Silky Kumari | **190070063**
Electrical Engineering | **B.Tech.**
Indian Institute of Technology, Bombay | **Gender: Female**
DOB: 17-02-2001

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2023	
Intermediate	CBSE	Surendranath Centenary School	2019	94.00%
Matriculation	CBSE	Surendranath Centenary School	2017	10

Pursuing a **Minor** degree in **Machine Learning** and **Data Science** from **C-MInDS, IIT Bombay**

Scholastic Achievements

- Secured **99.4 Percentile** in Joint Entrance Exam, Advanced among 0.17 million candidates ['19]
- Achieved **99.88 Percentile** in Joint Entrance Exam, Mains among 0.93 million candidates ['19]
- Qualified Regional Mathematics Olympiad **(RMO)** and selected for Indian National Mathematics Olympiad **(INMO)** conducted by the Homi Bhabha Centre for Science Education **(HBCSE)** ['17 & '18]

Key Projects

AI hacks: Chrome Dino Game [Apr '20 - Jun '20]
Institute Technical Summer Project | Institute Technical Council, IIT Bombay

- Interfaced the python code with the chrome browser-javascript using **Selenium**, a browser automation tool, to send actions to the chrome browser and receive the state of the AI agent to be fed into the DDDQN model
- Pre-processed the frames of the dino game using **OpenCV** to highlight the edges with **Canny edge detection**
- Implemented a **Convolutional Neural Network** model architecture using **PyTorch** to predict the Q-values
- Designed a **Dueling Double Deep Q-Network** model to train the DRL agent and achieved best score of **142**

NLPlay with Transformers [Ongoing]
Seasons of Code | Web and Coding Club, IIT Bombay

- Implemented **RNN, LSTM** and **GRU** and trained the models on movie reviews dataset for sentiment analysis
- Fine-tuned pre-trained **BERT** and **Roberta** for **sentiment analysis** using HuggingFace's transformers library
- Exploring and analyzing performance of pre-trained **GPT-2** and **T5** transformers for **text generation** tasks

Music Genre Recognition [Jan '21 - May '21]
Course Project | Guide: Professor Biplap Banerjee, IIT Bombay

- Performed **data visualization** and **augmentation** by splitting the 30 second audio clips each into 10 parts
- Extracted features using **Mel-frequency Cepstrum** and generated **Mel Spectrograms** for each audio clip
- Trained a **Convolutional Neural Network** model to predict the genre of the music with an accuracy of **93%**

Deep Reinforcement Learning [Apr '20 - Jun '20]
Summer Of Science | Maths and Physics Club, IIT Bombay

- Explored Deep RL algorithms like TD, SARSA, Deep Q-Learning, **Policy-based** and **Actor-critic methods**
- Implemented algorithms to solve **OpenAI Gym** environments including the **Frozen Lake** and **Lunar Lander**
- Trained an agent with **Double Deep Q-Network** to play **Atari Breakout** and achieved best score of **298**

Automatic Music Synthesizer [Jan '21 - Apr '21]
Course Project | Guide: Professor Maryam Shojaei Baghini, IIT Bombay

- Designed a **Finite State Machine** to play musical notes sequentially in a loop for a total duration of 8 seconds
- Generated seven major notes in Indian classical music using **clock divider circuit** and a master clock of 50MHz
- Designed the project on **Quartus** using behavioral modelling in **VHDL**, and successfully ran **RTL simulation**
- Burned svf file of the project into **Krypton Board**, and successfully verified the design with LEDs and speaker

Tinkering Bootcamp [Apr '20 - Jun '20]
Learners' Space | Technical Summer School, Institute Technical Council, IIT Bombay

- Designed a **self-sanitization system** for clinics and hospitals using **ESP32** micro-controller and **IR Sensors**
- Created an interface for the above system on the **Blynk IoT platform** to provide remote control access to user
- Developed a **COVID-19 Tracker and Alert system**, which monitors the active, recovery and the death rates of coronavirus cases and signals sudden outbreak of cases using **ESP32** micro-controller and **Arduino Uno**

Temperature Monitoring using Pt-51 [Jan '21 - Apr '21]

Course Project | Guide: Professor Rajbabu Velmurugan, IIT Bombay

- Interfaced **LM35** sensor using the **ADC MCP3008** with the **Pt-51** microprocessor to monitor the temperature
- Recorded the room temperature at **1Hz** and kept track of the recent 3 and averaged the last 10 measurements
- Designed a robust **alarming system** to notify abrupt changes in temperature using LED indicators and buzzers

Other Projects

- **Satellite Position and Speed Controller*** - Used a **Simulink model** with a **PID controller** to obtain the constant parameters to achieve the quickest settling time without excessive overshoot while ensuring stability
- **Image Segmentation*** - Implemented **Quadtree** based image segmentation and analyzed its applications for object detection, **localizing tumors** in medical images, image compression and object **recognition tasks**
- **Traffic-sign recognition system** - Built a deep learning model using **Keras** and trained it on the **GTSRB** dataset to classify the traffic signs into **43 different categories** with an accuracy of **97%**

**course project*

Engineering Experience - IIT Bombay Racing

*Cross functional team of 70+ members who design and fabricate **electric car** for **Formula Student International Design Competition** conducted by SAE and IMechE held annually at Silverstone, United Kingdom*

Design Engineer [May '21 - Present]

Localization and Mapping Subsystem

- Optimizing and fine-tuning **SLAM** algorithms to improve accuracy and reduce the computational complexity
- Working on **loop closure detection, data association,** resampling and **sensor calibration** techniques
- Responsible for training and **mentoring** Junior Design Engineers to be Design Engineers in the following year

Junior Design Engineer [Jul '20 - Apr '21]

Localization and Mapping Subsystem

- Implemented and tested SLAM algorithms including **EKF SLAM** and **FastSLAM** on a **ROS**-based Formula Student Simulator and Matlab respectively, and explored algorithms like **GraphSLAM** and FastSLAM 2.0
- Performed **sensor fusion** with **Kalman Filter** on MATLAB to estimate the position and orientation of the driverless vehicle using sensor measurements obtained from Inertial Measurement Unit **(IMU)** and **GPS**
- Attended a virtual **FSG Driverless Workshop**, organised by **Waymo** and **Formula Student Germany**

Position Of Responsibility

Mentor | Gaming meets AI [Mar '21 - Jul '21]

Seasons of Code | Web and Coding Club, IIT Bombay

- Prepared weekly materials and **assignments** to introduce mentees to deep learning and reinforcement learning
- Guided the mentees towards building a deep reinforcement learning agent to play the **2048 puzzle game**

Technical Skills

Programming	C, C++, Python, Julia, VHDL, Embedded C, Assembly (8051, 8086, 8085)
Softwares	MATLAB, Robot Operating System (ROS), Quartus, Keil, Gazebo, Arduino
Frameworks/Libraries	PyTorch, Keras, scikit-learn, numpy, matplotlib, pandas

Courses Udertaken

Electrical Engineering - Microprocessors, Probability and Random Processes, Control Systems, Digital systems, Signal Processing, Analog Circuits, Electronic Devices, Communication Systems*, Foundation of VLSI CAD*

Machine Learning and Programming - Introduction to Machine Learning, Programming for Data Science*, Machine Learning for Remote Sensing - II*, Advanced Methods in Satellite Image Processing

** courses to be completed by November 2021*

Extracurriculars

- Bagged **1st position** in **Strategy Wars**, a competition of wit and strategy including basic concepts of finance, analytics, and consulting, conducted by the **Finance Club, IIT Bombay** ['19]
- Won **4th prize** in **RecogniSign** traffic sign recognition competition organised by **Techfest, IIT Bombay**['20]
- Designed a **Bluetooth controlled obstacle maneuvering** bot with differential driving mechanism at **XLR8**, a competition conducted by the Electronic and Robotics Club **(ERC, IIT Bombay)** ['19]
- Won **Best Design Award** for designing and fabricating the electrical and mechanical subsystems of a **Remote Controlled plane** for a competition, organized by the **Aeromodelling Club, IIT Bombay** ['20]
- Completed a year long training in **Badminton** under **National Sports Organization, IIT Bombay** ['20]