TUDµNet: a Metropolitan-Scale Federation of Sensor Network Testbeds

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Context & Problem Statement

Software development for WSANs hard:
- wireless communication phenomena (interference, multipath reflection, fading, antenna diversity)
- complex sensing phenomena (magnetic fields, gas plumes, human behavior)
- experimentation logistics (batteries, flashing, etc.)

Proposed Approach

- deployment of several sensor nets
- development of support software for managing the software testing phase
- testbed interconnection via Ethernet-backbone

Current Status

Construction of TUDµNet
- testbed: hybrid between simulator and target deployment
- federation: integrates multiple, autonomous WSNs

Site | Focus | Size  
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CS Dept. | networking, sensing & actuation | 32 + 30 + 20  
GKmM Lab | gas plume detection | 50  
surPLUShome | environmental monitoring | 20  
total (2012) | 152  

Web interface to manage experiments:
- hierarchical zones (enable division of areas)
- parallel job execution
- centralized coordination
- access control
- heterogeneity
  - sensors (light, humidity, CO, CO2, temp., etc.)
  - nodes (TelosBs, Z1s, JCreates)
- basic system health monitoring

Ongoing Work

- extended health monitoring and healing
- emulation of node faults, fine grain control of node liveness
- extension to human-worn and robot-transported nodes
- support for further platforms (e.g., EconoTAGs)

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