Varun Sundar

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Indian Institute of Technology Madras

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Education

Program	Institution	%/CGPA	Completion
B Tech, Electrical Engineering (5th Semester)	Indian Institute of Technology Madras	9.59/10	2020
XII (CBSE)	Delhi Public School Bangalore South	96.2%	2016
X (CBSE)	Delhi Public School Bangalore South	10/10	2014

Scholastic Achievements

- Secured **AIR 2917** in JEE-Advanced 2016 (out of **1,50,000+ candidates**); Secured **AIR 501** in JEE-Mains 2016 (out of **13,00,000+ candidates**)
- Awarded **KVPY Scholarship (top 1% out of 10,000 applicants)** and offered provisional admission to IISc with fellowship in 2016
- **Top 1% (out of 35,000 students)** in the National Chemistry Olympiad 2016 and qualified for the **Indian National Chemistry Olympiad 2016**
- **Top 1% (out of 35,000 students)** in the National Physics Olympiad 2016 and qualified for the **Indian National Physics Olympiad 2016**

Relevant Coursework

- Reinforcement learning*
- Non-convex Optimization
- Deep learning*
- GPU Programming*
- Digital Signal Processing
- Probability theory
- Numerical Methods and Applied Programming

* - Indicates Courses in present semester

Skills

- **Core** - Python, C, C++, Ruby, Bluespec, Verilog
- **Packages** - Scikit-learn, Scipy, TensorFlow (core and Slim), Keras, Pytorch, Flask
- **Web** - HTML, CSS, JS, Jeyll, Hugo
- **Others** - LaTex, MATLAB, GNU Octave, Arduino, Git, Shell Scripting, Docker, Travis CI

Internships and Work Experience

Hyperverge Inc.

May'18 - July'18—Deep Learning Engineer

- Worked on building an end-to-end pipeline for training small scale object detectors on over 13 architectures for the specific case of satellite imagery
- Achieved a **mAP of 67.4** with a hybrid architecture involving atrous convolutions, and **nasnet** feature-extractors. Used a version controlled system to record deep learning experiments.
- Designed a bootstrapping system utilising fast-inference based on **tensorrt**. Pipeline was designed to work on parallel **ETL(Extract Transform Load)** for training, interleaved synchronous evaluation and on the run visualisations.
- Designed a visualisation metrics and system for large satellite data (Tb) on **mercaptor** based tools such as Google maps while using libraries such as **rtree, fastKML** in order to facilitate scalable human-annotation.

Research activities and Projects

Optimising Neural Machine Translation on FPGA's [*Guide: Assistant Prof. Pratyush Kumar P*]

Aug'18 - Present

- Working on on-device optimisation of **NMT** on **FPGA's** by performing correlated experiments on quantisation, pruning, surrogate functions and fused custom operators. Aim to reduce large overhead and compute cost of NMT models in their softmax and conversion layers.
- Presently working on **OpenNMT and Google NMT** based architectures as models under consideration.

CNN Monocular SLAM

June'18 - Present—GitHub

- Working on fusing benefits of **Large Scale Direct SLAM** with monocular depth estimation and fast image segmentation. Improved pipeline to incorporate any deep net based **detection, segmentation or heat map outputs**.
- Investigated usage of unsupervised monocular depth estimation with a wide number of techniques including : **stereo inspired left-right consistency, semi-supervised learning, 3-D depth reconstruction with ego-motion** (as a surrogate loss).

Shared Compute Setup

June'18 - Aug'18—CVI IIT Madras,GitHub

- Set up a shared cluster for 30 users in IIT Madras to access over 4 nodes with independent container environments.
- Utilised best practices in **Dockerfiles** to obtain low memory demands, secure (SSH-key encrypted) and reliable access to training stacks throughout IIT Madras. Required understanding of operation of institute networking, safe access practices, server cooling requirements and dataloss mitigation strategies.

AI for India: Social Initiative

June'18 - Aug'18— GitHub

- Working closely with a team of 6 and professors Pratyush Kumar and Mitesh Khapra in the department of Computer Science, with an objective of building social impact solutions to largely out-of-focus problems.

• Aim to democratise benefits of **Artificial Intelligence and Computer Vision** to a broader, unknown rural audience

Automatic Waste Segregator

Aug'17 - May'17—CVI, CFI IIT Madras

• Designed the deep learning backend and fabricated electronics for creating a low-cost, fast response segregator at source. Used an ensemble of visual and electrical features to accurately classify over 4,000 distinct objects into a given set of classes.

• Compiled a resource optimised version of tensorflow to deploy on low-power **Single Board Computers** such as a Raspberry Pi and Odroid.

• Demonstrated at **CFI Open House**. Patent filled, approval pending.

• Won the campus round of the **9th HULT Prize** a $ 1 million challenge to solve the world's most pressing issues by using energy to transform the lives of 10 million+ people, dubbed as the "Nobel Prize for Students". **Shortlisted for the regional round at NTU, Singapore.**

• Awarded **Best Research Proposal Presentation** at **Shaastra 2018**. Shortlisted for **Design Impact Awards**, **Digital Ocean Campus Programme**, and **Pragyan, IISc.**

Fiducial Localisation

Oct'17-Jan'18—GitLab

• Worked on autonomous and unsupervised detection of fiducials implanted for brain surgery. Utilised **mayavi** and **VTK** to perform 3-D visualisation of skull images, followed by **PCL** methods for KD-Tree objects, 3-D template matching, and local clustering.

• Documented Deep Learning methods to fiducial isolation based on rendered data augmentation, with 3-D covnets ande slices for 2-D covnets.

• Taken up as a part of the **BARC** problem statement, **6th Inter IIT Tech Meet** .

Hand-Gesture Recogniton

Nov'17-Jan'18—GitLab

• Developed an ensembled neural network to accurately classify 20 hand gestures. Used architectures based on *Incpetion-V4* and *Resnet-50* as a part of the structure. Accuracy bench-marked on *Marcel* database. Later extended to incorporate IMU sensor based inputs.

• Adjudged winners for **T-Hub's Hack2innovate**, presented by **NVIDIA** and **Samsung**. Invited to **Global Entrepreneurship Summit, 2017-Hyderabad.**

Positions of Responsibility

Head, Computer Vision and Intelligence Group, 2018-19

• Leading an undergrad community of 40 students who work enthusiastically towards building a impactfull organisation.

• Have conducted open sessions for an audience of 200+ strong multiple times in IIT Madras and a few outside. Developed git documented content to keep track of the changes the group has seen since 2016, accessible here

• Worked on standardisation systems for shared compute, documentation builds. Documentation engine built to be integrated directly with existing git workflow, found here

• Frequently interact with startups (Hyperverge Inc, Detect Technologies, Verihelp,etc), companies (Amazon, Google), NGOs and professors in our activities and projects.

Coordinator Centre For Innovation, 2017-18

• Part of **Computer Vision and Intelligence Group**, CFI, a community of students actively working on projects in Computer Vision and Deep Learning.

• Responsible for club's activities including conducting peer-to-peer sessions, hackathons and projects.

Events Coordinator, Shaastra 2018

• Responsible for conducting events under Shaastra, an **ISO 9001:2008** audited technical fest.

• Conducted a workshop on IoT devices and actively managed three other events, including **Amazon AWS Hackathon**, Deep Learning Summit and **IBM Watson Workshop**.

Extra-Curricular Activities

• Invited to conduct workshop titled **"Computer Vision through the Ages"** as a part of PySangamam 2018.

• Managerial Team, **E-Cell**: Conducted Bootcamp as a part of E-Summit 2017, a weeklong mentorship and pitching avenue for aspiring entrepreneurs.

• Represented **Cauvery Hostel** at Schroeter Tennis 2017

• Writer at **Immerse, IIT Madras**, the research blog of the institute. Drafted an article covering oncology based study methods with Prof (draft prepared).