Dikshant | **180040033**
Civil Engineering | **UG Third Year (B.Tech.)**
Indian Institute of Technology Bombay | **Male**
Specialization: Civil Engineering | **DOB: 12/12/2000**

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Examination	University	Institute	Year	CPI/%
Graduation	IIT Bombay	IIT Bombay	2021	8.77
Intermediate/+2	Delhi Public School, Hisar	Delhi Public School, Hisar	2018	91.20
Matriculation	K.L. Arya Public School, Hisar	K.L. Arya Public School, Hisar	2016	10.00

Scholastic Achievements

- Pursuing a Minor Degree in the Department of **Electrical Engineering** *(July 2019 - present)*
- Secured a **97.79 percentile** in JEE Advanced among **0.15 million+** candidates *(May 2018)*
- Currently ranked **eighth** on the basis of cpi in a batch of **112** students in Civil Department *(present)*
- Recipient of **Kishore Vaigyanik Protsahan Yojana** fellowship award given by IISc Bangalore *(2018)*
- Awarded by **special mention** award by technical council of hostel for excellence in the field *(2020)*

Research Project

Multi-Agent Patrolling *(April 2020 - present)*
Guide — Prof. Leena Vacchani and Prof. Arpita Sinha *Research Project*

- Designing a multi-agent patrolling algorithm using **Deep Q Network** Reinforcement Learning technique
- Developed the patrolling algorithms using **IoT** by simulating packet loss in node and car communication
- Applied **Conscientious Reactive** architecture for reducing idleness using **TraCi** library with **SUMO**
- Created an interface between **ROS** and **Webots** for designing a controller for a car on CAIR map
- Planned the most appropriate path for avoiding **static** and **dynamic obstacles** while maneuvering map

Techincal Projects

SeDriCa *(August 2020 - present)*
Innovation Cell— IIT Bombay *Technical team*

- Working in **24** member team aiming to develop the India's **1st** level **5** autonomous **self-driving car**
- Developed a model based Linear Quadratic Regulator (**LQR**) algorithm for optimizing controls of the car
- Modelled the basic kinematics and dynamics of the vehicle body and analyzing the wheel suspensions
- Devising a kinematic model based **Model Predictive Control** for stabilized motion planning of vehicle

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

Autonomous Quadruped Robot *(Sep 2019 - Jun 2020)*
Stride— IIT Bombay *Technical team*

- Part of **17** member team working on **autonomous quadruped** for its easy maneuvering on any terrain
- Stabilised an inverted pendulum cart system using **Kalman filter** with the aid of matlab simulink
- Investigated the field of **inverse kinematics and controls** for maintaining optimum balance of bot
- Studied rhythmic movement of each leg of the quadruped robot for optimal **gait** selection

Intelligent Picking Bot *(June 2020 - Sept 2020)*
Flipkart Robotics Challenge *D2C competition*

- Among the top **41** teams qualified for Stage 3 out of **6061** registered teams from all over the India
- Worked on a bot which is capable of locating, picking and stowing the items in a warehouse autonomously
- Using **YOLO** algorithm for object detection and **OpenCV** techniques to find out the grasping point
- Mapped the path between pick and drop area using **SLAM**, and used **A*** algorithm for path planning

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 and tested a **Neural Network** to find the **minimum energy** of the Hydrogen molecule

Impact Resistance Remote Control Car *(Jan 2020 - March 2020)*
Guide — Prof. Leena Vacchani and Prof. Nagamani Jaya Balila *MakerSpace Project*
- Designed an **carbon fibre composite** chassis as it is as high stiffness and tensile stress with low weight
- Aimed to make **shock absorbing tyres** after being inspired from sand flea robot of the Boston Dynamics
- Implemented **PID** control to maintain the position of the bot in a straight line with the help of **MPU**

Line Follower Bot using Arduino and IR Sensors *(Jan 2019)*
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

Work Experience

Room service automation robot *(June 2020 - July 2020)*
Golden Oak Projects — Startup in India *Summer Internship*
- Built a robot which can automate room services like supplying food items and clothings autonomously
- Mapped a room environment, build using gazebo interface, and navigated the bot using **DWA** algorithm
- Interfaced R-pi, arduino, IMUs and lidars for proper **SLAM, localization** and **navigation** of the bot

Technical Strengths

Languages	Python, C++, Matlab, Git, Octave, CSS, HTML, Markdown & LaTeX
Frameworks	ROS, PyTorch, Tensorflow, Keras, OpenCV, Numpy, Pandas & Scikit
Softwares	Webots, Gazebo, Carla, SUMO, Netedit, TraCi, Solidworks & Auto-CAD
Electrical	Raspberry Pi, Arduino, Node MCU & ESP32

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
- Conducted **ROS** session for beginners during quarantine period resulting in high participation of **300+**
- Improved the participation rate by **30%** in the XLR8 and enhanced a huge success rate of **92% y/o/y**
- Conducted sessions on **Arduino, R-Pi, Image Processing, PID** and **Serial Communication**

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
- 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

Key Courses Undertaken

Controls	Linear and Non-linear systems, Intelligent Feedback systems, Adaptive Control theory, Signals and systems, Linear Algebra
Robotics	Intro to robotics, ROS:localization, navigation and SLAM, Motion Planning
Computer Science	Foundation of Intelligent & Learning agents, Data Structure and Algortihms
Interdisciplinary	Computer Programming and Utilization, Calculus, Differential Equations, Electrical and Electronic circuits, Quantum Physics, Magnetism, Structural Analysis

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**
- Made a **bluetooth controlled** bot which can be controlled using a mobile app in XLR8 competition
- 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
- Grabbed **first** position from my hostel in **logic GC**, organized by Maths and Physics Club, IIT Bombay
- 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