

# Ishaan Watts

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## EDUCATION

### Indian Institute of Technology (IIT), Delhi, India

Bachelor of Technology; **Major:** Engineering Physics; **Minor:** Computer Science

July 2019 - May 2023

CGPA: 8.996/10

## EXPERIENCE

### Research Intern, Microsoft Research India

May 2023 - Present

Guide: Sunayana Sitaram | Multilingual Evaluation of LLMs [\[arXiv\]](#)

Bengaluru, India

- Working in **AI for Social Good** domain with primary focus on Fairness in machine learning and Responsible AI.
- Experimented RAG with LLMs via llama-index, LoRA for PEFT in LLMs and built a toxic multilingual dataset.
- Evaluated **multilingual** capabilities of LLMs across 22 datasets & 81 languages - **submitted at NAACL 2024**.

Guide: Akshay Nambi & Tanuja Ganu | Shiksha CoPilot [\[article\]](#)

- Engineered **Shiksha CoPilot** web app to help teachers create engaging content for students using Gen-AI.
- Built an intricate and user-friendly frontend via streamlit, structured telemetry and analysed collected data.
- Deployed CoPilot in **20 schools** across Karnataka and conferred with 1st prize in Microsoft Hackathon 2023.

### Machine Learning Engineer Intern, Torch Investment Management

Sept 2022 - Dec 2022

Mentor: Amit Sharma | Stock Price Modelling

Noida, Uttar Pradesh

- Refactored LightGBM model codebase to predict Top30 US S&P500 stocks and modelled Saudi market data.
- Curated a new feature using NLP techniques determining correlation between stock price and tweet sentiment.
- Scraped Twitter using snsrape, **topic-based filtering** using BART and **sentiment analysis** using FinBERT.

### Data Scientist Intern, Udaan

May 2022 - July 2022

Mentor: Pranjal Singh | Holistic User-Embeddings via GNNs

Bengaluru, India

- Developed framework to generate generic **user-embeddings** from interaction graph for better segmentation.
- Implemented **DeepWalk** as baseline, then built more complex multi-relational & multi-entity interaction graph.
- Applied **Hetero-Graph AutoEncoder** on new graph improving Udaan fraud detection by 2.45% - **offered PPO**.

### Research Intern, Griffith University

May 2021 - July 2021

Guide: Saiful Islam | Malware Detection

Queensland, Australia

- Performed **malware detection** and **program analysis** of binaries from VirusShare using machine learning.
- Constructed Control Flow Graphs from binaries through static analysis and used opcodes as features for nodes.
- Applied tf-idf vectorisation on dataset & designed **Graph Convolutional Network** to achieve **89.1%** accuracy.

## RELEVANT COURSEWORK

- Programming:** Data Structures and Algorithms | Digital Electronics | Machine Learning | Special Topics in Computer Applications (Social Computing) | Computer Networks | Analysis and Design of Algorithms
- Mathematics and Physics:** Linear Algebra and Differential Equations | Calculus | Probability and Stochastic Processes | Signals and Systems | Mathematical Physics | Computational Physics | Statistical Physics

## MAJOR AWARDS & ACHIEVEMENTS

- Bagged **1st position** in Topic Challenge and Honours in Executive Challenge at Microsoft Global Hackathon. **2023**
- Obtained **Department Rank 4** out of 49 in Physics, IIT Delhi including minor in Computer Science. **2023**
- Secured **6th position amongst 5000** teams all over India in the Amazon ML Challenge **2023**.
- Granted **Merit Award** in 3 semesters for ranking in top 3 out of 49 in Physics Department, IIT Delhi. **2021-2022**
- Achieved Rank 1635 in JEE-Advanced & 99.94 percentile in JEE-MAINS from over 1.4 million candidates. **2019**
- Recipient of the prestigious **KVPY Fellowship** (Kishore Vaigyanik Protsahan Yojana), Rank 1281/100,000. **2018**

## SELECTED TECHNICAL PROJECTS

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### Particle Identification using Eigen Faces, CNNs and GNNs (B.Tech Project - 2)

Jan 2023 - May 2023

Guide: Prof. Abhishek Iyer, IIT Delhi

[\[Code\]](#) [\[Report\]](#)

- Implemented **Eigen-Faces** decomposition to reduce image dimensionality and classified on euclidean distance.
- Proposed different **GNN** architectures for classification by converting images to **point-cloud representations**.
- Benchmarked CNNs with **0.8078** and GNNs with **0.597** (vanilla) & **0.710** (skip connections) ROC-AUC scores.

### Anomalous Signal Detection at Large Hadron Collider (B.Tech Project - 1)

Aug 2022 - Nov 2022

Guide: Prof. Abhishek Iyer, IIT Delhi

[\[Code\]](#) [\[Report\]](#)

- Utilized CERN's ROOT framework to obtain energy and momenta of proton collision for **anomaly detection**.
- Inspected features derived applying physics to calculate 2.719 signal discovery significance of distributions.
- Designed Neural Networks and **Auto-Encoders** with **96.3%** and **80%** accuracy and optimized using Optuna.

### Peer Server Peer (PSP) Networks (Computer Networks)

Sep 2022 - Oct 2022

Guide: Prof. Abhijnan Chakraborty, IIT Delhi

[\[Code\]](#)

- Implemented PSP file sharing system with **LRU cache** in server to facilitate efficient data storage and retrieval.
- Used **socket programming** abstraction ensuring secure file transmission to clients using TCP & UDP Protocol.
- Applied concurrency principles for efficient load balancing between clients and analysed scalability with size.

### Social Network Analysis of the Indian Stock Market (Social Computing)

Jan 2022 - May 2022

Guide: Prof. Abhijnan Chakraborty, IIT Delhi

[\[Code\]](#) [\[Report\]](#)

- Sourced NIFTY 4 year OHLC data from NSE, India and Yahoo Finance for social network and Covid19 analysis.
- Performed **time-series** decomposition estimating return, visualised stock-split and **40%** log deviation in Covid.
- Visualised stock graphs using Winner Takes All & MST method with Louvain **community detection** via Gephi.

### Yoga Pose Estimator using CNNs (Machine Learning)

Sep 2021 - Nov 2021

Guide: Prof. Rahul Garg, IIT Delhi

[\[Code\]](#)

- Designed **Deep CNN** model using **transfer learning** in PyTorch to detect yoga pose at different camera angles.
- Transformed images containing 19 Asanas to avoid background misrecognition & better feature interpretation.
- Developed hybrid Densenet121 architecture achieving **83%** accuracy leveraging GPU acceleration using HPC.

### Restaurant Environment Simulation (Data Structures & Algorithms)

March 2021 - April 2021

Guide: Prof. Amit Kumar, IIT Delhi

[\[Code\]](#)

- Simulated real-time working of restaurant environment using a hypothetical model to increase work output.
- Implemented **MinHeaps** to execute multiple queries productively and **AVL Trees** to access customer database.
- Fabricated the algorithm with state function which updates the customer with order state at every instant.

## SKILLS

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- **Languages:** Python, Java, SQL, Bash, C, C++, ~~TeX~~  $\text{\LaTeX}$ , Spark    **Technologies:** Git, Docker, ROOT, Azure, Databricks
- **Libraries:** PyTorch, TensorFlow, OpenCV, Numpy, Pandas, Matplotlib, Plottly, Streamlit, Langchain, LlamaIndex

## EXTRA CURRICULAR ACTIVITIES

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- **Reviewer** for AI-ML Systems 2023, an Indian conference on Systems Engineering and Artificial Intelligence.
- Attended **Winter School on Deep Learning** organised by Indian Statistical Institute (ISI), Kolkata in Spring 2023.
- Mentored six freshmen undergraduates for their academic wellbeing through **BSW Student Mentorship Program**.
- Acted **Publicity Coordinator** in Rendezvous'23 & **Decoration Coordinator** in Inter-IIT Sports Fest'23 at IIT Delhi.
- Prepared Care-Packages comprising poems & articles under **NSS Mental Health Project** during the pandemic.
- Completed **A1 level course in Spanish** as non-credited course of the Humanities and Social Sciences Department.
- Appointed **Vice Captain and Captain of Aquatics** Team for Girnar Hostel, IIT Delhi over the course of 2 years.