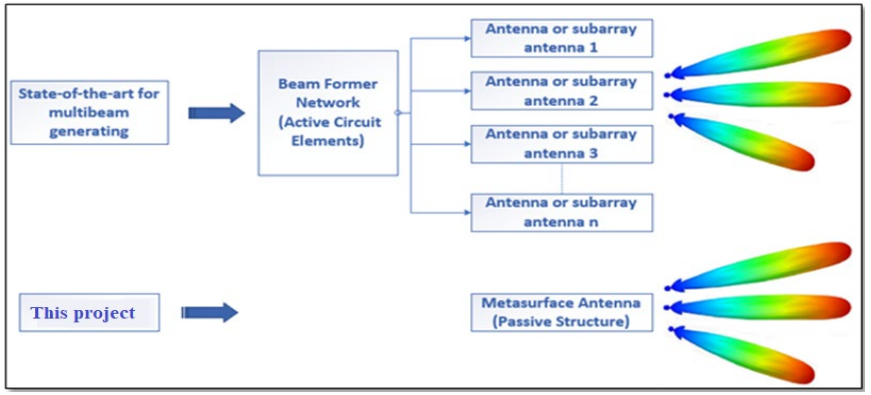
Investigating Feeding Structures for Multibeam Metasurface Antennas for Compact and Efficient 5G/6G Communication Systems

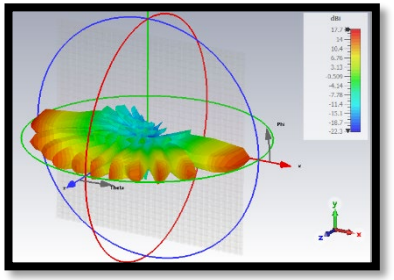
Bachelor/ Master Thesis

Background

Multibeam metasurface antennas offer the ability to manipulate electromagnetic waves in a highly customisable and controllable manner and have the potential to replace or simplify the current complex MIMO structures for 5G/6G systems. The project aims to optimise the designed models by our department by exploring the use of suitable feeding structures that achieve a more compact design with better impedance matching. These feeding structures will contribute to achieving three key objectives: increasing bandwidth, enhancing gain, and achieving a stable radiation pattern over a frequency sweep. The project is open to motivated and enthusiastic Bachelor/Master students with backgrounds in electrical engineering, antenna design, or electromagnetic theory.



Multibeam Metasurface



Tasks

1. Conduct a literature review of metasurface antenna design techniques, focusing on feeding structures, bandwidth optimisation, and gain enhancement.
2. Utilise CST and/or ADS software to design and optimise the feeding structure for the metasurface antenna. Employ CST software to optimise the performance of the overall design of the metasurface antenna, which includes the feeding structure.
3. Fabricate and measure the performance of selected metasurface antenna designs using a Vector Network Analyzer (VNA).
4. Analyse the results and compare them to the project's objectives to identify areas for further optimisation.
5. Write a thesis report documenting the project's methodology, results, and conclusions.

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