Rana Das 22B0738
Department of Civil Engineering **B.Tech**
Indian Institute of Technology Bombay Male

Pursuing a **Minor degree** in **Electrical Engineering** at *Department of Electrical Engineering, IITB*
Pursuing a **Major degree** of B.Tech in **Civil Engineering** at *Department of Civil Engineering, IITB*

Scholastic Achievements

- Secured top **3 Percent** Ranking in **JEE Advanced** out of **0.16 million** aspirants [2022]
- Attained a percentile of **99.198** in **JEE Mains** among **1.02 million** candidates [2022]
- Scored **92 Percent** in **All India Senior School Certificate Examination** [2021]
- Scored **95.6 Percent** in **All India Secondary School Examination** [2019]
- Cracked National Talent Search Examination [2019]
- Secured NCO International Rank 10 and Zonal Rank 3 [2019]
- Scored **293/390** in **Birla Institute of Technology and Science Admission Test** [2022]

Key Projects

Line Following Bot [May'23 - Aug'23]
Course Project | Course : Makerspace [MS101]

- Worked in a team of 6 and Lead them to build a **Autonomous Line Following Bot from scratch.**
- Bot capable of **Climbing Steep Slopes** while carrying load and able to dump in designated place.
- Used **Arduino, IR-Sensors, ADXL345 Accelerometer and Motor Driver** in the electric circuit.
- Designed **Variable Transmission** to tackle steep slopes using **3D printed planetary gears**, Speed and Power can be controlled by RPM control of Ring and Sun Gears using Arduino PWM control signals.
- Designed **Differential Steering of Frontal Wheels** for the Bot with ability for 25 degree of Deflection.
- Developed the CAD of the bot's chassis, wheels, clamps, shaft and gears on **Solidworks** and **Fusion 360**.
- Programmed the bot in **Arduino IDE** with AFmotor and Servo library and coded logic for slope detection with ADXL345 accelerometer and corresponding motor RPM for climbing up the slopes.

Data Analysis and Curve Fitting [July'23-Aug"23]
Course Project | Course : AI/DS [CE235]

- **Data analysis and regression fitting** of real world data to **predict concrete strength** and effect of factors.
- **Data analysis and regression fitting** of real world data to **predict builtup space** and effect of factors.
- Implementation of Linear, Logitical Regression. Development of Decision Tress and optimization using Random Forest method, AdaBoosting method, pre-pruning and Bagging.
- GitHub link to repository: AI/ML

3 Rotational DOF Robotic ARM [ongoing]
Self Project

- Arm have **3DOF** for rotational motion, BLDC motor at every Joint for Robust and performing arm.
- Utilizes **ESP32** with **FOC(Field Orientation Control)** modules to control BLDC motors.
- Arm will have **Precise Angular Control** over every joint with **Constant Force** application.
- Servo Control Claw Mechanism to pick and maneuver objects using servo and lever mechanisms.

Password-Manager Tool [May'22]
Self Project

- Simple Password Management tool written in cpp using crypto++ and $boost - iostream$ Libraries.
- Use of **Hashing** to keep saved password encrypted using **SHA-3 (384/512), SHAKE (128/256)**.
- **Local storage** of encrypted save files using fileIO methods.
- GitHub link to repository: simple-pw-maanger

Collide SDL2 [July'23-Aug"23]
Self Project

- Project involving **Game Engine Development** and **Physics Simulation** of rigid body collision.
- Learnt to use **SDL2** Library for C++ and had hands on experience with **Object Oriented Programming**.
- Implementation of keyboard and mouse inputs using SDL2 header files in the script.
- GitHub link to repository: $CollideSDL2$

Python+SQL Interactive DBMS [Oct'2021-Nov'2021]
Self Project

- Worked on a project involving **MySQL**, **Python Connector** and **Advanced Python Methods**.
- Implementation of **CRUD**(create, retrieve, update and delete) functionality in the script.
- **Lightweight script** runs in shell and have ability to connect to **remote MySQL servers** over Internet.
- Learnt to use connectors and manipulate data, specially large data-sets using advanced python methods.
- **Data Visualization and Analysis** methods in the script for comparison between parameters in data.
- GitHub link to repository: SDMS

Building Materials and Construction Term Project [ongoing]
Course Project | Course : CE209

- Working in a Team of 5 to Identify places and Infrastructure that Require Technical Overhaul in the campus.
- Prioritize identified areas based on factors such as safety concerns, impact on daily operations, and potential for energy efficiency improvements.
- Gain a deep understanding of modern building materials, construction techniques, and technologies.
- Develop expertise in project planning, resource allocation, and budget management.
- Hone skills in identifying, analyzing, and solving complex infrastructure issues.
- Develop proficiency in maintaining detailed records and generating comprehensive project reports.

Technical Skills

- **Programming Languages:** Python | C++ | C | Kotlin | Jupyter | R | SourcePawn
- **Software:** Fusion360 | SolidWorks | ANSYS | AutoCAD | LaTeX| MATLAB | Onshape | Arduino IDE
- **Database Management Tools:** mySQL | PostgreSQL | MongoDB
- **Python Libraries:** NumPy | Pandas | Matplotlib | SciPy | sklearn | seaborn | pytorch
- **Cloud Tech.**: AWS | GCP | Azure | OpenVPN | nginx | apache2
- **Content Creation**: Adobe Premier Pro | Adobe After Effects | DaVinci Resolve | Adobe Photoshop
- **Misc. :** git | GitHub | Canva | NetData | OpenSSH | FileZilla/winSCP/SFTP

Key Courses Undertaken

- **Machine Learning :** Artificial Intelligence and DataScience in Civil Engineering*.
- **Data Science :** Data Science: Machine Learning *by HarvardX**
- **Math :** Calculus | Linear Algebra | Partial Differential Equations.
- **Computer Science :**
  Computer Programming and Utilization
  CS50's Introduction to Programming with Python *by HarvardX*
  Python for Data Science *by UCSanDiegoX*
  Introduction to Web Development with HTML5 | CSS3 | JavaScript *by IBM**
- **Entrepreneurship and Philosophy :**
  Introduction to Entrepreneurship | Introduction to Philosophy | Economics*
- **Physics :** Quantum Physics | Classical Physics
- **Lab :** Solid Mechanics* | Chemistry | Physics

(To be completed by Nov'23)*

Extra-Curricular Activities

- Developed a **Business Model Canvas** and **Startup Plan** for an **Ed-Tech Startup "Chamka"** for **EnBuzz** Competition conducted by E-Cell with initial investment requirements and expected revenue modelled on different level of forecast-ed market response. [Nov'22-Dec'22]
- Played **Rugby** and **Flag-Football** competitively, was **one time District Champion** and was dubbed **best Defender**. [2017-2020]
- Competed in **Google Code to Learn** Contest and was best in District with **overall rank of 110** alongside my partner and received newspaper coverage for the same. [2018]
- Cleared Stage 1 of NSEP, NSEC, NSEJS, NSEA, IMO conducted by IAPT [2018-2021]
- Cracked Stage 2 of NSEC, NSEA conducted by IAPT [2018-2021]
- Multiple Time SOF NSO, SOF IMO, SOF IEO, SOF NCO gold-medalist [2018-2020]
- Participated in UL NSSC Zonal Convention [2018]
- STSE National Rank 3 [2018]