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City University of Applied Sciences

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Tim Rohde

Investigation and Implementation of a Simulation Model for the Representation of the System Behaviour of a Radar for Airspace Monitoring.

ABSTRACT - Masterthesis

In military and civil airspace surveillance, very high frequency (VHF) radars are used to monitor the spatial sectors of about 200 km in diameter. The purpose of a radar system is to identify and track flying objects. The monitoring and subsequent signal processing is fed with the results of a radar detector. In this context, tracking is the recursive estimation of the objects state consisting of position and velocity. The estimate is based on the Kalman filter with a constant velocity state model. The Kalman filter estimates the states and parameters of a system by using measurements and forms the basis for a multi-target tracking algorithm. Multi-target tracking algorithms are applied in order to track reliably several objects in an environment surrounded by clutter. The occurrence of several objects within a scan leads to data association problems. The allocation problem is solved by the JPDAF (Joint Probabilistic Data Association Filter). The aim of the following thesis is the basic description and implementation of a multi-target tracking algorithm for airspace surveillance in Matlab. The functioning of the Kalman filter is analyzed and the advantages and disadvantages of the PDAF (Probabilistic Data Association Filter) and JPDAF are discussed. Final results show that the hypothesis calculation performed by the JPDAF leads to higher computational effort, but it provides better results than the PDAF.