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BEENA KUMARI

SUMMARY

- Currently working as a research assistant and pursuing "MS by Research" program at IIIT Bangalore
- Nearly **4 years** of research and industrial experience in the domain of visualization, 3D point cloud processing, GPU computing, image processing and computer vision
- Experience in developing and implementing **image/3D point cloud processing algorithms**.
- Good knowledge of **C, C++ and CUDA**
- My current research work includes tensor visualization and visual analysis of 3D lidar point cloud.

RESEARCH INTERESTS

- Scientific and Information Visualization
- High Performance Computing
- Image Processing and Computer Vision

PUBLICATIONS

- **B. Kumari**, and J. Sreevalsan-Nair, "An Interactive Visual Analytic Tool for Semantic Classification of 3D Urban LiDAR Point Cloud" accepted as short paper in 23rd ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL 2015).
- **B. Kumari**, A. Ashe, and J. Sreevalsan-Nair, Remote Interactive Visualization of Parallel Implementation of Structural Feature Extraction of Three-dimensional LiDAR Point Cloud (Demo paper), Big Data Analytics, Lecture Notes in Computer Science, Vol. 8883, 2014, pp 129-132, Springer (Presented at IIT Delhi).
- **B. Kumari**, and J. Sreevalsan-Nair, "Three-dimensional Visualization of LiDAR Point Cloud Using Structural Feature Extraction," in Proceedings of NSDI (National Spatial Data Infrastructure) 2013 and Poster presentation at IIT Bombay.

EDUCATION

MS by Research in Information Technology (2013-Present)	**CGPA: 3.1/4.0**
International Institute of Information Technology Bangalore	
B.Tech in Electronics & Communication Engineering (2006-2010)	**CGPA: 7.84/10**
Shri Mata Vaishno Devi University, J&K	

TECHNICAL SKILLS

Programming Languages	C, C++, MATLAB
Framework/Libraries	OpenCV, CUDA, PCL, CGAL, OpenGL
Tools/Software	XMDV, Valgrind

EMPLOYMENT

Research Assistant	**IIIT Bangalore**	**April 2013 – Present**

3-Dimensional Visualization of Lidar data-sets [April 2013 – Present]
Technologies: C++, OpenGL, MATLAB 7.5, FLTK, CUDA
Description: A user-driven visualization system to explore and analyze LiDAR data sets available from institutional geological regions such as 3D campus GIS.

- Developed an application framework for visualization and analysis of LiDAR data-sets.
- Implemented algorithms to visualize the large-scale LiDAR data-sets.
- Parallel implementation of feature detection algorithm using GPU computing using CUDA

Software Engineer	**Larsen & Toubro IES, Mysore**	**Feb 2011 – March 2013**

Ultrasound Scanner [Oct 2012 - Mar 2013]
Technologies: C++, OpenCV, MATLAB 7.5, OpenGL
Description: An ultrasound machine where user can scan the organs and perform B-mode imaging.

- Implemented the loader to load .hex file into cypress USB controller and .bin file into FPGA.

Digital Image Analysis for Quantitative Pathology [Jul 2012 - Mar 2013]
Technologies: C++, OpenCV, MATLAB 7.5

Description: An application, where pathologists can perform automated quantitative IHC analysis for breast tissues and generate an IHC report.

- Understand the specific requirements of the project.
- Involved in Design, analysis and Feasibility study of the project.

Extended Depth of Field and 3D Reconstruction of Microscopic Objects [Mar 2012 - Jun 2012]

Technologies: C++, MATLAB 7.5, OpenCV, OpenGL

Description: An application which can generate the extended depth of field and montage from a stack of images taken from optical microscope and create its 3D model

- Developed focus measure algorithm for microscopic images using wavelets.

Portable Ultrasound Imaging on Android [Oct 2011 - Feb 2012]

Technologies: C++, OpenCV, OpenGL, MATLAB 7.5

Description**:** An android application in which user can load post RF demodulated data taken from any ultrasound probe and can do quick ultrasound diagnosis. It has two modes only: B-mode and Color Flow Doppler mode.

- Implemented ultrasound image formation algorithm for B-mode in MATLAB/OpenCV.
- Implemented scan conversion algorithm for B-mode and Doppler mode using OpenGL.
- Developed speckle reduction algorithm in MATLAB/OpenCV.

Moving Object detection, Tracking and Classification (Jun 2011 - Sep 2011)

Technologies: C++, MATLAB 7.5, OpenCV

Description: An application to detect, track and classify moving objects into human and non-human in live video.

- Implemented feature detection algorithms- optical flow and HOG in OpenCV/MATLAB

ACADEMIC PROJECTS

Visual Analytic Tool for Semantic Labeling of Urban Lidar Point Cloud [Feb 2015 – Present]

Technologies: C++, OpenCV, QT, CUDA, OpenGL, PCL, CGAL

Description: A Visual analytic tool for exploration, analysis, visualization of features and semantic labeling of urban LiDAR point cloud

- Developed an algorithm for interactive divisive clustering for semantic labeling in LiDAR point cloud.
- Implemented an interactive visual analytic framework for exploration, analysis and semantic labeling of LiDAR point cloud. Parallel implementation of algorithm using CUDA.
- Developing algorithm for visualization of feature descriptors using parallel coordinate plots.

Visual Assessment of Second Order Symmetric Tensors for Feature Detection in 3D Point Cloud [Apr 2015 – Present]

Technologies: C++, PCL, CUDA, FLTK

Description: Different types of tensor can be used for detection of structural features in 3d point cloud. Second order symmetric tensors are analyzed and compared for extraction of structural feature in 3d point Cloud

- Modeled the data using structural and voting tensors for feature detection in 3D point cloud.
- Implemented a tensor framework for comparison of different feature detection methods using second order symmetric tensor.

Surveillance Camera System Using FPGA [Aug 2009 - Apr 2010**]**

Technologies: VHDL

Description: Surveillance camera system built using the motion detector and FPGA to capture and store the video as the person passes through the motion detector and display it on the VGA.

- Implemented I2C communication protocol on FPGA
- Implemented VGA controller on FPGA