Tushar Singh

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Education

JOHNS HOPKINS UNIVERSITY **Sep. 2023 – May 2025(expected)**
Masters of Science Degree in ROBOTICS Baltimore, MD

DELHI TECHNOLOGICAL UNIVERSITY **Aug. 2019 – Jun. 2023**
Bachelors of Technology in ELECTRICAL ENGINEERING Delhi, India

Relevant Coursework

- Data Structures
- Computer Vision
- Algorithm for sensor-based robotics
- Machine Learning
- Deep Learning
- Robot Kinematics and Dynamics
- Probability and Statistics
- Computer Architecture
- Robotics Sensors and Actuators

Technical Skills

Software: Python, C++, Matlab, Numpy, Pandas, TensorFlow, Pytorch, Verilog, Ardupilot, Dronekit, Docker, Scikit Learn, Git, Cmake, Bash, Matplotlib, Multithreading
Hardware Systems: Arduino, Raspberry Pi, Jetson Nano, Intel Realsense tracking cameras, FPGA SoC, Ur5 Arm
Tools/OS/Frameworks: Linux, ROS/ROS2, VS Code, GitHub, Gazebo, Rviz, AMD Xilinx Vitis, Jupyter, SITL

Experience

Deep Learning and CV Research Assistant **Oct. 2023 – present**
ARCADE Lab - JHU | Python, Deep Learning, Computer Vision, Multimodal Generative AI Baltimore, MD

- Developed a non-conventional DNN to evaluate the accuracy of 2D/3D registration of X-rays and CT scans or DRRs in Minimal Invasive Surgery (MIS) to aid in complex surgical procedures with data generation and augmentation pipeline for model training.
- Actively researching in learning-based SLAM for robotic sinus endoscopy by image segmentation, volumetric Rendering, and 6 DOF pose estimation, and utilizing the LLMs and multimodal diffusion models for synthetic data generation
- Working on computer vision enabled stress analysis of surgeons during surgery by studying pupillometry.

Multi Agent Robotics Eng. **Sep. 2019 – Feb. 2021**
Adani Defence and Aerospace: Aerial Robotics | Python, Control Systems, Autopilot Delhi, India

- Developed and integrated avionics systems for an autonomous swarm of UAVs used in disaster relief applications.
- Co-developed a swarm control achieving collision avoidance and flocking using a weighted consensus-based algorithm, with a decentralized mesh communication architecture.
- Won the IAF MAHAR BABA Competition; presented the solution at Aero India 2021 an international defense event.

AI/ML Intern **Jun. 2022 – Sep. 2022**
Ericsson India Pvt. Ltd. | Python, TensorFlow, REST, FLASK, HTML/CSS Delhi, India

- Developed a Neural Network-based Generative Model to generate sample user data for various applications.
- Developed a REST web-based App using FLASK framework and HTML/CSS for the model.

Founding Member/Advisor for the startup **Jan. 2022 – Oct. 2022**
ZOID Technologies Pvt. Ltd. | C++, Verilog, signal processing, FPGA Delhi, India

- Devised a solution for algorithmic signal characterization of the incoming radar signals and Geo-locating the source of the radar signals for Ships, and Devised a solution for UAVs to act as Dispensable Decoys for the Ship and Air crafts.
- Successfully established project-based relationship with Indian NAVY

Projects/Publications

Human Action Recognition | Python, TensorFlow, Pandas, Deep Learning **January 2023**

- Developed a novel 3D CNN architecture capable of recognizing 101 actions performed by the Anchors using depthwise 3D convolution layers to upscale 2D Efficient NET architecture to a three-dimensional one.
- Achieved 98.74% and 86.49% accuracy on publicly available UCF-101 and HMDB-51 Datasets respectively.
- Published in IEEE ICACR 2023, Malaysia. Link

Deep Learning Based Visual Servoing | Python, ROS, Computer Vision, Learning based Control **May 2023**

- Developed a Deep Learning architecture to learn the control ques of a UAV to track a moving vehicle based on Spatio-temporal Data using LSTM and Transformers.
- Developed an environment on ROS/Gazebo to simulate Image-Based Visual Servoing (IBVS) control for data collection.
- Drafted Detailed manuscript of the project that is published in conference MECO 2023, IEEE. Link