

# Waveform Design for Performance improvement in active sensing systems

Mohammad Mahdi Naghsh

## Abstract

In this talk, we present the problem of waveform design for improvement of detection performance in active sensing systems. The main challenges including the effect of the signal-dependent interference at receive side and the fact that Doppler shift of targets are often unknown at the transmit side are considered. The raised design problems (for various situation) are non-convex and in some cases, belong to classes of NP-hard problems. We devise several methods to tackle the design problems and extend the proposed algorithms to the case of constrained design (peak-to-average-power-ratio (PAR) or similarity constraint). In case of multiple-input multiple-output (MIMO) systems, due to the complicated forms of the performance expressions, we resort to the most common information-theoretic criteria including Bhattacharyya distance, KL-divergence, J-divergence, and mutual information as design metrics. We cast the design problems under a unified optimization framework and devise algorithms to deal with these problems.