Vaibhav Raheja

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Education

University of Illinois Urbana-Champaign, *Masters Degree* 08/2023 - 12/2024
Major: Autonomy and Robotics CGPA: 3.77/4
Available to work full time (40hr/week) in Fall 2024

NMIMS' MPSTME, *Bachelors Degree* 07/2019 - 06/2023
Major: Computer Engineering CGPA: 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 Intern* 02/2021 - 05/2023
- Worked closely with a diverse 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 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.
- Achieved 2nd and 3rd place in the Cyber and Auto-Nav Challenge categories, demonstrating our excellence 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.
- Implemented a Proportional-Derivative (PD) controller with Pure Pursuit and longitudinal controller for steering and speed control to follow the trajectory.

Disease Detection System using Machine Learning | (*Python, Pytorch, CNN*)
- Achieved an accuracy rate of over 90% in predicting chronic diseases, including COVID-19, Pneumonia, Heart Disease, Chronic Kidney Disease, Diabetes, and various skin diseases. This system holds the potential to revolutionize early disease diagnosis.

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

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.