Communications in Computer and Information Science

Commenced Publication in 2007
Founding and Former Series Editors:
Phoebe Chen, Alfredo Cuzzocrea, Xiaoyong Du, Orhun Kara, Ting Liu,
Krishna M. Sivalingam, Dominik Ślęzak, Takashi Washio, Xiaokang Yang,
and Junsong Yuan

Editorial Board Members

Simone Diniz Junqueira Barbosa
Pontifical Catholic University of Rio de Janeiro (PUC-Rio),
Rio de Janeiro, Brazil

Joaquim Filipe
Polytechnic Institute of Setúbal, Setúbal, Portugal

Ashish Ghosh
Indian Statistical Institute, Kolkata, India

Igor Kotenko
St. Petersburg Institute for Informatics and Automation of the Russian
Academy of Sciences, St. Petersburg, Russia

Lizhu Zhou
Tsinghua University, Beijing, China
More information about this series at http://www.springer.com/series/7899
<table>
<thead>
<tr>
<th>Editors</th>
<th>University of Lisbon</th>
<th>Lisbon, Portugal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ana Paula Cláudio</td>
<td>Kadi Bouatouch</td>
<td>Rennes, France</td>
</tr>
<tr>
<td>University of Genoa</td>
<td>Alexis Paljic</td>
<td>Mines ParisTech</td>
</tr>
<tr>
<td>Genoa, Italy</td>
<td>Paris, France</td>
<td></td>
</tr>
<tr>
<td>Andreas Kerren</td>
<td>Christophe Hurter</td>
<td>French Civil Aviation</td>
</tr>
<tr>
<td>Linnaeus University</td>
<td></td>
<td>University (ENAC)</td>
</tr>
<tr>
<td>Växjö, Sweden</td>
<td>Toulouse, France</td>
<td></td>
</tr>
<tr>
<td>Alain Tremeau</td>
<td>Giovanni Maria Farinella</td>
<td>University of Catania</td>
</tr>
<tr>
<td>University Jean Monnet</td>
<td></td>
<td>Catania, Italy</td>
</tr>
<tr>
<td>Saint-Etienne, France</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ISSN 1865-0929  ISSN 1865-0937 (electronic)
Communications in Computer and Information Science
https://doi.org/10.1007/978-3-030-41590-7

© Springer Nature Switzerland AG 2020
This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.
The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.
The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland
Preface


The purpose of VISIGRAPP is to bring together researchers and practitioners interested in both theoretical advances and applications of Computer Vision, Computer Graphics, Information Visualization, and Human-Computer Interaction. VISIGRAPP is composed of four co-located conferences, each specialized in at least one of the aforementioned main knowledge areas.

VISIGRAPP 2019 received 396 paper submissions from 49 countries, of which 6% were included in this book. The papers were selected by the event chairs and their selection was based on a number of criteria that included the classifications and comments provided by the Program Committee members, the session chairs’ assessment, and also the program chairs’ global view of all papers included in the technical program. The authors of selected papers were then invited to submit a revised and extended version of their papers, having at least 30% innovative material.

The papers selected to be included in this book contribute to the understanding of relevant trends of current research on Computer Vision, Imaging, and Computer Graphics Theory and Applications, including: network visualization, visual data analysis and knowledge discovery, volume rendering, visualization applications and technologies, 3D reconstruction and animation, virtual and augmented reality, image and video understanding, deep learning, first person (egocentric) vision, multi-modal, human-computer interaction, and user evaluation.

We would like to thank all the authors for their contributions and also the reviewers who helped ensure the quality of this publication.

February 2019

Ana Paula Cláudio
Kadi Bouatouch
Manuela Chessa
Alexis Paljic
Andreas Kerren
Christophe Hurter
Alain Tremeau
Giovanni Maria Farinella
Organization

Conference Chair
José Braz Escola Superior de Tecnologia de Setúbal, Portugal

Program Co-chairs

GRAPP
Ana Paula Cláudio BioISI, Universidade de Lisboa, Portugal
Kadi Bouatouch IRISA, University of Rennes 1, France

HUCAPP
Manuela Chessa University of Genoa, Italy
Alexis Paljic Mines Paristech, France

IVAPP
Andreas Kerren Linnaeus University, Sweden
Christophe Hurter French Civil Aviation University (ENAC), France

VISAPP
Alain Tremeau Université Jean Monnet, France
Giovanni Maria Farinella Università di Catania, Italy

GRAPP Program Committee
Francisco Abad Universidad Politécnica de Valencia, Spain
Marco Agus King Abdullah University of Science and Technology, Saudi Arabia
Lilian Aveneau University of Poitiers, France
Gérard Bailly GIPSA-Lab, Université Grenoble Alpes, CNRS, France
Maria Beatriz Carmo Universidade de Lisboa, Portugal
Gonzalo Besuiovsky Universitat de Girona, Spain
Carla Binucci Università degli Studi di Perugia, Italy
Venceslas Biri University of Paris-Est, France
Fernando Birra UNL, Portugal
Kristopher Blom Virtual Human Technologies, Czech Republic
Stephen Brooks Dalhousie University, Canada
Dimitri Bulatov Fraunhofer IOSB, Germany
Patrick Callet Centre Français de la Couleur, France
L. G. Casado University of Almeria, Spain
Eva Cerezo, University of Zaragoza, Spain
Teresa Chambel Lasige, University of Lisbon, Portugal
Parag Chaudhuri, Indian Institute of Technology Bombay, India
Hwan-gue Cho, Pusan National University, South Korea
Teodor Cioaca, AID GmbH, Germany
António Coelho, Universidade do Porto, Portugal
Sabine Coquillart, Inria, France
Vasco Costa, INESC-ID, Portugal
Rémi Cozot, LISIC, University of Littoral, France
Luiz Henrique de Figueiredo, IMPA, Brazil
Bailin Deng, Cardiff University, UK
Paulo Dias, Universidade de Aveiro, Portugal
John Dingliana, Trinity College Dublin, Ireland
Jean-Michel Dischler, Université de Strasbourg, France
Anastasios Drosou, Centre for Research and Technology, Hellas, Greece
Thierry Duval, IMT Atlantique, France
Elmar Eisemann, Delft University of Technology, The Netherlands
Marius Erdt, Fraunhofer IDM@NTU, Singapore
Petros Faloutsos, University of California, Los Angeles, USA
Jean-Philippe Farrugia, LIRIS Lab, France
Pierre-Alain Fayolle, University of Aizu, Japan
Francisco R. Feito, University of Jaén, Spain
Dirk Feldmann, University of Münster, Germany
Jie Feng, Peking University, China
Jie-Qing Feng, State Key Lab of CAD&CG, Zhejiang University, China
Leandro Fernandes, Universidade Federal Fluminense, Brazil
Carla Freitas, Universidade Federal do Rio Grande do Sul, Brazil
Ioannis Fudos, University of Ioannina, Greece
Alejandro García-Alonso, University of the Basque Country, Spain
Miguel Gea, University of Granada, Spain
Djamchid Ghazanfarpour, Xlim Laboratory (UMR CNRS 7252), University of Limoges, France
Enrico Gobbetti, CRS4, Italy
Stephane Gobron, HES-SO, Arc, Switzerland
Alexandrino Gonçalves, Polytechnic Institute of Leiria, Portugal
Marcelo Guimarães, Federal University of São Paulo, Brazil
James Hahn, George Washington University, USA
Vlastimil Havran, Czech Technical University in Prague, Czech Republic
Nancy Hitschfeld, University of Chile, Chile
Ludovic Hoyet, Inria Rennes, Centre Bretagne Atlantique, France
Andres Iglesias, University of Cantabria, Spain
Juan José Jiménez-Delgado, Universidad de Jaen, Spain
Xiaogang Jin, Zhejiang University, China
Robert Joan-Arinyo, Universitat Politecnica de Catalunya, Spain
Luís Romero  Instituto Politecnico de Viana do Castelo, Portugal
Isaac Rudomin  BSC, Spain
Wang Rui  Zhejiang University, China
Beatriz Santos  University of Aveiro, Portugal
Basile Sauvage  University of Strasbourg, France
Vladimir Savchenko  Hose University, Japan
Rafael J. Segura  Universidad de Jaen, Spain
Ari Shapiro  University of Southern California, USA
Frutuoso Silva  University of Beira Interior, Portugal
A. Augusto Sousa  FEUP/INESC TEC, Portugal
Jie Tang  Nanjing University, China
Gabriel Taubin  Brown University, USA
Matthias Teschner  University of Freiburg, Germany
Daniel Thalmann  École Polytechnique Fédérale de Lausanne, Switzerland
Juan Carlos Torres  Universidad de Granada, Spain
Alain Tremeau  Université Jean Monnet, France
Torsten Ullrich  Fraunhofer Austria Research GmbH, Austria
Kuwait University  Kuwait University, Kuwait
Anna Ursyn  University of Northern Colorado, USA
Cesare Valenti  Università degli Studi di Palermo, Italy
Thales Vieira  Universidade Federal de Alagoas, Brazil
Andreas Weber  University of Bonn, Germany
Burkhard Wünsche  University of Auckland, New Zealand
Ling Xu  University of Houston-Downtown, USA
Lihua You  Bournemouth University, UK
Jian Zhang  Bournemouth University, UK

GRAPP Additional Reviewers

Simone Balocco  University of Barcelona, Spain
Renan Bela  PUC-Rio, Brazil
Ehtzaz Chaudhry  Bournemouth University, UK
Joao Marcos da Costa  PUC-Rio, Brazil
Andrea Lins  PUC-Rio, Brazil
Franziska Lippoldt  Fraunhofer Singapore, Singapore
Francisco Daniel  University of Jaén, Spain
Pérez Cano
Meili Wang  Northwest A&F University, China

HUCAPP Program Committee

Andrea Abate  University of Salerno, Italy
Leena Arhippainen  University of Oulu, Finland
Mirjam Augstein  University of Applied Sciences Upper Austria, Austria
Federica Bazzano  Politecnico di Torino, Italy
<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daniel Thalmann</td>
<td>École Polytechnique Fédérale de Lausanne, Switzerland</td>
</tr>
<tr>
<td>Godfried Toussaint</td>
<td>New York University Abu Dhabi, UAE</td>
</tr>
<tr>
<td>Pauliina Tuomi</td>
<td>Tampere University of Technology, Finland</td>
</tr>
<tr>
<td>Kostas Vlachos</td>
<td>University of Ioannina, Greece</td>
</tr>
<tr>
<td>Gualtiero Volpe</td>
<td>Università degli Studi di Genova, Italy</td>
</tr>
</tbody>
</table>

**IVAPP Program Committee**

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vladan Babovic</td>
<td>National University of Singapore, Singapore</td>
</tr>
<tr>
<td>Juhee Bae</td>
<td>University of Skovde, Sweden</td>
</tr>
<tr>
<td>Maria Beatriz Carmo</td>
<td>Universidade de Lisboa, Portugal</td>
</tr>
<tr>
<td>Till Bergmann</td>
<td>Max Planck Society, Germany</td>
</tr>
<tr>
<td>David Borland</td>
<td>University of North Carolina at Chapel Hill, USA</td>
</tr>
<tr>
<td>Massimo Brescia</td>
<td>Istituto Nazionale di AstroFisica, Italy</td>
</tr>
<tr>
<td>Ross Brown</td>
<td>Queensland University of Technology, Australia</td>
</tr>
<tr>
<td>Guoning Chen</td>
<td>University of Houston, USA</td>
</tr>
<tr>
<td>Yongwan Chun</td>
<td>University of Texas at Dallas, USA</td>
</tr>
<tr>
<td>António Coelho</td>
<td>INESC-TEC, Universidade do Porto, Portugal</td>
</tr>
<tr>
<td>Danilo B. Coimbra</td>
<td>Federal University of Bahia, Brazil</td>
</tr>
<tr>
<td>Christoph Dalitz</td>
<td>Niederrhein University of Applied Sciences, Germany</td>
</tr>
<tr>
<td>Mihaela Dinsoreanu</td>
<td>Technical University of Cluj-Napoca, Romania</td>
</tr>
<tr>
<td>Georgios Dounias</td>
<td>University of the Aegean, Greece</td>
</tr>
<tr>
<td>Achim Ebert</td>
<td>University of Kaiserslautern, Germany</td>
</tr>
<tr>
<td>Danilo Eler</td>
<td>São Paulo State University, Brazil</td>
</tr>
<tr>
<td>Maria Ferreira de Oliveira</td>
<td>University of São Paulo, ICMC, Brazil</td>
</tr>
<tr>
<td>Chi-Wing Fu</td>
<td>The Chinese University of Hong Kong, Hong Kong</td>
</tr>
<tr>
<td>Mohammad Ghoniem</td>
<td>Luxembourg Institute of Science and Technology, Luxembourg</td>
</tr>
<tr>
<td>Randy Goebel</td>
<td>University of Alberta, Canada</td>
</tr>
<tr>
<td>Martin Graham</td>
<td>University of Edinburgh, UK</td>
</tr>
<tr>
<td>Naemul Hassan</td>
<td>University of Mississippi, USA</td>
</tr>
<tr>
<td>Torsten Hopp</td>
<td>Karlsruhe Institute of Technology, Germany</td>
</tr>
<tr>
<td>Jie Hua</td>
<td>University of Technology Sydney, Australia</td>
</tr>
<tr>
<td>Jusufi Ilir</td>
<td>Linnaeus University, Sweden</td>
</tr>
<tr>
<td>Stefan Jänicke</td>
<td>University of Southern Denmark, Denmark</td>
</tr>
<tr>
<td>Mark Jones</td>
<td>Swansea University, UK</td>
</tr>
<tr>
<td>Bijaya Karki</td>
<td>Louisiana State University, USA</td>
</tr>
<tr>
<td>Jörn Kohlhammer</td>
<td>Fraunhofer Institute for Computer Graphics Research, Germany</td>
</tr>
<tr>
<td>Martin Kraus</td>
<td>Aalborg University, Denmark</td>
</tr>
<tr>
<td>Haim Levkowitz</td>
<td>University of Massachusetts Lowell, USA</td>
</tr>
<tr>
<td>Chun-Cheng Lin</td>
<td>National Chiao Tung University, Taiwan, China</td>
</tr>
<tr>
<td>Giuseppe Liotta</td>
<td>University of Perugia, Italy</td>
</tr>
<tr>
<td>Rafael Martins</td>
<td>Linnaeus University, Sweden</td>
</tr>
<tr>
<td>Krešimir Matkovic</td>
<td>VRVis Research Center, Austria</td>
</tr>
</tbody>
</table>
Kazuo Misue University of Tsukuba, Japan
Steffen Oeltze-Jafra Otto-von-Guericke-Universität Magdeburg, Germany
Benoît Otjacques Luxembourg Institute of Science and Technology (LIST), Luxembourg
Jinah Park KAIST, South Korea
Fernando Paulovich Dalhousie University, Canada
Torsten Reiners Curtin University, Australia
Philip Rhodes University of Mississippi, USA
Patrick Riehmann Bauhaus-Universität Weimar, Germany
Maria Riveiro University of Skövde, Sweden
Adrian Rusu Fairfield University, USA
Filip Sadlo Heidelberg University, Germany
Beatriz Santos University of Aveiro, Portugal
Giuseppe Santucci University of Roma, Italy
Angel Sappa ESPOL Polytechnic University, Ecuador, and Computer Vision Center, Spain
Falk Schreiber University of Konstanz, Germany, and Monash University, Australia
Hans-Jörg Schulz Aarhus University, Denmark
Celmar Silva University of Campinas, Brazil
Juergen Symanzik Utah State University, USA
Sidharth Thakur Renaissance Computing Institute (RENCI), USA
Roberto Theron Universidad de Salamanca, Spain
Günter Wallner University of Applied Arts Vienna, Austria
Jinrong Xie eBay Inc., USA
Anders Ynnerman Linköping University, Sweden
Hongfeng Yu University of Nebraska-Lincoln, USA
Lina Yu Intel Corporation, USA
Jianping Zeng Microsoft, USA
Yue Zhang Oregon State University, USA
Jianmin Zheng Nanyang Technological University, Singapore

IVAPP Additional Reviewers

Aris Alisandrakis Linnaeus University, Sweden
Xiaopei Liu ShanghaiTech University, China
Benjamin Mora Swansea University, UK
Wei Zeng Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China

VISAPP Program Committee

Amr Abdel-Dayem Laurentian University, Canada
Ilya Afanasyev Innopolis University, Russia
Palwasha Afsar Algorithmi Research Center, Uminho, Portugal
Sos Agaian
College of Staten Island and the Graduate Center, CUNY, USA

Vicente Alarcon-Aquino
Universidad de las Americas Puebla, Mexico

Mokhled Al-Tarawneh
Mu’taf University, Jordan

Hugo Alvarez
Vicomtech, Spain

Djamila Aouada
University of Luxembourg, Luxembourg

Karm Veer Arya
ABV - Indian Institute of Information Technology and Management

George Azzopardi
University of Groningen, The Netherlands, and University of Malta, Malta

Hichem Bannour
Pandora Media, USA

Giuseppe Baruffa
University of Perugia, Italy

Ardhendu Behera
Edge Hill University, UK

Fabio Bellavia
Università degli Studi di Firenze, Italy

Olga Bellon
IMAGO Research Group, Universidade Federal do Paraná, Brazil

Jenny Benois-Pineau
LABRI, University of Bordeaux, France

Neil Bergmann
The University of Queensland, Australia

Adrian Bors
University of York, UK

Marius Brezovan
University of Craiova, Romania

Alfred Bruckstein
Technion, Israel

Arcangelo Bruna
STMicroelectronics, Italy

Vittoria Bruni
University of Rome La Sapienza, Italy

Xianbin Cao
Beihang University, China

Alice Caplier
GIPSA-lab, France

Franco Alberto Cardillo
CNR, Italy

M. Emre Celebi
University of Central Arkansas, USA

Satish Chand
Netaji Subhas Institute of Technology and Jawaharlal Nehru University Delhi, India

Chin-Chen Chang
Feng Chia University, Taiwan, China

Jocelyn Chanussot
Grenoble Institute of Technology, France

Samuel Cheng
University of Oklahoma, USA

Manuela Chessa
University of Genoa, Italy

Chia Chong
Sunway University, Malaysia

Chien-Hsing Chou
Tamkang University, Taiwan, China

Laurent Chou
Université Paris Dauphine, France

Sara Colantonio
ISTI-CNR, Italy

Richard Connor
University of Strathclyde, UK

Donatello Conte
Université de Tours, France

António Cunha
Universidade de Trás-os-Montes e Alto Douro (UTAD), Portugal

Christoph Dalitz
Niederrhein University of Applied Sciences, Germany

Kenneth Dawson-Howe
Trinity College Dublin, Ireland

Anselmo Cardoso de Paiva
Universidade Federal do Maranhao, Brazil

Joachim Denzler
Friedrich Schiller University of Jena, Germany

Thomas Deserno
Technische Universität Braunschweig, Germany
Sotirios Diamantas Tarleton State University, Texas A&M System, USA
Ernst Dickmanns UniBw Munich, Germany
Yago Diez Yamagata University, Japan
Mariella Dimiccoli Insitut de Robòtica i Informàtica Industrial (CSIC-UPC), Spain
Jana Dittmann Otto-von-Guericke-Universität Magdeburg, Germany
Aijuan Dong Hood College, USA
Ulrich Engelke CSIRO, Australia
Shu-Kai Fan National Taipei University of Technology, Taiwan, China
Giovanni Maria Farinella Università di Catania, Italy
Jean-Baptiste Fasquel University of Angers, France
Jorge Fernández-Berni CSIC, Universidad de Sevilla, Spain
Gernot Fink TU Dortmund, Germany
David Fofi ImViA, France
Gian Foresti University of Udine, Italy
Mohamed Fouad Military Technical College, Egypt
Antonino Furnari University of Catania, Italy
Claudio Gennaro CNR, Italy
Przemyslaw Glomb IITiS PAN, Poland
Seichi Gohshi Kogakuin University, Japan
Luiz Goncalves Federal University of Rio Grande do Norte, Brazil
Manuel González-Hidalgo Balearic Islands University, Spain
Levente Hajder Eötvös Loránd University, Hungary
Xiyi Hang California State University, USA
Daniel Harari Weizmann Institute of Science, Israel
Walid Hariri ETIS ENSEA, Université de Cergy-Pontoise, France
Aymeric Histace ETIS UMR CNRS 8051, France
Wladyslaw Homenda Warsaw University of Technology, Poland
Fay Huang National Ilan University, Taiwan, China
Hui-Yu Huang National Formosa University, Taiwan, China
Laura Igual Universitat de Barcelona, Spain
Francisco Imai Apple Inc., USA
Jiri Jan University of Technology Brno, Czech Republic
Tatiana Jaworska Polish Academy of Sciences, Poland
Xiaoyi Jiang University of Münster, Germany
Luis Jiménez Linares University of Castilla-La Mancha, Spain
Zhong Jin Nanjing University of Science and Technology, China
Leo Jorksowicz The Hebrew University of Jerusalem, Israel
Paris Kaimakis University of Central Lancashire, Cyprus
Martin Kampel Vienna University of Technology, Austria
Etienne Kerre Ghent University, Belgium
Anastasios Kesidis National Center for Scientific Research, Greece
Nahum Kiryati Tel Aviv University, Israel
Constantine Kotropoulos Aristotle University of Thessaloniki, Greece
Arjan Kuijper Fraunhofer Institute for Computer Graphics Research and TU Darmstadt, Germany
Mónica Larese CIFASIS-CONICET, National University of Rosario, Argentina
Denis Laurendeau Laval University, Canada
Sébastien Lefèvre Université Bretagne Sud, France
Marco Leo CNR, Italy
Daw-Tung Lin National Taipei University, Taiwan, China
Huei-Yung Lin National Chung Cheng University, Taiwan, China
Xiuwen Liu Florida State University, USA
Giosue Lo Bosco University of Palermo, Italy
Liliana Lo Presti University of Palermo, Italy
Angeles López Universitat Jaume I, Spain
Bruno Macchiavello Universidade de Brasília, Brazil
Ilias Maglogiannis University of Piraeus, Greece
Francesco Marcelloni University of Pisa, Italy
Mauricio Marengoni Universidade Presbiteriana Mackenzie, Brazil
Emmanuel Marilly Nokia - Bell Labs France, France
Jean Martinet University Cote d’Azur, CNRS, France
José Martínez Sotoca Universitat Jaume I, Spain
Mitsuharu Matsumoto The University of Electro-Communications, Japan
Radko Mesiar Slovak University of Technology, Slovakia
Leonid Mestetskiy Lomonosov Moscow State University, Russia
Cyrille Migniot Université de Bourgogne, le2i, France
Dan Mikami NTT, Japan
Steven Mills University of Otago, New Zealand
Nabin Mishra Stoecker & Associates, USA
Sanya Mitaim Thammasat University, Thailand
Pradit Mittraapiyanuruk Panasonic R&D Center Singapore, Singapore
Birgit Moeller Martin Luther University Halle-Wittenberg, Germany
Thomas Moeslund Aalborg University, Denmark
Ali Mohammad-Djafari CNRS, France
Bartolomeo Montrucchio Politecnico di Torino, Italy
Davide Moroni ISTI-CNR, Italy
Kostantinos Moustakas University of Patras, Greece
Dmitry Murashov Federal Research Center “Computer Science and Control” of Russian Academy of Sciences, Russia
Feiping Nie University of Texas at Arlington, USA
Mikael Nilsson Lund University, Sweden
Nicoletta Noceti Università di Genova, Italy
Yoshihiro Okada Kyushu University, Japan
Gonzalo Pajares Universidad Complutense de Madrid, Spain
Theodore Papadopoulos Inria, France
Félix Paulano-Godino University of Jaén, Spain
Felipe Pinage Federal University of Parana, Brazil
Stephen Pollard HP Labs, UK
Aristeidis Tsitiridis  
Universidad Rey Juan Carlos, Spain

Cesare Valenti  
Università degli Studi di Palermo, Italy

Panayiotis Vlamos  
Ionian University, Greece

Frank Wallhoff  
Jade University of Applied Science, Germany

Tao Wang  
BAE Systems, USA

Layne Watson  
Virginia Polytechnic Institute and State University, USA

Quan Wen  
University of Electronic Science and Technology of China, China

Laurent Wendling  
LIPADE, France

Andrew Willis  
University of North Carolina at Charlotte, USA

Christian Wöhler  
TU Dortmund University, Germany

Stefan Wörz  
Heidelberg University, Germany

Yan Wu  
Georgia Southern University, USA

Pingkun Yan  
Rensselaer Polytechnic Institute, USA

Guoan Yang  
Xian Jiaotong University, China

Vera Yashina  
Dorodnicyn Computing Center of the Russian Academy of Sciences, Russia

Hongfeng Yu  
University of Nebraska-Lincoln, USA

Pietro Zanuttigh  
University of Padova, Italy

Huiyu Zhou  
Queen’s University Belfast, UK

Yun Zhu  
UCSD, USA

Zhigang Zhu  
City College of New York, USA

Peter Zolliker  
Empa-Swiss Federal Laboratories for Materials Science and Technology, Switzerland

Ju Zou  
University of Western Sydney, Australia

**VISAPP Additional Reviewers**

Eman Ahmed  
University of Luxembourg, Luxembourg

Gerasimos Arvanitis  
ECE, National Technical University of Athens, Greece

Renato Baptista  
University of Luxembourg, Luxembourg

Júlio Batista  
Brazíl

Romain Dambreville  
IRISA, France

Rig Das  
University of Luxembourg, Luxembourg

Konstantinos Delibasis  
University of Central Greece, Greece

Enjie Ghorbel  
University of Luxembourg, Luxembourg

Andrei Kopylov  
Tula State University, Russia

Arnau Mir  
University of Balearic Islands, Spain

Dependra Mishra  
IBM, USA

Mohammad Abdul Mukit  
University of Oklahoma, USA

Konstantinos Papadopoulos  
University of Luxembourg, Luxembourg

Zoltan Rozsa  
Hungarian Academy of Sciences Institute for Computer Science and Control (MTA SZTAKI), Hungary

Oleg Seredin  
Tula State University, Russia
Invited Speakers

Daniel McDuff  Microsoft, USA
Diego Gutierrez  Universidad de Zaragoza, Spain
Jiri Matas  Czech Technical University in Prague, Czech Republic
Dina Damen  University of Bristol, UK
Contents

Computer Graphics Theory and Applications

Synthesis and Validation of Virtual Woodcuts Generated with Reaction-Diffusion ........................................ 3
  Davi Padilha Mesquita and Marcelo Walter

Synthesising Light Field Volume Visualisations Using Image Warping in Real-Time ........................................ 30
  Seán K. Martin, Seán Bruton, David Ganter, and Michael Manzke

Motion Capture Analysis and Reconstruction Using Spatial Keyframes ..................................................... 48
  Bernardo F. Costa and Claudio Esperança

Human Computer Interaction Theory and Applications

Involving Hearing, Haptics and Kinesthetics into Non-visual Interaction Concepts for an Augmented Remote Tower Environment .............................................................. 73
  Maxime Reynal, Pietro Aricò, Jean-Paul Imbert, Christophe Hurter, Gianluca Borghini, Gianluca Di Flumeri, Nicolina Sciaraffa, Antonio Di Florio, Michela Terenzi, Ana Ferreira, Simone Pozzi, Viviana Betti, Matteo Marucci, and Fabio Babiloni

Virtual Reality System for Ship Handling Simulations: A Case Study on Nautical Personnel Performance, Observed Behaviour, Sense of Presence and Sickness ......................................................... 101
  Chiara Bassano, Manuela Chessa, Luca Fengone, Luca Isgrò, Fabio Solari, Giovanni Spallarossa, Davide Tozzi, and Aldo Zini

A Process Reference Model for UX ......................................................... 128
  Suzanne Kieffer, Luka Rukonić, Vincent Kervyn de Meerendré, and Jean Vanderdonckt

AAT Meets Virtual Reality ................................................................. 153
  Tanja Joan Eiler, Armin Grünwald, Michael Wahl, and Rainer Brück

Information Visualization Theory and Applications

Orthogonal Compaction: Turn-Regularity, Complete Extensions, and Their Common Concept ......................................................... 179
  Alexander M. Esser
A Model for the Progressive Visualization of Multidimensional Data Structure .......................... 203
Elio Ventocilla and Maria Riveiro

Visualization of Tree-Structured Data Using Web Service Composition .............. 227
Willy Scheibel, Judith Hartmann, Daniel Limberger, and Jürgen Döllner

Breaking the Curse of Visual Analytics: Accommodating Virtual Reality in the Visualization Pipeline ................................................. 253
Matthias Kraus, Matthias Miller, Juri Buchmüller, Manuel Stein, Niklas Weiler, Daniel A. Keim, and Mennatallah El-Assady

Designing a Visual Analytics System for Medication Error Screening and Detection ................................................................. 285
Tabassum Kakar, Xiao Qin, Cory M. Tapply, Oliver Spring, Derek Murphy, Daniel Yun, Elke A. Rundensteiner, Lane Harrison, Thang La, Sanjay K. Sahoo, and Suranjan De

A Layered Approach to Lightweight Toolchaining in Visual Analytics ............. 313
Hans-Jörg Schulz, Martin Röhlig, Lars Nonnenmann, Marius Hogräfer, Mario Aehnelt, Bodo Urban, and Heidrun Schumann

Fast Approximate Light Field Volume Rendering: Using Volume Data to Improve Light Field Synthesis via Convolutional Neural Networks ......................................................... 338
Seán Bruton, David Ganter, and Michael Manzke

A Reproducibility Study for Visual MRSI Data Analytics ................................. 362
Muhammad Jawad, Vladimir Molchanov, and Lars Linsen

Computer Vision Theory and Applications

A Self-regulating Spatio-Temporal Filter for Volumetric Video Point Clouds ................................................................. 391
Matthew Moynihan, Rafael Pagés, and Aljosa Smolic

Modeling Trajectories for 3D Motion Analysis .................................................. 409
Amani Elaoud, Walid Barhoumi, Hassen Drira, and Ezzeddine Zagrouba

Quantitative Comparison of Affine Feature Detectors Based on Quadcopter Images ................................................................. 430
Zoltán Pusztai, Gergő Gál, and Levente Hajder

An MRF Optimisation Framework for Full 3D Reconstruction of Scenes with Complex Reflectance ................................................................. 456
Gianmarco Addari and Jean-Yves Guillemaut
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robustifying Direct VO to Large Baseline Motions</td>
<td>477</td>
</tr>
<tr>
<td>Georges Younes, Daniel Asmar, and John Zelek</td>
<td></td>
</tr>
<tr>
<td>Localization and Grading of Building Roof Damages in High-Resolution</td>
<td>497</td>
</tr>
<tr>
<td>Aerial Images</td>
<td></td>
</tr>
<tr>
<td>Melanie Böge, Dimitri Bulatov, and Lukas Lucks</td>
<td></td>
</tr>
<tr>
<td>Semantic Image Completion Through an Adversarial Strategy</td>
<td>520</td>
</tr>
<tr>
<td>Patricia Vitoria, Joan Sintes, and Coloma Ballester</td>
<td></td>
</tr>
<tr>
<td>An Enhanced Louvain Based Image Segmentation Approach Using Color Properties and Histogram of Oriented Gradients</td>
<td>543</td>
</tr>
<tr>
<td>Thanh-Khoa Nguyen, Jean-Loup Guillaume, and Mickael Coustaty</td>
<td></td>
</tr>
<tr>
<td>Vehicle Activity Recognition Using DCNN</td>
<td>566</td>
</tr>
<tr>
<td>Alaa AlZoubi and David Nam</td>
<td></td>
</tr>
<tr>
<td>Quantifying Deformation in Aegean Sealing Practices</td>
<td>589</td>
</tr>
<tr>
<td>Bartosz Bogacz, Sarah Finlayson, Diamantis Panagiotopoulos, and Hubert Mara</td>
<td></td>
</tr>
<tr>
<td>Author Index</td>
<td>611</td>
</tr>
</tbody>
</table>