SOMIK DHAR

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EDUCATION

New York University, Tandon School of Engineering New York, NY
MS, Electrical Engineering- CGPA:**3.6/4.0** May'24
IIEST, Shibpur Kolkata, IN
B.Tech, Electrical Engineering Jun'21

TECHNICAL SKILLS

Programming Languages	Python, C/C++, MATLAB & Simulink, LaTeX
Libraries/Frameworks	Pytorch, ROS, Gazebo, OpenCV, Tensorflow, CUDA, Git, Docker, Linux

RESEARCH EXPERIENCE

Graduate Assistant **Jan'23 - May'24**
Ai4CE Lab, New York University *New York, NY*

- Developed a Variable-length VPR system handling multi-modal(images and sequences) inputs
- Evaluated the optimal image encoding method among foundational models, ViTs, and CNNs for VPR

Research Intern **Feb'22 - Jun'22**
Indian Institute of Science(IISc.), Bangalore *Bangalore, IN*

- Installed and calibrated a PhaseSpace Motion Capture System with ROS support, enabling precise tracking for multi-robot systems
- Employed Turtlebot3 robots with differential and mecanum drive configurations for multi-robot experiments
- Developed a Python-based CLF motion controller with CBF-based collision avoidance for multi-agent systems
- Achieved a 30cm safety radius in a 6x5 m arena, enabling real-time collision avoidance for multi-robot setups

PROJECTS

Vision-Based Pose & Velocity Estimation for MAV| *CV, SLAM* **Apr'23**

- Orchestrated a streamlined MATLAB-based MAV state estimation for accurate 6-DOF tracking
- Estimated pose using AprilTags and planar homography, and velocity using KLT optical flow with RANSAC
- Achieved 97% overall position accuracy and 91% velocity accuracy

State Estimation of MAV using Kalman Filters | *SLAM, Sensor Fusion* **Mar'23**

- Engineered the integration of EKF & UKF algorithms to optimize MAV state estimation fusing IMU, GPS and other sensor data
- Formulated a 15-D state vector, derived EKF Jacobians, and constructed UKF sigma points using visual and inertial measurements

Real-Time Mask Monitoring with Custom CNN Model | *CV, DL* **May'21 - Jun'21**

- Spearheaded the development of a TensorFlow-based facial mask detection system, securing 96% accuracy
- Optimized model for real-time performance, achieving <100ms inference time per frame on webcam feeds

Arduino Based Control & Navigation of 2WD Robot | *Arduino, CV, Controls* **Jul'21 - Dec'21**

- Built a differential drive 2WD robot with forklift for autonomous navigation in indoor environments
- Integrated Arduino MKR1000 WIFI, Motor Carrier, DC motors with encoders, micro-servo, ultrasonic sensors for collision avoidance, and webcam for robot and object localization
- Engineered PID controller for precise positioning, achieving 95% accuracy with 0.2cm deviation