



Sensor Network

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Sensor Network Overview

- Inexpensive, smart devices with multiple on-board sensors provide opportunities for instrumenting, monitoring, and controlling to our advantage, homes, cities, environment, and battlefields
- Sensor nodes have embedded processing capability : Sensing, Processing, Computation, Actuation, and Communication
- Sensor nodes are embedded into physical environments and becoming integral parts of our daily lives
- By using advanced cooperative signal and array processing algorithms, the system can effectively collect, process and deliver information from the physical world in the home, factory, and the battle field to the users



Constraints

- Operated with energy constraints
- The limited amount of energy stored at each node must support multiple functions
- Limited local data storage
- Communication bandwidth
- Information latency
- System Longevity



Challenges

- To combine the distributed data to produce meaningful global results
- To design the relevant signal and information processing and fusion algorithms for asynchronous execution
- The communication methods are needed to provide progressive accuracy
- Must optimize processing and communication among signal processing, data fusion, querying, and routing tasks
- Due to power limitation, temporal processing is feasible only over limited time periods
- To combine the information across different sensing modalities; jointly processing acoustic and seismic signals significantly enhance performance
- To effectively perform joint space-time processing across different nodes



Data Fusion

- Signal level Fusion
 - Not feasible if the sensors are distributed on different platforms
 - Ex. Taking a weighted average of the composite signals
- Feature Fusion
 - To combine feature extracted from signals
- Decision Fusion
 - More robust than fusion at the lower levels, as failure of one of the sensors does not signify the total failure of the entire system
 - Minimizes the amount of data to be transmitted between the individual sensors



My work

- Classification on Sensor Network

- To apply classification schemes in order to solve classification problems in sensor network area under constraints in some specific scenarios
- “Collaborative Classification Applications in Sensor Networks” appeared in SAM2002 IEEE workshop
 - To improve moving target classification performance by using data obtained from sensor networks with collaboration both across sensor nodes (Signal and decision-levels fusion) and within a sensor node (Multimodal data fusion)