

Ishaan Watts

✉ wattsishaan18@gmail.com  [WattsIshaan](https://github.com/WattsIshaan)  [GScholar](https://gscholar.org/profile/WattsIshaan)  [wattsishaan.github.io](https://github.com/wattsishaan.github.io)  [ishaan-watts](https://www.linkedin.com/in/ishaan-watts)

EDUCATION

Indian Institute of Technology (IIT), Delhi, India

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

July 2019 - May 2023

CGPA: 9.00/10

EXPERIENCE

Research Intern, Microsoft Research India

Sep 2023 - Nov 2023

Guide: Sunayana Sitaram | Multilingual Evaluation of LLMs [\[arXiv\]](https://arxiv.org/abs/2309.15484)

Bengaluru, India

- Experimented with LLMs on QA tasks for low resource languages via llama-index & in-context learning.
- Fabricated toxic multilingual prompts for Responsible AI study and developed evaluation dashboard webapp.
- Evaluated multilingual capabilities of LLMs across 22 datasets & 81 languages - **under review at NAACL 2023.**

Research Intern, Microsoft Research India

May 2023 - Aug 2023

Guide: Akshay Nambi & Tanuja Ganu | Shiksha CoPilot

Bengaluru, India

- Engineered Shiksha CoPilot web app to help teachers create engaging content for students using Generative 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 Pvt. Ltd

Sept 2022 - Dec 2022

Mentor: Amit Sharma | Stock Price Modelling

New Delhi, India

- Optimised code base for Regression Model to predict Top30 S&P500 for subsequent year with 19% returns.
- Scraped Twitter with snsrape and used BART and FinBERT for topic classification and sentiment analysis.
- Curated & modelled SASEIDX data extracted from Bloomberg achieving 33% returns using regression models.

Data Scientist Intern, Udaan

May 2022 - July 2022

Mentor: Pranjal Singh | Holistic User-Embeddings via GNNs

Bengaluru, India

- Developed framework to generate unsupervised multi-purpose embeddings to include varied vertical context.
- Applied DeepWalk and built intricate multi-relational buyer-seller interaction graph via pytorch-geometric.
- Designed Hetero-Graph AutoEncoder deployed in Fraud improving Udaan Hit by 2.45% - **recieved PPO.**

Research Intern, Griffith University

May 2021 - July 2021

Guide: Saiful Islam | Malware Detection

Queensland, Australia

- Performed static analysis on binary programs to construct Control Flow Graphs (CFGs) using angr library.
- Extracted opcodes, adjacency lists and applied tf-idf vectorisation to generate CFG of binary programs.
- Applied Graph Convolutional Networks (GCN) to construct graph2vec for classifying programs as malware.

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
- Finished B.Tech with Department Rank 4 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. 2023
- Granted Merit Award in 3 semesters for ranking in top 3 out of 60 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 (Kishore Vaigyanik Protsahan Yojana) Fellowship (Rank 1281/100,000). 2018

KEY TECHNICAL PROJECTS

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 abstractions ensuring secure file transmission to clients using TCP & UDP Protocols.
- 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 preliminary 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 and 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 various 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

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

EXTRA CURRICULAR ACTIVITIES

- **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.