

# Aman Raj

B.Tech. , Department of Electronics & Communication Engineering  
 Delhi Technological University (formerly Delhi College of Engineering)  
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## EDUCATION

### DELHI TECHNOLOGICAL UNIVERSITY (FORMERLY DCE)

B.TECH IN ELECTRONICS & COMMUNICATION ENGINEERING  
 May 2016 | Delhi, India  
 Aggregate: 82.52%, (5<sup>th</sup>/195)

### SPRING MEADOWS PUBLIC SCHOOL

Class XII, CBSE : May 2012 | Delhi, India  
 Aggregate : 95.0%, 1<sup>st</sup> in School  
 Class X, CBSE : May 2010 | Delhi, India  
 CGPA : 9.8/10

## AREAS OF INTEREST

Deep Learning  
 Computer Vision  
 Data Science  
 Machine Learning Algorithms

## RELEVANT

### COURSEWORK

Undergraduate:  
 Advance Engineering Mathematics  
 Probability & Stochastic Processes  
 Control Systems  
 Microprocessor & Interfacing  
 Embedded Systems  
 Computer Architecture  
 Programming Fundamentals  
 Robotics & Object Tracking  
 Pattern Recognition  
 Digital Image Processing  
 Computer Vision

Udacity:  
 Introduction to Parallel Programming  
 by John Owens, David Luebke

Coursera:  
 Neural Networks for Machine Learning  
 by Geoffrey Hinton  
 Algorithms: Design and Analysis  
 by Tim Roughgarden  
 Machine Learning  
 by Pedro Domingos

## WORK EXPERIENCE

### FACEBOOK INC. | MACHINE LEARNING ENGINEER

Ramesh Raskar, Manohar Paluri | Aug 2016 – Present

- I work in Applied Machine Learning(AML) group focused on understanding contents in images and videos. I currently work on object detection and recognition, semantic labeling and scene understanding. Recently, I implemented a distributed training pipeline in Caffe2 for Large Scale training on satellite images which is used by internal product team daily.
- **“Robocodes: Towards Generative Street Addresses from Satellite Imagery”**  
 We built a generative algorithm for robocodes. I developed many Deep Convolutional Neural Network architectures based on ResNet, UNet, SegNet, DenseNet for extracting roads from satellite imagery using large amounts of annotated and weakly annotated data.
- Also, experimented with Unsupervised learning models to leverage huge amount of unlabeled data. All the codes are opensourced.

### SUPPLYAI INC. | DATA SCIENTIST

Karthik Sridhar | Dec 2015 – July 2016

- Designed and implemented the predictive intelligence in company's first product Velo, aimed at reducing returns in supply chain. Built the backend of software using H2O.ai with mix of Scala, Java, Python.
- Skills gained in Data Analysis, Data Munging, Data Visualization, Feature Engineering, Feature Selection, developing data-centric software pipeline.

### RIGHT RELEVANCE INC. | DATA SCIENCE INTERN

Vishal Mishra | Dec 2015 – Feb 2016

- I fixed bugs in their existing Apache-Storm based topology to improve mining of urls from tweets, cleaning it, and then fetching articles from url.
- Wrote custom article extraction rules for specific urls for which existing system failed in javascript.

## RESEARCH EXPERIENCE

### CARNEGIE MELLON UNIVERSITY | SUMMER INTERN

Sebastian Scherer | Jun 2015 – Aug 2015

- **“Multi-Scale Convolutional Architecture for Semantic Segmentation”**  
 I worked in **AirLab**, the project was focused on implementing a novel multi-scale Deep Convolutional Neural network for semantic labeling of 2D scenes for indoor and outdoor scene understanding.
- Also, worked on transferring this learning for semantic classification of point cloud data to aid perception and path planning in a UAV.

### CARNEGIE MELLON UNIVERSITY | WINTER INTERN

Bhiksha Raj, Rita Singh | Dec 2014

- **Comic Polyglot in CMU IPTSE Winter School 2014**, the project aimed at developing an end to end solution for automatic translation of raw manga comics from Japanese into English. I implemented a convolutional neural network based system that detects text bubbles in comic strips.
- We used a combination of output of neural network model & MSER algorithm to detect text-regions with subsequent translation with an OCR-engine.

# RESEARCH ASSISTANT

## DELHI TECHNOLOGICAL UNIVERSITY

Prof. Rajesh Rohilla, Prof. S.Indu | Jun 2013 – May 2016

- **“FPGA Accelerated Abandoned Object Detection”**

Worked on developing a standalone system that uses a static background modeling algorithm and identifies any object lying abandoned for a given specified time. I accelerated algorithm's performance by implementing it on Xilinx FPGA board.

- Worked on **HistExtract**, an ICA based algorithm that extracts textual information from historical inscription images containing high correlation between signal and noise. Aim was to extract, binarize and preserve these inscriptions digitally. This project was sponsored by Department of Science & Technology, Govt. of India.

## DELHI TECHNOLOGICAL UNIVERSITY

Prof. N.S. Raghava | Oct 2012 – May 2013

- **Lunabotics Mining Project**, focused on developing a lunar rover to participate in NASA Lunabotics Mining Competition 2013. I designed and fabricated various electronic circuits, developed telemetry system for rover, establishing control and communication among digging, dumping, & locomotion mechanism. Project was supported by research grant from college.

## PUBLICATIONS

- N. Jayanthi, Ayush Tomar, **Aman Raj**, S. Indu, and Santanu Chaudhury. "Digitization of Historic Inscription Images using Cumulants based Simultaneous Blind Source Extraction". In Proceedings of ICVGIP 2014. ACM, Article 51, pp. 1-6.
- S. Indu, Ayush Tomar, **Aman Raj**, and Santanu Chaudhury. "Enhancement and Retrieval of Historic Inscription Images." In Computer Vision-ACCV 2014 Workshops, pp. 529-541. Springer International Publishing, 2014.
- **Aman Raj**, P. Selvan, A. Dixit, Gaurav Bansal, H. Solanki and F. Abbas, "Comic Polyglot", CMU IPTSE Winter School Poster Session, 2014. **(Best Project Award)**
- **Aman Raj**, Daniel Maturana, and Sebastian Scherer. "Multi-Scale Convolutional Architecture for Semantic Segmentation". Robotics Institute Technical Reports. CMU-RI-TR-15-21, 2015.
- R. Rohilla, **Aman Raj**, Saransh Kejriwal, and R. Kapoor. "FPGA Accelerated Abandoned Object Detection". IEEE's International Conference on Computational Techniques in Information and Communication Technologies (ICCTICT), 2016.
- Ilke Demir, Forest Hughes, **Aman Raj**, Kleovoulos Tsourides, Divyaa Ravichandran, Suryanarayana Murthy, Kaunil Dhruv, Sanyam Garg, Jatin Malhotra, Barrett Doo, Grace Kermani, Ramesh Raskar. "Robocodes: Towards Generative Street Addresses from Satellite Imagery". CVPR, 2017. **(award)**

## TECHNICAL SKILLS

- **Programming Languages:**  
C, C++, Python, Java, Scala, Lua, LaTeX, Matlab, Octave, Javascript, Unix Shell Scripting
- **Software/Others:**  
OpenCV, Caffe, Caffe2, Chainer, H2O.ai, Lasagne, Torch, Theano, Qt, AWS, Git, Apache-Storm, Apache-Spark, MongoDB, Xilinx Vivado HLS, MySQL
- **Development Boards:**  
Xilinx Zynq-7000 FPGA Imaging Kit, Intel Atom Board, BeagleBone Black, Arduino Due, Raspberry Pi

## OTHER PROJECTS

(Supervised by Prof. Rajesh Rohilla)

- **‘Robot Navigation system using Xbox Kinect’**

Built a navigation system for a robot using OpenCV and OpenKinect libraries, that uses disparity map along with pixel intensity calibration to compute the distance of an object/obstacle from the Xbox Kinect. Generated signals are sent to motor driver circuit that propels the wheel to avoid possible collision with obstacle.

- **“3B Biometrics Security System”**

Developed a system prototype using BeagleBone Black and RGB camera for purpose of authorizing access and remote monitoring in Robotics Lab(DTU). The system uses a combination of real-time face recognition and input password to authorize access and monitors student's activities in lab, and periodically sends these informations to lab-incharge on WhatsApp.

- **“Face Detection & Tracking”**

Created a robust algorithm that combines SIFT and CamShift algorithm to detect and track a human face in real time. The tracker correctly tracked face for more than 90 % of frames at 15 FPS on Intel core i5-2450M processor.

- **“Text Extractor Device”**

Developed a hand-held device that takes images from an on-board camera and extract texts from it using tesseract-ocr engine running on BeagleBone Black and shows the text on-screen with an accuracy of 92%.

## AWARDS AND ACCOMPLISHMENTS

- **Best Project Award** for the research project "Comic PolyGlot" in CMU IPTSE Winter School 2014.
- **CSSS Scholarship 2012:** Awarded by CBSE(Govt. of India) to meritorious students for distinctive performance in All India Senior Secondary Examination.
- **Award of Recognition** for contribution to DCE-DTU Alumni Association as Volunteer coordinator, 2014.
- **Awarded Silver Certificate** in HDFC Bank Meritus Scholarship, 2009.
- **Academic Excellence Award** for the year 2009-10 and 2011-12 in school for securing first position in final examination.
- Selected for **Inspire Science Camp** organized by Department of Science & Technology, Govt. of India in 2011, merit based selection based on Class-X CGPA.
- Obtained an All India Rank-**312** in **National Science Talent Search Examination** in year 2012.

## EXTRA-CURRICULAR ACTIVITIES

- **Volunteer Coordinator** during **Annual Alumni Meet 2013 and 2014** in college.
- **Teaching assistant** in NGO **Touch-India Trust**, it provides education to underprivileged kids in slum areas.
- Mentored juniors in their academic projects.
- Organized many technical workshops in college.