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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, Docker, PX4, Arduino, ANSYS, MS Office

Controls: LQR, LQG, Kalman Filter, EKF, Impedance Control

Deep Learning Models: Neural networks, CNN, VAE, RNN, Transformers

EXPERIENCE

Graduate Research Assistant | *ROS, Arduino, C, Ardupilot (Team)*   *UMD* | **(09/22 – PRESENT)**
- Developing a **quadrotor** for NIST's First Responder Indoor Challenge(UAS 4.0) and **current finalist**.
- Implemented **Obstacle Avoidance** using Time of Flight sensors.
- Working on **flight controller** settings for different 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 **autonomous outdoor navigation**.
- Utilizing a suite of advanced sensors including **GPS**, **IMU**, **LiDAR**, and **stereo camera**s.
- Developing algorithms for 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 **Multi-Task Variational Auto-Encoder** (VAE) to generate pseudo features in **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 (AIC) on the Anklebot | *Python (Team)*   *UMD* | **(11/22 – 12/22)**
- Validated existing work, where AIC strategy was used for assistive-resistive robot-aided therapy.
- Enhanced backdrivability of system by introducing **force feedback** and showcased its efficacy.
- Reduced jerk motion of **ankle trajectory** by modifying the cost function of position and actuator torque.

First Principles of Computer Vision | *numpy, matplotlib (Individual)*   *UMD* | **(09/22 – 12/22)**
- Implemented fundamental concepts: Edge detection, **Keypoints estimation** using corners , **Optical Flow** using Lucas-Kanade algorithm, **Iterative Closest Point** 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.
- Performed transfer learning-assisted **Semantic Segmentation** on VOC2007 images, with VGG16 backbone and **FCN-32** model. Pixel-wise cross entropy loss used.

Agile Robotics for Industrial Automation Competition (ARIAC) | *C++, ROS, Gazebo (Team)*   *UMD* | **(01/22 – 05/22)**
- Formulated a complex control system to handle **kitting** and **assembly** operations in automated warehouse.
- Manipulated robotic arms (**on linear rail and gantry robot**) using Moveit! and **AGV** using ARIAC plugins.
- Monitored environment using **cameras** and **break beam** sensor.
- Addressed **challenges** in manufacturing: 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.
- Traversed the **physical map** quickly, earning a **top 5 rank** among competing teams.

[Control of a Gantry Crane](#) | *Matlab (Individual)*   *UMD* **| (12/21)**

- Developed **LQR** controller for a crane suspending two masses to minimize oscillations.
- Derived motion equations, linearized the model, and performed controllability and observability checks.
- 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)**