Lab 4: Internet of Things

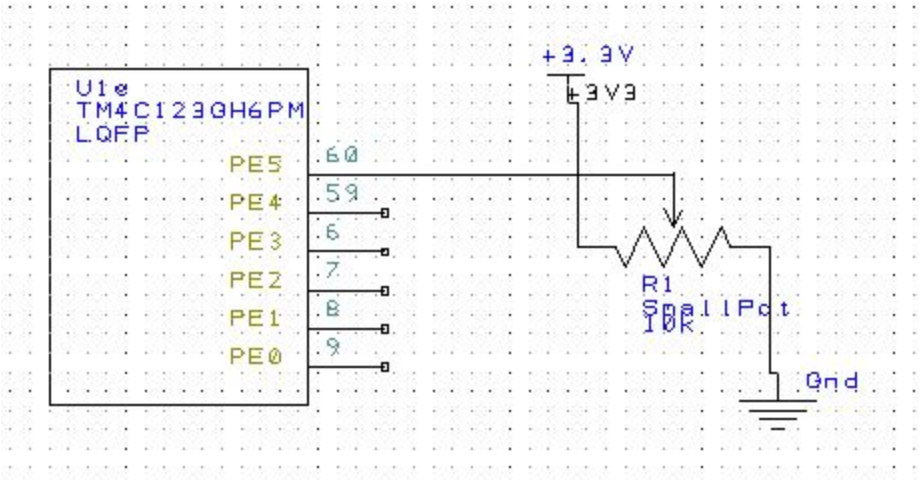
Allen Pan & Paris Kaman

Objectives

- Implement a system that connects to the internet via an IEEE 802.11 – Wifi module, CC3100
- Use DNS to convert name to IP address
- Configure a smart object that can retrieve data from a weather server using TCP
- Design a smart object that can store data onto an internet server using TCP
- Implement a web server to log data from your smart object

Hardware Design

Other than the Wifi board and LCD screen, we used one potentiometer to measure voltage.



Measurement

1. Percentage of lost packets. Basically how reliable is the system (assuming you have a connection to the AP)
   Since we are using TPC, when a packet is lost it gets resent along with every packet after it. The latency increases, but packets are not lost.

2. Minimum, maximum, and average time from 10 transmissions to openweathermap.org
   Maximum: 308 ms Minimum: 104 ms Average: 187 ms
   Recorded using Systick. Screenshot attached.
3. Minimum, maximum, and average times from 10 transmissions to your server

Maximum: 412 ms Minimum: 209 ms Average: 310 ms

Analysis and Discussion

1) In the client server paradigm, explain the sequence of internet communications sent from client to server and from server to client as the client saves data on the server. Assume the client already is connected to the wifi AP and the client knows the IP address of the server.

First, client sends a request to the server with a port number requesting a socket. The server creates the socket, and then the client connects to it. The client then sends packets to the server socket and the data is saved in the proper location. Server may send back a response.

2) What is the purpose of the DNS?

The DNS translates the symbolic internet addresses into numeric machine address that computers can recognize.

3) What is the difference between UDP and TCP communication? More specifically when should we use UDP and when should we use TCP?

TCP provides reliable, ordered delivery of data. Packets sent with TCP are tracked so no data is lost or corrupted in transit. UDP does not track packets so there is no guarantee that data is going to arrive. UDP emphasizes reduced latency over reliability.

For applications that do not require reliable data stream service, we use UDP over TCP. For example, a live stream uses UDP since we want it to be live. Lost packets will just be skipped.

I love TCP!