Tiny Application Sensor Kit (TASK)

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Sensor network application development and deployment present daunting challenges to even sophisticated software developers. Sensor network applications combine the complexities of both distributed and embedded systems design, and these are often amplified by unreliable network connections and extremely limited physical resources. Moreover, many sensor network applications are expected to run unattended for months at a time.

Real users of sensor networks ranging from plant biologists monitoring micro-climates in a giant redwood tree to facility managers monitoring vibration signatures of their equipments are most likely not sophisticated software developers. We must reduce the complexity of sensor network application development and deployment to ensure the success of sensor network technology in the real world.

We believe that many of the complexities in sensor network application development and deployment are caused by the current low-level programming interfaces and the lack of tools. At Intel Research in Berkeley, we have been building a suite of tools called the Tiny Application Sensor Kit (TASK) aiming to break down the barrier to entry for non-sophisticated users to develop and deploy their own sensor network applications.

TASK consists of the following components:

- **TinyDB** based sensor network that allows traditional programs to interact the sensor network through a declarative SQL-like interface. See `tinydb.pdf` for details.

- **TASK Server**, a server process running on a sensor network gateway that acts as a proxy for the sensor network on the internet.

- **TASK DBMS**, a relational database that stores sensor readings, sensor network health statistics, sensor locations and calibration coefficients, etc. Curently TASK only works with PostgreSQL (see http://www.postgresql.org) and has been tested on both 7.2 and 7.3 releases.

- **TASK client tools** including **TASK Deployment Tool** that helps users record sensor node metadata, **TASK Configuration Tool** that helps users choose data collection intervals and data filtering and aggregation criteria, and **TASK Visualization Tool** that helps users monitor the network health and sensor readings. See `TASKVisualizer.pdf` for details.

- **TASK Field Tool** running on a PDA that help users diagnose and resolve problems in certain areas of the network in the field. See `TASKFieldTool.pdf` for details.

TASK also integrates easily with most popular data analysis tools, e.g., MS Excel, Matlab, ArcGIS, etc through standard ODBC or JDBC interfaces.

The following is a quick-start guide for using TASK.

1. After the installation of TASK, the PostgreSQL database needs to be initialized before TASK can be used. First, `cd tinyos-1.x/tools/java/net/tinyos/task/tasksvr`. On Cygwin, simply and run `setup-task-db.sh`. On Linux, do the following

   (a) as root: `mkdir /pgdata; chown postgres.postgres /pgdata/`
   (b) change user to postgres
   (c) run `initdb`
   (d) edit `/pgdata/pg_hba.conf` to uncomment "local all all trust" and "host all all 127.0.0.1 255.255.255.255 trust" and comment out "local all all ident sameuser" at the end of the file

(e) run `setup-task-db.sh`

2. program TASK motes from `tinyos-1.x/apps/TASKApp`. You must program a node 0 for the basestation.

3. start the TASK server by `cd tinyos-1.x/tools/java; java net.tinyos.task.tasksvr.TASKServer &`

4. start TASK GUI by `cd tinyos-1.x/tools/java; java net.tinyos.task.taskviz.TASKVisualizer localhost`

5. start TASK Field Tool by `cd tinyos-1.x/tools/java/ne/tinyos/task/field; python config-gui.py; python tool.py`

TASK bugs can be submitted at
`https://sourceforge.net/tracker/?atid=551233&group_id=28656&func=browse`