

# JONTI TALUKDAR

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## EDUCATION

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### Institute of Technology, Nirma University

2014 -2018

Bachelor of Technology (*Electronics and Communication Engineering*), 7<sup>th</sup> Semester

GPA: 8.69 (Top 5 of the Batch)

## RESEARCH PROJECTS

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### Transfer Learning for Object Detection using Deep CNNs

Apr 2017 – Jul 2017

*Research Intern, High Performance Computing Lab, IIT Gandhinagar, Guide: Dr. Ravi Hegde*

- Trained Deep Convolutional Neural Networks on synthetic images for the task of object detection.
- Developed strategies for artificially rendering synthetic datasets using 3D object models from ShapeNet, achieving high photorealism for transfer learning.
- Used different data augmentation techniques for improving robustness and quality of synthetic datasets.
- Trained state of the art deep CNN architectures like faster RCNN, SSD, R-FCN, GoogLeNet, DetectNet, etc. using Caffe and TensorFlow frameworks and increased overall mAP by more than 35% through hyperparameter optimization.

### Road Network Extraction for Remote Sensing Applications

Jan 2017 – May 2017

*Under external funding through ISRO-RESPOND Project, Space Application Center- ISRO, Guide: Dr. Tanish Zaveri*

- Worked on implementing a two-step algorithm for extracting linear features from Synthetic Aperture Radar (SAR) images for Ahmedabad city.
- Preprocessed dual-pol SAR data and extracted C2 features using PolSAR Pro.
- Deployed a variety of filtering methods to remove speckle noise on images extracted.
- Analyzed the result of several decomposition methods to evaluate parameters like entropy, anisotropy, lambda etc.

### Real-time Human Action Recognition System

Apr 2016 - Feb 2017

*Funded R&D Project, IdeaLab Technology Incubator, Nirma University, Guide: Dr. Tanish Zaveri*

- Developed a novel approach for recognizing human actions like ‘clapping’, ‘boxing’, ‘running’, etc. using good features and the iterative optical flow algorithm.
- Training and testing was done on the KTH action recognition dataset.
- The algorithm used the resilient backpropagation algorithm for training the feedforward neural network, utilizing OpenCV and Python based machine learning libraries including ‘sklearn’, ‘skimage’, etc.
- Implemented and tested entire recognition pipeline in real time on embedded Linux platforms including Odroid XU4, Raspberry Pi 3.

### Design of High Speed Radix-4 SRT Divider

Apr 2017 - Jul 2017

*In Collaboration with RISE (Reconfig. and Intelligent Systems Engg.) Lab, IIT Madras, Guide: Dr. Sachin Gajjar*

- Designed and developed Fuzzy logic based SRT Radix 4 division algorithm in IBM Bluespec (System Verilog).
- Improved earlier SRT Radix 4 method through parallelization and use of Fuzzy logic for quotient and remainder selection.
- Implemented the algorithm on reconfigurable devices like the Xilinx Virtex UltraScale FPGA.

### Smart Spectrum Sensing for Cognitive Radio

Nov 2016 – Feb 2017

*Minor Research Project, Nirma University, Guide: Prof. Khyati Vachhani*

- Developed a Signal to Noise Ratio (SNR) based adaptive threshold algorithm for energy detection and spectrum sensing in GNU Radio.
- Used it to monitor primary user activity in radio environment using USRP B200 and reallocated bandwidth to secondary users, enhancing channel utilization.

## TECHNICAL SKILLS

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**Programming Languages:** Python, C, C++, Embedded C, Verilog HDL, MATLAB.

**Operating Systems:** Windows, Linux, Embedded Linux.

**Tools and Frameworks:** OpenCV, BVLC Caffe, TensorFlow, Nvidia DIGITS, RISC-V GNU toolchain.

**Software:** Blender, Xilinx ISE, Keil  $\mu$ Vision, Eagle, GNU Radio, Atmel Studio.

**Embedded Platforms:** Arduino, Raspberry Pi 3, Odroid XU4, XBee, USRP B200.

## EXPERIENCE

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**Design Intern, NXP Semiconductors**

**Jan 2018 - Present**

- Working with the Automotive Electronics division involved in the System IP Integration, Digital Design, CDC Checks and Verification of SoCs.

**Research Intern, HPC Lab, IIT Gandhinagar**

**Apr 2017 - Jul 2017**

- Joined the High Performance Computing Facility at IIT Gandhinagar under Dr. Ravi Hegde, in the capacity of a research intern, working on Deep Learning solutions for Computer Vision problems.
- Gained hands on experience working with state of the art deep learning architectures like SSD, Faster-RCNN etc. (through Caffe & TensorFlow implementations) for training on GPUs like the Nvidia TitanX and Nvidia GTX 1070.

**Internship Program, Jet Airways**

**May 2015 - Jun 2015**

- Joined the Jet Airways Engineering and Maintenance Facility at their hangar at Mumbai airport as part of the Engineering and Management Internship program.
- Worked at the Maintenance & Control Center (MCC) which manages global operations, engineering and maintenance of the entire fleet as well as provides technical assistance to ground & air crew.

## EXTRA CURRICULARS

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**Center Head, Fellowship Program, Make a Difference**

**Apr 2015 - May 2016**

- Joined the Ahmedabad city Core Team as part of fellowship program under Make a Difference.
- Played an active role in the Leadership X Design (**LxD**) **Programme**, increasing student attendance, pass ratio and reducing child stress in shelter homes.
- Worked 20 plus hours every week to ensure effective implementation and quality of all projects, Ed Support, Discover and Propel, within the city.

**Ed Support Volunteer, Make a Difference**

**Aug 2014 - Apr 2015**

- Took up ownership to teach Science and Math to secondary school students at a shelter home in Gandhinagar.
- Provided after-school support through teaching assistance and mentorship of the kids at the shelter.

## PUBLICATIONS

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- P. Rajpura, A. Aggarwal, M. Goyal, S. Gupta, **J. Talukdar**, R. Hegde, H. Bojinov, 'Transfer Learning by Finetuning Pretrained CNNs Entirely with Synthetic Images', *6<sup>th</sup> National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics (NCVPRIPG)*, Dec. 2017 (accepted)
- J. Talukdar**, S. Gupta, P. Rajpura, R. Hedge, 'Transfer Learning for Object Detection using State of the Art Deep Neural Networks', *5<sup>th</sup> IEEE International Conference on Signal Processing and Integrated Networks (SPIN)*, Feb. 2018 (accepted).
- J. Talukdar**, A. Biswas, S. Gupta, 'Data Augmentation on Synthetic Images for Transfer Learning using Deep CNNs', *5<sup>th</sup> IEEE International Conference on Signal Processing and Integrated Networks (SPIN)*, Feb. 2018 (accepted).
- J. Talukdar**, B. Mehta, 'Human Action Recognition using Good Features and Multilayer Perceptron Network', *6<sup>th</sup> IEEE International Conference on Communication and Signal Processing (ICCSP)*, April. 2017. (presented) (**arxiv-preprint**, arxiv:1708.06794)
- J. Talukdar**, B. Mehta, K. Aggrawal, M. Kamani, 'Implementation of SNR estimation based Energy Detection on USRP and GNU Radio for Cognitive Radio Networks', *2<sup>nd</sup> IEEE Intl. Conf. on Wireless Communication, Signal Processing and Networking (WiSPNET)*, Mar. 2017. (presented) (**arxiv-preprint**, arxiv:1708.06802)
- B. Mehta, **J. Talukdar**, S. Gajjar, 'High Speed SRT Divider for Intelligent Embedded System', *2<sup>nd</sup> Int. Conf. on Soft Computing (IcSoftComp)*, Dec. 2017 (accepted).