Department of Electrical Engineering Technion—Israel Institute of Technology
Signal Acquisition Modeling and Processing Lab - המעבדה לחישה מידול ועיבוד אותות

Project Proposal

Unimodular Coding for Hybrid Analog-Digital Beamforming

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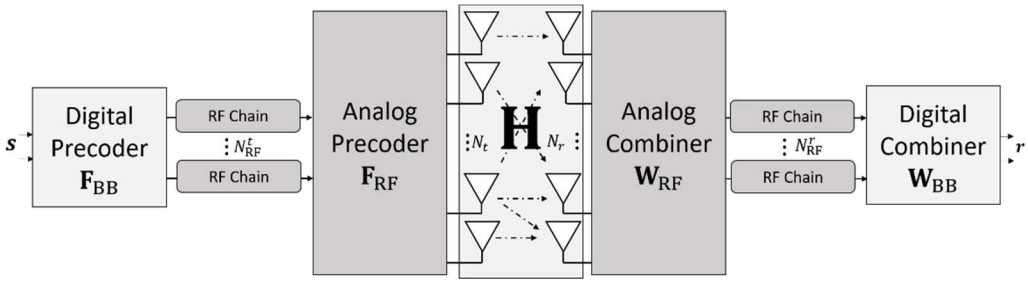
Massive MIMO systems are considered as one the leading enabler of 5G wireless communication. In this technology, the transmitter and receiver are equipped with very large number of antennas. This can potentially allow for higher data rates and better spectral efficiency.

One of the main challenges is massive MIMO system is the hardware complexity. When considering hundreds of antennas, dedicated RF chain per antenna like in traditional MIMO systems is no longer possible. Hence, it is desirable to reduce the number of RF chains is the system while still benefiting from the large number of antennas.

A framework for hybrid combiner design was previously developed in the lab [1], in which on of the suggested algorithm is a greedy algorithm that solves a vector problem ((37) in [1]) at each iteration. Currently this problem is solved using a dictionary, but this solution is sub-optimal. It is desirable to find a better solution for this problem as it will boost the algorithm's performance. One possible approach for solution is using unimodular coding [2].

The goal of the project is to develop a unimodular coding based solution to problem (37) in [1]. The project will include research next to matlab implementation

Required background: Introduction to Digital Signal Processing (044198), Computational Methods for Optimization (046197) (or a similar course)



[1] S. S. Ioushua and Y. C. Eldar, "Hybrid Analog-Digital Beamforming for Massive MIMO Systems".
[2] M. Soltanalian and P. Stoica, "Designing Unimodular Codes Via Quadratic Optimization".