Installation Manual

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Course: 74.783 Mobile Networking

Project: Time Synchronization in Sensor Networks Using Flooding Protocol

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Installation Manual

In the project, we have developed four modules as follows:

- **FTSP Algorithm Unit:** This module implements the FTSP algorithm. The module can be ported with TinyOS to facilitate a user to use the module in his application.

- **FTSP Application Unit:** This unit uses FTSP algorithm unit at the back end and provides an application that can report/collect the time synchronization information from the network.

- **Base Station Application Unit:** This application runs on the base station and collects the data from the FTSP Application unit and supplies the data to the serial port of the PC to which the base station is attached.

- **Network Information Display Unit:** This unit runs on the PC where the base station is attached. The application collects data from the network through the serial port to which the base station is attached and displays the data in the screen as well as sends to a file for output analysis.

Distribution of The Modules

The modules are supplied in a zip file and the unzipped folder, MobileProjectV1.2 can be placed under pathtotinyos/apps directory and ShowTimeSyncStat directory can be placed under pathtotinyos/tools/java/net/tinyos directory. This sets the platform to run the application.

But we can also distribute in the following way:

- **FTSP Algorithm Unit:** The interface file, interfaceFTSP.nc, can be placed under pathtotinyos/tos/interfaces directory.

  The implementation files, FTSPM.nc and FTSPC.nc, can be placed under pathtotinyos/tos/lib/userprovided directory.

- **FTSP Application Unit:** The files, FTSPAppC.nc, FTSPDebuggerM.nc, BeaconBroadcasterC.nc, and BeaconBroadcasterM.nc, can be placed anywhere but it is preferable to place the module under pathtotinyos/apps directory.

  Related files:

FTSPAppC.nc

FTSPDebuggerM.nc

BeaconBroadcasterC.nc

BeaconBroadcasterM.nc

Makefile

The format of make file should be ok and appropriate path to the other directory should be mentioned. See the example Makefile with the software.

- **Base Station Application Unit:** The unit can be placed anywhere. However, it is recommended to place the unit under pathtotinyos/apps directory.

  Files:

  BaseAppC.nc

  BaseAppM.nc

- **Base Station Application Unit:** The unit can be placed anywhere however it is recommended that they should be placed in pathtotinyos/apps directory

- **Network Information Display Unit:** The unit (folder) needs to be placed under pathtotinyos/tools/java/net/tinyos/

Compiling and Programming the Motes

After placement of the modules we need to compile the modules and program the motes also. This can be done as follows

- **Programming the clients**: Go to FTSP Application Unit/apps/FTSP directory. Mentionable this application module uses the FTSP algorithm unit. Change the Makefile so that COMPONENT=FTSPAppC exists in the file. For single hop network setup You have to remove -DMULTIHOP string if it exists in PFLAGS. For multi hop network setup You have to include -DMULTIHOP string in PFLAGS. now use following commands:

  make mica2/mica2dot/mica //depending on your mote type. It is just compilation

  MIB510=/dev/ttySN make mica2/mica2dot/mica install.XY //compile and program[flush to the ROM of motes] the motes

  N=0 or 1 or 2 if you use COM1 or COM2 or COM3 ports to connect the programmer board to the PC.

XY is the address of the mote. Please provide the address as XY coordinate and think the orientation of the motes in a matrix. For Single hop thing this doesn't matter but for multi hop algorithm this does matter.

Program as many clients as you want in this way but the address must not be conflicting.

- **Programming the Reference Broadcaster**: Go to FTSP Application Unit/apps/FTSP directory. Change the Makefile so that COMPONENT=BeaconBroadcasterC exists in the file. For single hop network setup You have to remove -DMULTIHOP string if it exists in PFLAGS. For multi hop network setup You have to include -DMULTIHOP string in PFLAGS. now use the following commands:

  make mica2/mica2dot/mica //depending on your mote type. It is just compilation

  MIB510=/dev/ttySN make mica2/mica2dot/mica install //compile and program[flush to the ROM of motes] the motes

  N=0 or 1 or 2 if you use COM1 or COM2 or COM3 ports to connect the programmer board to the PC.

For the reference broadcaster the address of the mote is not important.

- **Programming the Base Station:**Go to the Base Station Application directory. Use the same command just as above here also the address of the base station is not important

Running the Application:

Place all the motes and reference broadcaster around within the radio range of the base station. The base station is attached to the MIB510 programmer board and the board is directly attached to a PC. Power on all the motes except the base station[Base station would get power from the board which is powered by an adapter]. Go to the pathtotinyos/tools/java directory. Use the following command to run the statistics display unit.

java net.tinyos.X.ShowTimeSyncStat

X=the directory under which the java/class files are kept.