Seyedmorteza Mostajabodaveh

computer graphics and visualization fan and researcher

Education

2012–Present **Master candidate in computer science**, *Technische Universität München*, Munich.
Specialization: Computer graphics and visualization

2006–2011 **Bacholer of computer engineering**, *Hamedan University of Technology*, Hamedan, Iran, Grade: *15.04* out of 20.0.
Major: Computer hardware engineering

2005–2006 **Pre-university**, *National Organization for Development of Exceptional Talents' Shahid Beheshti School*, Borujerd, Iran.
Major: Mathematics and physics

2002–2005 **High school**, *National Organization for Development of Exceptional Talents' Shahid Beheshti School*, Borujerd, Iran.
Major: Mathematics and physics

Research Interests

Computer Graphics and Visualization

Virtual Reality

Computer Game Development

Object Oriented Programming (OOP)

Master thesis

title *Real-time streamsurface computation and rendering*

supervisors Prof.Dr. Westermann

advisors Dr. Andreas Dietrich, Dr. Frank Michel

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abstract Streamsurfaces are one of the powerful visualization tools, which are used to gain insight into characteristics and features of flow fields. In practice, streamsurfaces are approximated by triangulating adjacent pairs of integral curves, originating from a seeding line. The generation of integral curves bears quite some similarities to ray tracing algorithms used in physically based renderers. Although, the techniques used in ray tracing may not have good performance in the streamline computation context due to their different computational nature, they can be optimized for streamline computation by introducing some modifications. In this master thesis, I present my work on accurate streamsurface computation and rendering in real-time, by exploiting the scalability and portability features of parallel architectures in heterogeneous computing, and utilizing concepts from physically based rendering. To improve the efficiency, I use a scheduler to divide the streamsurface computation and rendering tasks on different devices proportional to their computation powers. Additionally, I apply and evaluate different acceleration structures and the concepts of caching to improve the efficiency and utilization of streamsurface generation on modern GPUs and CPUs to achieve real-time results. Furthermore, the possible impact of applying ray-packing and ray-sorting to the streamline computation is investigated.

Bachelor thesis

title *Incorporating affective states of players in video games*

supervisor Dr. Muharram Mansoorizadeh

abstract Video games are very popular, these days. They use different ways to interact with users. Keyboards, mouse, Joysticks, and recently camera are among the popular interaction devices. While technology involved in game industry develops new interactive devices to get user's interactions that capture lots of player's inputs, the games just use player's voluntary interactions. However, spontaneous behaviors of players are of much value in playing games, the players do not use involuntary interactions. Among several available representations for affects, two-dimensional continuous Activation/Evaluation(Valence) space has been adopted. We can determine the player's preferences in the environment by comparing his or her playing to the player's valence and activity in real-time. These information can be used to modify the game rules and environment to make it more attractive for players and create a unique experience during each gameplay session. (Score:20/20).

Experience

Vocational

2014–2016 **Student Job**, *Fraunhofer IGD*, Darmstadt.
Computer graphics research and developments.
Detailed achievements:
- participating in VELaSSCo EC project development;
- Higher-order primitive ray-tracer implemented in Intel Embree and NVIDIA OptiX.
- Virtual reality development with LEAP Motion and Oculus SDK.

2014–2014 **Research Assistant**, *TUM's TUM's Foerdertechnik Materialfluss Logistik (FML) group*, Garching bei München.

Detailed achievements:

- Working on 3D-Visualization of electromagnetic field strength distribution.

2013–2014 **Guided Research**, *TUM's Prof. Westermann's chair (Computer Graphics and Visualization)*, Garching bei München.

Abstract:Ray-traced global illumination (GI) algorithms are becoming widespread in real-time applications and computer video games. Path tracing is a common rendering technique to render images with global illumination effect. Low performance of these algorithms, makes their usage limited. To speed up these algorithms, some acceleration hi- erarchy like kd-tree, BSP-tree, etc. is used. Typically, BVH-Trees are used to accelerate path-tracing algorithms. Recently, these algorithms are run in real time on CPUs and GPUs but the ray coherency after the first bounce becomes too low; As mentioned by related works. As CPUs and GPUs use wide SIMD units, gaining high coherency on these units is very important. A coherency improvement mechanism can be used to restore the ray coherency. In this paper we are going to investigate the impact of ray sorting on execution coherency of processorâĂŹs SIMD units. Our measurements show that execution coherency is increased by sorting the secondary rays but the improvements in coherency values are not as much as we expected and was presented by other papers. The scenes which are rendered in our approach are voxelized and stored in Boundary Volume Hierarchy (BVH) acceleration hierarchy. Furthermore, the voxel-based path-tracer is used as global illumination technique.

2013–2014 **Research Assistant**, *TUM's Prof. Navab's chair (Computer Aided and Medical Procedures & Augmented Reality)*, Garching bei München.

Detailed achievements:

- Working on OpenGL debugging tools.
- Implemnting advanced ray caster for volume rendering of medical data.

2013–2013 **Practical Course**, *TUM's Prof. Cremers's chair (Computer Vision)*, Garching bei München.

Topic:**GPU Programming in Computer Vision**. Implementing optical flow and super resolution algorithms on GPU using CUDA.

2012–2013 **Student Job**, *Developer at MetaIO GMbH*, München.

Detailed achievements:

- Developing different Metaio's Junaio browser channels using HTML5, JavaScript, PHP, and MetaIO creator.
- Developing a hair-coloring C++ module using Metaio SDK.
- Participating into development of a game using Unity.
- 3D content creation and adjustments for mobile AR scenarios using 3D Studio Max.

2012–2013 **Practical Course**, *TUM's Prof. Westermann's chair (Computer Graphics and Visualization)*, Garching bei München.

Topic:**Interactive Visual Data Analysis** by using Direct3D 11 and C++.

2012–2012 **Student Job**, *Developer at Fortiss GMbH*, München.

Detailed achievements:

- Implementing an interface using windows message passing API to update the automotive system visualization in Ciros studio.

2008–2010 **Teaching Experiences**, *Hamedan University of Technology*, Hamedan, Iran.

Detailed achievements:

- Teaching assistant, B.S. Introduction to Programming, M.Sc. Hassan Bashiri, spring 2008.
- Teaching assistant, B.S. Advanced Programming, M.Sc. Hassan Bashiri, autumn 2008.
- Teaching assistant, B.S. Introduction to Assembly 80x86 Programming, M.Sc. Hatam Abdoli, spring 2009.
- Teaching assistant, B.S. Data Structures, Dr. Mir Hossein Dezfoulian, autumn 2009.
- Teaching assistant, B.S. Operating Systems, Dr. Muharram Mansoorizadeh, spring 2010.
- Teaching assistant, B.S. Computer Graphics, Dr. Mir Hossein Dezfoulian, autumn 2010.

Honors, Awards, Fellowships

- TUM Scholarship for International Students, Summer 2013, Winter 2013-14, and Summer 2015
- 1st Place in Local Hamedan Azad University ACM Programming Contest, Hamedan Azad University, 2010
- 1st Place in Local Hamedan University of Technology ACM Programming Contest, Hamedan University of Technology, 2009
- 2nd Place in Local Bu-Ali Sina Hamedan University ACM Programming Contest, Bu-Ali Sina University, 2007

Languages

English — TOEFL iBT Score(2011): 85 (Reading: 25, Listening: 19, Speaking: 17, Writing: 24)

Persian — Mother Language

German — Elementary

Computer skills

Frequently using — C/C++, CMake, OpenGL, Vulkan, OpenCL, GLSL shader programming, Qt

Familiar with — DirectX and HLSL shader programming, CUDA programming, NVIDIA Optix, Intel Embree, DOxygen Commenting, 3D object modeling and animation using 3D Studio Max, Game engines (Ogre, Irrlicht, Unity, UDK), Windows programming, 80x86 Assembly programming, Microsoft Foundation Classes (MFC), Thrift C++ API, WinSocket Programming, Creating AR content using Metaio SDK, Metaio Creator, and HTML5+Javascript+PHP (not available anymore since Metaio is sold to Apple), Pascal

Love to use — Latex, Git, and Linux

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