Bontalakoti Venkata Harshavardhan

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Education

- **Indian Institute of Technology, Hyderabad** — Telangana, India
  Bachelor of Technology - Mechanical Engineering; Exchange Student — *June 2024 - Present*
- **National Institute of Technology, Silchar** — Assam, India
  Bachelor of Technology - Mechanical Engineering; CGPA: 9.12/10.0 — *December 2021 - Expected July 2025*

Experience

- **Indian Institute of Technology, Madras** — Onsite
  Summer Intern (Full-time) — *May 2024 - July 2024*
  - Selected for the prestigious Summer Fellowship Program(SFP-2024) under the Aerospace Department.
  - Developed an open-source simulation environment for testing drones and ships using Unity and ROS2. Gained hands-on experience in integrating physics-based simulations with robotics frameworks, strengthening my skills in control systems, ROS2 and software development.
  - Simulated realistic interactions between ships and drones, incorporating ocean and wind dynamics to enhance control strategies for autonomous systems.
- **Instruments Research and Development Establishment, DRDO** — Onsite
  Summer Intern (Full-time) — *May 2023 - July 2023*
  - Entrusted with the design and analysis of ammunition mountings for drones, terrain vehicles, and naval vessels.
  - Gained practical experience in vehicle dynamics, design and failure analysis techniques.
  - Played a key role in conceptualizing an innovative approach to utilize Ocean Buoys for advanced coastline surveillance. This novel idea significantly improves the ability to monitor coastal activities thereby reducing the costs by up to 20%.
- **National Institute of Technology, Silchar** — Onsite
  Research Assistant (Part-time) — *September 2022 - July 2024*
  - Developed machine learning models using smartwatch data to predict human activity patterns, enhancing the understanding of user behavior in diverse environments.
  - Evaluated Human Activity Recognition datasets and presented a custom model, 200% faster, at the IFIP IoT Conference.
  - Set up a micro-stereo lithography system, improving printing time by 25% and accuracy by 15% through a novel resin injection method.

Projects

- **Drone Design Aerothon 2023**
  Team Praveg
  - As part of Team Praveg, we were entrusted with the challenge of designing a drone capable of autonomous operations and weight transportation.
  - Worked on the avionics section and the integration of machine learning algorithms for enabling autonomous control of the drone.
  - Designed and trained a custom Convolutional Neural Network (CNN) model which had a 90% accuracy in detecting targets.
- **Desktop Assistant Bot**
  Mandred Tech
  - Cyclops is an open-source desktop assistant bot which runs on a Large Language Model(Mistral 7B).
  - The bot is engineered for various features which includes idleness reminders, emotion detection, user presence verification, news reading, scheduling, music playing, camera operations, gaming, and more.
  - Leveraged Vosk's Text-to-Speech model for efficient conversion of voice commands into text. Moreover, sensor like DHT11 provides the functionality of detecting room temperature and humidity.
  - *Github Repo*: Cyclops
- **Human Navigator Based Cartography in ROS2**
  Personal Project
  - Developed a novel approach for robotic navigation by mapping locations based on human movement.
  - Implemented pose detection to enable a robot to follow a person while simultaneously mapping the environment.
  - Gained hands-on experience with ROS2, Gazebo, and pose estimation using the tflite MoveNet model.
  - *Github Repo*: Human Cartography

- **Survive-RL**
  Mandred Tech
  - As part of our startup, we created an open source reinforcement learning environment, which is hosted on GitHub.
  - The environment is inspired by the natural behavior of animals and is a multi-agent environment, where the agents have to survive and cooperate in a dynamic world.
  - The environment is implemented in Python and can be flexibly used for different problems, such as training swarm robots or understanding emergent behavior in agents.
  - *Github Repo*: Survive-RL
- **Quasar Rover**
  Team Four Square
  - As part of Team Four Square, we designed and built a solar-powered rover capable of transporting loads. This was in response to the problem statement given by ASME EFx 2023, a global engineering competition.
  - Involved in designing and simulating the stresses in the bot design, ensuring its structural integrity and durability using SolidWorks and ANSYS respectively.
  - Also engineered the communication system using NRF radio module, enabling the rover to receive and transmit signals from a custom remote controller.

Skills

- **Programming Languages**: Python, C, Matlab
- **Frameworks**: Tensorflow-Keras, Pandas, Scikit, OpenCV, Pygame, Google Colaboratory, ROS2, PyQt, Linux
- **Tools**: SolidWorks, Ansys, Arduino, ESP32, Simulink, Unity Game Engine, Gazebo
- **Languages**: Fluent – English, Hindi ; Native – Telugu ; Beginner- German
- **Soft Skills**: Leadership, Teamwork, Problem Solving, Communication

Achievements

- **ASME Student Design Competition 2023 Team Lead**: Our team Four Square took part in the ASME EFx 2023 held in Bengaluru, India and was placed among the top 5 teams.
- **Exhange Program**: Selected for the prestigious exchange program to Indian Institute of Technology, Hyderabad. This opportunity is given to only top 10% of the students after their junior year.
- **Smart India Hackathon 2024**: Won the Smart India Hackathon 2024 Hardware edition. Our team engineered a unique drone-based solution to address the problem statement of Smart Automation, demonstrating innovation, technical expertise, and teamwork.

Certifications

- **Matlab and Simulink Fundamentals**: Learned about the fundamentals of programming in Matlab and Simulink.
- **Robotics: Aerial Robotics(Coursera-UPenn)**: Learned about the control and simulation of drones and aerial robots.

Publications

- **Improvement in Multi-resident Activity Recognition System in a Smart Home Using Activity Clustering**: This paper analyzes various multi-resident activity recognition datasets, such as ARAS and CASAS, and proposes manually clustering the activity labels. The proposed approach improves the system's performance in terms of both recognition rate and computational time, as demonstrated on the ARAS dataset.

  Springer Publication: Internet of Things Advances in Information and Communication Technology