**Akshaan Khan** | **22B2226**
**Mechanical Engineering** | **B.Tech.**
**Indian Institute of Technology Bombay** | **Gender: Male**
**DOB: 23/09/2004**

| Examination | University | Institute | Year | CPI / % |
|---|---|---|---|---|
| Graduation | IIT Bombay | IIT Bombay | 2026 | |
| Intermediate | CBSE | MDS Public School, Udaipur | 2022 | 96.40% |
| Matriculation | CBSE | Delhi Public School, Udaipur | 2020 | 93.60% |

Pursuing a **Minor degree** in **Artificial Intelligence and Data Science** offered by **C-MINDS** department, IIT Bombay

## SCHOLASTIC ACHIEVEMENTS

- Achieved an All India Rank of **851** in the **JEE MAIN 2022** examination out of more than **1 Million** candidates *('22)*
- Ranked **1163** in the **IIT-JEE Advanced 2022** examination out of more than **1L** candidates across the country *('22)*
- Among **top 3%** in **Kishore Vaigyanik Protsahan Yojana (KVPY)** amongst **1.5L** students across the nation *('22)*
- Cleared the **National Defence Academy (NDA)** written exam with a score of **556** out of **900** in first attempt *('22)*

## PROFESSIONAL AND RESEARCH EXPERIENCE

**Generative AI Engineering Internship** — ***Cretorial Media Services Private Limited***
*A consulting firm leveraging Generative AI to transform brand strategies through innovative solutions* *(May '24 - Jul '24)*

- Created a **Text-to-Ecommerce** app using **Flask**, **generative models** and **CLIP** for image-product similarity search
- Integrated models for **keywords extraction**, **wordcloud generation** and **reverse engineering** prompts from images
- Researched to develop advanced **website analytics dashboard** integrating **Google Analytics** and other data sources
- Enhanced website performance and visibility through strategic use of **SEO** tools like **SEMRush** and **Google Analytics**

**Integrated Dashboard For Public Health Systems** — ***Public Health Department, Maharashtra***
*Koita Center for Digital Health | RnD Project | Prof. Ganesh Ramakrishnan* *(Jan '24 - May '24)*

- Developed a **dashboard** providing **advanced analytics** on **regional healthcare services** in a team of **4 members**
- Conducted **Exploratory Data Analysis** on **NPCDCS** newly diagnosed patient data for regional cancer load analysis
- Performed **correlation analysis**, **PCA**, and **K-Means** clustering to classify district units by their patient load capacity
- Extracted key insights and created impactful visualizations on the **Maharashtra map**, culminating in a detailed report

## POSITION OF RESPONSIBILITY

**AI Engineer** | *InstiGPT | NLP Subsystem | AI Community, IIT Bombay* *(Dec '23 - Apr '24)*

- Selected among **198 applicants** for **6-member team** to develop **InstiGPT**, a chatbot answering **IIT Bombay** queries
- Engineered a **RAG pipeline** using **Langchain** and worked with **databases** such as **ChromaDB** and **PostgreSQL**
- Orchestrated a successful **institute-wide deployment** and **scaled** the chatbot to cater **15,000+ students** effectively
- Conducted extensive research on document retrieval methodologies using **Knowledge Graph** and **Vector Databases**

## KEY PROJECTS UNDERTAKEN

**Deep Carlsen** | *Seasons of Code, 2023 | Web and Coding Club, IIT Bombay* *(May '23 - Aug '23)*

- Trained a **deep-learning** based **chess self-play model** using **TensorFlow** library based on **DeepChess** research paper
- Implemented model with **Siamese Network**, **MinMax** and **Alpha-Beta Pruning** algorithms to achieve **87%** accuracy
- Implemented the model on an **User Friendly Interface** designed using **PyGame** library to create a **game of chess**

**Hate-Speech Detector** | *LearnerSpace 2023 | Web and Coding Club, IIT Bombay* *(Jul '23 - Aug '23)*

- Developed **Hate-speech detector** by **fine-tuning** pretrained **BERT** model with **HuggingFace Transformers** library
- Trained the model using **PyTorch** to achieve **96% accuracy** on **HateSpeech18** dataset consisting **10,000+** examples
- Preprocessed **textual data** using **NLP** techniques such as **tokenization**, **lemmatization** and **One-Hot Encoding**

**COVID-19 Predictions using Deep Learning** | *Course Project : ME228 | Prof. S. Karagadde* *(Feb '24 - May '24)*

- Developed **Deep RNN** and **LSTM** models to predict global **COVID-19** cases and achieved a high $\mathbf{R^2}$ **score** of **0.95**
- Preprocessed geographical **COVID-19** data from January 2020 to May 2021 to perform **predictive time series** analysis
- **Trained** the models using **TensorFlow** and created **dynamic visualizations** with **Plotly** for insightful presentation

**Sudoku Solver** | *Winter in Data Science | Analytics Club, IIT Bombay* *(Dec '23 - Jan '24)*

- Trained a **CNN-based digit image classifier** with **TensorFlow** for precise digit recognition, achieving **97% accuracy**
- Utilized **OpenCV** to extract digits from Sudoku images and applied **image processing** techniques to enhance precision
- Employed a **Backtracking algorithm** to recursively solve extracted Sudoku puzzles from the given images efficiently

**Deep RL To Optimize Stock Trading Strategy** | *FinSearch 2024* | *Finance Club, IIT Bombay* *(Jun '24 - Present)*

- Utilizing **Deep Reinforcement Learning** to optimize **stock trading** strategies and to maximize investment returns
- Exploring algorithms such as **Deep Q-Learning** and **Deep Deterministic Policy Gradient** for best trading outcomes
- Training RL models on **NIFTY50 stocks** ranging from 2010 to 2019 and comparing to **ARIMA** and **LSTM** models

**SnakeRL** | *Seasons of Code, 2024* | *Web and Coding Club, IIT Bombay* *(May '24 - Present)*

- Developing and training a model to self-play the **Snake Game** utilizing a **Deep Reinforcement Learning Algorithm**
- Developing the game enviroment utilizing **PyGame library**, for enhanced **visualization** during the training process
- Researching various **Value-based** and **Policy-based deep RL** algorithms suitable for grid-based game environments

**UniTrain** | *FOSS 2023* | *Web and Coding Club, IIT Bombay* *(Sept '23 - Oct '23)*

- Contributed to **UniTrain**, an **open-source** Machine Learning framework for **training**, **evaluation**, and **deployment**
- Added functionality for a **ResNet101** Image Classification Deep Learning model with **101 layers** for enhanced accuracy
- Expanded capabilities by integrating support for **custom loss functions** and **optimizers**, thereby boosting versatility

**Data Compression in Large Datasets** | *Course Project : ME781* | *Prof. Asim Tewari* *(Oct '23 - Dec '23)*

- Implemented a **data compression** model utilizing **Adaptive Huffman Encoding** to achieve **50% compression rate**
- Developed an intuitive **User Friendly Interface** using **Gradio** library to deploy the model in a team of **5 members**
- Presented the model as an exciting **Start-Up idea**, identifying its **target customers**, **CVPs**, and **key competitors**

**Line Following Multi-Utility Bot** | *Course Project: MS101* | *Prof. Joseph John* *(Dec '22 - Feb '23)*

- Employed **3-D printing** and **Laser cutting** to construct **Line following multi-utility robot** in team of **6 members**
- Programmed robot using **Arduino** and **C**, and utilized **AutoDesk Fusion 360** for mechanical design and 3D modeling
- Added a **mechanical arm** to the robot for **Obstacle Detection and Removal mechanism** utilizing a **servo-motor**

**Finger Rehabilitation Mechanism** | *Course Project: ME232* | *Prof. P. Seshu* *(Jan '24 - Apr '24)*

- Modeled **Finger Rehabilitation Mechanism** in **MATLAB** to perform **position**, **velocity** and **acceleration** analysis
- Applied mathematical modeling for **Degree of Freedom** and **Static** and **Dynamic force** analysis for system stability
- Coded **simulations** and **analysis algorithms** to adjust link lengths, analyze and visualize dynamics and validate results

## TECHNICAL SKILLS

| | |
|---|---|
| **Languages** | C, C++, Python, SQL, HTML, CSS, LaTeX |
| **Python Libraries** | NumPy, TensorFlow, PyTorch, Pandas, Matplotlib, NLTK, Scikit-Learn, OpenCV |
| **Tools** | Git, MS Excel, MATLAB, Octave, Autodesk Fusion 360, Arduino IDE |

## KEY COURSES UNDERTAKEN

| | |
|---|---|
| **AI/ML/DS Courses** | Introduction to Machine Learning, Statistical Machine Learning and Data Mining, Applied Data Science and Machine Learning |
| **Mathematics Courses** | Calculus-I, Calculus-II, Linear Algebra, Differential Equations |
| **Programming Courses** | Computer Programming and Utilization, Computer Networks |
| **Physics Courses** | Introduction to Quantum Physics, Introduction to Classical Physics, Physics lab |
| **Chemistry Courses** | Organic and Inorganic Chemistry, Physical Chemistry, Chemistry lab |
| **Mechanical Courses** | Fluid Mechanics, Solid Mechanics and Strength of Materials, Thermodynamics, Kinematics and Dynamics of Machines, Mechanical Processing of Materials |

## EXTRA-CURRICULAR ACTIVITIES

- Earned certification from **Microsoft** for passing the **Azure AI Fundamentals** exam, demonstrating proficiency in **AI**
- Stood **First** in the **Freshiesta 2023 Football tournament** hosted by **Sports Council** of **IIT Bombay** in first year
- Awarded **Silver** Medal for performance in **Cancer Olympiad** conducted by **Geetanjali Cancer Centre, Udaipur**
- Achieved **Third** position in the **Science Model Exhibition Competition** organized by **Vigyan Samiti, Udaipur**
- Awarded **Bronze** Medal in the **International French Language Olympiad** conducted by **Silverzone Foundation**
- Participated and cleared **District** and **State** level qualifiers and qualified for **National Level Spell Bee** Competition
- Secured **second** position in **4 x 100 meters Relay Race** in school's **Annual Sports Meet** event in **9th standard**
- Secured **second** position in **Inter-House Football Tournament** which is held anually in the school in **6th standard**
- **Winner** and **Runner-up** of various **Inter-House Group Song Competitions** which are held annually in the school