Junaid Ahmed Uqaili

PhD Student at UPNA

Junaid Ahmed Uqaili is from Sindh, Pakistan.

He has received his B.E. degree in Electronic Engineering from MUET, Pakistan, and received the M.E. degree in Electronic Science & Technology from UESTC, China.

During his stay at UESTC, his dedication and contributions were duly recognized by presenting him the first prize for the Excellence Performance Award and second prize for the Academic Achievement Award.

His current research interests include Reconfigurable Intelligent Surfaces, Metasurfaces, Antennas Designing, mmWave and Electromagnetics.

'I believe that education is most valued when it is used to serve society in tangible and more practical way. In the dynamic realm of modern technology, I am particularly drawn to the revolutionary concept of reconfigurable intelligent surfaces and their transformative potential. I feel that this PhD is the most logical extension of my academic pursuits and a major step towards realizing my overarching goals. I am committed to leveraging my research to not only advance the field but also to harness these technologies for the betterment of society, paving the way for a more connected and sustainable future.'

Junaid Ahmed Uqaili has been integrated in the Antenna Group, under the supervision of Dr. Miguel Beruete, Full Professor at UPNA and Head of TERALAB (UPNA) and Multispectral Biosensing Group (Navarrabiomed).

Research

Reconfigurable Intelligent Metasurfaces

Research objective: To investigate the liquid crystal-based metasurfaces for the development of planar, reconfigurable components such as beam-steerers, lenses, modulators, and filters, optimized for mmWave frequencies in the context of advancing 6G wireless communication technology.

Abstract:

Reconfigurable Intelligent Surfaces (RIS) are smart surfaces able to dynamically control the waves impinging on them. They are based typically on a thin dielectric substrate with small metallic elements (called meta-atoms) printed on them, whose shape and arrangement determine the performance of the device. To obtain reconfigurable designs, the meta-atoms have to be loaded with active elements that could be PIN diodes, varactors, MEMs, transistors, graphene, phase-change materials, etc. Liquid crystal (LC) metasurfaces are an emerging technology able to improve the performance of RIS at mmWaves.

LCs offer a promising solution for the development of electronically reconfigurable metasurfaces that operate at short millimeter and terahertz waves. By utilizing LC substrates to fabricate beam-steering and metalen devices, capitalizing on the distinctive properties of LC materials.

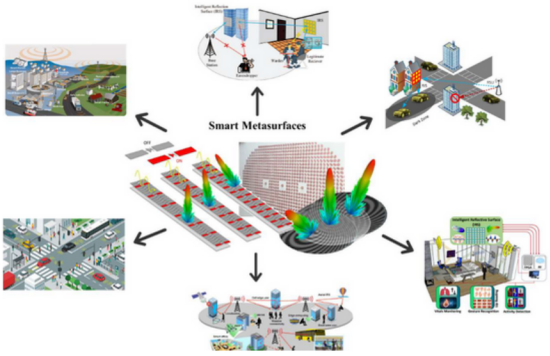

Fig. Conceptual overview of RIS and their application fields.

The culmination of this process involves simulation and optimization of RIS devices to achieve optimal beam control and precise focusing. The final frontier in our proposed research involves the integration of magnetic control alongside liquid crystals. Through the synergy of LC and bed-of-nails structures, our objective is to engineer reconfigurable lenses capable of achieving index variation through biasing or LC modification. This innovative approach empowers the implementation of versatile lenses, including Luneburg, Maxwell, and Eaton lenses, offering dynamic control over their response.

'I believe that anyone can excel in any field, as literature serves as the finest instrument for gaining expertise in any domain. With this conviction, I am confident in my ability to acquire mastery in my chosen field and to conduct innovative research during my PhD.'