Tracking Moving Targets with Sensor Networks

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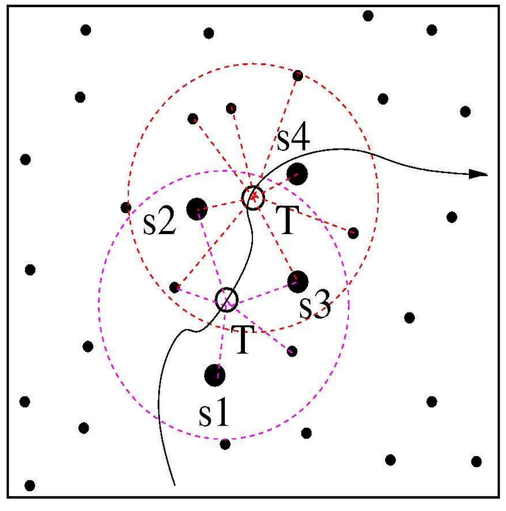
Problem

1: Estimating the location of a moving target

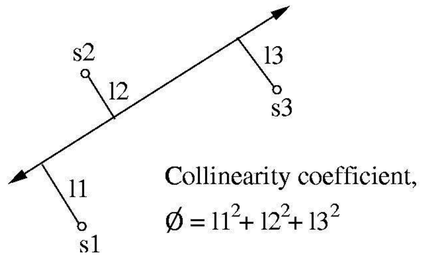
2: Sleep Schedules

3: Distributed tracking

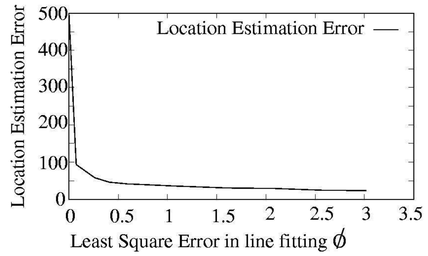
- Conservation of bandwidth and battery power of sensor
- Tracking with selected sensors



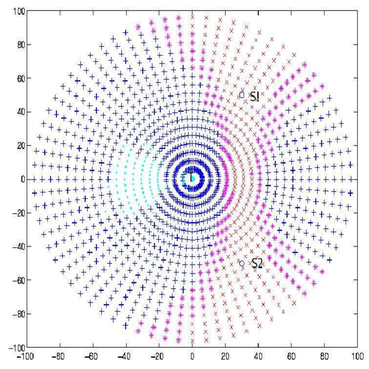
Collinearity

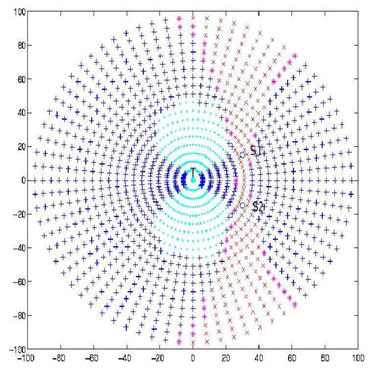


Collinearity coefficient,
$\emptyset = l1^2 + l2^2 + l3^2$

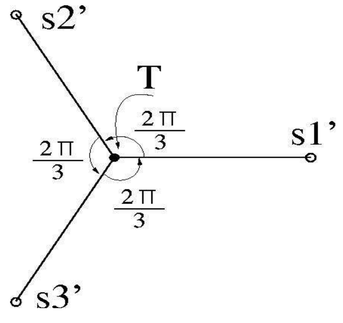


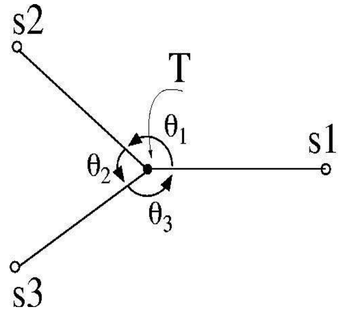
Ideal Direction





Spread





$$\text{Deviation from the ideal spread} = \Delta = \sqrt{\sum_{i=1}^{i=3} \left(\theta_i - \frac{2\pi}{3}\right)}$$

Multi-Objective Optimization

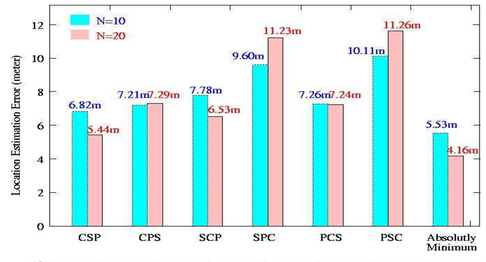
A sensor is selected such that

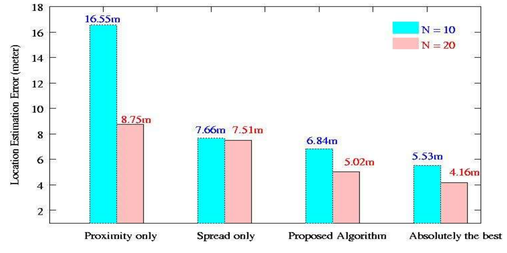
Step 1: Coefficient of collinearity is maximized,

Step 2: Deviation from the ideal direction is minimized
OR
Deviation from the ideal spread is minimized

Step 3: Distance of the sensor from the target is minimized

Results





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