

# KSHEER SAGAR AGRAWAL

Machine Learning • Computer Vision • Robotics & Systems

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## EDUCATION

### Indian Institute of Technology, Gandhinagar (IITGN)

B.Tech. Electrical Engineering with Minors in Computer Science and Engineering [Transcript]

CPI: 8.71/10.0

2020-2024

### Delhi Public School, Mumbai

Class XII, Central Board of Secondary Education [Transcript]

Percentage: 94.0%

2019-2020

### Delhi Public School, Mumbai

Class X, Central Board of Secondary Education [Transcript]

Percentage: 95.8%

2017-2018

## EXPERIENCES

### Amazon | Software Development Intern | Cloud Migration

Mentor: Rohit Sharma | Amazon Go | Just Walk Out Technology | Certificate

May '23 - July'23

- Worked in the Store Monitoring Squad in the Inventory Health Management Team at Amazon Go.
- Worked with Java, TypeScript, Spring Boot, AWS CDK, AWS Cloud Watch, AWS Lambdas, and other Amazon internal tools.
- Migrated & Optimised IhmWatchtowerTools (Store Monitoring Service) to a server less architecture using AWS Lambdas. Reduced Lambda run time from 45 to 30 seconds, reducing per store costs.
- Defined EventBridge and Alarms based on AWS Cloud Watch metrics to trigger Lambdas and monitor store updates.
- Reduced DevOps workload by reworking Device Teams Code Logic, simplifying the onboarding of new devices, and improving code modularity.
- Stressed on good quality documentation and contributed valuable bugs solution's on Amazon's internal platform, Sage.

## ACADEMIC RESEARCH PROJECTS

### Effects of Structured Pruning on Handling Uncertainty Estimates

Research Project • Advisor: Prof. Nipun Batra • Poster • Report • Code

August'23 - November'23

- Developed a comprehensive library for Structured Pruning Techniques in deep neural networks, providing standardized and extensible functionality for training, pruning, fine-tuning, computing metrics, and plotting.
- Implemented and compared various accuracy and uncertainty metrics for different pruning techniques, inspired by the "Lottery Ticket Hypothesis" research paper.
- Conducted detailed out-of-distribution analysis, particularly on CIFAR100 dataset, demonstrating improved model calibration and decision-making robustness in pruned models.

### DeblurGAN: Motion Deblurring Using Deep Generative Adversarial Network

Research Project • Advisor: Shanmuganathan Raman • Poster • Code

January'23 - May'23

- Implemented a PyTorch-based GAN model for motion deblurring, inspired by the "Deep Generative Filter for Motion Deblurring" research paper. Our implementation incorporates optimizations and improvements, achieving remarkable performance through cutting-edge techniques.
- Utilized the Learned Perceptual Image Patch Similarity (LPIPS) loss function, Differential Augmentation and Wasserstein GAN loss for accurate color contrast, consistent gradient flow, stability, and convergence during training.
- Developed a user-friendly codebase to encourage experimentation with different settings for optimal deblurring results.

## SELECTED PROJECTS

### Academic Request Database System

Institute Building Project • Supervisor: Prof. Dilip Srinivas Sundaram • Code

August'21 - December'21

- Database system used by college community and academic office to make and handle requests for academic documents such as Transcripts, Fee Receipts and many more.
- Technology Used: NodeJS, Express, Google Authentication, Google Sheets, Apps Script, Heroku Cloud Services.

### Open Source Career Fair Application

Course Project • Advisor: Prof. Mayank Singh • Code

January'23 - April'23

- Can be used by various college campuses and recruiters as a database and to communicate during the process of hiring of students on campus for Internship and New Grad Roles
- Technology Used: HTML, CSS, Bootstrap JQuery, Python, Django, MySQL.

## IoT SentryRover

Course Project • Advisor: [Prof. Jhuma Saha](#) • [Code](#)

January'23 - April'23

- Features Obstacle Detection Algos, Sim28ML GPS & ESP8266 Camera module for live-tracking & wide-range IoT control.
- Developed a web-application to control and monitor an STM-based surveillance robot using NodeMCU communication protocol and STM-32 micro controller.

## Statistical Language Modelling Using N-grams

Course Project • Advisor: [Prof. Mayank Singh](#) • [Code](#)

January'22 - March'22

- Used the Trigram Model to predict the next word and find the perplexity of a given sentence.
- Technology Used : Python, Natural Language Toolkit, HuggingFace.

## Image Segmentation using Random Walker Algorithm

Course Project • Advisor: [Prof. Shanmuganathan Raman](#) • [Code](#)

September'22 - October'22

- Implemented the Random Walker Algorithm for image segmentation, involving marked and unmarked pixel nodes.
- Calculated the probability of neighboring pixels adopting the same value based on pixel intensity differences.
- Utilized the combinatorial Dirichlet problem solution to determine final probabilities for pixel labels.
- Performed matrix calculations, and constructed a new image from calculated probabilities with a pixel accuracy of 93.7%.

## Real-Time Object Tracking using Gaussian Mixture Models

Course Project • Advisor: [Prof. Shanmuganathan Raman](#) • [Code](#)

October'22 - November'22

- Processed and analyzed a 30-second traffic video from YouTube, using OpenCV for frame extraction.
- Applied GMM to model pixel values, enhancing background-foreground distinction for precise object tracking.

## Face Recognition Using Eigenfaces & Principal Component Analysis

Course Project • Advisor: [Prof. Shanmuganathan Raman](#) • [Code](#)

August'22 - September'22

- Processed a dataset of 546 grayscale face images (112x92 pixels) using PCA to reduce dimensionality, and selected/normalized the top 350 eigenvectors for efficient face identification.
- Attained a 94.97% recognition accuracy on 20 test images through linear projection and distance comparison.

## TEACHING EXPERIENCE

- **Certification in Teaching Program, IIT GN** - Completed a 6-week long program engaging in practice modules and seminars aimed at developing and enhancing teaching skills.
- **Teaching Assistant, Data Structures & Algorithms, IIT GN** Aug'22 - Dec'22  
Designed and evaluated weekly lab assignments of this graduate level course, mentored lab sessions, prepared interactive demos and quizzes, and other logistical responsibilities for a total of 204 students.
- **Teaching Assistant, Data Structures & Algorithms in C++, Coding Ninjas Ed.Tech Company:** July'22 - Aug'22  
Actively participated in resolving programming and debugging doubts for 100+ students at Coding Ninjas.

## AWARDS AND ACHIEVEMENTS

- Achieved Top 25 selection in India for the **SIA Youth Scholarship** selection test held at Radisson Blue, Delhi.
- Developed an impactful Institute Building Project, implementing a streamlined database system for the Academic Office.
- Received the **Dean's List Award** for outstanding academic performance in four out of five eligible semesters.
- Attained the third position in the Ignite '21, IIT GN, Competitive Programming challenge.
- Recognized as the **Best Emerging Badminton Player'22**, receiving the award from the Dean of Student Affairs.

## TECHNICAL SKILLS

Languages: Python Java C++ Javascript

Tools: Git VS Code SQL Anaconda LaTeX Arduino

Libraries and Frameworks: Keras PyTorch OpenCV Pandas C++ STL JQuery Spring Boot ExpressJS

Cloud/Databases: MongoDB MySQL AWS CDK AWS Console AWS Cloudwatch AWS Lambda AWS S3

## POSITIONS OF RESPONSIBILITY & EXTRA CURRICULAR

- **Class Representative @ Electrical Engineering IITGN** - Worked in close liaison with the Professors for smooth functioning of academic activities. 2022 - 2023
- **Problem Setter & Member @ GRASP Club** - Conducted biweekly/monthly programming contests for the college community. 2022 - 2023
- **Badminton Captain @ IITGN** - Led a team of 5 players at the prestigious Inter-IIT Sports Meet'22. 2022 - 2023