

# Sensor Network Configuration Optimization

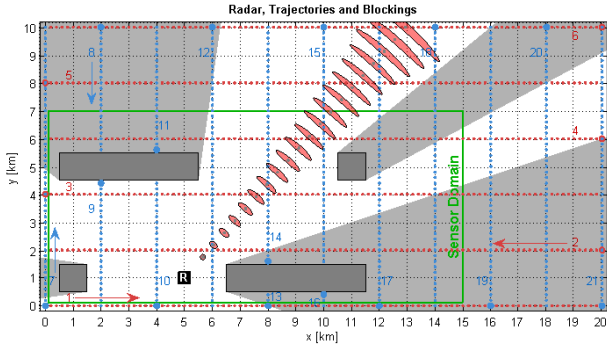
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## Problem Outline

Design of a Sensor Network is non-trivial

- Various types of sensors
- Capable, though costly
- Simple, but cheap
- Buildings block sensor views
- Positioning constraints
- Track performance requirements
- Network cost
- Various target trajectories



Example of an urban environment

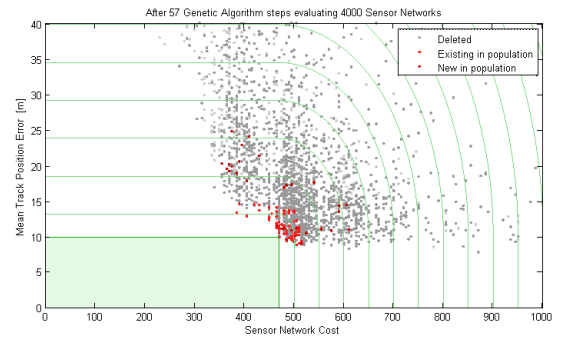
## Proposed Solution Approach

Formulate as an optimization problem

- Minimize network cost
- Performance constraint on track level

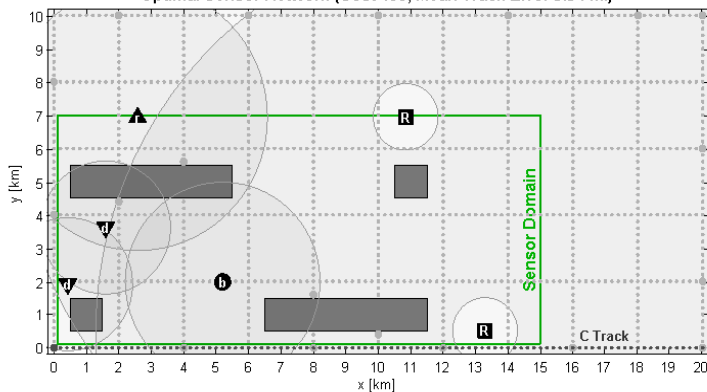
Apply a Genetic Algorithm

- Generate candidate solutions
- Improve during subsequent iterations



Each possible Sensor Network is projected as dot in the Cost / Performance plane

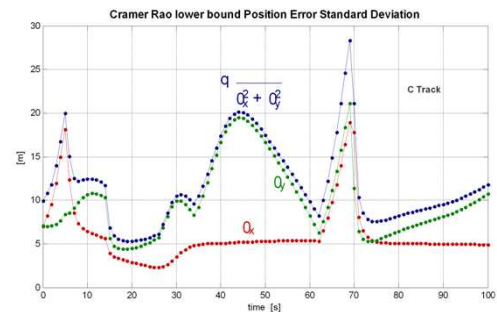
Optimal Sensor Network (Cost 400, Mean Track Error 9.94 m.)



Sensor Model Types:

- ▲ Range sensor measuring up to 4 km, cost 20
- Bearing sensor measuring up to 3 km, cost 10
- ◻ Doppler sensor measuring up to 2 km, cost 5
- ▣ Capable radar measuring up to 12 km, cost 100

## Results and Conclusions



- Sensor network can be configured automatically
- Well-defined criterion and constraints are crucial
  - Track performance requirements
  - Total network costs involved
- A mixture of various types is possible



The R&T Project D-FUSE (Data Fusion in Urban Sensor Networks) is contracted by the European Defence Agency on behalf of Members States contributing to the Joint Investment Programme on Force Protection

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