

# SASHI KUMAR PENTA

DirectX Driver Development Group  
Visual Computing Group, Intel Corporation,  
RA2, 2501 NW 229th Avenue  
Hillsboro, OR 97124

**sashikumar@gmail.com**  
<http://cs.unc.edu/~sashi/>

MOBILE: 503-705-4178

## EDUCATION

**MS** in Computer Science and Eng. UNC – Chapel Hill (Aug 2008)

**MS by Research (Thesis)** in Computer Science and Eng. [Computer Graphics] IIIT – Hyderabad (Dec 2005)

**B. Tech.** in Computer Science and Eng. [Honors in Visual Informatics] IIIT – Hyderabad (May 2003)

## OBJECTIVE

I aspire to be a part of a place where pioneering research is done.

## ACHIEVEMENTS

- Ranked **10** in B.Tech. in the graduating batch 2003 at IIIT, Hyderabad.
- **Dean's List** (Spring 2001, Fall 2001, Spring 2002 and Spring 2003) – Scholarship given for outstanding academic performance at IIIT, Hyderabad.
- Secured **40<sup>th</sup>** position in Google India Code Jam 2005.

## SOFTWARE SKILLS

- *Programming Languages* C, C++, Java, Lisp, Perl, Prolog
- *Operating Systems* GNU/Linux, Windows 7 / VISTA / XP, Mac OS X
- *Programming Tools & APIs* OpenGL, DirectX, CUDA, Cg, HLSL, Qt, CVS/SVN, OpenMP, MPI, Sed, Awk, Lex, Yacc, Visual studio
- *Others* Matlab, HTML, MySQL, Gimp, Latex

## WORK EXPERIENCE

- **Graphics Software Engineer**, Visual and Parallel Computing Group (VPG), **Intel** Corporation, Hillsboro, OR, USA. (Sept 2008 - Present)
- **Research Intern**, Integrated Data Systems Department, **Siemens Corporate Research**, Princeton, NJ, USA. (Summer 2008)
- **Research Assistant/Student**, CS Dept, **UNC at Chapel Hill** (Aug, 2006 – May, 2008)
- **Research Intern**, Interactive Visual Media group, **Microsoft Research**, Redmond, USA. (Summer 2007)
- **Software Engineer**, **NVIDIA** Graphics Private Ltd, Bangalore, India (Aug,2005 – July,2006)
- **Research Associate/Teaching Assistant/Student**, Center for Visual Information Technology (**CVIT**) at **IIIT**, Hyderabad (2001 – 2005)
- **Instructor** for the course, **Software Technologies** for MTech computer science students of IIIT-Hyderabad (Spring 2005)
- **Research Intern**, Imaging Technologies group, **GE John F Welch Technology Center**, Bangalore, India (Summer 2003)

## REFEREED JOURNAL PUBLICATIONS

- **"Compression of Multiple Depth-Maps for IBR"**  
**Sashi Kumar Penta** and P. J. Narayanan  
**The Visual Computer**, Volume 21, Numbers 8-10 / September, 2005  
Presented at the Thirteenth Pacific Conference on Computer Graphics and Applications, October, 2005 (**Pacific Graphics 2005**)

## REFEREED CONFERENCE PUBLICATIONS / POSTERS

- **"Background Replacement"**  
**Sashi Kumar Penta**  
Appeared in **SIGGRAPH 2008** (Poster).
- **"Fluid in Video: Augmenting Real Video with Simulated Fluids"**  
Vivek Kwatra, Philippos Mordohai, Rahul Narain, **Sashi Kumar Penta**, Mark Carlson, Marc Pollefeys, and Ming Lin  
Appeared in **Eurographics 2008**.
- **"Depth Images: Representations and Real-time Rendering"**  
Pooja Verlani, Aditi Goswami, P. J. Narayanan, Shekhar Dwivedi and **Sashi Kumar Penta**  
Proc. Of Third International Symposium on 3D Data Processing, Visualization and Transmission (**3DPVT**), June 14-16, 2006
- **"Depth+Texture Representation for Image Based Rendering"**  
P. J. Narayanan, **Sashi Kumar Penta** and Sireesh Reddy K  
Proc. Fourth Indian Conference on Computer Vision, Graphics and Image Processing (**ICVGIP**), pp. 113-118, 2004

## RESEARCH INTERESTS

My interests lie in the fields of Computer Graphics, Computer Vision and High performance Computing.

## MAJOR PROJECTS

- **DirectX Driver development**  
I am involved in designing, developing, debugging and performance analyzing of DirectX driver for DX9 and DX10 on Windows vista and Windows 7. I am involved in designing the Intel DirectX driver software architecture to support multi graphics hardware architectures. I developed some key tools at Intel to speed up the debugging process. I am involved in doing the performance analysis of our driver. I also developed tools for capturing data from Dx 10 and Dx 11 games for game analysis which in turn used for performance analysis of our driver. This work is being done as part of my work at Visual and Parallel Computing Group (VPG), Intel Corporation.
- **Image enhancement techniques on the GPU**  
In this project, we implemented two enhancement techniques, automatic computation of the angle to correct the horizon of an image, and automatic computation of bi-lateral filter parameters to remove the noise in an image. Parts of these techniques are implemented on the GPU using Direct 3D (DirectX 9) and HLSL in Shader Model 3.0. This work is done while I was interning at the Interactive visual group, Microsoft Research, under the mentorship and collaboration with Dr. Sing Bing Kang, Dr. Denis Demandolx and Bryan Ressler.
- **Fluid in Video: Augmenting Real Video with Simulated Fluids**  
In this project, we present a technique for coupling simulated fluid phenomena that interact with real dynamic scenes captured as a binocular video sequence. We first process the binocular video sequence to obtain a complete 3D reconstruction of the scene, including velocity information. We then perform fluid simulation within a 3D domain that contains the object, enabling one-way coupling from the video to the fluid. Our method, not only generates smoothly varying geometry across time, but also simultaneously provides the necessary

boundary conditions for one-way coupling between the dynamic geometry and the simulated fluid. Finally, we employ a GPU based scheme for rendering the synthetic fluid in the real video, taking refraction and scene texture into account. This work will appear in Eurographics 2008.

- **OpenGL-ES driver development**

OpenGL-ES stands for Open Graphics Library for Embedded Systems. The OpenGL-ES driver is a graphics driver. A graphics driver is a library of functions which allow an application to draw things on the screen. Using a standard API (such as OpenGL, OpenGL-ES) allows an application to be written using one set of functions, and then run on a variety of graphics hardware. As part of this team, I am involved in adding the extensions of OpenGL ES to the NVIDIA's OpenGL-ES, such as rendering to texture. I also worked on porting programs from OpenGL to OpenGL-ES for testing the quality of the OpenGL ES driver and fixing the bugs in the OpenGL-ES driver. This work has been done while I worked at NVIDIA from July, 2005 to June, 2006.

- **Depth Images: Representations and Real-time Rendering**

Depth Images (DIs) are viable representations that can be computed from the real worlds using cameras and/or other scanning devices. In this project, we present a discussion on the Depth Image representation and provide a GPU-based algorithm that can render large models represented using DIs in real time. We show the results using a proxy-based compression scheme for Depth Images and provide results for the same. We provide discussion on quality levels in Image Based Rendering (IBR) and show a way to create representations using DIs with different trade-offs between model size and rendering quality. This work was appeared in 3DPVT, June, 2006. <http://www.unc.edu/~sashi/3dpvt.pdf>

- **Compression of Multiple Depth maps for Image based Rendering**

Image Based Rendering techniques include those with geometry and those without. Geometric information in the form of a depth map aligned with the image holds a lot of promise for IBR due to the several methods available to capture it. It can improve the quality of generated views using a limited number of views. Compression of lightfields or multiple images has attracted a lot of attention in the past. Compression of multiple depth maps of the same scene has not been explored much in the literature. We propose a method for compressing multiple depth maps in this paper using geometric proxy. Different quality of rendering and compression ratio can be achieved by varying different parameters. Experiments show the effectiveness of the compression technique on several model data. This work was appeared in the Proc. Of the Thirteenth Pacific Conference on Computer Graphics and Applications, October, 2005. <http://www.unc.edu/~sashi/compression.pdf>

- **Depth Image Representation for Image based Rendering**

Image Based Rendering holds a lot of promise for navigating through a real world scene without modeling it manually. Different representations have been proposed for IBR in literature. Here we argue that a representation using depth maps and texture images from a number of viewpoints is a rich and viable representation for IBR. We have seen different aspects of this representation, including capture, representation, compression and rendering. Our results show how the representation can be used to model and render complex scenes. This work was presented at the Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP) 2004. <http://www.unc.edu/~sashi/dtr.pdf>

- **Laparoscopic Surgery Training Simulator**

Laparoscopic Surgery training is an important component in the medical education and practice. Conventional training methods involve huge costs. We built a virtual reality system for simulating the laparoscopic surgery training procedures. This enables the surgeons to perform a 'virtual surgery' and get evaluated. The system has a huge graphics module built using OpenGL and an evaluation module. This was done in collaboration with the Center for Artificial Intelligence and Robotics (CAIR), Bangalore.

## **MAIN STREAM COURSES**

Computer Graphics, High performance computing, General Purpose Computation using Graphics Processors, Scientific Computation, Advanced Image Synthesis, Computer vision and web, Introduction to Robotics, Machine Learning, Advanced Computer Graphics, Advanced Signal and Image Processing, Multimedia, Pattern Recognition, Computer Vision, Digital Image Processing.

## **REGULAR COURSEWORK**

Computer Programming, Data Structures, Computer Organization, Analog/Digital Circuits, Discrete Mathematics, Operating Systems, Computer Networks, Compilers, Database Management Systems, Digital Signal Processing, Algorithms, Principles of Programming Languages, Artificial Intelligence, Theory of Computation, Software Engineering, Data Ware housing and Mining, Data Compression, Operations Research, Probability and Statistics.

## **CONFERENCES/WORKSHOPS ATTENDED**

- SIGGRAPH 2011, Vancouver, BC, Canada.
- SIGGRAPH 2008, and SIGGRAPH 2010, Los Angeles, CA, USA.
- SIGGRAPH 2007, San Diego, CA, USA.
- Asian Conference on Computer Vision 2006 (ACCV 2006), Hyderabad, India
- Pacific Graphics 2005 (PG 2005), Macau, China
- Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP 2004), Kolkata, India.
- Workshop on Computer Vision, Graphics and Image Processing (WCVGIP 2004), Gwalior, India.
- Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP 2002), Ahmadabad, India.

## **MISCELLANIOUS ACTIVITIES**

- I am a member of the Association for Computing Machinery [ACM] / ACM SIGGRAPH.
- I like to play basketball, lawn tennis and badminton. I was an active member of the team that won the intra-institute basketball tournament in IIIT thrice in a row. I am the fall 2006 UNC-CH intramural recreational badminton champion.
- I was a volunteer for \*Muskaan in my life\* Foundation, whose primary objective is to provide educational support to children of under-privileged families.
- I was an active member of Intel Recent College Graduate Network executive board, where I organized and volunteered events such as: "Tree for all", "Paddle Clean-up", and "Beach clean-up", and more.

## **REFERENCES ON REQUEST**