



Dikshant
Civil Engineering
Indian Institute of Technology Bombay
Specialization: Civil Engineering

180040033
UG Third Year (B.Tech.)
Male
DOB: 12/12/2000

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2021	8.68
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 **tenth** 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)

PROJECTS UNDERTAKINGS

Multi-Agent Patrolling

(April 2020 - present)

Guide — Prof. Leena Vacchani and Prof. Arpita Sinha

Summer Project

- Designing a multi-agent patrolling algorithm using **Deep Q Network** Reinforcement Learning technique
- Formulating an algorithm which will allow smooth movement on any curved road and their junctions
- 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

Autonomous Quadraped Robot

(Sep 2019 - present)

Stride— IIT Bombay

Technical team

- Part of **17** member team working on **autonomous quadraped** 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 quadraped robot for optimal **gait** selection

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

Intelligent Picking Bot

(June 2020 - present)

Flipkart Robotics Challenge

D2C competition

- Working 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
- Incorporated **MoveIt** package for the robotic arm movement and calculated the Jacobian matrix for it

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 **stability criterion**
- Trained and tested a **Neural Network** to find the **minimum energy** of the Hydrogen molecule
- Received the SURP certificate for satisfactory results and validation of the proofs in the project

Impact Resistance Remote Control Car

(Jan 2020 - March 2020)

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**

Room service automation robot

Golden Oak Projects — Startup in India

(June 2020 - July 2020)

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, arduino, IMUs and lidars for proper SLAM, localization and navigation of the bot

Line Follower Bot using Arduino and IR Sensors

Electronics and Robotics Club — IIT Bombay

(Jan 2019)

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

TECHNICAL STRENGTHS

Languages

Python, C++, Matlab, Git, Octave, CSS, HTML, Markdown & L^AT_EX

Frameworks

ROS, PyTorch, Tensorflow, Keras, OpenCV, Numpy, Pandas & Scikit

Softwares

Webots, Gazebo, Carla, CoppeliaSim Player, Solidworks & Auto-CAD

Electrical

Raspberry Pi, Arduino, Node MCU & ESP32

POSITIONS OF RESPONSIBILITY

Convener

Electronics and Robotics Club

(April'19 - Present)

Institute 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, 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

Techfest IIT Bombay

(April'19 - Jan'20)

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** comprising 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

COURSES UNDERTAKEN

Neural Networks and deep learning

Robot Motion Planning

Computational Motion Planning

ROS: localization, navigation and SLAM

Introduction to Robotics

Digital circuits*

Linear Control Theory

Computer Programming and Utilisation

Signals and systems

Electronic Devices and circuits

Calculus

Linear Algebra

Differential Equations

* to be completed by December 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**
- 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
- 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