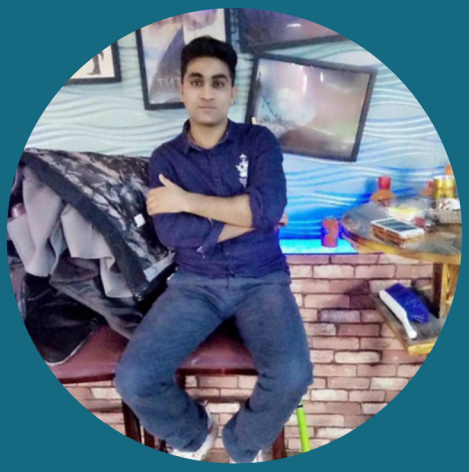

Rawal Javed

PhD Student at UPNA

Rawal comes from Pakistan. He has studied in Nanjing (China).

- BS in Electronics Engineering.
- MS in Control Science and Engineering.

Experience:

- Lecturer in Nanjing Normal University in China.
- Lab engineer in a project of Path Planning networks for smart cities domain, developing a target classification or recognition technique based on Deep Learning Algorithm.

Rawal has joined the Approximate Reasoning and Artificial Intelligence group (GIARA), a multidisciplinary team with broad experience in information fusion, fuzzy sets and extensions, and in the development models and applications in the fields of data mining, big data and image processing.
Rawal is working under the supervision of Dr. Daniel Paternain.

Research

Deep Fusion of LiDAR and Camera Data for Enhanced 3D Object Detection.

Research objective: To efficiently address the resolution mismatch issue when fusing LiDAR and Camera data, we will develop a precise two stage voxel level stereo LiDAR fusion framework called VBPFNET. The high sensor data sampling rate and high computing efficiency can be balanced well by solving this problem.

Abstract:

For 3D object detection tasks, Fusing the camera and LiDAR has become a de-facto norm. To use the feature from the image space, current approaches rely on point clouds from the LiDAR sensor as queries. However, previous studies discovered that the existing fusion framework is incapable of producing any forecast when there is a LiDAR malfunction, whether little or big. This severely restricts deployment capacity to realistic autonomous driving scenarios. To address these challenges, in this study, we will introduce VBPFNet, a novel architecture for efficiently aligning and combining point cloud and image data at the so-called "virtual" points.

The virtual points can particularly bridge the resolution gap between the two sensors and save more data for processing because their density is between that of the 3D points and 2D pixels. As data augmentation has so far provide a non-negligible contribution to 3D object detectors, we will also study data augmentation strategies that may be used to both point clouds and RGB images. When compared to state-of-the-art techniques, our thorough studies on the KITTI dataset will show good performance. Under robustness training settings that mimic different LiDAR failures, our framework will be much better than the current best practices. So far as we know, we will the first ones to deal with a realistic LiDAR failure that can be used in a realistic setting without any post-processing.

Key applications of my research:

- **Smart Cities**: Deep fusion of LiDAR and camera data can contribute to the development of smart city infrastructure. By deploying sensor networks that combine LiDAR and camera data, it becomes possible to detect and track objects in real-time, enabling applications such as traffic management, pedestrian safety, and infrastructure monitoring.
- **Healthcare and Medical Imaging**: In the healthcare field, deep fusion of LiDAR and camera data can be applied in medical imaging for enhanced object detection and segmentation. This technology can assist in accurate and precise detection of anatomical structures or abnormalities, leading to improved diagnosis, treatment planning, and surgical interventions.

'Since childhood, my aspiration has been to become a scientist, driven by a passion for advancing knowledge and technology in the fields of Deep Learning, Object Detection adn Artificial Intelligence'.