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EDUCATION

University of Maryland | *M.Eng. in Robotics* *College Park, MD, US* | **08.2021 – 05.2023(expected)**

- Relevant Coursework: Manufacturing Robotic Software, Planning, Advanced Perception, Robot Modeling, Control Systems, Rehabilitation Robots, Fundamentals of Deep Learning, Hands-on Aerial Robotics.
- Cumulative **GPA**: 3.95/4.0

National Institute of Technology, Calicut (NITC) | *B.Tech in Mechanical Eng.* *Kerala, India* | **07.2016 – 05.2020**

- Relevant coursework: Automobile Engineering, CAD/CAM, Manufacturing and Machine Design.

SKILLS

Programming Languages: C++, Python, Matlab

Tools & libraries: Gazebo, Solidworks, OpenCV, ROS 1, ROS 2, PyTorch, git,PX4, Arduino, ANSYS, MS Office, Lucidchart

Controls: LQR, LQG, Kalman Filter, Impedance Control

EXPERIENCE

Graduate Research Assistant| *ROS, Arduino, C, Ardupilot (Team)* *UMD* **| (09/22 – PRESENT)**

- Developing a quadrotor for First Responder Challenge (UAS 4.0) organized by NIST.
- Implemented Obstacle Avoidance using Time of Flight sensors.
- Implementing controller settings for various flight modes and assisting in manufacturing process.

Research Assistant for SPOT| *ROS, C++, Python (Team)* *UMD* **| (01/23 – PRESENT)**

- Integrating ROS packages for localization on Spot robot dog for outdoor navigation.
- Investigating and testing various sensors on Spot for vital signs detection for triage.

PROJECTS

Anomaly Detection in video surveillance | *PyTorch, seaborn (Team)* *UMD* **| (10/22 – 12/22)**

- Trained a Variational Auto-Encoder (VAE) to generate pseudo features in a weakly supervised setting.
- Augmented recent works which used Attention mechanisms with these pseudo features.
- Tested model on ShanghaiTech & UCF-crime datasets, achieving improved AUC: 94.21% and 83%.

Adaptive Impedance Control on the Anklebot | *Python (Team)* *UMD* **| (11/22 – 12/22)**

- Validated the results from existing work, where adaptive impedance control strategy was used for assistive-resistive robot-aided therapy using Anklebot.
- Reduced jerk motion of ankle trajectory by modifying the cost function of position and actuator torque.
- Enhanced backdrivability of system by introducing force feedback and showcased its efficacy.

First Principles of Computer Vision | *numpy, matplotlib (Individual)* *UMD* **| (09/22 – 12/22)**

- Implemented fundamentals concepts: Edge detection, Keypoints estimation using corners , Optical Flow using Lucas-Kanade algorithm, Shape Alignment using Affine Transforms and Image Stitching.
- Furthermore Structure from Motion, Epipoloar Geometry and corresponding depth map estimation, Superpixel segmentation and scene segmentation using Gaussian Mixture Model.
- Segmented images semantically by implementing FCN-32 model with the aid of transfer learning on VGG16.

Agile Robotics for Industrial Automation Competition (ARIAC) | *C++, ROS (Team)* *UMD* **| (01/22 – 05/22)**

- Formulated a complex control system to handle kitting and assembly operations in automated warehouse.
- Manipulated the robot arms (arm on linear rail and gantry robot) using Moveit! Interface and AGV movement using ARIAC plugins in Gazebo.
- Addressed main challenges in the manufacturing sector such as Sensor blackout, faulty parts, flipped parts and high-priority orders.
- Created a competitor ROS package and was victorious out of the 6 participating teams.

A-star implementation with non-holonomic constraints | *Python, ROS (Individual)* *UMD* **| (01/22 – 02/22)**

- Designed a 2D environment with obstacles using matplotlib and implemented algorithm for a circular robot.
- Programmed an open loop controller in ROS and effected it on actual turtlebot3.
- Secured top 5 position among participating teams.

Control of a Gantry Crane | *Matlab (Team)* *UMD* **| (12/21)**

- Developed LQR controller for a crane suspending two masses to minimize oscillations.
- Determined the equations of motions and its dynamic model was linearized, followed by controllability and observability check.
- Deployed Kalman filter for state estimation and implemented LQG.

EXTRA CURRICULAR ACTIVITIES

- Supervised gaming stalls at Ragam (one of the largest cultural fests in India). *NITC* **| (2019)**
- Contributed to Kerala flood relief campaign as a participant. *India* **| (2019,2020)**