

Education

Worcester Polytechnic Institute

Master of Science in Robotics Engineering

Visvesvaraya National Institute of Technology

Bachelor of Technology in Electronics and Communication Engineering | CGPA 8.45

Worcester, MA

Aug 2022 - Present

Nagpur, India

July 2018 - May 2022

Skills

- **Languages:** Python, C/C++.
- **Platforms:** OpenCV, Pytorch, Tensorflow, Git, ROS, Gazebo, Matlab, VREP, Linux.

Experience

Technische Universität Hamburg (TUHH),[Reference letter]

Robotics Summer Intern

Hamburg, Germany

May 2021 - August 2021

- Designed and generated biped walking gait trajectory using 3D Linear Inverted Pendulum Model (LIPM).
- Developed field endline detection and horizon detection method using traditional (computer vision) methods, also implemented a CNN based object detection algorithm.

Projects

Reconfigurable Quadrupedal Bipedal Snake Robot (ReQuBiS)[video link]

- Developed snake robots that reconfigures itself into a quadrupedal and bipedal configuration.
- Designed transformation gaits using key-frame interpolation based approach. Used sinusoidal trajectory curve for generating serpentine locomotion and used ZMP and kinematic model to generate quadrupedal walking gaits.

Edge detection, object detection and tracking for Nimbro

- Implemented Canny edge detection and horizon detection algorithm using traditional computer vision techniques (HSV masking and Hough line transform).
- Implemented YOLOV4 for object detection on the horizon detected video.

Simplified probability of boundary-based edge detection

- Implemented Derivative of Gaussian, Leung-Malik (LM), and Gabor filter banks.
- Generated the texture, brightness, and color gradient using chi-square distance. Averaged the gradient outputs with the Sobel and Canny image with variable weights in order to obtain the edge detected image.

Controls and trajectory generation for walking gaits of Nimbro using 3D LIPM.

- Generated a COM trajectory and swing leg trajectory for the multiple step of biped walking using 3D Linear Inverted Pendulum Model (LIPM).
- Designed a PID controller for the stabilising the humanoid. Modeled an algorithm for implementing kicking mechanism for biped using ZMP and kinematic model.

Panorama stitching

- Implementing panorama stitching algorithm using the traditional homographic estimation and deep learning approach (HomographyNet).

Hand Gesture Control of Computer Features [link]

- Implemented a hand gesture recognition method using a combination of ultrasonic sensors.

Dynamic Programming of Markov Decision Process

- Policy iteration and value iteration for the Frozen Lake environment from OpenAI Gym.

Publications

- H. Zade, **A. Varude**, K. Pandya, A. Kamat, S. Chiddarwar and R. Thakker, "ReQuBiS - Reconfigurable Quadrupedal Bipedal Snake Robots," 2021 IEEE 17th International Conference on Automation Science and Engineering (CASE), 2021, pp. 2241-2246, doi: 10.1109/CASE49439.2021.9551526.
- International Conference on Advances in Mechanical Engineering, ICAME. Rishabh Runwal, Shivraj Dhonde, Jatin Pardhi, Suraj Kumar,**Aadesh Varude** (2021) Hand Gesture Control of Computer

Course Work

- **Robotics:** Reinforcement Learning (CS 549), Controls of Mobile robots (Coursera) Controls Boot Camp (Steve Bruton)
- **Computer Vision:** Digital Image Processing, Advanced Image Processing, Computer Vision
- **Mathematics:** Probability, Differential Calculus, Linear Algebra, Matrix Theory, Vector Calculus, Statistics and Optimization.

Extra Cirricular

- **IvLabs research member:** Worked and mentored varied robotics project.
- **IEEE Vnit Chapter:** Conducted workshops like basic electronics and introduction to mobile robots under IEEE Vnit chapter.