Tenet: An Architecture For Tiered Sensor Networks
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http://tenet.usc.edu

Design Principles of Tenet

- Asymmetric Task Communication
  Any and all communication from a master to a mote takes the form of a task. Any and all communication from a mote is a response to a task.

- Addressability
  Any master in a Tenet can communicate with any mote or master in that Tenet. Any mote in a Tenet can communicate with at least one master in that Tenet.

- Task Library
  Motes provide a limited library of generic functionality, such as timers, sensors, simple thresholds, data compression, and FFT transforms. Each task activates a simple subset of this functionality.

Software and Tools

- The Tenet Stack
  - Tasking API
  Tasking API provides functions to describe a task to run on the motes.
  Example: sample(), actuate(), send(), count(), avg()

- Transport API
  Transport API provides functions to disseminate tasks and collect data from the network:
  send_task(task_description)
  attr* read_response(wait_interval)

Deployment and Testing tool: Tenetrun

- To simplify deployment and testing, “Tenetrun”:
  - Daemonizes the processes that constitute the master stack and restarts them if they fail.
  - Instantiates multiple copies of the master stack to emulate multiple masters in a single physical host.

Applications and Deployments

- Ambient Structural Vibration monitoring
  Continuous structural monitoring and event detection
  “sample(3 channels, 20 Hz) → send(stream)”
  (http://enl.usc.edu/projects/bridge/)

- Pursuit Evasion Game
  Pursuer robots estimate the location of evaders and corral them.
  “sample(0xaa, RSSI) → compare(LT, 0xaa, 125, 0xbb) → deleteactivetaskif(0xbb) → send()”
  (http://enl.usc.edu/projects/peg/)

- Wildlife (Lizard/snake) monitoring
  Cyclops take pictures of the trap, run image processing algorithms to detect the animals, and the result directs the biologists to the trap that has captured lizards or snakes.
  “periodic(2 mins) → detect_lizard(0xbb, 0xaa) → not(0xaa)→ deleteactivetaskif(0xaa) → send(stream)”