Sarim Mehdi

MASTER'S STUDENT

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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 *Oct 2019 - Mar 2020*

▪ Reviewed the accuracy of pretrained 2D object detectors like Faster-RCNN, SSD, & YOLO on video data

▪ Developed a 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

▪ Responsible for extraction of lane lines and aruco traffic markers that were fed as input to the RL agent

▪ Implemented state machine to execute a sequence of maneuvers at road junctions (turn left, turn right etc.)

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**: C/ C++ Programming, Control Theory, Electrical & Digital Circuit Analysis, Instrumentation, Embedded Systems

▪ **Thesis**: Designed a path-following drone and performed analysis under different PID values in the Unity simulation environment where it followed a collection of waypoints in a sequential manner under the influence of varying external disturbances

PROJECTS

Contributor to Open Source Robotics Library

Open Source Contributor *Aug 2020 - Present*

Python Robotics is an open source library for learning about robotics (path planning, mapping, navigation). My contributions: Bug Planning and variants of A*

Long Range IoT Hackathon (Bologna, Italy)

Project Lead *May 2018 - May 2018*

Worked as a team to prepare an application that would use an Arduino to send waste data from ten locations to a central radio network and formulate the optimum garbage collection route using Dijkstra's Algorithm.

Visual Inspection of Blade Tools

Individual Project *Jan 2019 - Jan 2019*

Developed an application using C++ and OpenCV that combined Canny Edge Detector, Hough Transform, and Harris Corner Detector to detect pointed edges of a blade tool, compute their angle, and also locate imperfections using a custom filtering technique.

Autonomous TurtleBot mapping & navigation in ROS

Group Project *Jan 2020 - Feb 2020*

Worked with a fellow student to program a TurtleBot in the ROS simulation environment. We implemented mapping and navigation using a custom bug planning algorithm and PRM, with a Potential Field Algorithm for following the planned trajectory.

Analysis of Joint-Space Trajectories of PUMA 560 manipulator

Individual Project *May 2020 - May 2020*

Studied performance of a PUMA 560 manipulator under PD with Gravity Compensation, Inverse Dynamics Control and Robust Sliding-Mode Control. Analysis was done in MATLAB using Peter Corke's Robotics Toolbox.

Walking Philosopher

Individual Project *Dec 2017 - Dec 2017*

Solved Tanenbaum's Walking Philosophers problem using an application developed in C with POSIX threads. The successful application had minimum starvation, no deadlock, and could work for any number of philosophers.

Efficient Charging and Discharging of Plug-in EVs

Project Lead *Dec 2018 - Dec 2018*

Coordinated within a team in applying the dual subgradient algorithm to provide an optimized schedule for the charging and discharging of Plug-in EVs when connected to the grid. The project was done in C++ using the Armadillo library for linear algebra operations and optimization and the MPI library for multithreading.

AWARDS

Unibo Action 2

University of Bologna *2017-05-01*

Received a two year study grant for Master's course based on meritorious GRE scores