Shailja | Curriculum Vitae

Visiting Research Scholar, Carnegie Mellon University (CMU), Pittsburgh

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Research Interests — Computer Vision, Image Processing, Design and Analysis of Algorithms

Education

- **Indian Institute of Technology (IIT), Kharagpur** **2012-2016**
  Bachelor of Technology (Hons) from Electrical Engineering Department

Publication

- Shailja, George Stetten "Descending Variance Graph for Segmenting Neurological Structures" - *In Preparation*

Research Experience

- **Carnegie Mellon University (CMU)** **Present**
  Visiting Research Scholar, Mentor : Prof. George Stetten, The Robotics Institute

  → **Project:** Automated Segmentation Analysis Using High Resolution Ultrasound Imaging
  - Developed the model of Descending Variance Graphs (DVGs) for segmenting neurological structure of ultrasound images in both 2D and 3D spaces.
  - Tested the algorithm for detecting tumors from various brain magnetic resonance images.
  - Currently developing a clustering algorithm to detect anatomical shapes using medialness of the segmented patches. Combined with the mean and variance of each patch, we are building an optimization algorithm which could try various combinations of inclusion/exclusion of patches to find the best combination in terms of yielding a segmented cluster with the desired medial parameters.
  - Lab Webpage - Visual Image Analysis Lab

- **University of Pittsburgh Medical College (UPMC)**
  Visiting Research Scholar, Mentors : Prof. Howard Aizenstein, Prof. Minjie Wu, Department of Psychiatry

  → **Project:** Descending Variance Graphs (DVGs) post-filter for hippocampus subfield segmentation from brain MRI
  - Developed the multi-modal Descending Variance Graphs (DVGs) algorithm for segmenting hippocampus area of brain MRI in 3D space. Results were verified using coregistered 3D images data from 7-Tesla fMRI.
  - Currently developing a touch-up tool for improving the T1 and T2 images which were segmented using freeSurfer software.
  - Implemented the DVG segmentation for skull stripping using T1, T2-FLAIR and automated ICV mask.

- **University of Washington (UW)** **Sept 2016 - Nov 2016**
  Research Assistant, Mentor : Prof. Tyler Folsom, Computing and Software Systems Division

  → **Project:** Localization and Navigation of a Self Driving Tricycle, Elcano
  - Successfully developed a fuzzy algorithm to estimate the position of a trike using GPS and dead reckoning. I also developed a lane detection algorithm to update the trike position from the edge to complement the GPS based positioning.
  - Developed an optical odometer for 2-D displacement measurement using 30×30 pixel image to track the trike's motion. In addition to the dead reckoning and lane detection algorithms that I implemented for the autonomous navigation, the use of this odometer led to a better position estimation of the trike, covering most corner cases as well.
  - In the media : UW Bothell News | The Woodinville Weekly | The Komo News TV Report

- **Indian Institute of Technology (IIT), Kharagpur** **Jul 2015 - April 2016**
  Bachelor's Thesis, Mentor : Prof. Jayanta Mukhopadhyaya, Computer Science Department

  → **Project:** Visual Navigation of Mobile Robots Using Monocular Vision
  - Developed an algorithm to generate a complete map of the traversable region for a robot using monocular vision.
  - Multiple images taken by a simple webcam were used for obstacle detection and avoidance.
  - Simple Linear Iterative Clustering (SLIC) was used for segmentation to reduce the memory and computation cost. The image was classified into traversable and non-traversable regions.
  - A simple mapping technique using inverse perspective mapping and occupancy grids was used, which is robust, and supports very fast updates to create the map for indoor navigation.

Industrial Experience

- **Flipkart Internet Pvt Ltd., Bangalore, India** **Nov 2016 - Aug 2017**
  Software Development Engineer
  - Worked at Flipkart, India's largest e-commerce company. Developed a software to automate the return flow of orders. Played a lead role in the order management system's migration to an improved version, handling a large amount of data.
- **GreyOrange Robotics, Gurgaon, India** **Jun 2016 - Sept 2016**
  Software Development Intern
  - Developed an algorithm to reduce the processing time of orders by implementing an idea of classifying each order as multiple or single item order. The algorithm was developed on the functional programming language - Erlang. Single-item orders were stacked together in a bin to be processed as multi-items orders, thus increasing the throughput.

Relevant Courses

- **Computer Science & Engineering and Mathematics**
  - Design & Analysis of Algorithm, Advance Digital Image Processing & Computer Vision, Machine Learning, Object Oriented Programming, Software Engineering, Computer Architecture & Operating System, Probability & Stochastic processes.
- **Electrical Engineering**
  - Digital Image Processing, Digital Signal Processing, Embedded System Design, Instrumentation Devices, Information Theory

Computer Skills

Programming Languages	C, Python, C++, Java, Assembly Language, Erlang, OpenCV, MATLAB
Other Software	Git, Arduino IDE, Proteus
Operating Systems	Linux, Ubuntu, Windows

Selected Projects

- **Plots to Table Converter**
  OpenSoft Inter-Hostel Competition, IIT Kharagpur, 2016
  - Developed a software for extracting information from plots in PDFs to create data tables. Set of scanned pages were used as input, with each page having one or more plots embedded in text.
  - Hough line transformation was used to find the plot region. Further smoothening and color segmentation processes were used for curve extraction.
  - Algorithms were developed to recognize plots, curves, captions, axis ranges etc. and a data set of two dimensional tables was created.
- **Unmanned Substation Transformer Control**
  - Developed a system to control the transformers autonomously, at an electrical power substation. Interfaced GSM SIM Modem with Arduino microcontroller to receive/make calls and SMS. This system along with a DTMF Decoder was used to control a transformer switch by making calls/SMS.
- **Gesture Controlled Robot**
  Minefield Event in Kshitij, Technical Fest, IIT Kharagpur, 2015
  - Designed an accelerometer based hand gesture controlled robot. Hand gestures could be used as input signals to drive the robot in different direction and detect mines using a metal detector circuit. The robot could rescue victims using a gripper attached to it.

Positions of Responsibility

- **Team Leader, OpenSoft Team**
  - I initiated and formed a team with 8 other undergraduate members and led the team to participate in the Inter-Hostel OpenSoft competition to win the Bronze award for our software.
- **Team Leader, Gopali Youth Welfare Society (GYWS)**
  - Led the team of GYWS, an NGO run by students and faculty of IIT Kharagpur. I was responsible for planning different activities, managing the overall action plan and coordinating between different teams of the society.
- **Mentor, Student Welfare Group (SWG)**
  - I was responsible for ensuring the academic and personal well being of three allotted men-tees.

Up to 3 references available on request