

EDUCATION

Ph. D [Expected Graduation: May, 2009] -- Computer Animation	[Currently in Semester 7]
Computer Science & Engg. Department, Indian Institute of Technology, Bombay	[CPI: 8.4%]
Bachelors of Engineering (Information Technology)	[July, 2004]
Vasantdada Patil College Of Engg., University of Mumbai, Mumbai	[University Topper for 3 years][Aggregate: 78%]
Diploma in Computer Technology	[May, 2001]
Vivekananda Education Society's Polytechnic, Mumbai	[Aggregate: 73.27%]

ACADEMIC ACHIEVEMENTS

- Honored with the prestigious **Infosys Fellowship** in 2007
- Was selected for joint research project with **University of Western Australia** for period of 3 months **[June 2006 – August 2006]**
- **First Rank** in the Mumbai University in Information Technology for **3 consecutive years**
- Awarded the **BEST STUDENT OF THE YEAR AWARD** in Vasantdada Patil College in the year 2003-04
- Awarded **Sir Ratan Tata and JRD Tata Scholarships for Academic Excellence** in years 2002, 2003
- **3rd rank** in school in SSC exam
- Successful in **Homi-Bhabha Science Exam** and **UNO** exam
- **First in** intra-school maths quiz

PUBLICATIONS

- **Fast, Parallel, GPU-based Construction of Space Filling Curves and Octrees at ACM SIGGRAPH I3D 2008, Symposium on Interactive 3D Graphics and Games:** Space Filling Curves (SFC) are particularly useful in linearization of data living in two and three dimensional spaces and have been used in a number of applications in scientific computing, and visualization. Interestingly, octrees, another versatile data structure in computer graphics, can be viewed as multiple SFCs at varying resolutions, albeit with parent-child relationship. In this paper we provide a parallel implementation of SFCs and octrees on GPUs that rely on algorithms designed to minimize or eliminate communications. The detailed version with supplementary videos can be found at: www.cse.iitb.ac.in/~rhushabh
- **Oral Paper on Visibility Map for Global Illumination in Point Clouds at ACM SIGGRAPH sponsored GRAPHITE 2007 conference:** Inter-reflections in complex point model scenes requires knowledge of visibility between point pairs. Computing visibility for point models is all the more difficult (than for polygonal models), since we do not have any surface or object information. We present in this paper a novel, hierarchical, fast and memory efficient algorithm to compute a description of mutual visibility in the form of a visibility map. Ray shooting and visibility queries can be answered in sub-linear time using this data structure. We evaluate our scheme analytically, qualitatively, and quantitatively and conclude that these maps are desirable. The detailed version with supplementary videos can be found at: www.cse.iitb.ac.in/~rhushabh/
- **Technical report on FMM-based Illumination Maps for Point Models :** The system designed accepts as input a Point Based Model with **no connectivity information**. It divides the model space into hierarchical voxels, defining the regions as to where each point belongs. An optimised heirarchical voxel-based algorithm for efficient point-pair visibility checking is then implemented. The next step deals with implementation of Fast Multipole Method to the model so as to calculate the radiance value at each point, from a set of visible points (calculated in the previous step). The algorithm then uses Point Based Rendering (PBR) to render these points, using surfels as primitives. The rendering method also takes into account view-point visibility using view-frustrum culling and the ubiquitous z-buffer. The detailed version of the same can be found at: www.cse.iitb.ac.in/~rhushabh Work is in progress and the paper is still not published, but expecting it to get accepted in near future.

WORK EXPERIENCE

- Teaching Assistant** **[July, 2004 - Present]**
- Primary Responsibility: Assist the Professor for conducting quizzes and exams; Grading the assignments, quizzes and exams; Maintaining the course web-page; Conducting Labs; Taking lectures; Helping the students in case of any difficulty.
- I am an assistant to **Prof. Sharat Chandran**.

Software Engineer, Tata Consultancy Services, Mumbai

[July, 2003 – June, 2004]

Completed a research projects titled “Automatic Log-Report generation and UNIX-Server script enhancement ” using Visual Basic and UNIX scripts under Mr. Mayuresh Jukr, at the Tata Consultancy Services (TCS) and Ms.Neeta Nadkarni (HOD of Computers Branch, Vasantdada Patil College Of Engg.).

COMPUTER SKILLS

Languages	: C, C++, Java, Java Servlets, Java Swing, HTML, 8085 Assembly, Pascal
Database Systems	: Oracle SQL, JDBC, FoxPro, D base III Plus
Scripting Languages	: PERL, UNIX-shell scripting
Software Packages	: MS Office, Acrobat, Photo shop, Flash, Latex, Visual Basic, MATLAB, ProE, Beamer, POV-RAY

EXTRA-CURRICULAR ACTIVITIES

- **Representative for Research Scholars** of Computer Science and Engineering Department, IIT Bombay for the year 2007-08
- **Chief Technical Co-ordinator** in Annual techfest of Vasantdada Patil College in the year 2003-04
- Organized **C Programming and Debugging Contest** in the inter college event.
- **Developed official website** for the Annual techfest of Vasantdada Patil College in the year 2003-04.
- Won **2nd Prize** for intra-college Volleyball match.
- Have done my **Diploma in GERMAN Language**.
- Organized a **Blood Donation Camp** in the college and developed a software for the same.

RELATED COURSES

Current Graduate Courses at Computer Science and Engineering Department - IIT Bombay: Advanced Computer Graphics, Computer Vision, Image Processing, Design and analysis of Algorithms, Software lab, Human-Computer Interaction, Computer aided geometric design, Seminar in **Spherical Mosaics using Quaternions and dense co-relation**.

Undergraduate Courses: Digital Imaging and Image Processing, Computer Graphics, Software Engineering, Management Information Systems, Computer Communications and Networks, Distributed Systems, Operating Systems, Database Management Systems, Artificial Intelligence, Structured Systems Analysis and Design, Simulation and Modeling, Information Theory, Digital Communications, Computer Organization.

PROJECTS

Computer Graphics and Vision

- **Global Illumination for Point Based Models using Fast Multipole Method (FMM) and Point Based Rendering [C++]**
Accepts a point based model without any connectivity information as input and computes a global illumination solution for the same using the Fast Multipole Method. All visibility information and occlusions are taken into consideration while computing the global illumination for the model. The model is then rendered using Point Based Rendering techniques. The project is still ongoing and is the crux of my **Ph.d thesis**.
- **Construction of 2D panorama using scenes from different view-points [C++]**
Images were taken from different view-points and were mosaiced together using 4-point feature correspondence so as to obtain one single complete image as viewed from the view-point of the base image.
- **Morphing of images [C++]**
One image was morphed to other by tracking the trajectory of control points and thereby changing the corresponding points. Better results were available as number of intermediate steps increased.
- **Image Enhancement and Line Detection [C++]**
Performed Contrast Stretching, Hough Transform based line-detection and Histogram Equalization. Developed Smoothing Filters (uniform neighborhood averaging, Gaussian and median filters), Sharpening Filters (High pass and High boost filter), Ideal low/high pass filter and Butterworth low/high pass filter.
- **Edge and Corner Detection [C++]**
Developed Edge Detectors (Gradient, Roberts, Prewitt, Sobel, Nevatia-Bapu, Compass, Laplacian, Marr-Hildreth, Canny) and Corner Detector(Harris).

- **Mine-Sweeper [C]**
Developed a gaming application which is commonly found in any Windows/Linux machine.
- **Shape re-construction from shading pattern [MATLAB]**
Given a image and direction of light source find the depth map of the image using the shading information.
- **Depth computation from stereo image pair [MATLAB]**
Given 2 images with some overlap regions find the point correspondence between 2 images and compute the depth.
- **Computation Of Optical Flow from frames obtained via arbitrary motion of camera [MATLAB]**

Networks

- **Automatic Log-Report Generation & UNIX-Server script enhancements [VB, UNIX Scripting]**
The project dealt with periodically checking the status of 60 different servers on the Network for their performance levels and also generating their automatic status report in a graphical format.
- **Java Network Simulator [Only Design]**
Developed a design for the software which would simulate a established/new network so that it can be studied in detail and get its performance levels examined.

Miscellaneous

- **Computer Controlled Robot for material handling purpose [Low-level C/C++]**
The project involved developing a computer controlled robot for relocating objects from one place to another. The robot could move forward/backwards, pick up different objects and place them at appropriate locations.
Project was awarded **3rd Prize in the Department.**
- **Creating servlets using Java and MySql [Java Servlets and SQL]**
Included dynamic query processing and updating the data.
- **Creating Graphical User Interfaces (GUI) using Java Swing [Java Swing, SQL]**
Developed bar-charts, pie-diagrams and scatter diagrams reflecting data in the database.
- **PERL Scripting**
Analyzed squid log files using PERL, created html pages from bibtex entries and did client-server Programming using PERL Scripting.
- **Disaster Warning System [Only Design]**
Dealt with how to warn masses of local disasters like fire and also of global disasters like Tsunami, Earthquakes etc.
- **Hospital Management System [Only Design]**