. 18, 2023

Online Only

Zoom ID: 822 8073 6008

Chair: Amine Bohi, *CESI LINEACT Laboratory*

Time	ID	Presenter	Affiliation
13:00-13:15	S7-1	Ignazio Gallo	University of Insubria
13:15-13:30	S7-2	Nagaraju C	Indian Institute of Technology Hyderabad
13:30-13:45	S7-3	Ignazio Gallo	University of Insubria
13:45-14:00	S7-4	Amine Bohi	CESI LINEACT Laboratory
14:00-14:15	S7-5	Prashant Gohel	DAICT
14:15-14:30	S7-6	Ekaterina P. Gerasimova	NUST MISIS
14:30-14:45	S7-7	Mengxiang Hao	Shanghai Jiao Tong University
14:45-15:00	S7-8	Ziyi Zhou	Yunnan University

#### Details

ID	Title and Authors
S7-1	Enhancing Crop Segmentation in Satellite Image Time-Series with Transformer Networks Ignazio Gallo, Nicola Landro, Mattia Gatti, Christian Loschiavo, Mirco Boschetti, Riccardo La Grassa, Anwar Ur Rehman
S7-2	A Data Parallel Approach for Distributed Neural Networks to Achieve Faster Convergence Nagaraju C, Ramesh Yenda, Krishna Mohan C
S7-3	Distortion-Aware Super-Resolution for Planetary Exploration Images Nicola Landro, Ignazio Gallo, Filippo Pelosi, Riccardo La Grassa, Anwar Ur Rehman
S7-4	CG-MER: A Card Game-based Multimodal Dataset for Emotion Recognition Nessrine Farhat, Amine Bohi, Leila Ben Letaifa, Rim Slama
S7-5	Quantum Time Series Forecasting Prashant Gohel, Manjunath Joshi
S7-6	Assessment of the Color Compatibility of Garments for Building a Recommendation System for An Outfit Ekaterina P. Gerasimova, Dmitry L. Sholomov
S7-7	Point Scene Understanding via Points-to-mesh Reconstruction and Multi-level Utilization of Proposals Mengxiang Hao, Hang Wu, Ruochong Fu, Yubin Miao
S7-8	Integrated Channel Attention Method for Siamese Tracker Ziyi Zhou, Yingran Jin, Yun Gao

**Poster Session****P/ Computer Graphics and Machine Vision**

Yerevan Time	14:30-15:10, Nov. 16, 2023	Venue	Blue Hall
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**Chair:**

ID	Title and Authors	Presenter	Affiliation
P-1	On Optimizing Morphological Neural Networks for Hyperspectral Image Classification Maksim Kukushkin, Martin Bogdan, Thomas Schmid	Maksim Kukushkin	Skolkovo Institute of Science and Technology
P-2	Cloud-based Metrological-Quality Camera Calibration Alexey Pak, Andrey Mir	Alexey Pak	Moscow Institute of Physics and Technology
P-3	Portfolio Selection via Topological Data Analysis Petr Sokerin, Kristian Kuznetsov, Elizaveta Makhneva, Alexey Zaytsev	Petr Sokerin	HS High Stake GmbH, Karlsruhe, Germany
P-4	Image Edge Detection using Pseudo-Boolean Polynomials Tendai Mapungwana Chikake, Boris Goldengorin	Tendai Mapungwana Chikake	Moscow Institute of Physics and Technology

\*Conference organizer does not provide printing service, please prepare and print out your poster and bring to conference site by yourself.

## ACADEMIC VISIT

**09:30-11:30, Nov. 18, 2023**

Lab 1	Center of Advanced Software Technologies
Lab 2	Laboratory for Mathematical Modeling of Quantum Systems

**When:** 9:30-11:30AM

**Who:** All delegates of ICMV 2023

**Where:** Meeting Point @ Main Entrance of RAU, by 9:30AM

Tips: No meal will be provided during the labs visit.

### **About Lab 1: Center of Advanced Software Technologies**

We are a Russian-Armenian University-based Center of Advanced Software Technologies(CAST). We design and develop cutting-edge technologies regarding compilers, program analysis and transformations, machine learning and artificial intelligence, autonomous systems and robotics, cloud computing, etc.

Our mission is to develop education, research, and science in Armenia. We are actively involved in the education process.

We engage students in practical research projects.

We provide teachers for many university courses.

We provide high scholarships to keep the students focused on education and research.

We have a pipeline for the students to become young scientists. We provide research topics and scientific advisors for masters and Ph.D. theses.

### **About Lab 2: Laboratory of "Mathematical Modeling of Quantum Systems"**

Scientific supervisor: Ph.D., Associate Professor. Hayrapetyan D.B.

The Laboratory of Mathematical Modeling of Quantum Systems (MMQS) conducts simulation, visualization and further analysis of physical processes and phenomena occurring in various quantum systems, and, in particular, in semiconductor quantum nanostructures. The MMQS laboratory is developing a set of programs for determining various physical characteristics of QT. Modules are being created to simulate both electronic properties and optical, statistical characteristics of QT. In addition, a utility module is being developed, designed for such purposes as the construction of diagrams of electronic levels, the construction of various dependencies, the construction of animation of the evolution of wave functions, etc.

Various packages are being developed and applied in the MMQS laboratory:

a package for calculating multi-partial states, such as exciton, trionic and biexciton;

package for calculating impurity states in QT;

a package with which it is possible to calculate nonlinear characteristics, such as nonlinear absorption, optical rectification, change in the refractive index, generation of second and third harmonics, etc.

It is also worth noting that within the framework of the laboratory's activities, research is being conducted in the field of machine learning, which is widely used in the study of materials and demonstrates superiority both in time efficiency and in the accuracy of forecasts. Machine learning applications for the search and design of materials can be divided into three main classes: the

prediction of material properties, the discovery of new materials and various other purposes. In research on predicting the properties of materials, regression analysis methods are usually used, which make it possible to predict both macroscopic and microscopic properties. The main idea underlying the application of machine learning in the discovery of new materials is to use a probabilistic model to test various combinations of structures and components and, finally, to select a material with good characteristics from a set of candidates using validation based on density functional theory (DFT). In addition, machine learning is also used for other purposes in materials research, such as process optimization and density function approximation.

Among other things, numerical calculations are carried out in the MMQS laboratory for scientific articles that are published in international peer-reviewed journals.

