This is a group project. Each group can have up to 3 students. Please form the group yourself and email me your group information.

**Project Description:**

In this project, you will develop a *multi-hop data collection tree protocol* based on TinyOS 2.x.

1. Development of a multi-hop data collection tree protocol

1.1 The protocol to form a multi-hop data collection tree

The base station locally broadcast a *tree construction message*, which includes its own ID and its depth to be 0;

When a node, say $A$, receives a *tree construction message* from node $B$ at its first time (i.e., node $A$ has not joined the data collection tree yet), node $A$ assigns its depth to be the depth of node $B$ plus one, and its parent to be node $B$. After this, node $A$ rebroadcasts the *tree construction message*.

When a node, say $A$, already joins the data collection tree and receives a *tree construction message* from node $B$, node $A$ just simply disregards the *tree construction message*.

The following is one example multi-hop data collection tree:
Also see attached slides for a dynamic view about how to construct a multi-hop data collection tree.

1.2 After the multi-hop data collection tree is formed, each node senses and transmits its light intensity to the base station every one second. For each received message, the base station displays the following information:

1. Node ID which originates the message;
2. Tree depth of the Node;
3. Sensed light value

Note: You do NOT need aggregation in this project.

**Basic Steps:**

Please follow the steps listed below:

1. Setting up TinyOS environment - XubunTOS

XubunTOS can be downloaded here:

http://toilers.mines.edu/Public/XubunTOS

2. Go through the TinyOS tutorials at http://docs.tinyos.net/index.php/TinyOS_Tutorials

**Hints:**

1. use setRFPower() to adjust the transmission range of a mote. In this way, you can set up a multi-hop network;
See:


for the information about setRFPower();

2. Please refer to TinyOS 2.x Tutorial

Lesson 3: mote-to-mote radio communication
Lesson 4: Mote-PC serial communication
Lesson 5: Sensing

3. Email list can be a great help. See “tinyos-help” here:
   http://www.tinyos.net/scoop/special/support#mailing-lists

What to hand in:

1. A document about how you design and implement your project. This includes all the important components and their relationship.
2. The source codes of the applications

Email a soft copy to wsnsummer2008@gmail.com by the due date and time. Please use a. your group name; b. WSN - Project; as the subject of the email.

Project Demonstration:

After the project is turned in, each group needs to schedule a 30-minute demo. You need to demonstrate how your system works.