Mobility in Wireless Sensor Networks

http://www.NetRL.cs.ucy.ac.cy

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Existing Trends in WSNs

- Assumption: WSNs are static in nature
- Many existing (routing and MAC) protocols and mechanisms assume immobile sensor nodes or weak mobility
- Need for new algorithms
  - cope with topology changes
  - involve new scheduling and priority assignments
- Joint MAC and routing optimization
Research Directions

• Mobility models
  – Individual mobility
    • Random walk, random waypoint, random direction, city section, etc.
  – Group mobility
    • Nomadic community, reference point group mobility, etc.

• Motion planning
  – compute, in a distributed way, the path that a mobile cooperating object should follow
Research Directions (cnt’d)

• Effects of mobility on routing
  – Rapidly changing topology
  – Need for adaptive distributed algorithms
  – Introduce realistic motion models
  – Analyze trade-offs between energy consumption

• Effects of mobility on MAC protocols
  – Majority of current MAC protocols assume static or weak mobility
  – New algorithms that predict topology changes + new scheduling and priority assignments
  – Joint MAC and routing optimization
Previous Work @ U. of Cyprus

NetRL Mobile WSN Testbed

MicaZ sends commands to other MicaZ on the network to move. MicaZ forward move commands to BOE-Bot over RS232 and BOE-Bot performs them (no odometer installed on robot, compass installed but not utilized at this stage). LCD for debugging.
Introducing mobility to WSNs for Coverage Maximization – Some challenges

- How to identify holes in a distributed way?
- Which hole to fill for maximizing coverage?
- How much energy is spent for moving to a target (Does it worth moving there)?
- Where to put the mobile nodes at the deployment stage?
- Can bio-inspired techniques help?
Future work

• Coverage maximization using mobility
  – Comparison/categorization of existing algorithms
  – Modification of existing algorithms to support features of other algorithms
  – Creation of new algorithms

• Introducing mobile nodes to HTAP to minimize congestion (in cooperation with Sergiou Charalambos)