



# IEEE 1<sup>st</sup> International Conference on **Intelligent Reality**

*Enabling Real-time Intelligent Analytics for Immersive Environments*

**12-13 May 2021 • Virtual Event**

# 2021 Event Details



**[Click here](#) to access the conference proceedings**

## Table of Contents

1. <a href="#">About the Event</a> .....	3
2. <a href="#">Event Program/schedule Day 1</a> .....	4
3. <a href="#">Event Program/schedule Day 2</a> .....	5
4. <a href="#">Sponsors</a> .....	5
5. <a href="#">Keynote Speakers</a> .....	6
6. <a href="#">Invited Speakers</a> .....	9
7. <a href="#">Accepted Papers</a> .....	10
8. <a href="#">Call for Papers/Areas of Interest</a> .....	11
9. <a href="#">Paper Submission Guidelines</a> .....	13
10. <a href="#">ACIR Competition Details</a> .....	14
11. <a href="#">Awards</a> .....	15
12. <a href="#">ACIR Competition Results</a> .....	16
13. <a href="#">Organizing Committee</a> .....	17
14. <a href="#">Technical Committee Co-Chairs Per Focus Area</a> .....	17
15. <a href="#">Program Committee Members</a> .....	18

# 2021 Event Details



## About the IEEE International Conference on Intelligent Reality (ICIR)

12-13 May 2021 | Virtual Event

The success of AI machine learning in deep neural networks has led to substantial improvements in computer vision, speech recognition, natural language processing, and other applications at comparable human performance and beyond. The advancement of computer graphics, modeling, and simulation with innovative smart interactive devices energizes the acceleration of immersive computing in the marketplace.

Integrating AI machine learning and immersive computing can propel future Intelligent Reality (IR), providing real-time intelligent assistant user experience for the immersive environment. Also, to make machine learning inferencing more robust with realistic content rendering, leveraging big data for handling Volume and Velocity of data from a single source or Varieties of data from multiple sources would provide the IR the perfect playing field.

Overall, by anchoring these technologies and others being developed such as augmented reality (AR), virtual reality (VR), mixed reality (MR), extended reality (XR), and Digital Twins, the line between the physical world and the digital world with analytics capability will be increasingly less distinct.

This conference identifies the challenges and opportunities to deploy AI machine learning into the immersive computing environment. However, two major near-term challenges that need investigation before making the IR an actual reality:

- **Device Challenges:** Mobile smart interactive devices such as smart glasses, heads et, helmet, and others equipped with limited power and storage, current AI machine learning trained models could be huge in size for such platforms, and may also require unique hardware accelerators for speedup execution.
- **Application Challenges:** There are at least four critical areas that need further research between IR and AI application:
  - **Integration Challenges:** identify issues for how AI Application can work well inside the IR environment;
  - **Deployment Challenges:** identify issues for how AI application can deploy to the IR environment;
  - **Operation Challenges:** user interface, content and context switching, and others; and
  - **Social/Ethical Challenges:** user behavior, safety, privacy, and others.

This conference aims to foster the IR vision by understanding current best practices, future innovations, and standards development for how to effectively and efficiently deploy AI machine learning and deep learning to the immersive environment (VR, AR, MR, and XR). The integration of smart interactive devices, immersive computing, and AI machine learning can transform and enhance learning and human performance in education, science, engineering, telemedicine, healthcare, manufacturing, finance, business, public services, and ultimately our society itself.

# 2021 Event Details



## Day 1 | 12 May 2021

\*All times are in Eastern Time US (ET).

Time	Topic/Title
09:00 – 09:15	Opening and Welcome <b>Wo Chang</b> , ICIR General Chair, NIST, US
09:15 – 10:15	Moderator: <b>Wo Chang</b> , ICIR General Chair, NIST, US <b>Keynote – Mixed Reality, Robotics, and Spatial Intelligence</b> <b>Marc Pollefeys</b> , ETH Zurich and Director of Science, Microsoft, Switzerland
10:15 – 10:30	Break
10:30 – 11:30	Session Chair: <b>Ehsan Azimi</b> , Provost's Postdoctoral Fellow, Johns Hopkins Univ, US <b>Paper: xR4DRAMA: Enhancing Situation Awareness using Immersive (XR) Technologies</b> Spyridon Symeonidis, Sotiris Diplaris, Nicolaus Heise, Theodora Pistola, Athina Tsanousa, Georgios Tzanetis, Elissavet Batziou, Christos Stentoumis, Ilias Kalisperakis, Sebastian Freitag, Yash Shekhawat, Rita Paradiso, Maria Pacelli, Joan Codina, Simon Mille, Montserrat Marimon, Michele Ferri, Daniele Norbiato, Martina Monego, Anastasios Karakostas and Stefanos Vrochidis <b>Paper: Manipulating Avatars for Enhanced Communication in Extended Reality</b> Jonathon Hart, Thammathip Piumsomboon, Gun Lee, Ross Smith and Mark Billinghamurst
11:30 – 12:10	Moderator: <b>Kathy Grise</b> , Senior Program Manager, Future Directions, IEEE, US <b>Invited Talk – Self Healing Systems in an Intelity World</b> <b>Aishwarya Alesh</b> , Data Scientist II, Adobe, US
12:10 – 13:00	Meal Break
13:00 – 14:00	Moderator: <b>Kathy Grise</b> , Senior Program Manager, Future Directions, IEEE, US <b>Keynote – Learning from Multi-Agent, Emergent Behaviors in a Simulated Environment</b> <b>Danny Lange</b> , Senior VP of Artificial Intelligence and Machine Learning, Unity, US
14:00 – 15:00	Session Chair: <b>Lyuba Alboul</b> , Sheffield Hallam University, UK <b>Paper: Creating Immersive Experiences based on Intangible Cultural Heritage</b> Theodora Pistola, Sotiris Diplaris, Christos Stentoumis, Evangelos Stathopoulos, Georgios Loupas, Theodore Mandilaras, Grigoris Kalantzis, Ilias Kalisperakis, Anastasios Tellios, Despoina Zavranka, Panagiota Koulali, Vera Kriezi, Valia Vraka, Foteini Venieri, Stratos Bacalis and Stefanos Vrochidis <b>Paper: Augmented Reality Assisted Orbital Floor Reconstruction</b> Yihao Liu, Ehsan Azimi, Nikhil Dave, Cecil Qiu, Robin Yang and Peter Kazanzides
15:00 – 15:15	Break
15:15 – 16:15	Moderator: <b>Elizabeth Chang</b> , ICIR Publication Chair, University of Maryland, US <b>Keynote – Spatial Perception in Immersive Virtual Environments</b> <b>Victoria Interrante</b> , Professor, University of Minnesota, US

# 2021 Event Details



16:15 – 17:05 Moderator: **Elizabeth Chang**, *ICIR Publication Chair, University of Maryland, US*  
[Invited Talk – Interactive Platform for Medical Procedures in Mixed Reality](#)  
**Ehsan Azimi**, *Provost's Postdoctoral Fellow, Johns Hopkins University, US*

17:05 – 17:10 Day 1 Closing Remarks  
**Wo Chang**, *ICIR General Chair, NIST, US*

---

# 2021 Event Details



## Day 2 | 13 May 2021

\*All times are in Eastern Time US (ET).

Time	Topic/Title
09:00 – 09:00	Moderator: <b>Sin-Kuen Hawkins</b> , ICIR Organization Chair, IEEE, US <a href="#">Keynote – Artificial Stupidity and Intelligent Systems in the (R)evolution of Digital Supports to Actual Reality</a> <a href="#">Lizbeth Goodman</a> , Director SMARTlab and Professor, University College Dublin, Ireland
10:00 – 10:40	Moderator: <b>Sin-Kuen Hawkins</b> , ICIR Organization Chair, IEEE, US <a href="#">Invited Talk – Natural User Interfaces for 3D Modeling, Design, and Fabrication</a> <a href="#">Manfred Lau</a> , Assistant Professor, City University of Hong Kong, China
10:40 – 11:00	Break
11:00 – 12:00	Moderator: <b>Julie Bernicker</b> , ICIR Communication Chair, IEEE, US <a href="#">Keynote – Vision of how AI Machine Learning Applies to VR/AR for Health Applications</a> <a href="#">Jennifer Esposito</a> , VP Health, Magic Leap, US
12:00 – 13:00	Meal Break
13:00 – 14:30	Session Chair: <b>Joaquim Jorge</b> , Instituto Superior Técnico, Portugal <a href="#">Paper: Corner-based Square Fiducial Marker Detection for Hand-manipulated</a> Breawn Schoun and Min-Hyung Choi  <a href="#">Paper: Building a Motion-Aware, Networked Do-It-Yourself Holographic Display</a> Amilcar Gomez, Javier Talavera, Siem Sium, Biao Xie, Haikun Huang and Lap-Fal Yu  <a href="#">Paper: Interfacing Cyber and Physical Worlds: Introduction to IEEE 2888 Standards</a> Kyoungro Yoon, Sang-Kyun Kim, Sangkwon Peter Jeong and Jeong-Hwan Choi
14:30 – 15:30	Moderator: <b>Wo Chang</b> , ICIR General Chair, NIST, US <a href="#">Keynote – Enabling Intelligence from Reality</a> <a href="#">Mikaël Bourges-Sévenier</a> , Fellow, SiMa.ai, US
15:30 – 15:45	Break
15:45 – 16:45	Session Chair: <b>Louis Nisiotis</b> , ICIR Competition Chair, Cyprus Competition
16:45 – 17:00	Award Ceremony and Closing Remarks <b>Wo Chang</b> , ICIR General Chair, NIST, US

## Sponsors



# 2021 Event Details



## Keynote Speakers



**Dr. Danny Lange**, Senior VP of Artificial Intelligence and Machine Learning at Unity  
**Talk Title: Learning from Multi-Agent, Emergent Behaviors in a Simulated Environment**

As head of machine learning at Unity, Lange leads the company's innovation around AI (Artificial Intelligence) and Machine Learning, focusing on bringing AI to simulation and gaming.

Prior to joining Unity, Lange was the head of machine learning at Uber, where he led efforts to build the world's most versatile Machine Learning platform to support the company's hyper-growth. Lange also served as General Manager of Amazon Machine Learning -- an AWS product that offers Machine Learning as a Cloud

Service. Before that, he was Principal Development Manager at Microsoft where he led a product team focused on large-scale Machine Learning for Big Data.

Lange spent 8 years on Speech Recognition Systems, first as CTO of General Magic, Inc., then through his work on General Motor's OnStar Virtual Advisor, one of the largest deployments of an intelligent personal assistant until Siri. Danny started his career as a Computer Scientist at IBM Research.

He holds MS and Ph.D. degrees in Computer Science from the Technical University of Denmark. He is a member of ACM and IEEE Computer Society and has several patents to his credit.



**Professor Marc Pollefeys**, Professor, ETH Zurich and Director of Science, Microsoft  
**Talk Title: Mixed Reality, Robotics, and Spatial Intelligence**

Marc Pollefeys is a Professor of Computer Science at ETH Zurich and the Director of the Microsoft Mixed Reality and AI Lab in Zurich where he works with a team of scientists and engineers to develop advanced perception capabilities for HoloLens and Mixed Reality. He was elected Fellow of the IEEE in 2012. He obtained his PhD from the KU Leuven in 1999 and was a professor at UNC-Chapel Hill before joining ETH Zurich.

He is best known for his work in 3D computer vision, having been the first to develop a software pipeline to automatically turn photographs into 3D models, but also works on robotics, graphics, and machine learning problems. Other noteworthy projects he worked on are real-time 3D scanning with mobile devices, a real-time pipeline for 3D reconstruction of cities from vehicle mounted-cameras, camera-based self-driving cars, and the first fully autonomous vision-based drone. Most recently his academic research has focused on combining 3D reconstruction with semantic scene understanding.

# 2021 Event Details



## Keynote Speakers



**Dr. Victoria Interrante**, Professor, University of Minnesota  
**Talk Title: Spatial Perception in Immersive Virtual Environments**

Dr. Interrante works for the Department of Computer Science and Engineering at the University of Minnesota. Professor Interrante's research focuses on applying insights from visual perception and cognition to the development of more effective virtual reality experiences and the more effective communication of complex information through visual imagery. In this work, she has enjoyed collaborating with colleagues in a wide variety of fields, from architectural design and neuropsychology to engineering and medicine.

Dr. Interrante is a recipient of the 2020 IEEE VGTC Virtual Reality Career Award in recognition of her lifetime contributions to visualization and visual perception for AR and VR, and the 1999 Presidential Early Career Award for Scientists and Engineers, "the highest honor bestowed by the U.S. government on outstanding scientists and engineers beginning their independent careers". She was also a recipient of the 2001-2003 McKnight Land-Grant Professorship from the University of Minnesota.

At the University of Minnesota, Dr. Interrante is currently serving as the director of the University-wide Center for Cognitive Sciences and as a member of the graduate faculty in the interdisciplinary Cognitive Science and Human Factors programs. She also served from 2010-2013 as a member and 2013-2014 as co-chair of the Women's Faculty Cabinet, providing consultation and advice to the Vice Provost for Faculty and Academic Affairs to improve and enrich the academic and professional environments for women faculty at the University of Minnesota. She also served as Director of Graduate Studies for the Department of Computer Science and Engineering from 2010-2013.



**Dr. Jennifer Esposito**, VP Health, Magic Leap  
**Talk Title: Vision of how AI machine learning applies to VR/AR for health applications**

Dr. Esposito is the Vice President and General Manager, Health at Magic Leap, where she also leads overall corporate strategy and development. With over 20 years of experience, Jennifer is a seasoned tech, healthcare IT, medical devices, and biotech executive. After spending over 13 years at GE Healthcare, Jennifer was the General Manager of Health and Life Sciences at Intel Corporation prior to joining Magic Leap.

Jennifer is a board director at VivaLNK and advisor to start-ups focused on digital health and biotechnology. She is active in initiatives on global health, identifying novel ways technology can be used to advance the SDGs and IHRs and is the former co-chair of the Working Group on Digital Health for the Broadband Commission for Sustainable Development and former co-chair of the Global Health Security Agenda Private Sector Roundtable. [Note, you may delete this paragraph if you do not have room for it]

Jennifer has a graduate degree from the Dartmouth Institute for Health Policy and Clinical Practice at Dartmouth College where she focused on Epidemiology and Biostatistics and remains a full member of the American Association of Physicists in Medicine. She holds a patent for industrial IoT medical imaging equipment.



# 2021 Event Details



## Keynote Speakers



**Dr. Mikaël Bourges-Sévenier**, Fellow, SiMa.ai  
**Talk Title: Enabling Intelligence from Reality**

Dr. Bourges-Sévenier joined SiMa.ai as a Fellow to oversee system solutions to accelerate the proliferation of high-performance machine learning inference at very low power in embedded edge applications. Before joining SiMa.ai, Mikaël was the Senior Director and Architect for deep learning visual enhancements at Intel, Fellow for Performance Application Engineering on Multimedia at AMD, Director of High-Performance Imaging at Aptina, Senior Architect of 3D, GPGPU, Multimedia at Motorola Mobility, Senior Manager of Technology Strategy at Dolby Laboratories, Senior Computer Scientist and Architect of Mobile and Devices at Adobe Systems, and others.

Mikaël written many foundational books in animation framework including Core Web3D, An Introduction to the MPEG-4 Animation Framework Extension (AFX), The MPEG-4 Jump Start, etc. Mikaël has made significant contributions to the ISO/IEC JTC 1/SC 29/WG 11 (MPEG) and was the Chair for the Synthetic and natural Hybrid Coding (SNHC) Subgroup and produced many valuable ISO/IEC foundational standards for enabling immersive computing.



**Professor Lizbeth Goodman**, Director SMARTlab and Professor, University College Dublin  
**Talk Title: Artificial Stupidity and Intelligent Systems in the (R)evolution of digital supports to Actual Reality**

is Chair of Creative Technology Innovation and Professor of Inclusive Design for Education at University College Dublin, College of Engineering and Architecture. She founded the SMARTlab in its first iteration in 1992, and has developed the award winning practice-based PhD Programme through the institute, along with the associated MAGIC Multimedia and Games Innovation Centre and Gamelab internationally as well as founding the Inclusive Design Research Centre of Ireland.

Prior to joining UCD, Lizbeth was Director of Research for Futurelab Education, working with David Puttnam's team to establish innovative platforms for the future of education in a context of global change. In 2019 she was named Woman of the Decade by the Women's Forum of WEF. In 2008 she was named 'Best Woman in Academia and the Public Sector' and also 'Best Woman in Technology' by the Blackberry Rim international awards panel. She was nominated to Chair the Royal Irish Academy's Social Sciences Committee in 2012. She is the author/editor of 14 books and many peer-reviewed articles, and a prolific broadcast presenter on TV, Radio and Online. She is PI and co-PI of several major funded research projects, and also an evaluator and judge of numerous research council and EC evaluation panels. She is known as an expert in Digital Inclusion, including learning models for communities at risk. She is an award-winning advocate of community-based ethical learning and teaching models using interactive tools and games to inspire and engage learners of all ages using novel Virtual and Augmented Reality, Assistive Technology, and Creative Tech solutions developed by her team.

# 2021 Event Details



## Invited Speakers



**Mr. Aishwarya Asesh**, Data Scientist II, Adobe, US  
**Talk Title: Self Healing Systems in an Intelity World**

Mr. Asesh is an exceptional machine learning scientist who is passionate about incubating inventive technologies for the most challenging technical problems and has led to substantial contributions in the field of machine learning and artificial intelligence. Currently, he is working with Adobe research and is passionate about applying his knowledge to breathe air to creativity and develop solutions to critical research problems in the field of analytics. He currently holds multiple patents for his novel contributions.

He has facilitated and fostered research developments around the globe by serving as a Program Committee and Technical Committee member at some of the best ML and AI conferences and research groups.

Apart from the hustle of research life, his philosophy is that one needs to be grounded in theory, and be aware of where they are on the Dunning-Krueger curve, but that shouldn't be considered as an excuse for not doing extraordinary things.



**Dr. Ehsan Azimi**, Provost's Postdoctoral Fellow, Johns Hopkins University, US  
**Talk Title: Interactive Platform for Medical Procedures in Mixed Reality**

Ehsan Azimi is a Provost's Postdoctoral Fellow at the Johns Hopkins University. He completed his Ph.D. in Computer Science at the Johns Hopkins University. Ehsan is passionate about the applications of technology in healthcare and surgery. His research focuses on mixed reality and medical robotics. He was named a Siebel Scholar.

He has developed novel display calibration methods and new user interaction modalities for head-mounted displays that improve surgical navigation and training of medical procedures. The work is covered in the Engineering Magazine as well as the other media. He also implemented techniques for robot-assisted cochlear implant placement, intraocular robotic snake, and needle steering. Before joining Johns Hopkins, he worked at Harvard Medical School where he innovated a method that improves the resolution and dynamic range of a medical imaging system.

Mr. Azimi holds multiple patents and his work has led to over 20 peer-reviewed articles in journals and conferences. He was awarded the Link Fellowship. Ehsan served as a mentor for several students and scholars in their projects and studies.

# 2021 Event Details



## Invited Speakers



**Dr. Manfred Lau**, Assistant Professor, City University of Hong Kong, China  
**Talk Title: Natural User Interfaces for 3D Modeling, Design, and Fabrication**

Manfred Lau is an Assistant Professor in the School of Creative Media at the City University of Hong Kong, China. He was previously a faculty member at Lancaster University in the UK, a visiting faculty at Yale University, and a post-doctoral researcher in Japan working with Prof. Takeo Igarashi. He received his Ph.D. degree in Computer Science from Carnegie Mellon University and his B.Sc. degree from Yale University. Manfred's research interests cover various areas including computer graphics, human-computer interaction, sketch-based interfaces and design, and 3D modeling and fabrication.

## Accepted Papers

IEEE ICIR Conference Proceedings can be accessed [here](#) on *IEEE Xplore*.

**Paper: *xR4DRAMA: Enhancing Situation Awareness using Immersive (XR) Technologies***

Spyridon Symeonidis, Sotiris Diplaris, Nicolaus Heise, Theodora Pistola, Athina Tsanousa, Georgios Tzanetis, Elissavet Batziou, Christos Stentoumis, Ilias Kalisperakis, Sebastian Freitag, Yash Shekhawat, Rita Paradiso, Maria Pacelli, Joan Codina, Simon Mille, Montserrat Marimon, Michele Ferri, Daniele Norbiato, Martina Monego, Anastasios Karakostas and Stefanos Vrochidis

**Paper: *Manipulating Avatars for Enhanced Communication in Extended Reality***

Jonathon Hart, Thammathip Piumsombon, Gun Lee, Ross Smith and Mark Billingham

**Paper: *Creating Immersive Experiences based on Intangible Cultural Heritage***

Theodora Pistola, Sotiris Diplaris, Christos Stentoumis, Evangelos Stathopoulos, Georgios Loupas, Theodore Mandilaras, Grigoris Kalantzis, Ilias Kalisperakis, Anastasios Tellios, Despoina Zavraka, Panagiota Koulali, Vera Kriez, Valia Vraka, Foteini Venieri, Stratos Bacalis and Stefanos Vrochidis

**Paper: *Augmented Reality Assisted Orbital Floor Reconstruction***

Yihao Liu, Ehsan Azimi, Nikhil Dave, Cecil Qiu, Robin Yang and Peter Kazanzides

**Paper: *Corner-based Square Fiducial Marker Detection for Hand-manipulated***

Breawn Schoun and Min-Hyung Choi

**Paper: *Building a Motion-Aware, Networked Do-It-Yourself Holographic Display***

Amilcar Gomez, Javier Talavera, Siem Sium, Biao Xie, Haikun Huang and Lap-Fal Yu

**Paper: *Interfacing Cyber and Physical Worlds: Introduction to IEEE 2888 Standards***

Kyoungro Yoon, Sang-Kyun Kim, Sangkwon Peter Jeong and Jeong-Hwan Choi

# 2021 Event Details



## Call for Papers/Areas of Interest

Researchers, industries, and standards experts were invited to submit their work on this new frontier of Intelligent Reality. Areas of interest included but were not limited to:

### 1. Intelligent Reality Science and Foundations

- Advanced Analytical Models
- Efficient neural network inference Engines, Transfer Learning
- Innovative Rendering Models
- Security, Privacy, Integrity, and Ethics
- Evaluation Metrics and Methodologies
- Novel Quality Models
- Quality of Experience
- New Standards

### 2. Intelligent Reality Technology and Infrastructure

- Neural Network Compression
- Point Cloud Compression
- Immersive Visual Media: Omidirectional, 360, 3DoF, 3DoF, 6DoF+, etc.
- Spatial Audio, 3D Surround Sounds
- Geometric Modeling and Design
- Media Coded Representation
- Interact Machine Learning between Virtual Objects and Real World
- Interoperability between Machine Learning, Virtual Objects, and Real World
- Sensor Fusion
- Visual Analytics
- Multimodel Interaction and Experience
- Rendering Techniques
- System Architectures, Design, and Deployment
- Energy-efficient Computing
- New Programming Models and Environments
- Software Techniques and Architectures

# 2021 Event Details



## 3. Hardware, Accelerators, Devices for Intelligent Reality

- AR Glasses, VR Headsets, other AR/VR Form-Factors, Smart Devices (
- Sensors technology in actuators, tactile, haptic, etc. for IR applications
- Network on Chip, System on Chip, Programmable Chip
- FPGA/CGRA/GPU/etc. accelerators for IR applications
- Operating system support and runtimes for hardware accelerators
- Programming models and platforms for accelerators
- Novel system organizations and designs
- Computation in memory/storage/network

## 4. Intelligent Reality Applications

- Arts, Games, Leisure, Sports, and Entertainment
- E-commerce, Retail, Real Estate
- 3D Model and Terrain Data/Tourism and Travel
- Interior Design, Landscaping & Urban Planning
- Telepresence, Teleoperation, collaboration, and social interactions
- Education, Simulation, and Training
- Healthcare, Medicine, Therapy
- Transportation, Automotive, Aerospace
- Geospatial
- Industrial, Military, Emergency Response
- Communication and Collaboration
- Manufacturing and Occupational Safety
- Advertising & Marketing
- Government, Public Sector and Society in General

## 5. Intelligent Reality Services

- Emergency
- Environmental
- Public Safety
- Health Care
- Public Transportation
- Travel and Booking
- Public Buildings (Repair & Maintenance)
- Social
- Urban Planning
- Professional
- Housing/Tourism

# 2021 Event Details



## 6. Intelligent Reality Management

- Content Creation, Authoring, and Management
- Analytics Services and Management
- Scalability and Efficiency between AI, Virtual Objects, and Real World
- Data Acquisition, Integration, Cleaning, and Best Practices
- Visualization Analytics
- Computational Modeling and Data Integration

## 7. Security, Ethics, Privacy, and Trust in Intelligent Reality

- Research in Security, Privacy, Integrity, and Ethics
- Techniques and Models for Fairness, Diversity, Transparency, and Interpretability
- Experimental Studies of Fairness, Diversity, Accountability, and Transparency
- User Impacts of Novel Attacks
- Trade-offs between Transparency and Privacy
- Intrusion, Anomaly, Threat Detection
- Multi-layer Defensive Frameworks
- Novel Threats, Attacks, Mitigations
- Trust Management

## 8. Social Connection and Concerns in Intelligent Reality

- User Behaviors and Psychology
- Groups and Communities Interaction
- User Safety for in Social Environments

## Paper Submission Guidelines

All submissions must be written in English, either in an MS Word format or in a Latex format, and must use standard IEEE two-column conference templates that can be downloaded from: <https://www.ieee.org/conferences/publishing/templates.html>. All papers must be submitted electronically.

Full papers should be a maximum of 8 pages long, and a minimum of 4 pages including tables, figures, and references. Accepted papers longer than 8 pages will be charged for each extra page @ \$100 per page. Full papers cannot be longer than 10 pages.

All submitted papers will be reviewed by three international program committees. IEEE takes the protection of intellectual property very seriously. All submissions will be screened for plagiarism using Cross Check. By submitting your work, you agree to allow IEEE to screen your work for plagiarism: <http://www.crossref.org/crosscheck/index.html>

# 2021 Event Details



## Author Mandatory Registration

At least one author of each accepted full paper is required to register to ICIR to have his/her paper published in the IEEE ICIR conference proceedings. The full paper must be presented at the conference by one author to be submitted for publication in IEEE Xplore.

## Competition

Technological integration of smart interactive devices, immersive technologies, and AI machine learning algorithms are the future of propelling Intelligent Reality (IR). We challenged developers to create AI machine learning IR applications to provide a real-time decision-making user experience with analytics capability for the immersive (VR/AR/MR/XR) environment.

Those interested in competing in ACIR were required to submit their work for evaluation. For IR application evaluation and consideration, at least one member of the team was required to register for the ICIR conference.

## Eligibility

The ACIR Competition was open to anyone interested in Intelligent Reality development. Two competition tracks were held:

- Professionals: researchers, hobbyists, or professionals.
- Students: from an accredited university

## Teams

You may register as a team (up to five persons per group) or as an individual.

## Instructions

IR Applications (developers and university students) submitted to the Competition were required to meet the following guidelines:

- Implementation needs to be original work (existing or new are acceptable)
- Includes AI machine learning techniques and run within VR/AR/MR
- Answered evaluation criteria using the given PPT presentation template
- Recorded a 5 to 7 minute video (mp4) to showcase key implementation features
- Granted IEEE to post presentation and video on IEEE ICIR website
- Students must have attended an accredited university (for students only)
- Detailed submission guidelines can be accessed [HERE](#). Access the PPT presentation template [HERE](#).

# 2021 Event Details



## Evaluation Criteria

- Originality: How unique and innovative is the idea?
- Implementation: What design methods and AI/ML techniques used, development platform, language, tools
- Potential Impact: How does the project contribute to the IR domain?

## Evaluation Team

- Isidoros Perikos, University of Patras, Greece
- Ryan McMahan, University of Central Florida, US
- Francesco Ferrise, Politecnico di Milano, Italy
- Wei-Chiang Hong, Oriental Institute of Technology, Taiwan
- Nicholas Napp, Xmark Labs, US
- Anitha Pillai, Hidustan University, India
- Cerasela Crisan, University of Bacau, Romania
- Stefania Serafin, Zuffo, Denmark
- Taehee Jeong, San Jose State University, US

## Awards (at the discretion of the Evaluation team)

### Professionals:

- 1st Place: up to \$1000 with 100 Ranking Points and IEEE certificate
- 2nd Place: up to \$500 with 50 Ranking Points and IEEE certificate
- 3rd Place: up to \$300 with 30 Ranking Points and IEEE certificate

All other submitters will receive 10 Ranking Points for participation

### Students:

- 1st Place: up to \$500 with 100 Ranking Points and IEEE certificate
- 2nd Place: up to \$300 with 50 Ranking Points and IEEE certificate
- 3rd Place: up to \$100 with 30 Ranking Points and IEEE certificate

All other submitters will receive 10 Ranking Points for participation

The final number of awards and the amount of each award will be based on the evaluation of the presentation and the recorded video. The final decision will be at the discretion of the ICIR and ACIR organizers.

Winners showcased their submitted videos were asked 3-4 questions during the award ceremony.



# 2021 Event Details



## ACIR Competition Results

We would like to thank all of those who participated in the 1st Annual Application Competition for Intelligent Reality (ACIR). We would like to extend a special congratulations to the winning teams: CYberVision, DCXR, and Interwoven Spaces.

### Student Tracks

#### CyberVision - Virtual Museum

- Aimilios Hadjiliasis, University of Central Lancashire (UCLan), Cyprus
- Floris Alexandrou, University of Central Lancashire (UCLan), Cyprus



#### DCXR – Do-It-Yourself Holographic Display

- Amilcar Gomez Samayoa, George Mason University
- Javier Talavera, George Mason University
- Siem G. Sium, George Mason University
- Biao Xie, George Mason University
- Haikun Huang, George Mason University
- Lap-Fai Yu, George Mason University



### Professional Track

#### Interwoven Spaces - Creating New Intelligent Digital Realities

- Dr. Lyuba Alboul, Sheffield Hallam University
- Dr. Louis Nisiotis, University of Central Lancashire, Cyprus Campus



# 2021 Event Details



## Organizing Committee

- General Chair: Wo Chang, *NIST, US*
- Organization Chair: Sin-Kuen Hawkins, *IEEE, US*
- Competition Chair: Louis Nisiotis, *University of Central Lancashire, Cyprus*
- Publication Chair: Elizabeth Chang, *University of Maryland, US*
- Communication Chair: Julie Bernicker, *IEEE, US*

## Technical Committee Co-Chairs Per Focus Area

Focus Area	Co-Chairs
IR Science and Foundations	<ul style="list-style-type: none"> <li>• Yu Kong, <i>Northeastern University, US</i></li> <li>• Suryanarayan Poonam, <i>Google, US</i></li> <li>• Kyoungro Yoo, <i>Konkuk University, Korea</i></li> </ul>
IR Technology and Infrastructure	<ul style="list-style-type: none"> <li>• Ashesh Aishwarya, <i>Adobe, US</i></li> <li>• Sang Kyun Kim, <i>Myoungil University., Korea</i></li> <li>• Anderson Maciel, <i>Federal University of Rio Grande do Sul, Brazil</i></li> </ul>
Hardware, Accelerators, and Devices for IR	<ul style="list-style-type: none"> <li>• Long Cheng, <i>Hitachi ABB Power Grids, US</i></li> <li>• Manfred Lau, <i>City University of Hong Kong, China</i></li> </ul>
IR Applications	<ul style="list-style-type: none"> <li>• Ehsan Azimi, <i>Johns Hopkins University, US</i></li> <li>• Doug Bowman, <i>Virginia Tech, US</i></li> <li>• Francesco Ferrise, <i>Politecnico di Milano, Italy</i></li> <li>• Hai-Ning Liang, <i>Xi'an Jiaotong-Liverpool University, China</i></li> </ul>
IR Services	<ul style="list-style-type: none"> <li>• Mark Clement, <i>Brigham Young University, US</i></li> <li>• Antonio Uva, <i>Polytechnic Institute of Bari, Italy</i></li> <li>• Xinyue Ye, <i>Texas A&amp;M University, US</i></li> </ul>
IR Management	<ul style="list-style-type: none"> <li>• Lyuba Alboul, <i>Sheffield Hallam University, UK</i></li> <li>• Gerard Kim, <i>Korea University, Korea</i></li> </ul>
Security, Ethics, Privacy, and Trust in IR	<ul style="list-style-type: none"> <li>• Frank Steinicke, <i>Universität Hamburg, Germany</i></li> <li>• Dongxiao Zhu, <i>Wayne State University, US</i></li> </ul>
Social Connections and Concerns in IR	<ul style="list-style-type: none"> <li>• Aniket Bera, <i>University of Maryland, US</i></li> <li>• Janki Dodiya, <i>IUBH Internationale Hochschule, Germany</i></li> </ul>

# 2021 Event Details



## Program Committee Members

Names and Affiliation	Country
Matt Adcock, <i>CSIRO</i>	Australia
Asesh Aishwarya, <i>Adobe</i>	US
Lyuba Alboul, <i>Sheffield Hallam University</i>	UK
Ehsan Azimi, <i>Johns Hopkins University</i>	US
Abdelhamid Bouchachia, <i>Bournemouth University</i>	UK
Wolfgang Broll, <i>Ilmenau University of Technology</i>	Germany
Gerd Bruder, <i>University of Central Florida</i>	US
Long Cheng, <i>Hitachi ABB Power Grids</i>	US
Gloria Cerasela Crisan, <i>University of Bacau</i>	Romania
Sauptik Dhar, <i>LG Electronics</i>	US
Janki Dodiya, <i>German Aerospace Centre</i>	Germany
Ralf Dörner, <i>RheinMain University of Applied Sciences</i>	Germany
Francesco Ferrise, <i>Politecnico di Milano</i>	Italy
Gary B. Glesener, <i>Virginia Technology</i>	US
Paul Grimm, <i>Fulda University of Applied Sciences</i>	Germany
Ioannis Hatzilygeroudis, <i>University of Patras</i>	Grece
Wei-Chiang Hong, <i>Jiangsu Normal University</i>	China
Jason Van Hulse, <i>Florida Atlantic University</i>	US
Taehee Jeong, <i>San Jose State University</i>	US
Ruoming Jin, <i>Kent State University</i>	US
Joaquim Jorge, <i>Instituto Superior Técnico</i>	Portugal
Sungchul Jung, <i>University of Canterbury New Zealand</i>	New Zealand
Latifur Khan, <i>The University of Texas at Dallas</i>	US
Yingjie Lao, <i>Clemson University</i>	US
Manfred Lau, <i>City University of Hong Kong</i>	China
Gun Lee, <i>University of South Australia</i>	Australia
Hai-Ning Liang, <i>Xi'an Jiaotong-Liverpool University</i>	China
Liang Liang, <i>University of Miami</i>	US
Li Liao, <i>University of Delaware</i>	US
Jean-Luc Lugrin, <i>University of Würzburg</i>	Germany
Ryan McMahan, <i>University of Central Florida</i>	US
Catarina Pinto Moreira, <i>Instituto Superior Técnico</i>	Portugal
Omar Niamut, <i>TNO</i>	Netherlands
Louis Nisiotis, <i>University of Central Lancashire</i>	Cyprus
Quang Vinh Ngyuen, <i>University of Western Sydney</i>	Australia
Mitsunori Ogihara, <i>University of Miami</i>	US
Vasile Palade, <i>Coventry University</i>	UK
Isidoros Perikos, <i>University of Patras</i>	Greece

# 2021 Event Details



## Program Committee Members

Names and Affiliation	Country
Anitha S. Pillai, <i>Hidustan University</i>	India
Kevin Ponto, <i>University of Wisconsin – Madison</i>	US
Suryanarayan Poonam, <i>Google</i>	US
Radu-Emil Precup, <i>Politehnica University of Timisoara</i>	Romania
Dirk Reiners, <i>University of Arkansas – Little Rock</i>	US
Aradhya Saini, <i>Indian Institute of Technology Roorkee</i>	India
Myriam Servières, <i>Centrale Nantes</i>	France
Jungpil Shin, <i>The University of Aizu</i>	Japan
Alexandre Gomes de Siqueira, <i>Florida University</i>	US
Tom Vierjahn, <i>Westphalian University of Applied Sciences</i>	Germany
Benjamin Weyers, <i>Trier University</i>	Germany
Xinyue Ye, <i>NJIT</i>	US
Ghada Zazmi, <i>National Institutes of Health</i>	US
Dongxiao Zhu, <i>Wayne State University</i>	US
Lyudmila Zinchenko, <i>BMSTU</i>	Russia
Marcelo Zuffo, <i>Universidade de São Paulo</i>	Brazil