Coded-Radar for Interference Suppression in Super-Dense Environments

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Millimeter-wave radar belongs to key sensors in any modern ADAS (Advanced Driver Assistant System), which is used now almost at all new cars [1, 2]. However; as the automotive radar market increases, present automotive radar sensors suffer from radar-to-radar interference between multiple cars due to sharing limited spectrum (from 76 GHz to 81 GHz). The mutual interference between automotive radars degrades performance of victim radar and increases the chance of miss detection (due to increased noise floor) or false detection (due to ghost targets) [3]. Since the detection and tracking of objects, especially that have low radar cross sections such as pedestrians and cyclists are very critical in autonomous driving systems, it is important to effectively mitigate mutual interference from radar signal.

In the framework of the project entitled Coded-Radar for Interference Suppression in Super-Dense Environments (CRUISE), we are working on implementation of phase-coding (PC) for frequency modulated continuous wave (FMCW) radar to improve radar coexistence. Moreover, we are investigating new processing themes for proposed approach in MIMO (Multiple Input Multiple Output) applications. During the project, we will address the challenges of using PC-FMCW such as spectrum spreading caused by coding, proper decoding by using group delay filter to align beat signals of target echo's, and waveform cross-correlation enhancement.

At the end of the project, CRUISE will ensure proper radar signal detection, accurate ranging, Doppler and azimuth measurements, and object classification in a highly-occupied frequency spectrum. It is expected that the developed technology will act as an enabler for the introduction of future driving assistance and autonomous driving systems.

References:

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