

2017 3DTV Conference: The True Vision – Capture, Transmission and Display of 3D Video (3DTV-CON 2017)

**Copenhagen, Denmark
7-9 June 2017**



**IEEE Catalog Number: CFP1755B-POD
ISBN: 978-1-5386-1636-9**

**Copyright © 2017 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP1755B-POD
ISBN (Print-On-Demand):	978-1-5386-1636-9
ISBN (Online):	978-1-5386-1635-2
ISSN:	2161-2021

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com



Date: Wednesday, 07/Jun/2017

8:00am - 6:00pm seminar room 1.001 (Gæstekantinen)	Registration desk
9:00am - 9:15am seminar room 1.001 (Gæstekantinen)	Opening
9:15am - 10:15am seminar room 1.001 (Gæstekantinen)	Keynote 1: 3D Imaging for Research and Industry - from lab to large scale facilities N/A by Camilla Trinderup, PhD, The Imaging Center at DTU - http://www.imaging.dtu.dk/
10:15am - 10:30am seminar room 1.001 (Gæstekantinen)	Coffee break
10:30am - 12:30pm seminar room 1.001 (Gæstekantinen)	Session 1: Acquisition systems and coding
12:30pm - 1:30pm (AAU kantinen)	Lunch@ AAU canteen
1:30pm - 3:30pm seminar room 1.001 (Gæstekantinen)	Session 2: 3D displays and visualization
3:30pm - 3:45pm seminar room 1.001 (Gæstekantinen)	Coffee break
3:45pm - 5:45pm seminar room 1.001 (Gæstekantinen)	Session 3: Evaluating of 3D media
6:00pm - 7:00pm (AAU kantinen)	Welcome reception: AAU Copenhagen campus, AC Meyers 15, 2450 Copenhagen (same to conference venue)

Date: Thursday, 08/Jun/2017

8:00am - 5:00pm seminar room 1.001 (Gæstekantinen)	Registration desk
9:15am - 10:15am seminar room 1.001 (Gæstekantinen)	Keynote 2: Why 3D movies are so painful N/A by Dmitriy S. Vatolin, Graphics and Media Lab (GML) Department of Computational Mathematics and Cybernetics of M.V. Lomonosov Moscow State University - http://graphics.cs.msu.ru/en/people/staff/dvatolin
10:15am - 10:30am seminar room 1.001 (Gæstekantinen)	Coffee break
10:30am - 12:30pm seminar room 1.001 (Gæstekantinen)	Session 4: 3D Applications and services
12:30pm - 1:30pm (AAU kantinen)	Lunch @ AAU canteen
1:30pm - 3:30pm seminar room 1.001 (Gæstekantinen)	Session 5: 3D in VR
3:30pm - 3:45pm	Coffee break



seminar room 1.001 (Gæstekantinen)	
3:45pm - 5:00pm	Round Table: The future of 3D - What is next? N/A Open Discussion on the future of 3D Media: New directions and applications.
seminar room 1.001 (Gæstekantinen)	
7:00pm - 9:00pm (Cock's & Cows SP34)	Conference Dinner: Cock's & Cows SP34, Sankt Peders Stræde 38, 1455 Copenhagen (roof garden of Hotel SP34)
Date: Friday, 09/Jun/2017	
9:00am - 2:00pm	Registration desk
seminar room 1.001 (Gæstekantinen)	
9:15am - 10:15am	Keynote 3: Creating and Accessing 3D Content N/A by Dr. Henrik Aanaes, associate professor in computer vision at the Technical University of Denmark - http://people.compute.dtu.dk/aanes/
seminar room 1.001 (Gæstekantinen)	
10:15am - 10:30am	Coffee break
seminar room 1.001 (Gæstekantinen)	
10:30am - 12:30pm	Session 6: 3D sensors and depth cameras
seminar room 1.001 (Gæstekantinen)	
12:30pm - 12:40pm	Closing
seminar room 1.001 (Gæstekantinen)	

Presentations

Session 1: Acquisition systems and coding

Time: Wednesday, 07/Jun/2017: 10:30am - 12:30pm

Location: seminar room 1.001 (Gæstekantinen)

Session Chairs: [Gerasimos Arvanitis](#), [Hu Tian](#)

Acquisition system for dense lightfield of large scenes 45

Matthias Ziegler, Ron op het Veld, Joachim Keinert, Frederik Zilly
Fraunhofer IIS, Germany; matthias.ziegler@iis.fraunhofer.de

Robust disparity estimation on sparse sampled light field images 21

Yan Li, Gauthier Lafruit
Université Libre de Bruxelles, Belgium; yali@ulb.ac.be

Mixed-resolution HEVC based multiview video codec 37

Bruhanth Mallik, Akbar Sheikh Akbari, Ah-Lian Kor
Leeds Beckett University, United Kingdom; b.mallik6347@student.leedsbeckett.ac.uk

Lossless compression of subaperture images using context modeling 77

Ionut Schiopu¹, Moncef Gabbouj¹, Atanas Gotchev¹, Miska M. Hannuksela²
¹Tampere University of Technology, Finland; ²Nokia Technologies, Finland; ionut.schiopu@tut.fi

Simulation of Microlens Array Based Plenoptic Capture Utilizing Densely Sampled Light Field N/A

Ugur Akpınar, Erdem Sahin, Atanas Gotchev
Tampere University of Technology; atanas.gotchev@tut.fi



Session 2: 3D displays and visualization

Time: Wednesday, 07/Jun/2017: 1:30pm - 3:30pm

Location: seminar room 1.001 (Gæstekantinen)

Session Chairs: [Itaru Kitahara](#), [Atanas Gotchev](#)

Extreme field-of-view for head-mounted displays 9

Ismo Rakkolainen¹, Roope Raisamo¹, Matthew Turk², Tobias Höllerer², Karri Palovuori³

¹University of Tampere; ²University of California, Santa Barbara; ³Tampere University of Technology; ismo.rakkolainen@uta.fi

Color Moiré reduction and resolution enhancement technique for integral three-dimensional display 57

Hisayuki Sasaki, Naoto Okaichi, Hayato Watanabe, Masanori Kano, Masahiro Kawakita, Tomoyuki Mishina

Japan Broadcasting Corporation (NHK), Japan; sasaki.h-ey@nhk.or.jp

Automatic 2D to Stereoscopic Video Conversion for 3D TVs 89

Xichen Zhou, Bipin C. Desai, Charalambos Poullis

Concordia University, Canada; charalambos@poullis.org

Weighted regularized laplacian interpolation for consolidation of highly-incomplete time varying point clouds 29

Gerasimos Arvanitis, Aris Lalos, Konstantinos Moustakas, Nikos Fakotakis

University of Patras, Greece; arvanitis@ece.upatras.gr

Accurate multi-view stereo by selective expansion 49

Hu Tian, Fei Li

Fujitsu Research&Development Center Co., Ltd., China, People's Republic of; tianhu@cn.fujitsu.com

Session 3: Evaluation of 3D media

Time: Wednesday, 07/Jun/2017: 3:45pm - 5:45pm

Location: seminar room 1.001 (Gæstekantinen)

Session Chairs: [Ismo Rakkolainen](#), [Matthias Ziegler](#)

Automatic Subjective Quality Estimation of 3D Stereoscopic Videos: NR-RR Approach 61

Hossein Malekmohamadi

De Montfort University, United Kingdom; hossein.malekmohamadi@dmu.ac.uk

A depth perception evaluation metric for immersive 3D video services 93

Gokce Nur Yilmaz

Kirikkale University, Turkey; nur.gkc@gmail.com

Read-the-game skill evaluation by analyzing head orientation in immersive VR 113

César Daniel Rojas Ferrer¹, Itaru Kitahara², Yoshinari Kameda²

¹Graduate School of Systems and Information Engineering, University of Tsukuba; ²Center for Computational Sciences, University of Tsukuba; s1620853@u.tsukuba.ac.jp

Viewport-dependent delivery schemes for stereoscopic panoramic video 25

Ramin Ghaznavi-Youvalari¹, Miska Hannuksela¹, Alireza Aminlou¹, Moncef Gabbouj²

¹Nokia Technologies, Finland; ²Tampere University of Technology; ramin.ghaznavi-youvalari@nokia.com

Smoothly Switching Method of Asynchronous Multi-View Videos Using Frame Interpolation 13

Hidehiko Shishido, Aoi Harazaki, Yoshinari Kameda, Itaru Kitahara

University of Tsukuba, Japan; s1330212@gmail.com



Session 4: 3D Applications and services

Time: Thursday, 08/Jun/2017: 10:30am - 12:30pm

Location: seminar room 1.001 (Gæstekantinen)

Software tools for analysis and visualization of the Antikythera mechanism 109

Eleftherios Anastasovitis^{2,1}, Manos Roumeliotis²

¹Centre for Research and Technology Hellas, Greece; ²University of Macedonia, Greece; manos@uom.gr

Physical Forces Aware Aging Simulation on Cultural Heritage Artifacts 81

Evdoxia Taka, Konstantinos Papachristou, Anastasios Drosou, Nikolaos Dimitriou, Dimitrios Tzovaras

CERTH/ITI, Greece; kostas.papachristou@iti.gr

Caravaggio in Rome: a QoE-based proposal for a Virtual Gallery 17

Chiara Di Stefano, Federica Battisti

Roma Tre University, Italy; federica.battisti@uniroma3.it

DIGIART: building new 3D cultural heritage worlds 105

Eleftherios Anastasovitis, Dimitrios Ververidis, Spiros Nikolopoulos, Ioannis Kompatsiaris

Centre for Research and Technology Hellas, Greece; anastasovitis@iti.gr

Collaborative 3D Accessories Customization and Trading through Web Interface 41

Chin Pok Hui¹, Wai-Man Pang¹, Vane-Ing Tian²

¹Caritas Institute of Higher Education, Hong Kong S.A.R. (China); ²The Open University of Hong Kong; wmpang@ieee.org

Session 5: 3D in VR

Time: Thursday, 08/Jun/2017: 1:30pm - 3:30pm

Location: seminar room 1.001 (Gæstekantinen)

Design of an Annotation System for taking notes in Virtual Reality 53

Damien Clergeaud^{1,2}, Pascal Guitton^{2,1}

¹INRIA, France; ²Université de Bordeaux, France; damien.clergeaud@inria.fr

Visual realism and presence in a virtual reality game 117

Jonatan Hvass, Oliver Larsen, Kasper Vendelbo, Niels Nilsson, Rolf Nordahl, Stefania Serafin

Aalborg University Copenhagen, Denmark; ncn@create.aau.dk

Wireless Controller for Interactive Virtual Reality Games 74

Seyedmahdi Kazempourradi, Seyfettin Onurhan Ozturk, Murat Berke Erdemli, Burak Gulerce, Mahmut Sami Yazici, Levent

Ozmen, Can Hakan Dagidir, Sidem Isil Tuncer, Erdem Ulusoy, Hakan Urey

Koc University, Electrical Engineering Department, Optical Microsystems Laboratory, Turkey; mkazempour14@ku.edu.tr

Body-part tracking from partial-view depth data 70

Manolis Vasileiadis, Dimitris Giakoumis, Sotiris Malassiotis, Ioannis Kostavelis, Dimitrios Tzovaras

Information Technologies Institute, Centre for Research and Technology Hellas, Greece; tzovaras@iti.gr

A Client-Server Architecture for Real-time View-Dependent Streaming of Free-Viewpoint Video 97

Jonas Scheer¹, Carlos Fernández de Tejada Quemada¹, Oliver Grau²

¹Saarland University, Intel Visual Computing Institute; ²Intel; jonas.scheer@intel-vci.uni-saarland.de



Session 6: 3D sensors and depth cameras

Time: Friday, 09/Jun/2017: 10:30am - 1:15pm

Location: seminar room 1.001 (Gæstekantinen)

The use of advanced imaging technology in welfare technology solutions – some ethical aspects 5

Kari K. Lilja^{1,2}, Jari Palomäki¹

¹Tampere University of Technology, Finland; ²Satakunta University of Applied Sciences; kari.lilja@kolumbus.fi

SpAtIAL: A Sensor based Framework to Support Affective Learning 85

Anastasios Karakostas, Dimitrios Ververidis, Spiros Nikolopoulos, Ioannis Kompatsiaris

Centre for Research and Technology Hellas, Greece; akarakos@iti.gr

Detecting walkable plane areas by using rgb-d camera and accelerometer for visually impaired people 101

Kenta Imai¹, Itaru Kitahara², Yoshinari Kameda²

¹Graduate School of Systems and Information Engineering, University of Tsukuba; ²Center for Computational Sciences, University of Tsukuba; s1620749@u.tsukuba.ac.jp

Adaptive Filter for Denoising 3D Data captured Depth Sensors 1

Somar Boubou, Tatsuo Narikiyo, Michihiro Kawanishi

Toyota Technological Institute, Japan; somar.boubou@gmail.com

Stereo Camera Upgraded to Equal Baseline Multiple Camera Set (EBMCS) 33

Adam L. Kaczmarek

Gdansk University of Technology, Faculty of Electronics, Telecommunications and Informatics, Poland;

adam.l.kaczmarek@eti.pg.gda.pl

Additional Paper

Low Cost Embedded Vision System For Location and Tracking of a Color Object 65

Diego Ayala, Danilo Chavez

Escuela Politecnica Nacional