Amritaansh Narain Yadav | **200100022**
Mechanical Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 11/7/2002

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2024	
Intermediate	ISC	City Montessori School	2020	95.50%
Matriculation	ICSE	City Montessori School	2018	92.20%

Pursuing **minor** degree from the department of **Computer Science and Engineering** at IIT Bombay

Scholastic Achievements

- Current **Department Rank 3** in Mechanical Engineering Department among 196 students pursuing B.Tech *[2022]*
- Secured **99.38 percentile** in IIT-JEE Main among **0.92 million** applicants competing for 0.2 million seats *[2020]*
- Qualified **National Defence Academy (NDA)** written exam twice among 400k+ aspirants *[2020]*

Technical Projects

Unmesh Mashruwala Innovation Cell | SeDriCa *[March 2021 - Present]*

Cross functional team of 30+ students developing India's first self driving car and competing in IGVC 2023

Localization	• Tested variations of SLAM Package - **LeGO-LOAM** on RViz for precise pointcloud generation • Implemented **Probabilistic Occupancy Grid** utilizing **Bayes Filter** and **Bresenham's Algorithm** to deal with the issue caused by finite non zero resolution of LiDAR in mapping • Implementing **Extended Kalman Filter** for global state estimation from GPS and IMU sensors and modelling vehicle as Non-linear 2-DOF Bicycle Model for predicting next state
Motion Planning	• Incorporated **A* Planner** with modified heuristic to minimize turn angle and number of turns for expeditious path generation to improve over speed of initially used slower Hybrid A* Planner • Deployed **Model Predictive Path Planner** over sharp path generated by A* planner to incorporate vehicle kinematics and dynamics by modelling the vehicle as 2-DOF bicycle model
Computer Vision	• Deployed **Distance Estimator** for evaluating detected object distance from Pointcloud Data • Integrated pretrained **LaneDet** and **Spatial CNN** models in pipeline for detecting lanes • Implemented **Hierarchical Clustering** with custom metric over **IPM** for seperating lanes • Designing purely **Image Processing** based Lane Detection module for detecting lanes and estimating lane equations at intersection and curves via appropriate interpolation over **IPM**

Autonomous Quadruped Robot | Team STRIDE *[Sept 2021 - Feb 2022]*

10 member team working on autonomous quadruped for its easy maneuvering on any terrain *IIT Bombay*

- Understood data structure and flow of a GitHub Package for implementing it as base module for **Quadruped**
- Developed **Inverse Kinematics** of a 3R Robotic Arm to obtain desired end effector positions from traction forces
- Integrated an Eigen based C++ Library with base module to get reference trajectory for quadruped path traversal
- Implemented Model Predictive Controller with **Linear Quadratic Regulator** for calculating 12 end effector forces from estimated reference gait trajectory for quadruped using python library **CVXPY** for non-linear optimization

Blogging Web Application | Web Development Project *[July 2022]*

Summer Learning Project | Django based responsive platform to post and view socially curated blogs *Self Project*

- Designed a responsive blogging web application, using **Django** framework for back-end and **Bootstrap** for front-end
- Implemented features such as credit for posting blogs, up-vote/down-vote button and curating by most popular blogs
- Developed commenting feature over each blog with like/dislike, reply option for each comment to initiate dialogue

Lasso Game | Computer Programming and Utilization *[Jan 2021 - Feb 2021]*

CS101 | Course Project | Enhance game by integrating additional features into 500 lines of code *IIT Bombay*

- Tinkered with **C++ Library** and SimpleCpp Graphics to understand the code of the projectile motion based game
- Enhance game with multiple levels each with different objective, help option, limited attempts and timer for level
- Utilized **Object Oriented Programming** to simulate projectile motion of randomly spawning of weighted coins

Superposition Principle Validity in Beam Bending | Solid Mechanics *[Feb 2022 - May 2022]*

ME218 | Course Project | Guide: Prof. Krishna Jonalagadda, Department of Mechanical Engineering *IIT Bombay*

- Measured deflection of **Cantilevered Aluminium beam** at different point loads along the beam using dial gauge
- Substantiated the use of **Principle of Superposition** for estimating the beam deflection under combined loading
- Checked validity of Euler Bernoulli Beam theory for Aluminium beam and investigated the causes of **8.4%** error

Data Structures and Algorithms | Summer of Science *[May 2021 - July 2021]*

Summer Learning Project | Initiative by Math and Physics Club, Institute Technical Council *IIT Bombay*

- Understood **Data Structures** such as Stacks, Arrays, Queue, Linked List, Binary Trees, Heaps and Graphs
- Learnt and documented about Greedy Algorithms, **Graph Traversal Algorithms**, programming techniques like Dynamic Programming and **Sorting Algorithms** like Merge Sort, Quick Sort, Bubble Sort and Insertion Sort

Automated Flappy Bird | Evolving Neural Networks *[May 2022]*

Summer Learning Project | NEAT - Neuroevolution of Augmenting Topologies over flappy bird *Self Project*

- Designed Flappy Bird Game with necessary game mechanics and keyboard controls using pygame python library
- Trained agent using **NEAT Algorithm** to obtain optimal neural network topology which maxmized score metric

Life Expectancy Prediction using ML | Data Science Project *[Oct 2021 - Nov 2021]*

DS203 | Course Project | Guide: Prof Amit Sethi, Department of Electrical Engineering *IIT Bombay*

- Condensed data to size of **16000** entries from **15 datasets** each with more than 50000 entries using Pandas Library
- Performed **Exploratory Data Analysis** to obtain useful insights on 13 factors and their effects on life expectancy
- Implemented SVM for Regression to achieve **Mean Absolute Error** of **0.51** and **R2 Score** of **0.98** on test dataset
- Utilized **Hyperparameter Grid Search** via Scikit-learn library to obtain best hyperparameters for training SVM

Technical Skills

Programming and Styling Languages	C++, Python, HTML, CSS, Django, LaTeX
Simulation Softwares	Robot Operating System, Gazebo, RViz
Softwares	Ubuntu Linux, Matlab, Git, Microsoft Excel
Machine Learning	Tensorflow, OpenCV, Pandas, Keras

Positions of Responsibility

Teaching Assistant | Linear Algebra | Differential Equations *[May 2022 - July 2022]*

Academic Post to guide fresher students through academic difficulties in MA106 and MA108 *IIT Bombay*

- Conducted weekly tutorial sessions for a batch of 40 students to discuss solutions to preassigned tutorial problems
- Solved queries throughout the semester and conducted extra doubt solving sessions for students facing difficulties

Technical Secretary | Hostel - 2 Council *[Nov 2021 - March 2022]*

3-tier 10+ member council responsible for managing technical intra hostel affairs *IIT Bombay*

- Prepared hostel teams for **Technical Cup 21-22** against 15 hostels for competing in General Championship
- Conducted various speaker sessions and workshops and launched numerous technical projects for the hostel residents
- Worked cohesively with Technical Councillor for maintaining **Technical Inventory** containing technical necessities

Events Coordinator | Techfest *[June 2021 - Dec 2021]*

Asia's Largest Science and Technology Festival | Online Reach: 5 Million+ | Events: 280+ *IIT Bombay*

- Managed **200+ College Ambassadors** across India to conduct workshops and competitions to promote Techfest
- Thoroughly explored the agricultural conditions and technology in India to design an **Agricultural Competition**
- Ideated for a series of informative and educational posts for **Instagram** under theme **What If** for techfest publicity
- Curated database for the **Techfest Online Lecture Series** to contact eminent personalities from around the globe
- Conceptualized and worked upon the design of the problem statement of **Game Development Competition**

Interview Coordinator | Placement Cell *[Nov 2021 - Dec 2021]*

Placement Cell responsible for on-campus placements of graduating students in 2022 *IIT Bombay*

- Coordinated with a team of **250+ members** for conducting placement interviews of **1700+ students**
- Assisted in conducting tests for **15+ firms** and handling placement related **student queries**

Courses Undertaken

Computer Science and Mathematics	Programming for Data Science, Introduction to Computer Programming, Data Structures and Algorithms, Linear Algebra, Differential Equation, Calculus and Numerical Analysis
Mechanical Engineering	Structural Mechanics, Engineering Mechanics, Solid Mechanics, Thermodynamics, Fluid Mechanics, Engineering Drawing, Strength of Materials, Mechanical Measurements, Manufacturing Process
Other Key Courses	Quantum Physics, Economics, Electricity and Magnetism, Electronics and Electrical Circuits, Biology, Physical, Inorganic and Organic Chemistry

Extracurricular

Technical	• Completed **Data Analytics** bootcamp organized by Analytics Club at IIT Bombay *[2021]* • Pursuing finance research project about **Option Pricing Models** and their accuracy *[2022]* • Designed **Obstacle Avoidance bot** in ROS and tinkered with **OpenCV**, AruCos markers *[2021]* • Created **Autonomous Line Following Bot** in Line Follower Bot Workshop *[2021]*
Sports	• Completed yearlong sports training program under **National Sports Organization** *[2021]*