

SUMMARY

Automation engineering student with a passion for self-driving cars and a background in computer vision and deep learning

SKILLS

- Programming: Python, C++, C, OpenCV, PyTorch, MATLAB & Simulink, Rospy
- Software: PyCharm, Visual Studio, Google Colab, ROS, Unity 3D
- OS: Ubuntu, Windows
- Languages: English (Fluent), Urdu (Native)

EXPERIENCE

Computer Vision & Deep Learning Intern

T3LAB, Italy Oct 2019 - Mar 2020

- Reviewed the accuracy of pretrained 2D object detectors like Faster-RCNN, SSD, & YOLO on video data
- Developed real-time (30 FPS) application for vehicle and person counting at busy road junctions
- Also did research on my Master Thesis

AUDI Autonomous Driving Competition Participant

AUDI, Germany May 2018 - Oct 2018

- Among 16 teams selected from all over Europe
- Led a team of 4 other students in designing an autonomous car algorithm using deep reinforcement learning and computer vision techniques
- Designed a simulator (from scratch) using C++ and Unity where RL agent was trained and tested using Apprenticeship Learning

EDUCATION

Master's in Automation Engineering

University of Bologna, Italy Sep 2017 - Oct 2020

- **Coursework:** Computer Vision, Industrial Robotics, Optimization Models, Probability & Stochastic Processes, Mechatronics Systems, Mechanics, Real-Time Systems
- **Thesis:** Object trajectory prediction from an ego-centric perspective by combining 3D object detector (PointPillars) with depth map (MADNet) and real-time semantic segmentation neural nets

Bachelor's in Electrical Engineering

National University of Science & Technology, Pakistan Sep 2012 - Jun 2016

- **Coursework:** Programming, Control Theory, Circuit Analysis, Embedded Systems
- **Thesis:** Designed a path-following drone and performed analysis under different PID values in the Unity simulation environment

PROJECTS

- **Contributor to Open Source Robotics Library:** Python Robotics is an open source library for learning about robotics (path planning, mapping, navigation). My contributions: Bug Planning and variants of A*
- **Visual Inspection of Blade Tools:** Programmed application to measure tooth angles of blade tool using C++ and OpenCV functions (Canny Edge, Hough Transform & Harris Corner Detector)
- **Robot Mapping & Navigation in ROS:** Worked in conjunction with another student in implementing mapping and pathfinding algorithm for Turtlebot in ROS using custom bug algorithm and PRM. Potential Field Algorithm used for trajectory following
- **Joint-Space Trajectory Analysis of the PUMA 560 manipulator:** Studied the joint-space performance of PUMA 560 manipulator under PD Control with Gravity Compensation, Inverse Dynamics Control and Robust Sliding-Mode Control using Peter Corke's Robotics Toolbox in MATLAB
- **Solution to Tanenbaum's Walking Philosophers:** Developed the program in C using POSIX threads with minimum starvation and no deadlock and usable for any number of philosophers