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Sang-Uok Kum

Research Interests

- Multi-view stream encoding; Multimedia; Image-Based Rendering; Computer Graphics; Computer Vision

Education

University of North Carolina — Chapel Hill, NC

- Ph.D. Computer Science, August 2006
- Dissertation Title: *Encoding of Multiple Depth Streams*
- Advisor: Ketan Mayer-Patel

University of North Carolina — Chapel Hill, NC

- M.S. Computer Science, May 1999

Yonsei University — Seoul, South Korea

- B.S. Astronomy (Minor: Computer Science), March 1996

Work Experience

January 2004 – Present — University of North Carolina — Chapel Hill, NC

Research Assistant for Prof. Ketan Mayer-Patel

- Developed effective encoding techniques for multiple depth streams (streams with color and depth information per pixel) using traditional video compression techniques and image based rendering (IBR) techniques. The depth information is utilized to exploit spatial coherence between streams in addition to temporal coherence between frames for effective encoding. Papers published in NOSSSDAV 2006 and 3DPVT 2006.

July 2000 – December 2003 — University of North Carolina — Chapel Hill, NC

Research Assistant for 3D Tele-Immersion project under Prof. Henry Fuchs and Herman Towles

- Developed a real-time algorithm to compress 3D dynamic environments. The developed compression algorithm handles the scalability of the acquisition, enables network bandwidth control and rendering to perform in real-time. Paper published in ACM Multimedia 2003 (*Nominated for Best Student Paper*) and ACM TOMCCAP.
- Developed a multi-platform distributed rendering system for the Tele-immersion project. Paper published in ITP 2002 and CVRV 2003.

August 1999 – June 2000 — University of North Carolina — Chapel Hill, NC

Research Assistant for Colab Project under Prof. David Stotts

- Set up a distributed VR system using 2 SGI O2s, Fakespace Pinch Glove, Polyhemus FASTRAK and LONG RANGER, and 2 Virtual Reality V6 HMDs.
- OvalTine: Real-time, server-side, semi-automatic anchor generation system on the SGI O2 platform designed for tracking faces in videoconferencing environments. Paper published in ACM Hypertext 2000.

June 1999 – July 1999 — University of North Carolina — Chapel Hill, NC

Research Assistant for Office of the Future Project under Prof. Henry Fuchs and Herman Towles

- Began building real time image acquisition system using the Dalsa DAC512 high speed black & white camera with the Matrox Genesis card via the VLDS interface.

July 1998 – May 1999 University of North Carolina Chapel Hill, NC

Research Assistant for Fastlinks Project under Prof. John Poulton

- Designed 8b/10b encoder & decoder circuit which runs with a 400MHz clock based on Widmer & Franaszek paper "A DC-Balanced, Partitioned-Block, 8B/10B Transmission Code".

January 1997 – July 1998 University of North Carolina Chapel Hill, NC

Research Assistant for the Nanomanipulator Project under Prof. Russell Taylor

- Designed real-time surface shaders for multiple data-set visualization, using UNC's graphics supercomputer, PixelFlow.
- IMS: Image analysis package, written in Java and C.

Teaching Experience

July 1999 – August 1999 University of North Carolina Chapel Hill, NC

- Instructor for *COMP 14: Introduction to Programming* during Summer Session II

August 1996 – December 1996 University of North Carolina Chapel Hill, NC

- Teaching Assistant for *COMP 114: Foundations of Programming* under Prof. Steve Weiss

Publication

- **Sang-Uok Kum**, and Ketan Mayer-Patel, "Reference Stream Selection for Multiple Depth Stream Encoding", *Proc. of the 3rd Symposium on 3D Data Processing, Visualization and Transmission (3DPVT),* 8 pages, June 14 – 16, 2006, Chapel Hill, NC, USA
- **Sang-Uok Kum**, and Ketan Mayer-Patel, "Intra-Stream Encoding for Multiple Depth Streams", *Proc. of the 16th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV)*, pp. 62 – 67, May 22 – 23, 2006, Newport, RI, USA
- **Sang-Uok Kum**, and Ketan Mayer-Patel, "Real-Time Multidepth Stream Compression", *ACM Trans. on Multimedia Computing, Communications, and Applications (TOMCCAP)*, Vol. 1, No. 2, pp. 128 – 150, May, 2005
- **Sang-Uok Kum**, Ketan Mayer-Patel, and Henry Fuchs, "Real-Time Compression for Dynamic 3D Environments", *Proc. of the 11th ACM International Conference on Multimedia*, pp. 185 – 194, November 4 – 6, 2003, Berkeley, CA, USA **(Nominated for Best Student Paper)**
- Herman Towles, **Sang-Uok Kum**, Travis Sparks, Sudipta Sinha, Scott Larsen, and Nathan Beddes, "Transport and Rendering Challenges of Multi-Stream 3D Tele-Immerison Data", *NSF Lake Tahoe Workshop on Collaborative Virtual Reality and Visualization (CVRV)*, October 26 – 28, 2003, Tahoe City, CA, USA
- Herman Towles, Wei-Chao Chen, Ruigang Yang, **Sang-Uok Kum**, Henry Fuchs, Nikhil Kelshikar, Jane Mulligan, Kostas Daniilidis, Loring Holden, Bob Seleznik, Amela Sadagic, Jaron Lanier, "3D Tele-Collaboration Over Internet2"**,** *International Workshop on Immersive Telepresence (ITP)*, pp. 28 – 31, December 6, 2002, Juan Les Pins, France
- Jason Smith, David Stotts, and **Sang-Uok Kum**, "An Orthogonal Taxonomy for Hyperlink Anchor Generation in Video Streams using OvalTine", *Proc. of 11th ACM Conference on Hypertext and Hypermedia (HT)*, pp. 48 – 57, May 30 – June 4, 2000, San Antonio, Texas, USA

Awards

- Link Foundation Fellowship, 2002-2003: National fellowship to foster advanced level study in simulation and training research (1 of 5 awardees).
- Jungsoo Scholarship, 1993-1996: Merit based national scholarship (1 of 12 awardees at Yonsei University).

Skills

Computer Languages: C++, C, Perl, Java, FORTRAN, Pascal, ML

Other: OpenGL, Renderman, MAGIC, irsim, TCP/IP, HTTP