Gaurav Kumar

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Education

- **Veermata Jijabai Technogical Institue (VJTI)** — Matunga, India
  Bachelor of Technology in Textile Manufacturing — *Batch of 2024*
- **Allen Swami Vivekanand Jr. College** — Kopar Khairane, India
  HSC — *Batch of 2020*

Skills Summary

- **Languages**: Python, C++ , C , solidity, Embedded C
- **Libraries**: OpenCV, Sklearn, rospy, tensorflow
- **Frameworks**: Git, TensorFlow, Keras, Pandas, ROS, Moveit, Rviz
- **Tools**: Git hub, Google Collab, Remix IDE, Solidworks, Riviz, gazebo
- **Platforms**: Linux, Windows , Pop OS
- **Softwares**: Premier pro, photoshop
- **Soft Skills**: Leadership, Event Management, Writing, Public Speaking, Time Management

COMPETITIONS

- **ITC by IIT Bombay(IxT challange)** — IITB
  Top 3 finishers — *July 2022 - September 2022*
  - **Problem statement -** Safe recovery of an open source Quadrotor UAV platform with one motor failure.
  - **proposed solution 1-** The mathematical and software approach.(Nonlinear Model Predictive Control (NMPC) controller.)
  - **proposed solution 2-**The hardware design approach(Stopping the motor diagonal to the failed motor and spinning the remaining two motors opposite to each other.)
- **ITC by IIT Bombay(IxT challange)** — IITB
  Top 3 finishers — *July 2022 - September 2022*
  - **Problem statement -** Implementation of a Reinforcement Learning system on a micro-controller based module for stabilizing an actuated platform.
  - **proposed solution 1-** Use the STMCUBEIDE and Mx Programmer to program the given system and achieve the desired results leading to optimal policy. The microcontroller used will be STM32F103.)
  - **proposed solution 2-** RL functions can be adapted with the least-square temporal difference (LSTD) learning algorithms to develop a model-free state feedback controller with (LQR) as a baseline controller.
- **Smart India Hackathon (SIH)** — Remote
  Representing college for SIH — *March 2022 - present*
  - **Problem statement -** Using depth sensors or computer vision in prosthetic lower extremity exoskeleton appliance to alert or adjust gait.
  - **Proposed solution-**we shall be using IMU in this contraption in order to calibrate the depth sensor readings and eliminate the noisy data.
  - This alert output and processed data shall be generated by our microcontroller.
  - Parallely, our aim would be Design/Procure a real life working exoskeleton with electric motors and utilize IMU attached at knees, ankles and waist to measure gait characteristics of the user like gait speed, mean step width, mean stance time, and cadence.
  - We shall also be utilizing gait simulations with our depth sensing mechanism in order to gauge real life output.
- **Vision Beyond Limits** — IITB
  IITB techfest finalist — *Dec 2021 - Feb 2022*
  - We had brainstormed and coded a **multi-class classification** approach for disaster assessment from the given **dataset of post-earthquake satellite imagery**
  - Approach used for object detection and its implementation:- We have used **supervised learning** to extract the data as we are provided with a labelled data set.
  - **Semantic segmentation** is then applied on the the data, which helps in detecting the the amount of damage each building ha sustained.

Projects

- **Gesture Detection and Replication** — Remote
  OpenCv, Python, Coppeliasim — *Sep 2021 - Oct 2021*
  - Aim of the project was to **detect and recognise basic hand gestures** and imitate them using a **simulation of a robotic hand**.
  - We have tested many methods for gesture detection but our main focus was on Convexity defects and CNN model to detect gestures.
  - Used **Convexity defects** and **Contours** for gesture detection and simulation was done on **CoppeliaSim**.
  - We have used **Remote API** functions of coppeliasim for connection with coppeliasim. Depending on the gesture detected movement was done by robotic hand.

- **Wall-E** — Remote
  IOT, ESP-IDF — *N/A*
  - **Aim** of the project was to make a **Self balancing** and a **line following bot**.
  - we had used **ESP-32** microcontroller for this project.
  - we updated the PID control values for line following over wifi on the bot.

- **MARIO** — Remote
  ROS, Gazebo, Rviz — *N/A*
  - MARIO abbreviation for Manipulator on ROS Based Input Output is a bot with 3 Degree of Freedom. It consists of two SG90 micro servo and one MG995 metal gear servo motor.
  - The servo motors are placed on base, elbow and shoulder enabling it with 3 Degrees of Freedom.

- **Autonomous Vehicle navigation** — Remote
  ROS, Gazebo, Rviz, CNN, opencv — *December2022 - Present*
  - This project utilises the use of machine learning to drive the vehicle in a stimulation environment using machine learning algorithms.
  - The stimulation is in gazebo enviornment and controlled by the ROS.

Position of Responsibility

- **Society of Robotics and Automation** — Mumbai , India
  Active member — *March 2021 - Present*
  - **First year-**
  - Attended workshops like Wall-E, Pixels, Mario.
  - Qualified for Eklavya Mentorship programme and successfully completed the same.
  - **Second Year -**
  - Hosted the club launch for freshers.
  - Conducted various workshops on OpenCV, Image Processing, Self Balancing and line following bot, Manipulator on ROS Based Input Output bot with 3 Degree of Freedom and mentored the junior on the same.
  - Guided Juniors in various competitions like Algocon and Eklavya.

- **Technovanza** — Mumbai, India
  Sponsorship Administrator — *November 2022 - Present*

- **Technovanza** — Mumbai , India
  Department Coordinator — *March 2021 - December 2021*
  - Brought maximum participation from department.
  - Represented Technovanza from Textile Department.

- **Enthusia** — Mumbai , India
  Event Coordinator — *March 2021 - June 2022*
  - Event Coordinator of Marathon and Cyclothon.
  - Successfully conducted marathon in offline mode.

- **Textile Department** — Mumbai , India
  Event Manager — *March 2021 - Present*
  - Successfully managed and conducted various Textile Events.
  - Did live streaming of the events on various social platforms.