SIGNAL PROCESSING SESSION, MELT08

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PROBLEMS IN THIS FIELD

- Sensing provides raw signals or measurements
- Localization as estimation problem:
  - Given observation z
  - Need location x
  - Seek estimate $\hat{x}(z)$
- Typical techniques
  - Statistical inference: characterize the distribution p(x | z)
  - Optimization: define a criterion E, seek location estimate x, which minimize E

CHALLENGES

- From raw signal to distance/angle/other measurements
- Noisy observations --- For instance, WiFi signal can be several dBs off.
- Multi-modal observation --- poses difficulty to statistical methods.
- Non-convex criterion --- poses difficulty to optimization methods.
- Computational complexity --- need suitable computation methods.
- Other challenges
  - Asynchronous data
  - Need for communication across nodes
  - Distributed algorithms

THIS SESSION

- A Novel Backtracking Particle Filter for Pattern Matching Indoor Localization --- statistical method
- A Geometrical Perspective on Localization --- performance metric, implications on localization.
- Localization Using Signal Strength: To Range Or Not To Range? --- handling noisy data
- Mobile Sensor Localization and Navigation using RF Doppler Shifts --- localization from raw signals.