Questions?

- **Show and Tell**
  - Still very few #8 and #9!

- **Project**
  - First prototype are due in 2 weeks…
  - New reading about user evaluation on the site…
I2C

- Key points
  - Data is transmitted one bit at a time, both ways
  - Synchronous: Both parties are sharing a clock
  - 2 wires protocol
    - Data (SDA), Clock (SCL)
    - Device identified by their address
      - In general set in hardware
      - 7 or 10 bits
I2C setting

• To do:
  – Disable the SPI subsystem (SSPCON1bits.SSPEN)
  – Set Master SSP to I2C master (SSPCON1bits.SSPM3:0)
  – Set the Baud generator (SSPADD)
  – Set the Slew control (SSPSTATbits.SMP = 1)
  – Set direction for SCK (RC3), SDI (RC4)
  – Clear collision detection (SSPCON1bits.WCOL)
  – Enable the module
I2C Write (Master side)
I2C Write phases

• **Start (S) event**
  SSPCON2bits.SEN = 1;
  while (SSPCON2bits.SEN == 1);

• **Write (address, command, data)**
  SSPBUF = DEVICE_ADDRESS;
  while (SSPSTATbits.R_W == 1);

• **Slave ACK status**
  In SSPCON2bits.ACKSTAT

• **Stop (P) event**
  SSPCON2bits.PEN = 1;
  while (SSPCON2bits.PEN == 1);
I2C Read (Master side)

**Figure 15.22:**
I2C Master Mode Waveform (Reception, 7-bit Address)
I2C read phases

- **Start (S) event**
  
  ```
  SSPCON2bits.SEN = 1;
  while (SSPCON2bits.SEN == 1);
  ```

- **Write (address, command, data)**
  
  ```
  SSPBUF = DEVICE_ADDRESS;
  while (SSPSTATbits.R_W == 1);
  ```

- **Slave ACK status**
  
  ```
  In SSPCON2bits.ACKSTAT
  ```

- **Read**
  
  ```
  SSPCON2bits.RCEN = 1;
  while (SSPCON2bits.RCEN == 1);
  result = SSPBUF;
  ```

- **Master ACK**
  
  ```
  SSPCON2bits.ACKDT = 0;
  SSPCON2bits.ACKEN = 1;
  while (SSPCON2bits.ACKEN == 1);
  ```

- **Master NACK (last)**
  
  ```
  SSPCON2bits.ACKDT = 1;
  SSPCON2bits.ACKEN = 1;
  while (SSPCON2bits.ACKEN == 1);
  ```

- **Stop (P) event**
  
  ```
  SSPCON2bits.PEN = 1;
  while (SSPCON2bits.PEN == 1);
  ```
TC74

• Digital temperature sensor
  – I2C interface
  – Range: -65°C to 127°C
  – Address on the package

• Register structure

**TABLE 3-1**: SMBus/I^2^C Protocols.
Assignment

• Show the current temperature on HyperTerminal

• Build a simple thermostat system
  – Setting using the potentiometer
  – Action simulated using LED, printf…

• Check with the oscilloscope