Alok Ashok Kale | **23B4215**
Environmental Science & Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 05/12/2004

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2027	8.07
Intermediate	CBSE	DAV PUBLIC SCHOOL TALWANDI KOTA RAJASTHAN	2023	95.20%
Matriculation	CBSE	NALANDA ACADEMY ANANTPURA KOTA RAJ	2021	85.00%

SCHOLASTIC ACHIEVEMENTS

- Awarded **AA** grades for exemplary performance in five courses, including **C++**,with an SPI of 9 in Semester 4 *('25)*
- Secured 99.99241 and 99.53 percentile in Physics and Maths, and an overall 99.65 percentile in **MHT-CET** *('23)*
- Amongst the top **0.72%** out of **1.11 Mn+** in **JEE Main** & top **2.75%** out of **0.18 Mn+** in **JEE Advance** *('23)*
- Cleared the internal hackathon round of **Smart India Hackathon** and was in top **50** teams at **IIT Bombay** *('24)*
- Secured a silver medal twice in the SOF Science Olympiad (NSO) for top performance at the school level *('2019,2018)*
- Secured AIR **28** in ResoStart exam with over **30k** participants, showcasing strong skills in Math, Science, MAT *('20)*

KEY PROJECTS

AI-Powered Email Automation Agent | Self Project *(Ongoing project)*

- Built an AI agent to send personalized emails from Excel contacts, using **LangGraph** with local LLMs via Ollama
- Designed a multi-step state machine with **human-in-the-loop** feedback for revising email content before dispatch
- Automated email sending via **Mailjet API** with attachments and personalization using {name}, {email} placeholders
- Building **React–Django** app for secure Excel upload, real-time draft editing, and email dispatch via user-friendly UI
- Automated emails via Mailjet API with attachments, personalized placeholders, and delivery status logging to Excel

Drone Controller - UMIC | Tech Team, IIT Bombay *(2024)*

- Developed a body rate controller using **Python**, **ROS**, **Gazebo**, **MAVLink**, and **MAVROS** to control the drone
- Designed a system to convert the desired positional coordinates into body rate commands for precise drone control
- Integrated **PX4** flight stack to the transmit body rate commands, enabling precise control over rotational velocities
- Used control theory and a PID controller to maintain stable flight, ensuring the drone followed the desired trajectory

Hand Gesture Controlled Drone | Self Project *(2024)*

- Built a gesture-controlled drone using **TensorFlow, MediaPipe DNN, and OpenCV** for hand gesture recognition
- Integrated **ROS** for seamless communication between the gesture detection system and the drone's control mechanism
- Integrated **PX4** flight stack to the transmit body rate commands, enabling precise control over rotational velocities
- Used **Gazebo** to simulate and ensure accurate gesture-to-action mapping and system reliability before deployment
- Initially used a **CNN** for gesture recognition, then switched to a **DNN** for faster predictions and IoT compatibility
- Collected, cleaned, and prepared the dataset independently to train the model for optimal real-world performance

Controllable GAN | Self Project *(2024)*

- Implemented a **Controllable GAN** using PyTorch, enabling the generation of images with the user-defined attributes
- Designed a **Generator** that takes latent noise and specific control inputs, allowing targeted modifications such as age progression, hair color changes, presence or absence of glasses, and manipulates gender and (orientation) in the image
- Developed a **Discriminator** trained on the CelebA dataset to accurately differentiate between real and generated images and validate controlled attributes like age, hair color, and glasses, improving conditional generation accuracy
- Utilized **BCE loss function** and the **Adam optimizer** to ensure stable adversarial training and improve convergence

Line Follower Drone- UMIC | Mathworks Minidrone Competition *(2024)*

- Collaborated with a team to build a line-following drone using vision-based algorithms in **MATLAB and Simulink**
- Created an image-processing algorithm to segment camera feed, detect lane markings to extract navigational features
- Analyzed pixel intensity variations in real-time camera feed to extract navigational data, for accurate path tracking
- Optimized the control system in **Simulink** to improve motion planning, response time, and line-following accuracy

Traffic Sign Classification using CNN and Gradio Interface | Self Project *(2024)*

- Developed a CNN-based deep learning model to classify real-world traffic signs using a dataset of traffic sign images
- Preprocessed data and managed datasets via Google Drive integration and image augmentation using **TensorFlow**
- Trained the model to achieve validation accuracy of **81%** and using early stopping to optimize model performance
- Developed an interactive web app using **Gradio** for real-time traffic sign identification via image upload and prediction

Universal Testing Machine | Course Project | Course: MS101 | Prof. K.N.Jonnalagadda *(2023)*

- Led a team of 6 to design and develop a Universal Tensile Machine (UTM) for testing tensile strength of materials
- Created a 3D model in **Fusion 360** to simulate operation and manufacture **laser-cut and 3D-printed** components
- Developed a lead screw mechanism to lift the gripping unit firmly holding the material, applying force until it breaks
- Calibrated the servo motors by testing known masses, ensuring precise force measurement and reliable test results

- Programmed an **Arduino** microcontroller to automate servo motors and infrared sensors, optimizing system accuracy

Zerodha Clone (Frontend) | Self Project *(2024)*

- Designed the frontend of a Zerodha clone using ReactJS and JavaScript, styled with CSS and implemented Bootstrap

CVAE | Self Project *(May '24 - Jun '24)*

- Developed a **Conditional VAE** using TensorFlow to generate 30-second jazz waveforms from the GTZAN dataset
- Built a custom **1D ResNet-style** encoder-decoder architecture for learning the latent representations of raw audio
- Implemented **KL divergence** and reconstruction loss; visualized waveform generations across epochs using Matplotlib
- Created a inference pipeline to synthesize and smoothly playback new jazz samples using the learned latent vectors

Advanced GANs: WGAN-GP and cGAN | Self Project *(2025)*

- Built **WGAN-GP** and **cGAN** in PyTorch to generate the MNIST digits with stable, class-controlled outputs
- Used gradient penalty to enforce the Lipschitz constraint, enhancing stability and improving convergence in WGAN
- Designed a **critic** for WGAN-GP to estimate Wasserstein distance and a **discriminator** for cGAN on class labels
- Developed generators for both models — CGAN's generator used noise vectors and class labels for controlled outputs
- Used **Adam optimizer**, tuned hyperparameters, and **Binary Cross-Entropy loss** in cGAN for effective training
- Visualized training and outputs using Matplotlib, demonstrating the models' ability to learn diverse digit structures

StyleGAN2 Implementation | Self Project *(2025)*

- Implemented a **StyleGAN2** architecture using PyTorch, focusing on modulated convolution layers and style control
- Built the `ModulatedConv2d` module with per-sample weight modulation and demodulation logic for image synthesis
- Created visualization utilities using **Matplotlib** and `torchvision` to inspect generated image grids during training
- Designed efficient blocks for generator components, enabling the latent vector injection and spatial transformations

POSITIONS OF RESPONSIBILITY

Cultural Secretary | Hostel 6, IIT Bombay *(2024-2025)*

- Elected after a multi-round selection process, recognized for leadership and active contributions to hostel culture
- Spearheaded participation in multiple **cultural festivals** and the **GCs** including Ganesh Chaturthi, Gyrations, Halloween, Dramatics, and Short Film, handling planning, decor, team coordination, rehearsals, and creative direction
- Mobilized and auditioned hostel residents for inter-hostel competitions, formed high-performing and motivated teams, and strategically delegated roles to individuals based on the skills, enthusiasm, discipline, and leadership potential
- Managed Hexfest (Hostel 6's flagship event) by leading end-to-end logistics, planning, creative promotions, and event coordination, ensuring record-breaking participation, engagement, and seamless execution across all the activities

Ambience Coordinator | Mood Indigo, IIT Bombay *(2024-2025)*

- Part of the Ambience team for Asia's largest cultural fest, contributing to decoration, ideation, and thematic design
- Working with members to conceptualize, plan, and execute event aesthetics, ensuring a visually immersive experience
- Assisting in setup, and coordination while gaining hands-on experience in event execution, logistics, and management

Operations Coordinator | E-CELL, IIT Bombay *(2024-2025)*

- Led successful execution of the Networking Event at Hiranandani Gardens, coordination, and on-ground operations
- Managed tent setup, ensured proper placement, and arranged food and beverages to provide a seamless experience
- Coordinated with over 45 startups, facilitating interactions and ensuring smooth engagement during the event
- Supervised logistics, power supply, and overall event infrastructure, ensuring all operational aspects ran efficiently

Controls Trainee Engineer | UMIC, IIT Bombay *(2023-2024)*

- Worked in a 30-member team, each specializing in different subsystems, to collaboratively design and develop drones
- Applied various control systems, including PID and MPC, to improve drone stability, navigation, and maneuverability
- Created presentations and regularly shared updates in team meetings, effectively communicating the key insights
- Studied controls research papers and articles to understand advanced control concepts and their practical applications

TECHNICAL SKILLS

- **Programming** – Python, C, C++, JavaScript, ReactJS, HTML, TypeScript, MATLAB, LaTeX, Django, LangChain, LangGraph
- **Libraries/Tools** – TensorFlow, PyTorch, NumPy, Pandas, OpenCV, MediaPipe, Keras, Scikit-learn, Gradio, Bootstrap, Arduino IDE, GitHub
- **Software/Platforms** – Fusion 360, SolidWorks, Simulink, Gazebo, ROS, MAVROS, MAVLink, Jupyter Notebook, VS Code, Ollama, Mailjet API, Excel
- **ML/DL Concepts** – CNN, DNN, VAE, CVAE,W-GAN, Controllable GAN, C-GAN, StyleGAN2, Autoencoders, Early Stopping, KL Divergence

EXTRACURRICULAR ACTIVITIES

NSS Volunteer | IIT Bombay *(2023-2024)*

- Took part in multiple environmental initiatives, including jungle cleanup drives, to promote ecological sustainability
- Supported conservation efforts at Sanjay Gandhi National Park by aiding the staff in maintenance and awareness
- Visited old age homes and orphanages, engaging with residents and providing support through various initiatives

CULTURAL and SPORTS | IIT Bombay *(2024-2025)*

- Designed and created costumes for the Halloween GC, contributing to the event's visual theme, assisted in choreography
- Worked in the teams of Gyrations and MDGC, managing stage lighting, sound coordination, and making the prods
- Competed in the Intra-Department Cricket League and our team secured 2nd position with strong performance
- Participated in Film GC, contributing to acting, direction, shooting, poster design, production and story writing