Scholastic Achievements

- Achieved **Rank 1044** in *JEE Advanced* (Joint Entrance examination) amongst **160 K**+ registered students 2022
- Achieved **99.82 Percentile** score in the *JEE Main* examination amongst **1.26 million**+ registered students 2022
- Placed in the top **35** students in India to attend *Virtual Mathematical Olympiad Orientation Camp* **(MOOC)** 2021
- Achieved the prestigious **INMO** Merit Award by securing a position among the top **45** students in India 2020
- Achieved **Rank 60** in the *TS Engineering Entrance* (*EAMCET*) examination amongst **1.5 lakh**+ students 2022
- Achieved **Rank 113** in the *AP Engineering Entrance* (*EAPCET*) examination amongst **2 lakh**+ students 2022
- Selected for the prestigious **(KVPY)** Fellowship Award under the stream (SX) amongst **50,000** +students 2021

Key Projects

Automatic Algorithmic Trader | Prof. Ashutosh Kumar Gupta *Course Project | Autumn 2023*

- Simulated a market environment with stock expiry times using **priority queues, maps, and strings, tracking transactions**, money transfers, and calculating profit/loss for participants to analyze market dynamics
- Implemented an **arbitrage detection algorithm**, resulting in **profits without actual stock transactions**
- Enhanced the algorithm to optimize collective order execution for **complex linear combinations** and extended the system to manage the order book, **accommodating multiple quantities** and **preventing cancellations**

Cricket Minesweeper | Prof. Kameshwari Chebrolu *Course Project| Spring 2023*

- Developed a combination of two classic games, **Minesweeper and Cricket**, using HTML, CSS, and JavaScript
- Implemented **player-selectable grid sizes** and **random scoring** mechanics, ranging from single run to six runs, in the game. Integrated the **interactive sound effects** for every action to enhance user experience
- Each player has **multiple opportunities** to score runs , take wickets, along with **specific missions** to accomplish
- Power-ups are **randomly distributed** on the grid, and when a player reveals a block containing a power-up, they can gain an advantage in the game such as **score double** the run or reveal the position of fielders for 1-2 sec

Image Compression | Prof.Ajit Rajwade *Course Project | Autumn 2024*

- Implemented **grayscale JPEG compression** using 2D DCT, **Huffman encoding**, achieved compression ratios up to **1:20**. Designed a high-quality decoder reconstructing images with low RMSE, ensuring precise restoration.
- Enhanced compression performance through optimized **quantization matrices** and efficient 2D DCT computation.
- Developed a lossy compression method for **cartoon like images** that exploits edge information extracted using **Canny edge** dectector,by encoding edge locations with JBIG and applying quantization, subsampling, PAQ coding.
- Compared image compression with **PCA** techniques on specific image classes,evaluating performance and efficiency.

Deep Learning | Prof. Swaprava Nath *Course Project | Spring 2024*

- Implemented **Logistic Regression, Decision Tree, and Support Vector Machine (SVM) classifiers** for various classification tasks, enhancing model accuracy and performance through effective feature selection
- Applied **PCA and k-means clustering** for **unsupervised**, and utilized **LDA** for supervised data classification
- Built **RNN and CNN** from scratch, using the RNN for **word completion** and the CNN for **digit recognition**
- Implemented the **Gale-Shapley** algorithm for optimal matching of suitors to reviewers based on preference order

Exploring Reinforcement Learning through Retro Games | Self-project Summer *2024*

- Explored **multi-armed bandit problem** using ϵ-greedy strategy , q-learning for **CartPole-v1**, optimizing parameters (learning rate, discount factor, epsilon decay).Monitored mean time per episode and **mean reward**
- Implemented **DQNs** to optimize value functions and used **CNNs** to analyze game frames for reward maximization
- Implemented state representation, action definition, and reward system to enable **Mountain car-problem** gameplay

Tic-Tac-Toe Prodigy | Prof. Swaprava Nath *Course Project | Spring 2024*

- Crafted a **Smart** TicTacToe player by executing **Backward Induction** to each action for the best possible move
- Developed a **History class** in python to recognize the winning boards, updating histories, and allocating utilities
- Also designed our TicTacToe player with α-β **pruning** for enhanced computational speed and reduced memory

Other Projects

Online Portfolio and Personal Website | Prof. Kameshwari Chebrolu *Course Project | Spring 2023*

- Constructed the website's **fundamental structure** using **HTML**, ensuring a solid and organized base for content
- Employed **CSS** styling techniques to significantly enhance the website's **visual appeal** and overall layout
- Successfully transformed a static website into an interactive dynamic experience using JavaScript, demonstrating proficiency in **Front-End Web Development** using **HTML, CSS , JavaScript**

MIPS Assembly Query Processor | Prof. Biswabandan Panda *Course Project | Autumn 2023*

- Developed a **MIPS assembly language program** capable of efficiently **processing queries** on a dataset
- Implemented **heapsort** to **efficiently sort the dataset**, enabling the **retrieval of the index** of a specific data value in the **sorted array**, thus facilitating the **counting of elements smaller** than the queried data value
- Employed **binary search** to locate the query value, leading to an advantageous time complexity of O(nlog(n))

Kernel Density Estimation | Prof. Ajit Rajwade *Course Project | Autumn 2023*

- Implemented **KDE** using **Cross Validation** procedure to **estimate PDF** for data of unknown distribution
- Trained estimators using a random subset from a normal distribution, determined optimal parameters by evaluating log joint likelihood on the complementary subset, considering the estimated (PDF) across parameter values
- **Compared** the **estimated PDF** and **true PDF** by plotting graph using **MATLAB** to determine efficiency

Iris Flower Classification | Self Project *Self Project | Spring 2024*

- Designed and implemented various machine learning models, including Logistic Regression, Support Vector Machines (SVM), and **Decision Tree Classifier**, for classifying IRIS flower species based on their features
- Conducted detailed exploratory data analysis and visualized relationships within the dataset using **Matplotlib**
- Achieved a remarkably **high prediction accuracy** of over **95%** using SVM and Logistic Regression models

Mobile Background scientific knowledge | Prof. Mythili Vutukuru *Course Project | Autumn 2023*

- Presented a PowerPoint detailing about the **history and timeline** of when, where, by whom, and how the science behind the Mobile and Telephone technology developed, highlighting the key inventors and milestones
- Societal needs for faster communication, business efficiency, and personal connectivity drove the adoption of telephone technology, while demand for robust **communication infrastructure** accelerated its practical use
- Science has transformed mobile technology by making devices more friendly through advancements in **touchscreens, user interfaces, voice recognition, and processing power,** enhancing accessibility and convenience for users

Mountain Cargo Bot | Prof. Ankit Jain, Prof. Joseph John *Course Team Project | Spring 2023*

- Developed a line-following cargo bot, using **Fusion 360** ,3-D Printing ,Laser Cutting ,electrical items(battery,motor)
- Enginereed a **dumping system prototype** which works with servo motor , arduino and capable of carrying **300g**
- The bot Infrared sensors are calibrated such that it can climb an inclined plane following the line , **without toppling**

Courses Undertaken

Computer Science	Data Structures and Algorithms†, Design and Analysis of Algorithms, Artificial Intelligence and Machine Learning†, Software Systems Lab, Digital Logic Design and Computer Architecture†, Computer Programming and Utilization†, Automata Theory and Logic, Operating Systems†, Discrete Structures, Data Analysis and Interpretation,Computer Networks* ,Abstraction and Paradigms for Programming*
Mathematics	Probability-1,Calculus, Linear Algebra, Differential Equations
Learner Space	Excel and SQL for Big Data Handling, Python for Data Science
Misc.	Economics, Introduction to Electrical and Electronic Circuits(Maker space), Design Thinking for Innovation , Quantum Physics

†*Course has corresponding lab*

Technical Skills

Languages	C++, Python, Bash, MIPS, VHDL, x86
Software	Git, LaTeX, MATLAB, Arduino IDE, Sed, Awk, GDB, Excel
Data Science Libraries	NumPy, MatPlotLib, Pytorch, Pandas,Jupyter Notebook
Development	CSS, HTML, Javascript

Extracurricular Activities

- Achived State Rank **1-(2014),2-(2015)** in **CHUKKA LAXMI BAYAMMA** Science Talent Search Examination
- Secured **Subject Matter Expert (Mathematics)** internship at **MyMegaminds** through an Internshala platform
- Secured position among the top **1 percentile** in **NSTSE** among **4,20,200+** students across India in the year 2014
- Successfully completed a year long **NSO** program of **Volley Ball** and participated in **Aahvan** Fest at IIT Bombay
- Won the **championship title** in both the **CSE Cricket Tournament** and **Kho-Kho Tournament** in 2024
- Successfully managed and coordinated a team as an organizer for **TechFest** and **Mood Indigo** at IIT-Bombay