Sociable Objects Workshop

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Plan for Today

- Sensor / Actuator Presentation
- Requests for Next Classes
- Final Project Ideas
- Mesh Network Exploration / Internet Interlude
- ZigBee Internet Gateway
- ZIG code snippets
- Readings & Assignments

Sensor / Actuator Presentation

Requests for Next Classes

Final Project Ideas

Final Project Ideas

- Present your group's ideas
  - write each on the board
  - describe very briefly
- Reactions from class
  - gut, then discuss briefly
- Reactions from group, explanations if needed

Final Project: errata

- You can work with anyone
- Meet with your group again if you like
- Meet with anyone else whose idea you might want to work on
- Make something for the show
- Be extraordinary!

Final Project Suggested Timeline

- Week 10: Make observations, select your idea and finalize your group
- Week 11: Build a prototype and test it. Observe the results.
- Week 12: Build a revision and test it. Observer the results.
- Week 13: Create a final that works well, with a presentation and demo that tells its story
- Week 14: Final Presentations

Exploring a Mesh Network

XBee ZigBee Node Indicators

- ATNI Node Indicator
- ATND Node Discovery
- ATDN Destination Node

- Also:
  - ATDB signal strength in DBm
  - AT%V Voltage

Transmitting Data

- Read a list of all nodes on the network using ATND

  MY<CR>
  SH<CR>
  SL<CR>
  NI<CR> (Variable length)
  PARENT_NETWORK ADDRESS (2 Bytes)<CR>
  DEVICE_TYPE<CR> (1 Byte: 0=Coord, 1=Router, 2=End Device)
  STATUS<CR> (1 Byte: Reserved)
  PROFILE_ID<CR> (2 Bytes)
  MANUFACTURER_ID<CR> (2 Bytes)
  <CR>

- Set the Destination Node using ATDN

Internet Interlude

- IP addresses
- ports
- sockets
- layers physical, transport, application
- telnet demo

Telnet

- into ZIG
- ssh into itp
- daytime
- web server
- mail server

ConnectPort via Telnet

Command Line

- telnet
- port 23 is default
- hostname or IP address needed
- telnet zig.faludi.com 25

ConnectPort via HTTP

HTTP

- web access
- port 80 is default
- http://zig.faludi.com

ConnectPort via iDigi

iDigi

- web access
- developer.idigi.com
- user itp
  pass <generic>
- http://developer.idigi.com

ZigBee Internet Gateway

To use the gateway you need to:

Switch the PAN to AAAA: ATIDAAAA

Set your radio to 115200 baud: ATBD7

Set the destination address to zero: ATDH0 and ATDL0

When you're ready to go, attach the XBee to your Arduino's hardware serial port (pins 0 and 1), then send a URL and you'll get back the response. For example to send your request from Arduino:

```
Serial.println("http://www.faludi.com/test.html");
```

And to read the response back:

```
if (Serial.available()) {
    char inChar = Serial.read();
    print ( inChar );
}
```

Some useful things to know:

- currently supported URL formats (items in [] are optional):

  http://host/path[:port]

  https://host/path[:port]

  ftp://[username:password@]host/path[:port]

- sending help will get the current help file from the gateway
- baud rates lower than 115200 will work if the results you're getting are brief
- the software is still under development and may go offline for improvements from time to time
- right now error messages are displayed raw. You can ignore the specifics which are solely for our debugging

COMMANDS:

help: displays this file

http://<host/path> receives a URL

https://<host/path> receives a secure URL

http://<host/path:port>

https://<host/path:port>

ftp://<host/path>

ftp://<username:password@host & path>

USE:

The recommended speed is 115200 baud which can be set with ATBD7

Lower baud rates may work if you are receiving short responses

The following formats are NOT yet supported:

http://<username:password@host/path>

telnet://<host:port>

mailto:<addr@host>

XBee I/O into a database

ZigBee Internet Gateway Demo

Send a request

Serial.println(“http://itp.nyu.edu/~raf275/testpage.html”);

Seek a character

```
if (Serial.available() > 0) {

        if (Serial.read() == ‘A’) {

           //do something

        }

}
```

Send a value

Serial.println(“http://faludi.com/testpage.php?value=137”);

Read an ASCII decimal value

```
if (Serial.available() >= 3) {

        position1 = Serial.read() - 48;

        position2 = Serial.read() - 48;

        postion3 = Serial.read() - 48;

        value = position1 *100 + position2 * 10 + position3

}

// using a buffer would be more sophisticated
```

Read a phrase

```
char buffer[128], result[128];
int count = 0;


if (Serial.available() > 0) {


        buffer[count] = Serial.read();
        count++;
        if (buffer[count] == '\r') {
              strcopy(result, buffer);
              count = 0;


}


// additional code would be added to make this work well
```

Readings and Assignments

- Readings
  - none

- Assignments
  - Complete all your labs and post all your documentation.
  - Finalize your group, select a final idea and begin observations