**Dikshant**
**Civil Engineering**
**Indian Institute of Technology Bombay**
**UG Second Year**
**180040033**

**ACADEMIC DETAILS**

| Examination | University | Institute | Year | CPI/% |
|---|---|---|---|---|
| Graduation | IIT Bombay | IIT Bombay | 2020 | 8.64 |
| Intermediate/+2 | Delhi Public school, Hisar | Delhi Public School, Hisar | 2018 | 91.20 |
| Matriculation | K.L. Arya D.A.V. Public School | K.L. Arya D.A.V. Public School | 2016 | 10.00 |

## Scholastic Achievements

- Secured a **97.79 percentile** in JEE Advanced among **0.25 million+** candidates *(May 2018)*
- Secured a **99.47 percentile** in JEE Mains among **0.25 million+** aspirants *(April 2018)*
- Currently ranked **sixth** on the basis of cpi among **100+** students in Civil Department *(July 2018-present)*
- Recipient of **Kishore Vaigyanik Protsahan Yojana** out of **0.1 million** candidates *(Feb 2018)*
- Pursuing a Minor Degree in the Department of **Electrical Engineering** *(July 2019-present)*

## Projects Undertakings

**Autonomous Quadruped Robot** *(Sep 2019 - Present)*
*Stride— IIT Bombay* *Technical team*

- Part of **17** member team working on **autonomous quadruped** for its easy manoeuvering on any terrain
- Stabilised an inverted pendulum cart system using **Kalman filter** with the aid of matlab simulink
- Investigating the field of **inverse kinematics and controls** for maintaining optimum balance of bot
- Modelled and simulated the rigid-body mechanics of a walking robot using **Simscape Multibody**

**Driverless Car Simulations** *(April,20 - Present)*
*Guide — Prof. Leena Vacchani and Prof. Arpita Sinha* *Summer Project*

- Creating interface between **ROS** and **Webots** for designing a controller by writing python script
- Designing Artificial Intelligence algorithm for multi-agent patrolling by creating data points for navigation
- **Planning** the most **appropriate path** for avoiding static and dynamic obstacles while manoeuvering it

**Room service automation robot** *(April,20 - Present)*
*Golden Oak Projects - Startup in India* *Summer Internship*

- Building a robot which can automate room services like supplying food items autonomously
- Mapped a room environment, build using gazebo interface, and navigated the bot using **DWA** algorithm
- Interfacing **R-pi**, **teensy**, IMUs and lidars for proper SLAM, localization and navigation

**Terrace Farming Bot** *(Oct 2019-Dec 2019)*
*Inter IIT technical meet* *8th edition*

- Designed a lightweight **autonomously** driven bot which can do the of plowing, seeding and harvesting
- Implemented **PID** controller to control the motion of bot using distance from the wall by ultrasonic sensor
- Worked on development of reliable navigation plan using **visual odometry** and stepper motor encoders
- Presented the controls mechanism on the behalf of inter IIT tech contingent in the DIC problem statement

**Impact Resistance Remote Control Car** *(Jan'20 - Present)*
*Guide- Prof. Leena Vacchani and Prof. Nagamani Jaya Balila* *MakerSpace Project*

- Designing an **carbon fibre composite** chassis as it is as high stiffness and tensile stress with low weight
- Aiming to make **shock absorbing tyres** after being inspired from sand flea robot of the Boston Dynamics
- Ideating the CAD Model considering all aspects such as position and alignment of electric components
- Implementing **PID** control to maintain the position of the bot in a straight line with the help of **MPU**

**Application of Machine Learning in Quantum Mechanics** *(April 2019 - July 2019)*
*Guide - Prof. Alok Shukla, Department of Engineering Physics — IIT Bombay* *SURP*

- Wrapped up basics of Machine Learning algorithms like **Neural Networks, K-means clustering,**
- Brushed up the basics of quantum mechanics including **energy quantisation** and **stablity criterion**
- Trained a **Neural Network** to find the **minimum energy** of Hydrogen molecule using an open-source

**Line Follower Bot using Arduino and IR Sensors** *(Jan'19 - Jan'19)*
*Electronics and Robotics Club — IIT Bombay* *Event of ERC*

- Implemented a closed-loop **PID** algorithm using Arduino UNO for controlling L293D motor driver
- Integrated five **Infra-red LED Sensors** to follow the path consisting of white lines on black background
- Took feedback from sensors to control the direction of bot using **differential** steering mechanism
- Successfully able to navigate through all the tracks designed for the competition among **100+** participants

**Bluetooth Controlled Bot** *(Jan'19 - Jan'19)*
*Electronics and Robotics Club — IIT Bombay* *Flagship Event of ERC*

- Made a bot which can be connected to any andriod using the help of **bluetooth module**(HC05) will communicate with microcontroller(**At-tiny**) to give commands to motor driver(L293d).
- Designed an **acrylic chassis** for it and applied Differential steering mechanism to it for its proper controls.
- Sketched the printed circuit board for the competition using **Autodesk** software

## Technical Strengths

| | |
|---|---|
| **Programming** | Python, C++, Matlab, Markdown, Git, CSS, HTML, Octave & LaTeX |
| **Softwares** | Webots, ROS, Gazebo, Adams, RViz, CoppeliaSim Player & Auto-CAD |
| **Electrical** | Raspberry Pi, Arduino, Node MCU, ESP32 & MPU |

## Positions of Responsibility

**Convener** *(April'19 - Present)*
*Electronics and Robotics Club* *Institue Technical Council*

- Part of a **17** Member Team responsible for introducing & **mentoring 1000+** Students in technical field
- Managed Get Mechanised and conducted Get Electrified session for the club's main flagship event, XLR8 attended by 600+ enthusiasts, mainly compromising of fresh year students, across the institute.
- Improved the participation rate by **30%** in the XLR8 and enhanced a huge success rate of **92% y/o/y**
- Conducted sessions on **Arduino, Raspberry Pi, Image Processing** and **Serial Communication**
- Escorted session on **MATLAB** and taught about implementing **PID** algorithm on a cart on a hilly terrain

**Robowars Coordinator** *(April'19 - Jan'20)*
*Techfest IIT Bombay* *Asia's largest technical fest*

- **International Robowars Competition Co-Ordinator** in techfest which have a huge footfall of **175,000+** and a budget exceeding **4 Million** compromising of around **15+** international teams
- Canvassed track for the India's largest Robot Combat Competition where participants from around the globe battle each other for the coveted Robowars Competition Title and aided all the participants for it
- Spearheaded a team of **10+** organizers responsible for the planning and execution of **280+** events
- Amplified Techfest's national reach by expanding tech competitions into **125+** colleges across India

## Courses Undertaken

Computational Motion Planning
Introduction to Robotics*
Linear Control Theory
Signals and systems
Calculus
Differential Equations
Robot Motion Planning
ROS: localization, navigation and SLAM
Linear and Non-linear Control theory
Computer Programming and Utilisation
Electronic Devices and circuits
Linear Algebra

** to be completed by J 2020*

## Extracurriculars

- Replicated **thor hammer**, which only "worthy" people can access using the mechanism of **electromagnetism** and **RFID sensor** among the fresh students in **Institute Technical Council orientation**
- Mentored a team for the **meshmerize** competition involving path planning for the technical fest, 2019
- Demonstrated an **Arduino based game** for EnPoWER using the help of 16*2 LCD in UG orientation
- Successfullly completed the introduction to machine learning course by Andrew NG on coursera
- Grabbed **first** position from my hostel in **logic GC**, organized by Maths and Physics Club, IIT Bombay
- Organized informal events during IIT Bombay's **Mood Indigo'18**, Asia's Largest Cultural Festival
- Member of the winning team in inter hostel football and cricket general championship
- Served as an **NCC cadet** in the **2 Maharashtra Engineering Regiment** of IITB 2018-19 while being in the selected cadets for the **Republic Day Parade '19** and awarded with the **NCC ATC certificate**
- Represented IIT Bombay in Football, Volleyball, Tug of War and Athletics in **Annual Training Camp,2018**
- Counseled school students of BMC under **Career Counseling Campaign** organized by Abhyuday