

Jayin Khanna

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EDUCATION

- Shiv Nadar University, Bachelor of Science in Mathematics** 2022-2026
Minor in Computer Science and Engineering Specialisation in AI and ML, Math Finance
CGPA: **8.7** | **Rank 1** *Rank Certificate Link*
- IIT-Madras, BS in Data Science and Applications** 2023-2027
CGPA: **9.13** | *Foundation Level Certificate*
- Suncity School, Senior Secondary Examination Class XII-CBSE** 2022
Subjects: Physics, Mathematics, Chemistry, Economics, and English
Overall percentage: **94.3%**
- Suncity School, Secondary Examination- Class X CBSE** 2020
Received Certificate of Merit for scoring 100% in Mathematics CBSE Class XII Board exams.
Overall percentage: **96.4%**

EXPERIENCE

- SPIRE Lab, Indian Institute of Science (IISc) Bangalore** *Jul 2025 – Present*
Machine Learning Research Fellow | **Supervisor: Prof. Prasanta Kumar Ghosh**
- **Time-Scale Modification (TSM)** of speech using **Generative Adversarial Networks (GANs)**.
 - Developing **ScalerGAN**: an unsupervised GAN-based model to modify speech rate while preserving speaker identity, pitch, and naturalness.
 - Extracted and engineered audio features including **STFTs**, **Mel spectrograms**, and **MFCCs** for input to GAN-based architectures.
 - Applying on lab acquired audio data for personalized speech playback, podcast speed control, and assistive tools for language learning. **Project Report: Link**
- Indian Institute of Technology (IIT) Kharagpur** 2025
Deep Learning Learning Research Intern | **Supervisor: Dr. Niloy Ganguly**
- Worked on developing attribution techniques using **Integrated gradients**, **Manifold IG**, **Guided IG** towards neural network **interpretability**.
 - Currently extending these methods to sequential models and large language models (LLMs) using **Granger causality** and **Randomized Path Integrals**. Computer vision in the future
 - **Reproduced** the results of Integrated gradients and Manifold Integrated gradients and tested a new methodology on MIG to improve performance
- National Institute of Science Education and Research (NISER), Bhubaneswar** 2025
Deep Learning Research Intern | **Supervisor: Dr. Subhankar Mishra**
- Working on **structured and unstructured pruning** techniques for model compression.
 - Focused on **GraSP (Graph Reordering and selective pruning)** to reduce complexity while maintaining the expressiveness of Graph Neural networks. Reviewed 5 papers.
 - Developing a new methodology using GCN, Branch and Bound for GNN Pruning
- Institute of Nuclear Medicine and Allied Sciences-DRDO, Ministry of Defence** 2024
Machine Learning Research Intern | **Supervisor: Dr. Shilpi Modi, Sc.'E'**
- Developed a **Convolutional Neural Network (CNN) ResNet model** for classifying sEMG stress measurements, focusing on improving accuracy and generalization.
 - Preprocessed sEMG data using PyEMGPipeline, determining that raw data provided better performance for CNN classification.
 - Improved model accuracy from **91% to 97.98%** with ResNet architecture, achieving **98% overall accuracy** and near-perfect precision, recall, and F1 scores.
 - Implemented **AlexNet architecture** into the model to further enhance accuracy.
 - Currently incorporating and optimizing sequence models such as **RNNs** and **LSTMs** to improve classification performance and generalizability with expanded and reacquired datasets.
 - Research work selected for a presentation in the **SUMMIT 2.0 Conference**.
 - **Certificate: Link** **Project Report: Link** **Conference Certificate: Link**
- Institute of Nuclear Medicine and Allied Sciences-DRDO, Ministry of Defence**
Machine Learning Research Intern | **Supervisor: Dr. Shilpi Modi, Sc.'E'**
- Working on the application of network control theory to understand cognitive state transitions in the brain.
 - Developing deep learning models to extract insights from diffusion spectrum imaging (DSI) and diffusion tensor imaging (DTI) data.

- Implementing graph neural networks (GNNs) to study the role of hubs and weakly connected regions in cognitive function.

University of California Santa Cruz, CA International Summer Research Program (ISRP)

2024

Statistics Research Intern | **Supervisor:** Prof. Bruno Sansó

- **Time-varying quantiles** for environmental variables, focusing on **Atmospheric River (AR)** activity along the California coast.
- Analyzed **IARTMIP Tier 2 ERA5 Reanalysis** data (1979–2019) spanning global $1/4^\circ$ grids at hourly resolution, isolating California coastal grid cells for study.
- Developed and applied **ARIMA models, harmonic regression**, and residual diagnostics on **log-inter-arrival times** of ARs, incorporating key climate indices
- Discovered higher first- and second-harmonic amplitudes in certain locations, indicating potential **periodic atmospheric/oceanic patterns** and **sub-seasonal variability**.
- Performed statistical significance testing (OLS regression, p-values, $R^2 \approx 0.05$) revealing limited contribution from 80-month cycles but occasional annual/semi-annual effects in AR inter-arrival times.
- Conducted **data preprocessing** and large-scale **NetCDF time series analysis** using **Python (statsmodels, NumPy, Pandas, Matplotlib)** for over **40 multi-decade datasets**.

RightProfile by Syntellect

Dec 2024 – Mar 2025


Machine Learning Intern, Research and Development team

- Developed Computer Vision and Deep Learning models to automate the annotation of 10,000+ raw images.
- Conducting R&D on object detection models such as **YOLOv8, YOLOv5, Detectron2, and Faster R-CNN** to retrain and enhance performance of the existing model.

The Habitats Trust

Dec 2024 – Feb 2025

Machine Learning Intern, Tech4Conservation Project

- Conducting research and development on modern Computer Vision and object detection models such as MegaDetector, Zamba, and Timelapse to classify and analyze wildlife in camera trap images.
- **Certificate:** [Link](#) 

ACADEMIC DEVELOPMENT


Polymath Jr, Summer Research Intern

June – Aug 2024, 2025

- Engaged in research on Non-Local Models
- Collaborated with Professors Petronela Radu and Mikil Foss from the University of Nebraska-Lincoln
- Focused on developing and analyzing mathematical models that incorporate non-local interactions.

Mathematics Training and Talent Search Program (MTTS 24)

2024

- Selected from over 3,000 applicants all over India for one of 180 seats.
- Mentored by Professor Arusha C (IIT Bombay), Dr. A. Satyanarayana Reddy (IIT Kanpur), and Dr. Ajit Kumar (ICT Mumbai).
- Completed rigorous coursework and led discussions in Linear Algebra, Real Analysis, Proof writing and Number Theory.
- **Certificate:** [Link](#) 

Teaching Assistant for MAT161: Applied Linear Algebra

2025

PROJECTS AND CERTIFICATIONS

Research Assistant: Investor Behavior Analysis using Deep Learning

2024-2025

Research Supervisor: Dr. Ashish Vazirani

- Developed a Deep Learning and OpenCV-based framework to analyze investor emotions, stance, and decision-making patterns in *Shark Tank* videos.
- Utilized **EmotioNet** for facial expression recognition and NLP models for the analysis of sentiment and intent from textual transcripts.
- Integrated multimodal data (visual and textual) to predict key factors influencing investment decisions.

Time Series and Sentiment Analysis in US Financial Markets using Deep Learning

2024-2025

Research Supervisor: Dr. Charu Sharma (Mathematics Dept, SNU)

- Analyzing Time series Patterns and sentiment in US financial markets.
- Implemented Sequential Deep learning and ML models to understand market sentiment and its impact on financial trends.
- Working with the past 5-7 years of daily data of 31 potential financial indicators to predict financial trends. Applying Dimensionality Reduction Techniques, Statistical Time-Series Analysis, and DL Sequential Models

OUR: Domain Adaptation Techniques in Medical Imaging

2024-2025

Research Supervisor: Dr. Saurabh Janardan Shigwan

- Conducting Research on Unsupervised Domain Adaptation (UDA) Techniques for Medical Imaging Applications in CT and MRI.
- Implemented the Geodesic Flow Kernel on Grassmann manifolds to extract domain-invariant features, enabling effective cross-modality image analysis.
- using Correlation Alignment (CORAL) and Maximum Mean Discrepancy (MMD) with geometric transformations to reduce domain shift.
- Previously worked on deep learning models to correct MRI motion artifacts in real-time using k-space data.

Reading Projects and others: LLMs hard coded from scratch | Neural Temporal Point Processes | Image and Video Dehazing models | AI Othello game from scratch

Coursera Certifications

- Supervised Machine Learning: Regression and Classification (DeepLearning.AI)
- Advanced Learning Algorithms (DeepLearning.AI)
- Big Data Modelling and Management systems

RELEVANT COURSEWORK

Mathematics: Machine Learning in R, Machine Learning Foundations and Techniques, Stochastic Processes (Graduate Course), Measure and Integration(Graduate Course), Statistics, Probability, Uni-variable Calculus, Multi-variable Calculus, Linear Algebra (I and II), Discrete Time Finance Mathematical Modeling, Numerical analysis, Mathematical Finance, Proof writing, Vector Calculus and Geometry, Real analysis (I and II), Algebra I (Group theory), Algebra II (Ring theory), Number Theory.


Computer Science: Deep Learning, Introduction to Large Language Models, Reinforcement Learning, Computer Vision, Artificial Intelligence, Tools in Data Science, Computational Thinking, Python Programming, Programming in C, Data Structures and Algorithms in C, Analysis and Business Modeling in R.

Others: Financial Econometrics(Time Series Analysis), Introductory Microeconomics, Business Data Management

Tools and Libraries:

- *Python, C, R, EViews, Excel, LaTeX*
- *PyTorch, TensorFlow, Keras, OpenCV, scikit-learn, NumPy, Pandas, Matplotlib, Seaborn, SciPy*

ACHIEVEMENTS

- **Summer Research Fellowship at IISc Bangalore**
Awarded by the Indian Academy of Sciences, INSA, and NASI. Selected among the top 10% nationwide. Received stipend and travel grant.
- **Selected for Biomedical Data Science Programme 2025, Ashoka University**
Among the top 20 students selected nationwide for this collaborative summer programme between Ashoka University and Yale University
- **Rank 1** out of all the 19 students pursuing BSc (Research) in Mathematics, 2026
- Research work on *Preprocessing Pipeline and Application of CNNs for Surface Electromyography (sEMG) Signal Classification* selected for a presentation in the **SUMMIT 2.0 Conference** held at Shiv Nadar University.
Certificate: [Link](#) 
- Attained the **99.59 Percentile (top 0.5%)** in CUET Mathematics Exam 2022 among 2.29 lakh students.
- Received a Certificate of Merit from CBSE for scoring 100% in the CBSE Class X Mathematics Board exams. (Awarded to top 0.1% students)