Principles of Wireless Sensor Networks

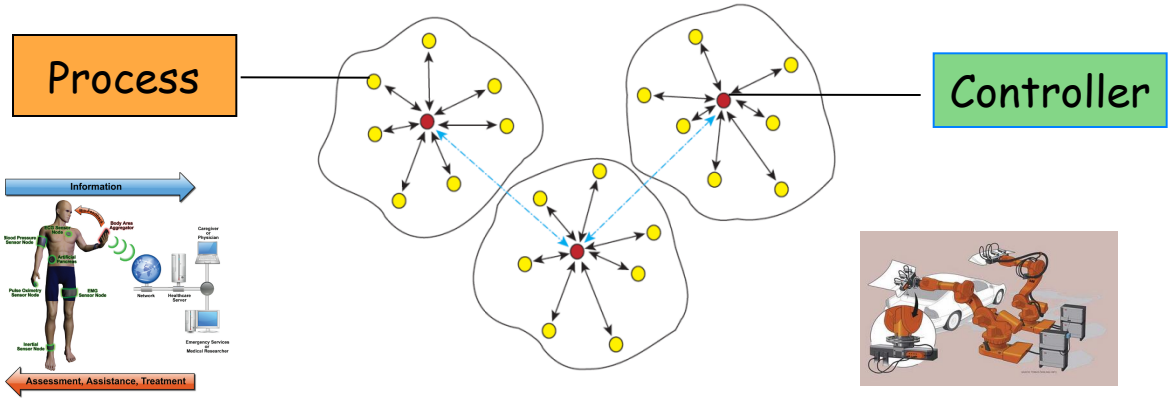
https://www.kth.se/social/course/EL2745/

Lecture 9
February 13, 2013

Carlo Fischione
Associate Professor of Sensor Networks
e-mail: carlofi@kth.se
http://www.ee.kth.se/~carlofi/

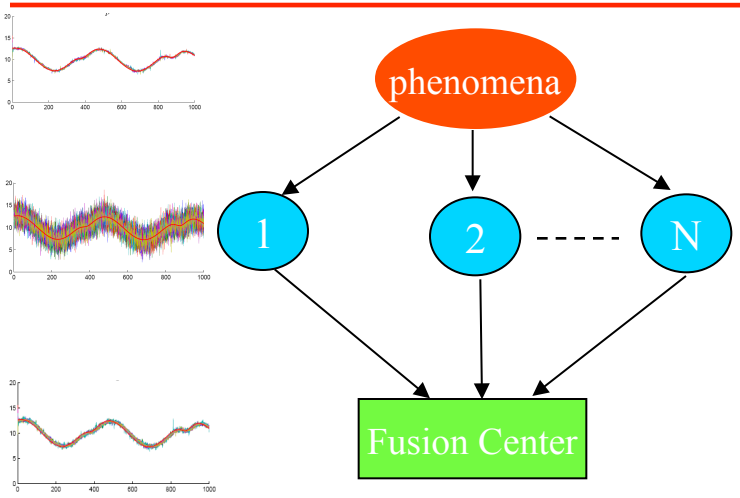
KTH Royal Institute of Technology
Stockholm, Sweden

Previous lecture

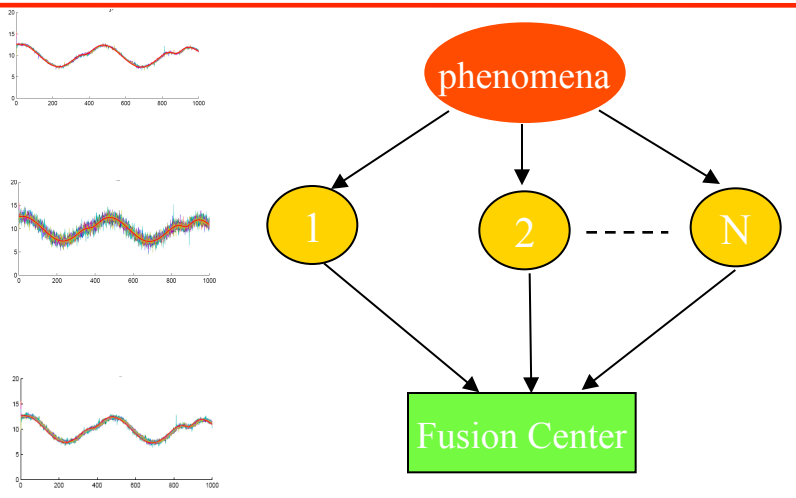


How to estimate phenomena from noisy measurements?

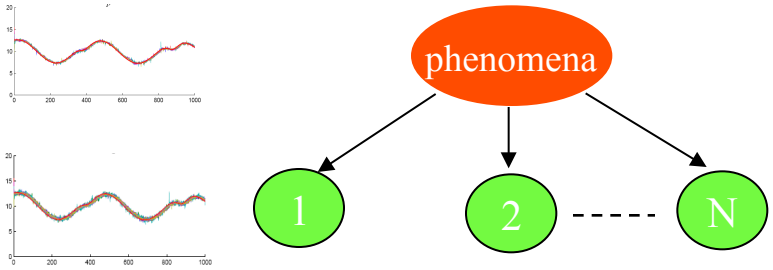
Estimation



Centralized Estimation:
no intelligence on sensors



Distributed Estimation:
some intelligence on sensors



Completely distributed (or decentralized) Estimation

Course content

- Part 1
  - Lec 1: Introduction
  - Lec 2: Programming
- Part 2
  - Lec 3: The wireless channel
  - Lec 4: Physical layer
  - Lec 5: Mac layer
  - Lec 6: Routing
- Part 3
  - Lec 7: Distributed detection
  - Lec 8: Distributed estimation
  - Lec 9: Positioning and localization
  - Lec 10: Time synchronization
- Part 4
  - Lec 11: Networked control systems 1
  - Lec 12: Networked control systems 2
  - Lec 13: Summary and project presentations

Today's learning goals

- Which measurements are used for estimating the position of a node?
- How to estimate the position of a node?
- What is the effect of measurement noises?

Outline

- Common measurements
  - time
  - range
  - angle
- Triangulation
- Trilateration
- Distributed collaborative methods

Summary

- We have studied the basic of localization for sensor networks
- Localizing the nodes consists in applying estimation techniques
- Statistical methods could give more precision, but are also more complex

Next lecture

- Application of estimation and detection to synchronization