Vikram Voleti

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Research interests: To work at the intersection of computer vision and machine learning; to understand and apply learning techniques such as deep neural networks to vision-related research

EDUCATION

Indian Institute of Technology (IIT), Kharagpur *2009 - 2014*

Dual Degree (B.Tech. (H) + M.Tech.) in Electrical Engineering,
with Master's specialization in Instrumentation and Signal Processing **CGPA:** 8.44 / 10

RESEARCH PAPERS

Journal:

[1] S. Jonna, S. Satapathy, V. S. Voleti, R. R. Sahay, "Unveiling the scene: A Multimodal Framework for Simultaneous Image Disocclusion and Depth Map Completion using Computational Cameras," *International Journal of Computer Vision*, 2017 (under review)

Conference:

[2] V. Voleti, "*Carry-Free Implementations of Arithmetic Operations in FPGA*" in *Proc. 24th National Conference on Communications*, 2018 (under review) [pdf]

[3] V. Voleti, P. Mohan, S. Gupta, J. Iqbal, "Simple Real-Time Pattern Recognition for Industrial Automation," in *Proc. International Conference on Industrial Design Engineering*, 2017 (under review) [pdf]

[4] S. Jonna, V. S. Voleti, R. R. Sahay, and M. S. Kankanhalli, "A Multimodal Approach for Image De-fencing and Depth Inpainting," in *Proc. Int. Conf. Advances in Pattern Recognition*, 2015, pp. 1—6 [pdf, IEEE]

CURRENT WORK

Research Intern — *Applied Research Lab* *May 2017 - present*

International Institute of Information Techonology - Hyderabad, India

Under Prof. C. V. Jawahar, Centre for Visual Information Technology, IIIT-Hyderabad

- Towards weakly supervised lipreading using deep neural networks
- Analyzing the effect of attributes on visual speech recognition datasets such as Lipreading-in-the-wild
- Experimenting with convolutional and recurrent neural networks for self-training on unlabelled datasets

WORK EXPERIENCE

Image Processing Engineer — *Embedded Systems team* *February 2016 - May 2017*

GreyOrange Robotics, India — *a multinational firm that designs, manufactures and deploys advanced robotics systems for automation at warehouses, distribution and fulfillment centres*

- Developed computer vision module to perform video processing in real time for warehouse automation
- Optimized and implemented vision and learning algorithms for faster pattern recognition
- Experimented with CNNs on GPU for classification of objects on warehouse conveyor belts
- Developed embedded vision modules in automated guided robots for warehouses
- Research paper [3] based on work is under review at ICIDE 2017, for publishment by ACM

Associate Engineer — *Avionics Software & Systems Testing group* *July 2014 - February 2016*

Airbus, India — *a commercial aircraft manufacturer, the largest aeronautics & space company in Europe*

- Involved in development and integration of avionics systems for the long-range aircrafts family
- Simulated signal-level modifications to the Flight Warning Computer, adopting standard avionics coding guidelines (DO-178B)

RESEARCH PROJECTS

"De-fencing of Images using RGB-D Data" — M.Tech. Thesis *2013 - 2014*

IIT Kharagpur, India — *Prof. Rajiv Sahay, Department of Electrical Engineering*

- Elimination of fence-like occlusions, inpainting of images using RGB-D data
- Nominated for Best M.Tech. Project Award among three departments (Electrical, Electronics, CS)
- Research paper [4] based on project work is published in the proceedings of ICAPR 2015 in IEEE Xplore
- Co-authored journal paper [1] is under review at the International Journal of Computer Vision (IJCV)
- Links — GitHub repository containing thesis, presentation, code files, and results

"Identification of Bilabial Consonants in Audio and Lip Closures in Video" — B.Tech. Thesis

IIT Kharagpur, India — *Prof. Rajiv Sahay, Department of Electrical Engineering* *2012 - 2013*

- Measurement of synchronization between audio and video using bilabial cues in both modes
  - Trained a Gaussian Mixture Model (GMM) in MATLAB with MFCCs extracted from audio
  - Devised a C++ program to identify lip closures in video using OpenCV modules
- Links — GitHub repository containing thesis, presentation, code files, and results

RESEARCH INTERNSHIPS

"Implementation of Carry-Free Arithmetic Operations in FPGA" *Summer 2013*

KU Leuven, Belgium

Under Prof. Ingrid Verbauwhede, Computer Security & Industrial Applications research group

- Designed and implemented addition, subtraction, multiplication, modular reduction using Carry-Free Logic
- Developed, tested and verified the modules in Verilog, and simulated circuits in Xilinx
- Single-author research paper [2] is under review at the 24$^{\text{th}}$ Indian National Conference on Communications, NCC 2018, for publishment in IEEE Xplore
- Links — GitHub repository containing report, presentation, and related files

"Fingertip Gesture Recognizer using HMMs" *Summer 2012*

IIT Kharagpur, India

Under Prof. Aurobinda Routray, Department of Electrical Engineering

- Implemented Hidden Markov Models (HMMs) in MATLAB, verified with standard implementations
- Created a program that recognizes shapes drawn by fingertip using HMM
- Links — GitHub repository containing report, presentation, code files, and results

"Measurement of Intra-die Power Variation in Sub-nm FPGA's" *Summer 2011*

Imperial College, London

Under Prof. Peter Cheung, Head, Department of Electrical and Electronics Engineering

- Measured the relative power consumption among the LookUp Tables (LUTs) of an FPGA
- Designed and implemented an automated workflow for signal processing, and visualization of results
- Links — GitHub repository containing presentation, certificate, and recommendation letter

TECHNICAL SKILLS

Programming : C, C++, HTML/CSS, Javascript, Python, MATLAB, Shell, Verilog
Operating Systems: OS X, Unix/Linux, Windows
Libraries: CUDA, IDS (cameras), Keras, LaTeX, OpenCV, PyTorch, Tensorflow

TEACHING EXPERIENCE

Teaching Assistant — IIT Kharagpur, India *2013 - 2014*

- Teaching Assistant for Real Time Signal Processing, Introduction to Electrical Engineering courses
- Conducted tutorials, laboratory sessions, and developed assignments

SCHOLASTIC ACHIEVEMENTS

- Attended summer schools on Computer Vision and Machine Learning at IIIT-Hyderabad in 2017
  - Stood 3rd in Computer Vision Summer School out of 120+ participants, was rewarded full fee waiver
  - Stood 4th in Machine Learning Summer School out of 120+ participants, was rewarded full fee waiver
- Talk: "Mathematics of back-propagation in multi-layer perceptrons"
  - Lecture given at GreyOrange Robotics, India, and IIIT-Hyderabad
  - Tutorial iPython notebooks are available on GitHub page [link]
- Completed *additional* courses in the department of Computer Science & Engineering at IIT Kharagpur — Algorithms-I, Artificial Intelligence, Computational Number Theory
- Achieved "**EX**cellent" (highest) grade in Digital Voice & Picture Communication, Programming & Data Structures, Real Time Signal Processing lab., Digital Electronic Circuits, Control & Electronic System Design, Power Systems lab., Total Quality Management, Transform Calculus, Game Theory & Applications
- Awarded the Order of Merit by Indian Institute of Technology (IIT), Kharagpur, upon graduation in 2014
- Built a real time simple-code reader in MATLAB for robot path planning as a course project
- Participated in Amazon Data Science competition in MVSP 2012, Kaggle competitions, Coursera courses on machine learning, computer vision, neural networks, natural language processing
- Qualified JEE 2009 by IIT at 99.7 percentile, with All India Rank of 1330 (out of 384,977)

RELEVANT COURSES

Computer Science & Engineering: Algorithms-I, Artificial Intelligence, Computational Number Theory, Computer Architecture & Operating Systems

Computer Vision and Multimedia: Digital Image Processing & Applications, Digital Voice & Picture Communication, Vision & Visualization

Signal Processing, Embedded Systems: Analog Communication, Analog Signal Processing, Data Communication Networks, Digital Electronic Circuits, Digital Signal Processing, Mixed Signal Circuits & System-on-Chip, Power Electronics, Programmable & Embedded Systems, Real Time Signal Processing, Signals & Networks, Statistical Signal Processing

Mathematics & OR: Probability & Stochastic Processes, Transform Calculus, Game Theory & Applications, Total Quality Management

OTHER ACTIVITIES

- French — completed the A1-level course by Alliance Française de Delhi, Gurgaon centre
  - Languages known — Telugu (native), English (fluent), Hindi (fluent), French (novice)
- Robotics — made a zipline-traversing robot for a nation-wide manual robotics competition in 2012
- Speedcuber — participated in Rubik's cube solving competitions by World Cube Association
- Debate — headed organization of IIT Kharagpur Model United Nations 2013, participated in other MUNs
- Dramatics — part of the English dramatics club of IIT Kharagpur since 2009, promoted to Governor in 2011, participated & won medals in 15 drama competitions in India, including "Best Actor" in 2010
- Volunteering — served as a volunteer for the National Service Scheme of India in Kharagpur in 2011
- Movie reviewer — movie reviews on my blog [link], published on multiple websites

OTHER POSITIONS OF RESPONSIBILITY

- Captain, Dramatics & Literary, Patel Hall, IIT Kharagpur *2012-2014*
- Governor Board Member, IIT Kharagpur Model United Nations 2013 *2012-2013*
- Governor, the English Dramatics Society of IIT Kharagpur *2011-2012*
- General Secretary (Treasury), Electrical Engineering Society, IIT Kharagpur *2011-2012*