

GUEST EDITORIAL PREFACE

Special Issue on the Portuguese Computer Graphics Meeting, 2014 Edition (EPCG) Part 1

António Ramires Fernandes, ALGORITMI and Department of Informatics, University of Minho, Braga, Portugal

Nuno Rodrigues, School of Technology and Management, Computer Science and Communication Research Centre, Polytechnic Institute of Leiria, Leiria, Portugal

INTRODUCTION

The Portuguese Group for Computer Graphics (GPCG - Grupo Português de Computação Gráfica¹), the Eurographics Portuguese chapter, is the main promoter for research dissemination in the areas of Computer Graphics, Computer Vision, and Image Processing in Portugal.

The Portuguese Computer Graphics Meeting is the main event where all researches across Portugal meet to discuss their ideas and promote research partnerships. The meeting has already a long history, with the first one taking place in June 1988 in Lisbon. The meetings are organized locally by Universities, Polytechnic and research institutes in full cooperation with GPCG, providing a full national coverage throughout the years.

This special issue covers the 21st edition of these meetings, which took place in Leiria, in November 2014². The Portuguese Computer Graphics Meeting 2014 (EPCG 2014 - 21º Encontro Português de Computação Gráfica) was a joint organization between Instituto Politécnico de Leiria and GPCG. This is the first of a two part special issue.

The meeting had over 30 paper presentations from authors all around the country, arranged in six sessions: Serious Games, Human-Computer Interaction (HCI), Rendering and Visualization, Modelling, Applications, Computer Vision and Augmented Reality. We also had the privilege of having two outstanding invited talks, by Diego Gutierrez, from the University of Zaragoza, Spain, focusing on perceptually optimized coded apertures and femto photography and by Joaquim Jorge, from the University of Lisbon, focusing on tangible user interfaces.

Serious Games are a hot topic, and the authors in this section are fully aware of its social relevance and potential for education. The session had articles proposing a game to teach Sign

Language to everyone, a face expression editor for a game to help dealing with Social Anxiety, and finally a game focused on helping to learn the blood circulatory system.

HCI is a very broad field, and this session reflects this fact. Contributions related to large data set searching and visualisation for educational data and LEGO blocks were presented alongside with applications to assist tunnel anxiety therapy, and a gesture based interface designed for older adults.

The earth atmosphere dominated the applicational aspect of the session on rendering and visualization, with a state of the art on atmospheric scattering, and the dynamic visualization of virtual clouds based on Skew-T/Log-P thermodynamic diagrams. On the more fundamental side we had a work regarding ray-tracing efficiency, in particular focusing of ray reordering techniques for GPU algorithms.

Modelling terrains and subsoil with tangible interfaces, and procedural modelling of roads for driving simulators were the applicational contributions this year. On a more fundamental note we also had a proposal for a new segmentation method that outperforms previous state of the art algorithms.

Exploring the Solar System and the Milky Way providing an interactive and immersive journey is the topic of a contribution in the application's session. On a more earthly note, craniometrics was the theme of a contribution focused on assisting on the measurement of 3D scanned cranial model features. Building and debugging 3D applications is not a trivial task. A review of open source debuggers was presented.

Computer vision is also present in a number of articles, being used to determine the location in indoor environments, to assist on augmented reality applications for architectural plans, to increase the sense of proximity in virtual meetings, or to improve the workflow in these meetings. Medical applications were also present with a contribution for the 3D reconstruction and visualisation of liver and vascular networks.

From the set of contributions to EPCG 2014, a subset was selected in order to provide a glimpse of the research actually being carried out in Portugal.

IN THIS ISSUE

For this special issue of IJCICG we invited the authors of a selection of contributions to submit an extended and updated version of their previously presented work. This issue is the result of their work.

The first article of this special edition “Accelerating Occlusion Rendering on a GPU via Ray Classification” is targeted at GPU architectures where global illumination techniques, such as ambient occlusion, may be performed via ray casting. The authors focus on ray classification techniques by reordering rays to maximize their spatial coherence in order to improve parallel performance.

In the next contribution, “LS3D - Immersive Interface for 3D Object Search” a prototype based on gestures and speech is presented to address the search of three-dimensional objects in different contexts. The prototype is tested with the search of LEGO blocks and compared against a commercial application.

Focusing on procedural modeling, “Procedural Generation of Road Paths for Driving Simulation” presents a method for the generation of road paths for driving simulation experiments, inspired in methods used in roadways engineering. The authors aim to significantly reduce the need of experts in the preparation of road paths and generate road model suitable for conducting scientific work in a driving simulator.

The contribution “Preoperative and Intraoperative spatial reasoning support with 3D organ and vascular models: derived from CT data using VTK and IGSTK” introduces an automatic solution using 3D reconstruction aimed at medical contexts, specifically for the visualization/spatial reasoning of vascular networks within the liver and kidney. The solution presented is demonstrated with two computer assisted surgery tools that were developed within this context: a contour annotation/reconstruction tool and an intraoperative visualization/navigation tool.

António Ramires Fernandes

Nuno Rodrigues

Guest Editors

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This special issue would not have been possible without the contribution of the authors who agreed to present extended and updated versions of the work previously submitted at the meeting.

All the reviewers also deserve our praise for their constructive and timely reviews.

The organization of the Portuguese Computer Graphics Meeting, Edition of 2014, including both the local organization committee as well as the Portuguese Group for Computer Graphics, was spotless and certainly an incentive for both authors and reviewers to help us put this issue together.

At last, but definitely not least, we must thank the editors-in-chief of IJCICG for their invitation, and support, presenting this work to a broader audience.

REFERENCES

Gonçalves, A., Ramires Fernandes, A., & Rodrigues, N. (Eds.), (2014). Atas do 21º Encontro Português de Computação Gráfica - EPCG 2014 [Proceedings of the 21th Portuguese Computer Graphics Meeting], Leiria, Instituto Politécnico de Leiria.

ENDNOTES

- ¹ <http://www.gpcg.pt>
- ² <http://epcg2014.estg.ipleiria.pt/>

António Ramires Fernandes graduated in Computer Science at University of Minho, Portugal and got a PhD in Artificial Intelligence from the University of St. Andrews, Scotland. For over 20 years he has been teaching several computing programming courses at University of Minho, gradually focusing on computer graphics, with curricula ranging from the mathematics foundations of CG to API and shader programming. He was the director for the Master Programme in Computer Graphics and Virtual Environments, and currently is responsible for the profile in Computer Graphics in the Master Course in Computer Engineering. His research is mainly focused in real-time computer graphics with a few incursions on the theme of accessibility for the disabled, with the latest works focusing on children with ASD.

Nuno Rodrigues, PhD in Computer Science, is an Adjunct Professor at the School of Technology and Management of the Polytechnic Institute of Leiria, Portugal, where he graduated in Computer Engineering. He earned a Master's degree in Computer Science at the Faculty of Sciences and Technology, Universidade NOVA de Lisboa, Portugal, and holds a PhD in Informatics from the University of Trás-os-Montes and Alto Douro, Portugal, with the thesis 'Rule-based Generation of Virtual Traversable Architectural-Period Houses'. He is also an investigator and Head of the Computer Graphics and Sound Research Group at the Computer Science and Communication Research Centre in the same Institute. He is also the author of literature related with Procedural Modelling and Virtual Heritage, area where he has been working in the latest years in several projects involving heritages sites. His main research interests are: Procedural Modelling, Virtual Reality, Virtual Heritage, Multimedia Systems and Interaction.