Analytical and Intelligent solutions for the Integrated Sensing and Communication in 6G networks

Keywords

Artificial Intelligence, Radar sensing, Optimization, Internet-of-Things

Description

In recent years, the integrated sensing and communication (ISAC), in which the sensing and communication share the same frequency band and hardware, has emerged as a key technology for the future sixth-generation (6G) wireless systems. In particular, there are two main advantages over dedicated sensing and communication functionalities: 1) Integration gain to efficiently utilize congested resources for dual use of both communications and sensing, and even more interesting, 2) Coordination gain to balance dual-functional performance or/and perform mutual assistance. Benefiting from these two advantages, applications of ISAC have been extended to numerous emerging areas, including vehicular networks, environmental monitoring, Internet of Things, as well as in-door services such as human activity recognition.

However, the gap between the current state-of-the-art technologies and the performance limits may hinder the implementation of ISAC in the future wireless networks. Therefore, it is important to provide useful insights of the fundamental limits of ISAC for the development of better ISAC technologies.

Goal

The goal of the thesis is twofold. On the one hand, we discuss the analytical challenges of realizing multiple functionalities in the wireless networks. On the other hand, we are interested in learning approach to improve the ISAC performance and efficiency. The student is expected to carry out an in-depth and research-focused thesis for selected topics.

Requirements

- Basic knowledge on mathematical optimization/wireless communications
- MATLAB and/or Python programming skill is a plus
- Motivation to learn new material and work efficiently

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