Bhuvan Aggarwal | **190040026**
Civil Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 25-09-2001

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2023	
Intermediate	CBSE	Bhavan Vidyalaya, Chandigarh	2019	96.20%
Matriculation	CBSE	Bhavan Vidyalaya, Chandigarh	2017	10

Pursuing a Minor Degree in the Department of **Computer Science and Engineering**

Scholastic Achievements

- Currently ranked **1st** among 120 students in the Civil Engineering Department Batch of 2023 *('20 - Present)*
- Received the **OPJEMS** scholarship by the Jindal Group after going through multiple tests and interviews *('20)*

Professional Experience

Data Science Associate | DTime *(May'21 - Jul'21)*

A machine learning consultancy firm trying to harnesses data to support the sustainability transition

- Researched about the **energy trading system** in the United Kingdom to get the domain knowledge of the problem
- Performed exploratory data analysis and feature engineering on the dataset to extract useful information for training
- Predicted maximum energy prices using an attention based **LSTM** model while decreasing the MAE loss from **16** to **6**
- Conceptualised and built an online learning approach to predict the acceptance of offers, achieving F1-score of **0.61**

Machine Learning Intern | Lending Katalyst *(Jun'21 - Jul'21)*

A startup aimed at revolutionising legal processes using AI

- Delivered a pipeline to convert documents from kannada to english using **Pytesseract** and **Google Translate API**
- Generated embeddings of legal documents using a **BERT based encoder** and trained an LSTM classifier to predict if the properties are clear for any legal transactions depending on history of the property with an accuracy of **85%**
- Deployed the model on **heroku** using **Flask**, to be used both, as an **API** as well as with a GUI

Data Science Intern | The Sparks Foundation *(Oct'20 - Nov'20)*

- Designed a **stacked LSTM model** for future stock price prediction based on numerical analysis of historical prices
- Incorporated **sentimental analysis** of news headlines to get an f1-score of **0.81** while predicting movement of prices
- Performed a predictive analysis on student's marks depending on the historical marks and hours of study put in

Technical Projects

Senior Perception Engineer | SeDriCa, Unmesh Mashruwala Innovation Cell *(Sept'19 - Present)*

One of 11 finalists among 259 teams in Mahindra RISE Driverless Car Challenge | Awarded a Mahindra E2O

- Working in a team of 22 students to develop India's first **Level 5 self driving car**, customized for the Indian roads
- **Led** the **Autonomous Parking Subsystem** and worked towards creating an end-to-end pipeline using techniques such as Inverse Perspective Mapping, 3D point cloud segmentation and various other Deep learning frameworks
- Implemented Kmeans clustering and plane fit algorithm on **3D LIDAR Point cloud** for ground segmentation
- Working on the **decision making backbone** which includes obeying traffic rules, environment aware actions etc
- Transformed the 3D point cloud to a 2D occupancy grid in ROS for obstacle tracking, lane merging and reverse driving
- Mentored a team of 5 students to build an autonomous **maze-solver bot** with obstacle detection and avoidance

Source code Plagiarism detection | Research Project *(May'21 - Present)*

Project Guide: Prof. Prabhu Ramachandran, C-MInDS, IIT Bombay

- Building a model to incorporate the **writing pattern** and the **execution flow** to detect plagiarism in codes and text
- Extracting features from writing pattern using a **BERT based encoder** and abstract syntax tree for syntactical grammar
- Ideating on creating a user-interactive GUI for hosting the created model and training the model as a **Siamese network**

Multi-Task Self Supervised Visual Learning | Research Project *(May'21 - Present)*

Project Guide: Prof. Amit Sethi, Department of Electrical Engineering, IIT Bombay

- Investigating previous research in the field and trying to know the different approaches used for the same
- Built a multi-head network with a **ResNet-50** backbone and trained it using self supervised contrastive learning
- Working on creating a lane segmentation model by fine tuning the **multi head network** with a frozen backbone

Future Frames Prediction | Research Project *(Jan'21 - May'21)*

Project Guide: Prof. Amit Sethi, Department of Electrical Engineering, IIT Bombay

- Created a unified GAN model for predicting accurate and temporally consistent future frames over time which consist of single **generator** that can predict both future and past frames using the **retrospective cycle** constraints
- Used **Deformable convolutions** to learn geometric transformations and **Conv-LSTMs** for predicting frames
- Employed two **discriminators** to identify fake frames and fake sequences and got a **PSNR** value of **29.88**

Grid 2.0 - Robotics Challenge | Flipkart *(Jul'20 - Dec'20)*

Ranked in the Top 3 among the 1000+ participating teams and qualified for the national round

- Worked in a team of 5 students to build an **autonomous drone** satisfying the needs of the competition
- Applied the **Artificial Potential Field** method for real-time dynamic path planning of the drone running at 30 fps
- Included 3D obstacle detection and avoidance along with a custom **YOLO-v3** based frame detection algorithm

S.A.S.H.A - Smart Artificial System for Home Automation *(Mar'20 - Jul'20)*

Institute Technical Summer Project | Institute Technical Council | IIT Bombay

- Developed a **security-enabled**, **Python-based Chatbot** capable of controlling the daily-use electrical appliances along with Natural language processing based conversation with the user, and some other voice assistant features
- Deployed the bot on **Telegram** and created a **user interactive** website to assist the user with basic commands
- Scaled the bot to add other energy-saving features such as the **Green House Mode** and the **Night Mode**

Mask Detector | Covid Projects | Tinkerers' Laboratory, IIT Bombay *(Jun'20 - Jul '20)*

- Created an integrated model to detect if a person is wearing a mask using the MTCNN model to detect the faces
- Trained a Transfer Learning Model with base model as **MobileNetV2** on a custom dataset for detection of mask

Plastic Shredder | Sustainable Social Development | NSS, IIT Bombay *(Oct'19 - Mar'20)*

- Coordinated in a team of 5 to create a **plastic shredder** to be deployed in the institute to ease the recycling process
- Ideated on the various specifications of the machine and created a complete **3D CAD model** of the same

Accident Avoidance System for vehicles *(Oct'17 - Feb'18)*

- Presented the project at various competitions and **won** the **CBSE National Science Exhibition** among others
- Designed a fully functional accident avoidance system for vehicles using various micro-controllers and sensors
- Incorporated eye blink rate monitoring to measure the **Drowsiness** of the driver and an alert system for the same

Summer of Machine Learning | Self-Projects *(May'21 - Jul'21)*

- Built a face recognition with emotion detection and emotion-based music recommendation system
- Created a content-based spotify recommendation system using user's historical and current spotify streaming data
- Implemented a **seq2seq** abstractive text summarizer using bidirectional LSTM architecture with attention
- Developed an integrated model for **automatic captioning** of images using ResNet50 for image feature extraction

Positions of Responsibility

Manager | Team Sedrica, Unmesh Mashruwala Innovation Cell *(May'21 - Present)*

Innovation Cell aims to facilitate technical start-ups and foster an atmosphere of innovation and entrepreneurship

- Managing a team of 6 responsible for developing the **team's website**, and improving the **social media** outreach
- Supervising the **three** phase team recruitment process including a technical assignment followed by interviews
- Organised the Trailblazher innovation challenge in collaboration with The Innovation Story

D-AMP Mentor | Department of Civil Engineering *(May'21 - Present)*

- Mentoring 6 sophomores to help them cope with academic difficulties and help in their **holistic development**
- Worked towards revamping the D-AMP blog and adding the academic resources for the reference of the students

Convenor | Tinkerers' Laboratory, IIT Bombay *(May'20 - May'21)*

The alumni-funded 'makerspace' for innovators to encourage prototyping and execution

- Worked in a team of **7** to manage the lab, cultivating the tech culture in institute and approve funding for projects
- Collaborated with the **Stanford Byers Center for Biodesign**, to organize a long-term Design Thinking course
- Executed **30+** projects focused towards containment of the **COVID-19** virus for deployment within the **institute**

Manager of Virtual Gathering | E-Convocation 2020, IIT Bombay *(Jun'20 - Aug'20)*

The first-ever Virtual Convocation in India, with 10k+ hits in 6hrs

- Praised by the **Hon'ble Prime Minister** and was featured on **30+** media channels including Times of India and CNN
- Created the **virtual model** of the institute using a third party software to bring in the **social aspect** of **convocation**

Key Technical Skills

- **Programming languages:** Python, C++, HTML, CSS, Javascript, Jquery, MATLAB, SQL, Bash, PHP
- **Softwares:** Solidworks, AutoCAD, Adobe Photoshop, Premiere Pro, After Effects, Arduino IDE, LaTeX, GIT
- **Frameworks:** Django, Bootstrap, Materialize, Tensorflow, PyTorch, Keras, Robot Operating System(ROS), ROS2

Relevant Courses

- **Machine Learning:** Machine Learning*, Deep Learning Specialization*, GAN Specialisation*, MLOps Courses*
- **Other:** Engineering Graphics and Drawing, Computer Programming and Utilization, Python Specialisation*

(:Online Courses)*

Extra-Curricular Activities

- Awarded a **Special Mention** for contribution in sustainable social development under NSS, IIT Bombay
- Received the **Special Mention** in Hostel-9 Technical Awards for contribution in cultivating the tech culture in hostel
- Pursuing a finance project in **Commodities and Currencies** under Finsearch program organised by the Finance Club
- Mentored **10** students to complete a super sampling project under the Seasons of Code organised by the WNCC club
- Designed and fabricated a **bluetooth** controlled four-wheeled bot with on-board power supply in **XLR8**