

# Vaibhav Raheja

✉ vaibhavvraheja@gmail.com | 📞 +1(217)-202-9970 | 🌐 Vaibhav-Raheja | 🌐 Vaibhav-Raheja | 🌐 Portfolio

## EDUCATION

**University of Illinois Urbana-Champaign, Masters Degree** 08/2023 - 12/2024  
Major: Autonomy and Robotics GPA: 3.77/4  
**NMIMS' MPSTME, Bachelors Degree** 07/2019 - 06/2023  
Major: Computer Engineering GPA: 3.67/4

## WORK EXPERIENCE

**Intelligent Motion Laboratory, Research Developer** 08/2023 - 12/2023

- Implemented advanced facial detection and analysis techniques using FaceMesh, OpenFace 1.0, and DeepFace for a robotic eye exam, alongside head pose estimation with ZED camera's depth tracking, to enhance the accuracy and effectiveness of facial feature detection in various scenarios.
- Engineered and simulated a robotic arm, focusing on optimizing camera placement for effective 3D mapping, thereby improving the precision of face detection and head pose estimation for comprehensive eye examinations.

**All India Institute of Medical Sciences (AIIMS) Hospital, Research Developer** 02/2021 - 05/2023

- Worked closely in a robotics team, developed and executed an innovative research project to perform intubation financed by the Indian Council of Medical Research (ICMR). This project led to noteworthy achievements, such as a 20% enhancement in accuracy.
- Played a key role in the design and assembly of a custom catheter and mouthpiece integrated with a camera system, contributing to successful intubation, with a 'xArm 5' robotic arm.

## PROJECTS

**Intelligent Ground Vehicle Competition (IGVC), | (ROS, OpenCV, PID Control, Path Planning, CAD)**

- Led a multidisciplinary team as captain of Team D.A.R.V.I.N for an international robotics competition in Detroit, USA.
- Secured 2nd and 3rd place in the Cyber and Auto-Nav Challenge categories, demonstrating our capabilities in autonomous navigation using lane and object detection with GPS navigation.

**Autonomous Driving Car | (Python, Path Planning, Vehicle Control, CARLA Simulator)**

- Implemented Hybrid A\*, Spline Interpolation, and Dynamic Programming for path planning for autonomous navigation on Formula 1 racetracks in the CARLA simulator.
- Integrated a Proportional-Derivative (PD) controller with Pure Pursuit and longitudinal controller for steering and speed control to follow the trajectory.

**Reinforcement Learning using Dog Robot | (Python, Gazebo, ROS)**

- Developing a custom reinforcement learning (RL) framework aimed at enhancing the control and adaptability of the Unitree Go1 robot, aiming to demonstrate a quantifiable improvement over the factory MPC controller.

**Soft Robotics Hand | (Arduino, 3D Modelling and Printing)**

- Created a Soft Robotic Hand controlled by five individual stepper motors, enhancing dexterity and flexibility, with Arduino for control and 3D modeling and printing for construction.

**Custom Surveillance Drone | (Arduino, 3D Modelling and Printing, ESC Controller, Pix hawk)**

- Engineered a custom surveillance drone featuring a modular 3D-printed body and high-performance 1200KV BLDC motors, controlled via a Pix hawk Flight Controller and an ESC for motor control.

## SKILLS

**Programming:** Python, C++, Robot Operating System(ROS), OpenCV, PyTorch, Control Algorithms, Motion Planning algorithms, Machine Learning(ML), Convolutional neural network (CNN)  
**Tools:** Autodesk Fusion 360, Computer-Aided Design (CAD), Linux, Git, Arduino, Raspberry Pi, 3D printing

## PUBLICATIONS

Raheja, Vaibhav et al. (Nov. 2022). "Multi-Disease Prediction System using Machine Learning". In: *International Conference on Futuristic Technologies (INCOFT)*. URL: <https://ieeexplore.ieee.org/document/10094382>.