

Harshit Gupta

Third Year Undergraduate

Major in Electrical Engineering with Minor in Machine Learning and Applications

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ACADEMIC QUALIFICATIONS

Year	Degree/ Certificate	Institute	Performance
2017-Present	B. Tech	Indian Institute of Technology, Kanpur	9.51/10.0
2017	Class XII: AISSCE	Delhi Public School, R.K. Puram	96.2%
2015	Class X: AISSE	Delhi Public School, R.K. Puram	10.0/10.0

PUBLICATIONS

A Deep Learning Framework for Robust DOA Estimation using Spherical Harmonic Decomposition

Vishnuvardhan Varanasi, **Harshit Gupta**, Rajesh Hegde. Submitted to IEEE Transactions on Audio, Speech and Language Processing (Current Status: Accepted with Minor Changes)

SCHOLASTIC ACHIEVEMENTS

- Recipient of the **Academic Excellence Award**, for distinguished academic performance in freshman and sophomore year
- Secured All India Rank **1106** in **Joint Entrance Examination Advanced** among 220,000 screened aspirants
- Secured All India Rank **3462** in **Joint Entrance Examination Main** among 1.2 million aspirants
- Recipient of the **KVPY Fellowship** under **SX Stream** by the Indian Institute of Science, Bangalore in the year 2017
- **Gold medal** awarded by Delhi Public School, R.K. Puram for Academic Excellence for **7 consecutive years**
- Secured an **A grade** in all the courses undertaken in the 2nd and 3rd semester, with an A* in MSO202 and MSO203

TECHNICAL PROJECTS

DOA estimation using Spherical Harmonic Features

Dec. 2018 - Aug. 2019

Professor Rajesh M. Hegde, Dept. of EE

IIT Kanpur

- Extracted the features from the recordings of a stationary source of sound using Spherical Harmonic Decomposition
- Designed and implemented two different CNN architectures for combined and decomposed DOA estimation.
- Achieved a better accuracy than MUSIC-DPD using both approaches, with a significant reduction in the training and run-time computational complexity for one of the approaches. Tested the working of the model on the LOCATA dataset.
- Using the decomposed DOA model ensured that a denser search grid (of resolution 2 degrees along theta and phi) could be used without compromising the computational complexity, thus ensuring better estimates.
- Extended the decomposed DOA estimation algorithm to a moving source. Used a Kalman filter for tracking the corresponding path. Better results than the MUSIC-DPD algorithm were obtained.
- The paper has been submitted to IEEE Transactions on Audio, Speech and Language Processing.

Adaptive Beamforming for DOA Estimation

Jan. 2019 - Present

Professor Rajesh M. Hegde, Dept. of EE

IIT Kanpur

- This is an extension of the previous work of Decomposed DOA estimation. A binary classifier was trained to predict if a source of sound was present at the origin.
- This model was then used to test the presence of sources on a sparse search grid using rotation of the features.
- For the coordinates predicted, the features are rotated using a denser search grid around these coordinates, and fed to the trained binary classifier, to predict the DOAs more precisely.
- Using the classifier model based on decomposed DOA model ensures that the time complexity isn't compromised, and we are to detect multiple stationary sources on a denser search grid (grid resolution is 2 degrees along theta and phi).

Person, Gender and Age Detection of TV Viewers

May 2019 - Aug. 2019

Broadcast Audience Research Council (BARC), India

- Designed a device using PIR sensors to track the number of people in a room without compromising the privacy of the users.

- Implemented a wake-word detector and designed a speaker recognition system by extracting the MFCC coefficients of the speech and using iHMM. The trained model was able to correctly detect and differentiate between six people.
- Integrated the above modules in a single stand-alone device, which detected the users' age group, gender, and identity.

RELEVANT COURSES

Mathematics: Probability and Statistics, Linear Algebra & ODEs, Partial Differential Equations (A*), Complex Variables (A*)

Electrical Engineering: Signals Systems and Networks, Machine Learning for Signal Processing, Communication Systems

Computer Science: Data Structures and Algorithms, Fundamentals of Computing, Introduction to Machine Learning (i)

i: In Progress A*: Exceptional performance

SKILL SET

- **Programming Languages/Scripts:** C, C++, Python, Keras, HTML, CSS | **Operating Systems and Platforms:** Windows, MacOS, Linux
- **Softwares:** Matlab, Octave, Git, LATEX

POSITIONS OF RESPONSIBILITY

Student Guide (*Counselling Service, IIT Kanpur*)

July 2018 - July 2019

- Guided six freshmen students of 2018 UG batch with their academic, extra-curricular and personal issues
- Associated with the team responsible for the supervision of the orientation of the 2018 UG batch of around 900 students

Academic Mentor (*Counselling Service, IIT Kanpur*)

Apr. 2018 - Apr. 2019

- Responsible for conducting remedial sessions for first-year students and helping them in the course TA101
- Provided personal mentoring to academically weak students and helped them overcome difficulties in their courses

Company Coordinator (*Students' Placement Office, IIT Kanpur*)

Aug. 2018 - Apr. 2019

- First point of contact between the companies and SPO: Coordinated the internship and placement process for a number of recruiters

EXTRA-CURRICULAR ACTIVITIES

- Volunteer/Intern, Child Rights and You (CRY), an NGO: Raised the issue of poor sanitation and lack of toilets in villages, online as well as offline and gathered more than 10,000 rupees through campaigning for the same
- Nominated as an Early Education Jury for the 5th International Chinh India Kids Film Festival and Forum held in New Delhi, India
- Member of the 2-UP-CTR division of the National Cadet Corps (NCC) in freshman year