XXX Spanish Computer Graphics Conference

Málaga, Spain

September 22 – 24, 2021

The conference is co-located with CEDI 2021 - Congreso Español de Informática 2021

Conference Chair
Nuria Pelechano (Universitat Politècnica de Catalunya)

Program Co-Chairs
Lidia M. Ortega (Universidad de Jaén)
Antonio Chica (Universitat Politècnica de Catalunya)

Proceedings Production Editor
Dieter W. Fellner (TU Darmstadt & Fraunhofer IGD, Germany)

Sponsored by EUROGRAPHICS Association

delivered by EUROGRAPHICS DIGITAL LIBRARY www.eg.org diglib.eg.org

DOI: 10.2312/ceig.20212019

This work is subject to copyright.

All rights reserved, whether the whole or part of the material is concerned, specifically those of translation, reprinting, re-use of illustrations, broadcasting, reproduction by photocopying machines or similar means, and storage in data banks.

Copyright ©2021 by the Eurographics Association
Postfach 2926, 38629 Goslar, Germany

Published by the Eurographics Association
–Postfach 2926, 38629 Goslar, Germany–
in cooperation with
Institute of Computer Graphics & Knowledge Visualization at Graz University of Technology
and
Fraunhofer IGD (Fraunhofer Institute for Computer Graphics Research), Darmstadt

ISBN 978-3-03868-160-1

The electronic version of the proceedings is available from the Eurographics Digital Library at `https://diglib.eg.org`

Table of Contents

Table of Contents iii

International Program Committee iv

Author Index v

Keynotes vi

Full Papers – Capture Techniques and Pathfinding

Synthetic Data Set Generation for the Evaluation of Image Acquisition Strategies Applied to Deep Learning Based Industrial Component Inspection Systems 1
Fátima A. Saiz, Garazi Alfaro, Iñigo Barandiaran, Sara Garcia, M. P. Carretero, and Manuel Graña

Neural Colorization of Laser Scans 9
Marc Comino Trinidad, Carlos Andújar, Carles Bosch, Antonio Chica, and Imanol Muñoz-Pandiella

Short Papers

Intensity-Guided Exposure Correction for Indoor LiDAR Scans 15
Marc Comino Trinidad, Carlos Andújar, Carles Bosch, Antonio Chica, and Imanol Munoz-Pandiella

ISSIGraph: An Open Source Multi-platform C++ Tool for Rapid 2D/3D Wireframe Sketching 19
Carlos Jiménez de Parga

Aplicación del motor de videojuegos Unity para la reconstrucción virtual de yacimientos arqueológicos 23
Alberto Calzado-Martínez, Ángel Luis García-Fernández, and Lidia M. Ortega-Alvarado

A GPU-accelerated LiDAR Sensor for Generating Labelled Datasets 27
Alfonso López, Carlos Javier Ogayar Anguita, and Francisco Ramón Feito Higueruela

Generación de fenómenos naturales mediante la simulación realista de sólidos deformables en Bifrost 31
José Cruz, Juan Manuel Jurado, J. Roberto Jiménez-Pérez, and Lidia Ortega

Generation Process of Intrinsic Images Dataset Through Physically-based Rendering 35
Ignacio Moral Rodríguez, Alfonso López, J. Roberto Jiménez-Perez, Francisco R. Feito, Lidia Ortega, and Juan M. Jurado

Digital Layered Models of Architecture and Mural Paintings over Time 39
Milagros Guardia, Paola Pogliani, Giulia Bordi, Panayiotis Charalambous, Carlos Andujar, Imanol Munoz-Pandiella, and Xavier Pueyo

Comparison of GPU-based Methods for Handling Point Cloud Occlusion 43
Alfonso López, Juan Manuel Jurado, Emilio José Padrón, Carlos Javier Ogayar, and Francisco Ramón Feito

International Program Committee

Oscar Argudo, LIRIS-CNRS
Bedrich Benes, Purdue University
Diego Borro, CEIT
Carles Bosch, Universitat de Vic
Jose Maria Buades, Universitat de les Illes Balears
Dan Casas, Universidad Rey Juan Carlos
Panayiotis Charalambous, CaSToRC, The Cyprus Institute
Miguel Chover, Universitat Jaume I
Antonio Coelho, Universidade do Porto / INESC
Marc Comino, Universitat Politècnica de Catalunya
Jose Garcia Rodriguez, Universidad de Alicante
Jesús Gimeno, Universidad de Valencia
José Iglesias, Universidad de A Coruña
Juan José Jiménez, Universidad de Jaén
Carmen Juan, Universitat Politècnica de València
Jorge Lopez Moreno, Universidad Rey Juan Carlos
Ricardo Marques, Universitat de Barcelona
Héctor Martínez, IEMR, Oslo
Adolfo Muñoz, Universidad de Zaragoza
María Murcia, Facebook
Carlos Ogayar, Universidad de Jaén
Inmaculada Remolar, Universitat Jaume I
Jose Ribelles, Universitat Jaume I
Riccardo Scateni, University of Cagliari
Rafael Segura, Universidad de Jaén
Ana Serrano, Universidad de Zaragoza
Toni Susin, Universitat Politècnica de Catalunya
Juan Carlos Torres, Universidad de Granada
Carlos Ureña, Universidad de Granada
Anne-Hélène Olivier, Université Rennes, France

Author Index

Alfaro, Garazi 1
Andújar, Carlos 9, 15, 39
Anguita, Carlos Javier Ogayar 27
Barandiaran, Iñigo 1
Bordi, Giulia 39
Bosch, Carles 9, 15
Calzado-Martínez, Alberto 23
Carretero, M. P. 1
Charalambous, Panayiotis 39
Chica, Antonio 9, 15
Cruz, José 31
Feito, Francisco Ramón 35, 43
Garcia, Sara 1
García-Fernández, Ángel Luis 23
Graña, Manuel 1
Guardia, Milagros 39
Higueruela, Francisco Ramón Feito 27
Jiménez-Perez, J. Roberto 31, 35
Jurado, Juan Manuel 31, 35, 43
López, Alfonso 27, 35, 43
Muñoz-Pandiella, Imanol 9, 15, 39
Ogayar, Carlos Javier 43
Ortega, Lidia M. 23, 31, 35
Padrón, Emilio José 43
Parga, Carlos Jiménez de 19
Pogliani, Paola 39
Pueyo, Xavier 39
Rodríguez, Ignacio Moral 35
Saiz, Fátima A. 1
Trinidad, Marc Comino 9, 15

Keynote

Scenic Landscapes

Eric Galin
LIRIS – CNRS

Abstract

While three-dimensional landforms, such as cave networks, arches, and overhangs occupy a relatively small proportion of most computer-generated landscapes, they are distinctive and dramatic and have a crucial visual impact. The dominant heightfield representation of terrain precludes such features, and existing volumetric structures such as voxels are memory intensive to handle large scenes.

In this talk, I will present skeletal implicit surfaces as a powerful and compact model lending itself to representing a range of landform features. I will show how it is possible to combine geologically-based simulations and artist-oriented authoring to synthesize scenic landscapes with such diverse structures as slot canyons, sea arches, stratified cliffs, fields of hoodoos, and karstic cave networks.

Biographical Note

Eric Galin is a Professor of Computer Science at University Lyon 1, France. He obtained an engineering degree from Ecole Centrale de Lyon in 1993 and a Ph.D. in Computer Science from Université Lyon 1 in 1997.

His research interests embrace procedural modeling of virtual worlds, simulating natural phenomena, and modeling with implicit surfaces. For the past decade, he contributed to several high-level procedural methods for modeling terrains, generating road networks and villages, generating river networks and simulating the mutual influence between ecosystems and terrains.

Eric Galin served in several program committees such as SMI, Eurographics and the series of Eurographics Workshop on Natural Phenomena. He was the co-chair of Eurographics 2017 conference. He participated in the creation of the French Chapter of Eurographics in 2004 and belongs to the CA. From 2008 to 2013, he was the administrator of Gamagora, a high-level education program connecting Level Design, Graphics Design and Computer Game Programming tracks.

Keynote

The Infinite Loop

Ferran Argelaguet
Hybrid research team, Inria

Abstract

Las interacciones cotidianas se rigen por un bucle infinito, el bucle de percepción-acción. Este bucle funciona sin cesar en todo momento, el cerebro recibe y procesa estímulos externos, determina que acciones quiere/necesita realizar y las ejecuta. Dichas acciones generan estímulos adicionales que cierran el bucle. El bucle de percepción-acción modela un proceso complejo que está delimitado por las habilidades perceptivas, cognitivas y motoras de cada uno de nosotros. En la vida real, este bucle se desarrolla sin intermediarios, percibimos y actuamos en el mundo real directamente. Sin embargo, cuando nos sumergimos en la realidad virtual, el bucle de percepción-acción es distorsionado debido a las limitaciones de los dispositivos de realidad virtual. Esta charla abarcará un conjunto de trabajos de investigación con el objetivo final de concebir interfaces de usuario 3D adaptativas. Interfaces conscientes de las capacidades de percepción e interacción de los usuarios. Interfaces capaces de ayudar al usuario de manera transparente al interaccionar en mundos virtuales. A diferencia de las interacciones cotidianas, que están limitadas por las leyes de la física, las interacciones en entornos virtuales sólo están limitadas por nuestra imaginación.

Biographical Note

Dr. Ferran Argelaguet is a Research Scientist at the Hybrid research team, at Inria, the French National Institute for Research in Computer Science and Control, in Rennes, France. He received his bachelor's degree in Computer Science from the Universitat Politècnica de Catalunya in 2006 and his PhD in Computer Science in 2011. His research activity is devoted on the field of Virtual Reality, a multidisciplinary research field, with a particular focus on Human Computer Interaction and Human Perception. He publishes regularly in top VR conferences and journals, such as IEEE VR or IEEE TVCG. He also serves regularly as international program committee member in VR conferences such as IEEE VR or ACM VRST and since 2019 he is Program Co-Chair of the IEEE Virtual Reality and 3D User Interfaces Conference track.

Keynote

Imágenes y Animación

Marcos Fajardo
Solid Angle

Biographical Note

Marcos Fajardo, ex-alumno de la Universidad de Málaga, es el fundador de Solid Angle SL (ahora parte de Autodesk, Inc.) donde dirigió el desarrollo de Arnold, un software de trazado de rayos para la renderización de imagenes 3D en cine y TV. Arnold se ha usado en proyectos como Gravity, Blade Runner 2049, Juego de Tronos, Pocoyó, y en multitud de películas del universo cinematográfico de Marvel como The Avengers, Iron Man 3, o Spider-Man: Into the Spider-Verse. Anteriormente, fue arquitecto de software en Sony Pictures Imageworks, investigador asociado en el Institute for Creative Technologies de la Universidad del Sur de California junto al Dr. Paul Debevec, y consultor en varios estudios de producción 3D. En 2017, Marcos y su equipo recibieron el Oscar de la Academia de Hollywood en la categoría Científica y de Ingeniería por su trabajo con Arnold. Mas recientemente, Marcos ha coproducido proyectos como el cortometraje “La Noria”.