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

Dual Degree (B.Tech. (H) + M.Tech.) in Electrical Engineering *Graduated 2014*
with Master's specialization in Instrumentation and Signal Processing
Indian Institute of Technology (IIT), Kharagpur **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 (accepted) [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
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 has been accepted 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

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

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

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]
- Won the SMS Classification challenge in the 2017 Hack2Innovate hackathon in Bangalore, India
- 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
- Participated in Amazon Data Science competition in MVSP 2012, Kaggle competitions, Coursera courses on machine learning, computer vision, neural networks, natural language processing
- 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
- 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)
- 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 and 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
- Travel & adventure — I enjoy traveling, trekking, swimming; I loved backpacking in Western Europe

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*