Harsh Mahesheka

Website: https://harshmahesheka.github.io/

Email: harsh.mahesheka.eee20@iitbhu.ac.in
Mobile: +91-947-0292-105

EDUCATION

- **Indian Institute of Technology (BHU)** — Varanasi, India
  *Bachelor and Masters of Technology - Electrical Engineering; **GPA: 9.52*** — *July 2020 - June 2025*
  with minor in Computer Science and Engineering

SKILLS AND INTERESTS

- **Areas of Interests**: Path Planning, Computer Vision, Deep Reinforcement Learning
- **Languages and Libraries**: Python, MATLAB, C++, CMake, Ruby, OpenCV, Stable Baselines, Tensorflow, Pytorch, Latex, Git
- **Tools**: Robotic Operating System, Moveit, Gazebo, Isaac Sim, PyBullet, Carla, Webot

EXPERIENCE

- **Robot Learning Lab, University of Freiburg** — Freiburg, Germany
  DAAD-WISE Research Internship Under Dr. Abhinav Valada — *May 2023 - Present*
  - **Reinforcement Learning Planner for Kinesthetic Learning**: Developed an RL-based planner to generate base velocities for mobile manipulators, enabling them to achieve end-effector goal poses provided by teleoperator. Utilized the planner to streamline the collection of demonstations for kinesthetic learning.
  - **Interfaced Toyota HSR Robot**: Created an interface that enables the use of the HSR robot with the Nvidia Issac simulator for training and testing Deep Reinforcement Learning planners.

- **Robotics Research Center, IIIT Hyderabad** — Hyderabad, India
  Research Internship Under Dr. K. Madhava Krishna — *May 2022 - December 2022*
  - **Reinforcement Learning Based Global Planner**: Working on RL-based Global Planner trained to reduce localisation drift by avoiding symmetric or featureless areas. Created platform for training and testing DRL global planners on ROS-compatible simulations.
  - **Visual Language Navigation**: Worked on grounding waypoints on annotated maps by analyzing complex language commands in Indoor Environment.

- **Google Summer of Code - Open Robotics** — Remote
  Student Developer — *May 2022 - September 2022*
  - **Package Creation Tool**: Created tool for generating template packages for gazebo simulator.
  - **CMake Macros**: Created macros for installing and sourcing worlds, models, plugins etc. in gazebo robotics simulator.

    These tools were designed to streamline the process of creating and deploying new packages, making it easier for researchers and developers to build and test their robotic systems.

- **Indian Institute of Technology (BHU)** — Varanasi, India
  Research Project under Dr. Shyam Kamal — *Feb 2022 - Present*
  - **Multi Purpose Household Bot** [Link]: Designed and Fabricated a ROS integrated mobile bot that could help in day to day household activities like vacuum cleaning, baby monitoring etc.
  - **Visual Navigation in Indoor Environments**: Implemented VSLAM, Point-Point Navigation, Frontier Exploration, Human Following etc., algorithms on the bot using RGBD camera.

Relevant Course's Taken

- **MA-101** Engineering Mathematics, **MA-202** Probability and Statistics, **CSO-101** Computer Programming, **CSO-201** Discrete Maths, **CSE-458** Soft Computing
- **ME-314** Mechatronics , **EE-211** Linear Control Systems, **EE-313** Modern Control Engineering
- **ROS for Beginners 1, ROS for Beginners 2, ROS for Beginners 3** by Anis Koubaa on Udemy.
- **Deep Learning Specialization** by Andrew Ng and **Reinforcement Learning Specialization** by the University of Alberta on Coursera.

Projects

- **Centralized Multi-Agent Pick Up and Delivery System** [Link]: Designed and fabricated Omni-directional ROS-based mobile robot for warehouse delivery.Implemented CBS-based Multi-Agent Path Planning and Scheduling as Global Planner and PID Tracking based Local Planner. Developed a Centralized Localization mechanism based on Cameras and odometery data.
- **Autonomous Wheelchair** [Link]: Implemented Mapping, Localisation, Navigation, Obstacle Avoidance(Static & Dynamic), Human Following, Human Velocity Prediction etc. on a physical wheelchair using both LiDar and RGBD camera (one at a time).
- **UAV guided UGV on Mountainous Terrains** [Link]: Navigated a car which was being localized using camera on an overhead drone on a pre-mapped snow-covered hilly area in Gazebo. The project included Road Segmentation, UAV Localization Controls and Planning along with UGV Localization Controls and Planning.
- **JerBot – a bio-mimetic bipedal robot** [Link]: Formulated an alternate design for biped locomotion, mimicking Jerboa and Fabricated a prototype along with mechanical validation of hardware. My major contribution was improving design based on trajectory testing done through Towr framework.

Achievements

- Got nominated for a funded research internship at University of South California, USA under the IUSSTF-Viterbi India Program.
- Got nominated for a funded research internship in Germany under the DAAD-WISE Program.
- Got selected for Google Summer of Code'22 as Student developer in Open Robotics.
- Stood first in Robotics Conclave, third in Labyrinth (ROS-based maze solver), and first in Scientist of Utopia (Astronomy-based Hackathon) at Technex (Annual Technical Fest of IIT BHU).
- Won IAROS 2021 under Industrial Automation Track.
- Finalist at Vichesta (ROS Based Competition at Annual Fest of IIT Dhanbad)
- Ranked 3rd among 60+ international teams in TIB-JUDO eminence, an English Parliamentary Debate Competition.
- Cleared Tabs in multiple International Debates in both English and Hindi. Also won numerous oratory events like Extempore, Debate, JAM, etc. at inter and intra college level.
- Secured an All India Rank of 3900 (top 0.3%) in JEE Advanced Examination.

Memberships and Leadership

- **Secretary** of **Robotics Club**, **IIT BHU.**
- **Mentor** at **RoboReG** (Robotics Research Group at IIT BHU).
- **Debating Lead** at **Literary Club**, **IIT BHU**.
- **Founding Member** at **Team Artemis** (Consumer Robotics Research Team at IIT BHU).