



Amit Kumar Mallik
Computer Science & Engineering
Indian Institute of Technology Bombay

19D070007
UG Second Year
Male
DOB: 27/03/2002

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2021	9.90
Intermediate/+2	HSC	Alpha Junior College of Science and Commerce	2019	81.54
Matriculation	CBSE	Kendriya Vidyalaya AFS Begumpet	2017	10.00

Pursuing **Minor** in Machine Intelligence and Data Science

SCHOLASTIC ACHIEVEMENTS

- Currently ranked **15th** among a batch of **143** students of Computer Science and Engineering (2020)
- Awarded **Institute Academic Award** for exceptional academic performance among **1100+** students (2020)
- Received **AP** grade in Calculus awarded to top **35** students among **1137** registered for the course (2019)
- Among **13** students to be awarded **Change of Branch** to Computer Science and Engineering (2020)
- Secured **All India Rank 306** in **JEE Advanced** among 0.24 million aspirants (2019)
- Secured **All India Rank 89** in **JEE Main** among 1.15 million aspirants (2019)

OLYMPIADS

- Represented **Team India** and achieved **Diploma I (gold medal)** in **IAO** (International Astronomy Olympiad) for securing **World Rank 3** among **33** selected students from 14 countries (2017)
- Represented **Team India** and achieved **Honorable Mention** in **IMO** (International Mathematical Olympiad) among **594** selected students from **107** countries (2018)
- Among India's **top 300** students selected for **INPhO** (Indian National Physics Olympiad), **INChO** (Indian National Chemistry Olympiad) and **INAO** (Indian National Astronomy Olympiad) (2019)
- Ranked among the **top 1%** across India in **NSEJS** (National Standard Examination in Junior Science) (2017)
- Received the prestigious **KVPY** fellowship with **All India Rank 321** awarded by DST, Govt. of India (2019)
- Awarded **NTSE** (National Talent Search Examination) scholarship by NCERT, Govt. of India (2017)

KEY PROJECTS

Object Detection for Autonomous Driving

Autumn 2020

Guide: Prof. Biplab Banerjee | Course Project: Machine Learning for Remote Sensing II

IIT Bombay

- Implementing a **YOLO** based single stage object detector **from scratch** using the **Mish activation** function and **mosaic data augmentation** inspired by YOLOv4
- Conceptualized a **novel** loss function using **Complete IoU** loss and a bounding box **uncertainty** parameter inspired by Gaussian YOLOv3 to improve **localization accuracy**
- Experimenting on **location aware deformable convolutions** for more robustness to geometric transforms

Pick and Place Challenge

Summer 2020

Autumn of Automation

Innovation Cell, IIT Bombay

- Simulated a **fully autonomous**, pick and place robot with integrated **camera** sensor and **LiDAR** for navigation
- Achieved **99.50%** test accuracy for 8 word **text classification** using a **deep learning model**
- Utilised **OpenCV** for color and shape recognition using **contours** and **HSV color thresholding**
- Recruited in the **Machine Learning** Subsystem of Innovation Cell based on performance in the project

Weed Detection App

Summer 2020

Institute Technical Summer Project

Institute Technical Council, IIT Bombay

- Developed an **Android application** for **classification** of weeds and crops from a captured image
- Performed **data augmentation** to prepare a **custom dataset** with **100+** pictures from the agricultural field
- Trained a deep learning model implementing **transfer learning** on **MobileNetV2** using **Keras** framework
- Successfully classified images with **92%** test accuracy and integrated the model using **TensorFlow Lite**

International Aerial Robotics Competition

Ongoing

Longest running university based aerial vehicle challenge

Innovation Cell, IIT Bombay

- Working as **Jr. Machine Learning Engineer** in an **interdisciplinary** team of 20 students
- Examined **YOLOv3**, **YOLOv4** and **Gaussian YOLOv3** research papers for accurate localization
- Implementing **color thresholding** techniques for **light bulb detection** and its ON/OFF state

Decompiler (RTL to Pseudo-C)

Autumn 2020

Guide: Prof. Amitabha Sanyal | Course Project: Software Systems Lab

IIT Bombay

- Developing a **decompiler** to convert architecture dependent **Register Transfer Language** to machine independent **pseudo-C** for enhanced readability and portability across architectures
- Utilizing **Lex** and **Bison** to scan and parse source code written in RTL
- Identifying key elements of the program such as **assignments**, **basic arithmetic operations**, **conditional and looping constructs**, **function calls** and **memory accesses** in the parsed code
- Performing **local & global data flow** and **control flow analysis** to contextualize and optimize parsed code

Graph Theory and Matroid Theory

Summer 2020

Summer of Science

Maths and Physics Club, IIT Bombay

- Surveyed literature on various combinatorial aspects of graphs including **chromatic number** and **connectivity**
- Investigated **algebraic** properties of graphs and their applications in **planarity**, **flows** and **circulation**
- Examined **Matroid Theory** from **Lattice** perspective and their applications to prove properties of graphs

Inferential Statistics

Summer 2020

Course project

Coursera

- Performed exploratory data analysis using **R** on GSS 1972-2012 dataset with about **60,000** entries
- Utilized **standardized bar plot** to analyze the relationship between confidence in science and education level
- Performed **chi-square independence** test on the data and confirmed the hypothesized relationship

Handwritten Digit Classifier

Summer 2020

Self Project

Kaggle Competition

- Trained a **14** layer Keras model from **scratch** on augmented MNIST data and obtained **99.31%** test accuracy
- Placed among **top 9%** with a rank 196 in **Kaggle** digit recognizer competition with an accuracy of **99.65%**

Permutation Class

Autumn 2020

Guide: Prof. Ajit Diwan | Course Project: Data Structures and Algorithms

IIT Bombay

- Implemented a class for **permutations** including various operations like **exponentiation** and **logarithm**
- Achieved **linear time complexity** by using **permutation cycles** and **chinese remainder theorem**

DC Power Supply

Autumn 2019

Guide: Prof. Joseph John | Course Project: Introduction to Electrical Engineering Practice

IIT Bombay

- Designed a DC power supply **from scratch** using a **full wave rectifier** circuit along with capacitive filters
- Engineered circuits for **+12V**, **-12V**, **+5V** regulated supply using **Zener Diode** and **LM 7805**

TECHNICAL SKILLS

Programming	C++, C, Python, Bash, Java, Racket, SWI-Prolog
Web development	HTML, CSS, Bootstrap, JavaScript, jQuery, AJAX, PHP, Django
Data Science	TensorFlow, PyTorch, R, OpenCV, MATLAB/GNU Octave, R Studio
Software	Android Studio, Git, \LaTeX , Solidworks, AutoCAD, ROS, Gazebo

KEY COURSES UNDERTAKEN

Computer Science	Computer Programming and Utilisation, Data Structures and Algorithms*, Discrete Structures*, Data Analysis and Interpretation*, Software Systems Lab*, Computer Networks**, Digital Logic Design**, Design and Analysis of Algorithms**, Logic for Computer Science**
Mathematics	Calculus, Linear Algebra, Introduction to Probability Theory*
Data Science	Machine Learning for Remote Sensing II*, Convolutional Neural Networks [†] , Inferential Statistics [†]
Miscellaneous	Electricity and Magnetism, Quantum Physics, Chemistry, Biology, Introduction to Electrical Engineering Practice, Power Engineering - I

* To be completed by December 2020

** To be completed by May 2021

[†] Coursera Courses

EXTRACURRICULAR ACTIVITIES

- Awarded **Technical Special Mention** from Hostel 2 for exceptional contribution to technical activities (2020)
- Recognized as Mumbai **Centre Topper** in **Mimamsa**, a national **science quiz** held by IISER Pune (2020)
- Among the **top 35** students to qualify for **Athletics Inter IIT Camp**, for **400m** and **800m** event (2019)
- Secured **3rd** position in Independence Day Biathlon which included **5 km running** and **7 km cycling** (2019)
- Ranked **2nd** in **3 km** long Freshiesta **cross country race** organised for first year undergraduates (2019)
- Secured **1st** position in inter-hostel **Astronomy** General Championship on Observation Planning (2019)
- Engineered an **app-controlled bot** as a part of XLR8 competition organized by ERC, IIT Bombay (2019)
- Ranked **2nd** in **Bazinga Mathematics** competition organized by Maths and Physics club, IIT Bombay (2019)