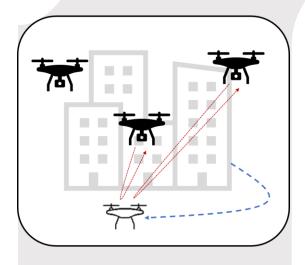# DISTRIBUTED RADAR SENSING ON SDR

MSc project

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Distributed radar sensing on Software Defined Radio (SDR)

Keywords: radar, multistatic, range estimation, SDR

Introduction: Modern radar systems extend well beyond traditional applications characterized by massive dish antennas and kWatts of output power. Contrary, current trend is in moving towards distributed networks of short-range devices that can incorporate both active and passive radar sensing. Development of such distributed radar networks is in part motivated by the prospects of using unmanned aerial vehicles (UAVs) as potential carriers for radar sensors.

The main bottleneck for an implementation of a distributed mutlistatic radar system is the need for precise time synchronization required to determine range in a bistatic system or coordinate operation in a multi-node monostatic system. This project is aimed towards evaluating the limitations of the GPS-based time synchronization methods for distributed radar sensing with software defined radio (SDR). An SDR is a radio transceiver that provides a tunable RF front-end for reception and transmission of radio signals, while most of the signal processing is handed over to the general-purpose processor, rather than being done in special-purpose hardware. This provides a great degree of flexibility for radio system design and prototyping.

Project description: The main goal of this project is to implement and test time synchronization protocols for distributed range estimation on SDR platforms. The main approach includes using PPS and/or 10MHz reference signals for board time and frequency synchronization. Additionally, a further reference from a stationary anchor node can be used to enhance time synchronization accuracy. Both a bistatic and a staggered monostatic operation will be considered.

Requirements: You are a motivated student looking for a Bachelor or Master thesis topic in the field of radio systems. You have/are interested in obtaining experience in practical radio system design and have strong programming skills (Linux, python, C++), enjoy working with hardware and have knowledge of signal theory and signal processing basics, e.g., terms such as waveform, demodulation, Fourier transform are familiar to you.

If you are interested in this topic, please contact **Dr. A. Lavrenko** at a.lavrenko@utwente.nl