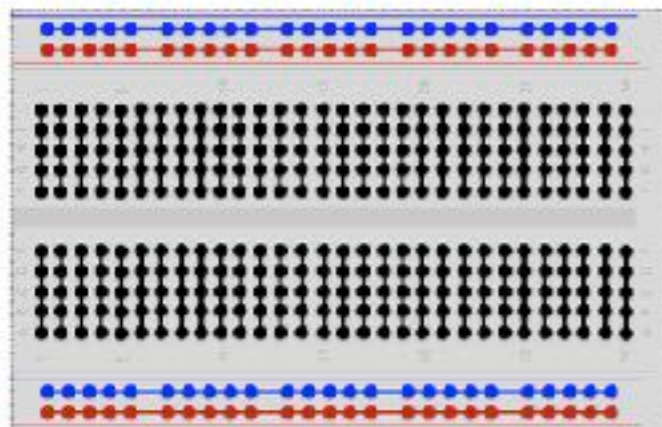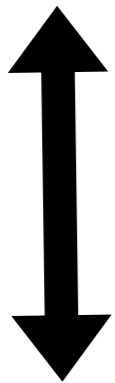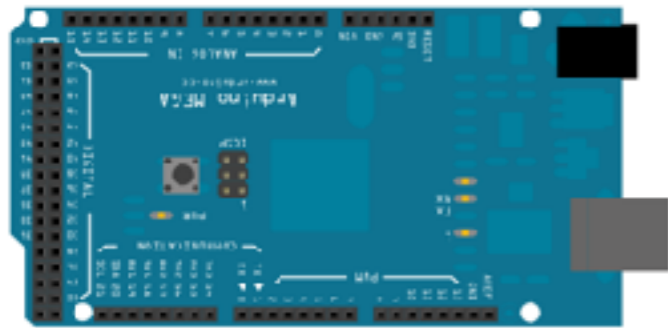# This week

In-class:

1. Wire up Thermistor circuit and connect to Arduino.

2. Write Arduino code to do polled resistance measurements.

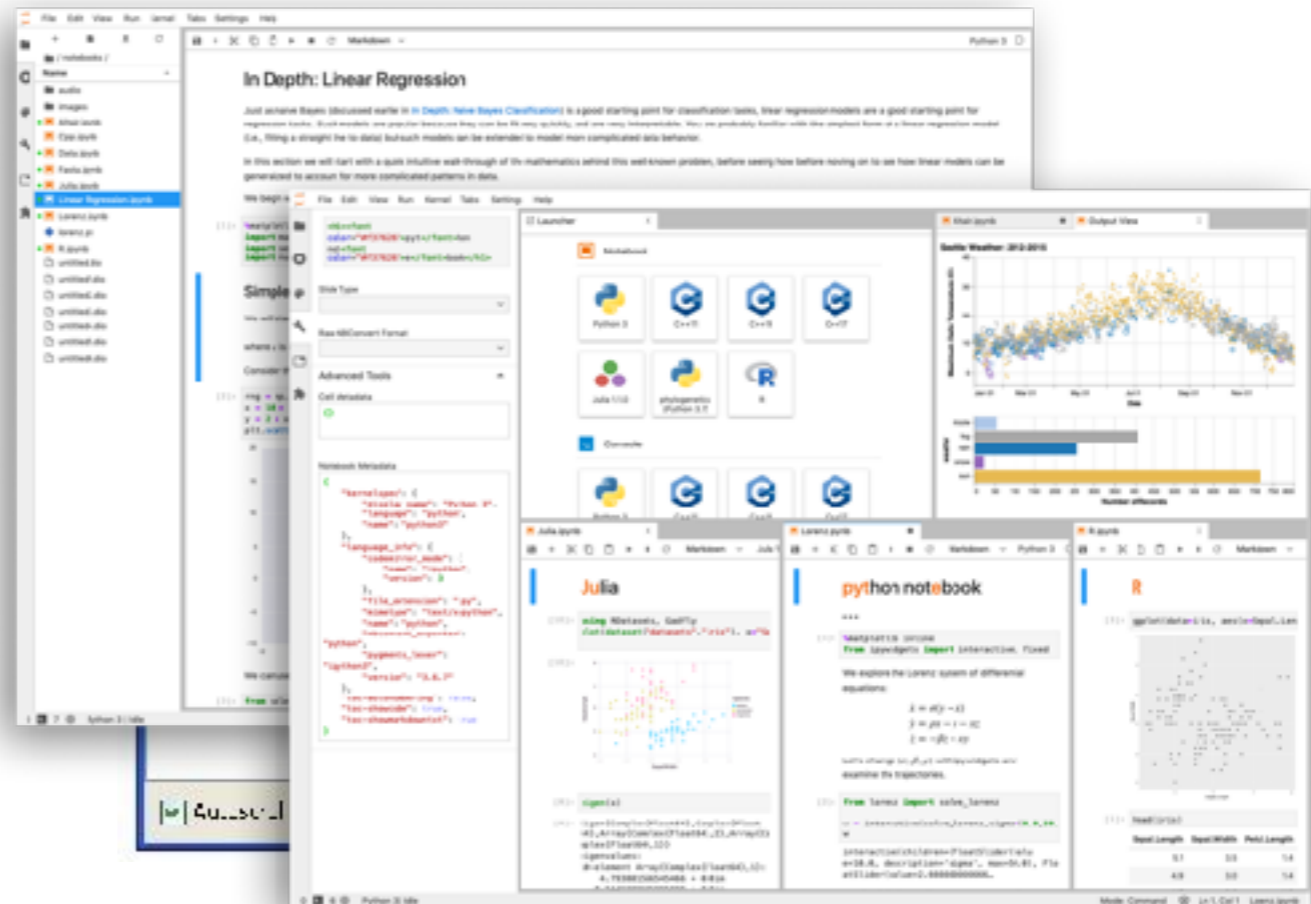3. Install pyserial through Anaconda.

At home:

4. Use python to connect to Arduino serial port and read resistance measurements.

5. Record temperature data overnight and save to csv.

Serial data collection

RS-232 Serial protocol

- One (1) bit at a time.

- Can only maintain one software connection at a time.

- RS-232 data transfer from 4800 to 115,200 baud.
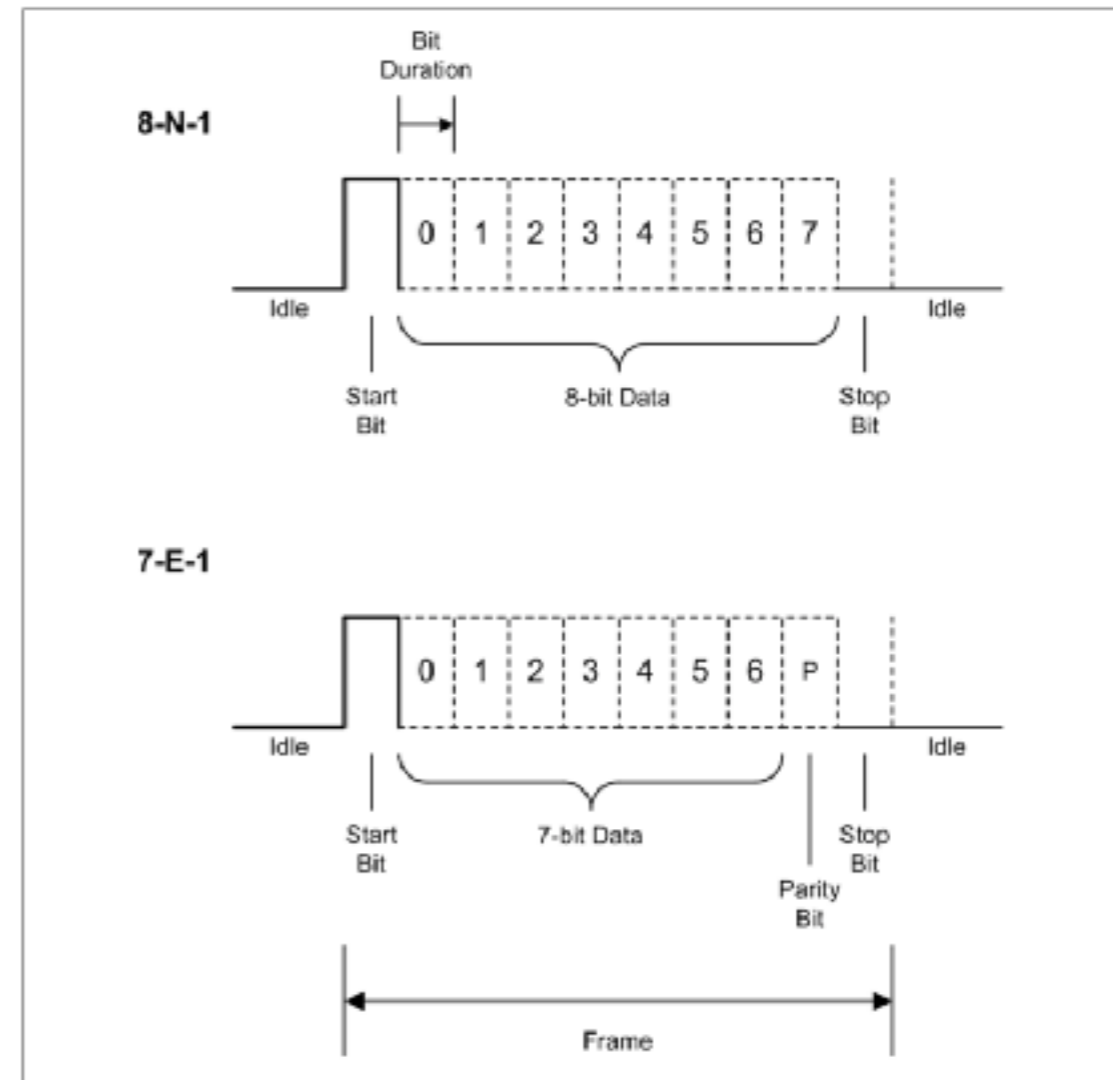
- Baud rate is bits/s.

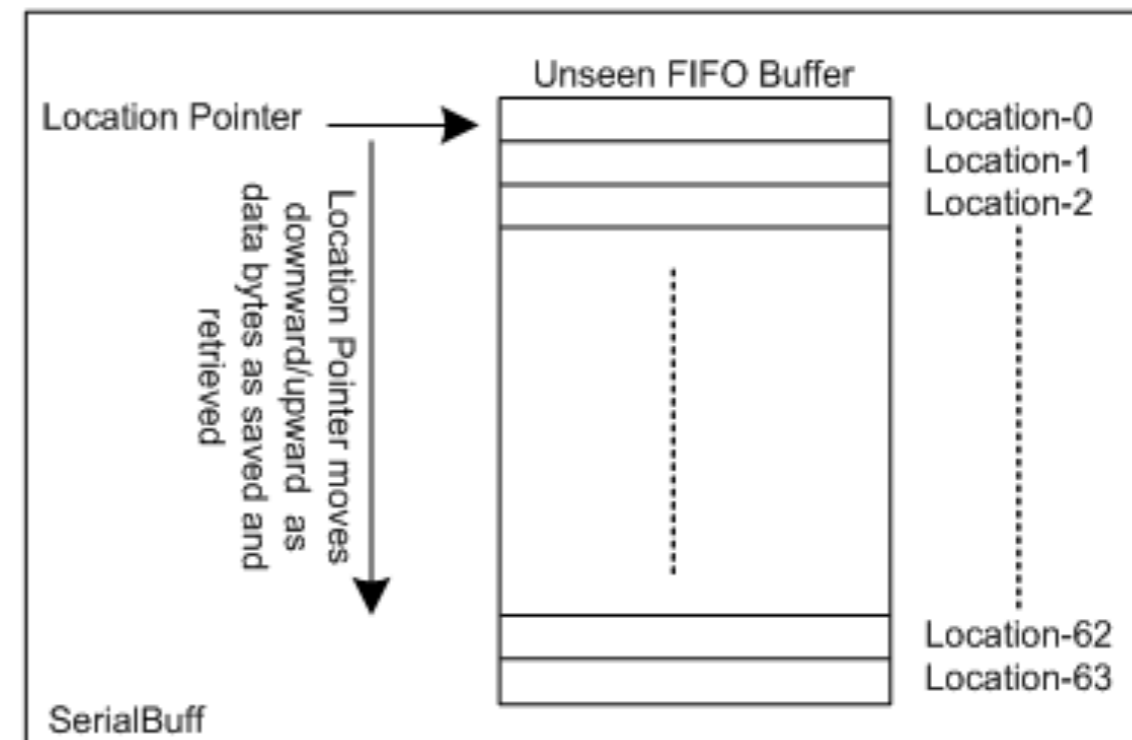Figure 7-18. RS-232 data formats

Serial algorithm

Considerations:

- How frequently to measure? How frequently to record?

  - Using delay(); and t.sleep(); to help with flow control.

- Polled measurement protocol.
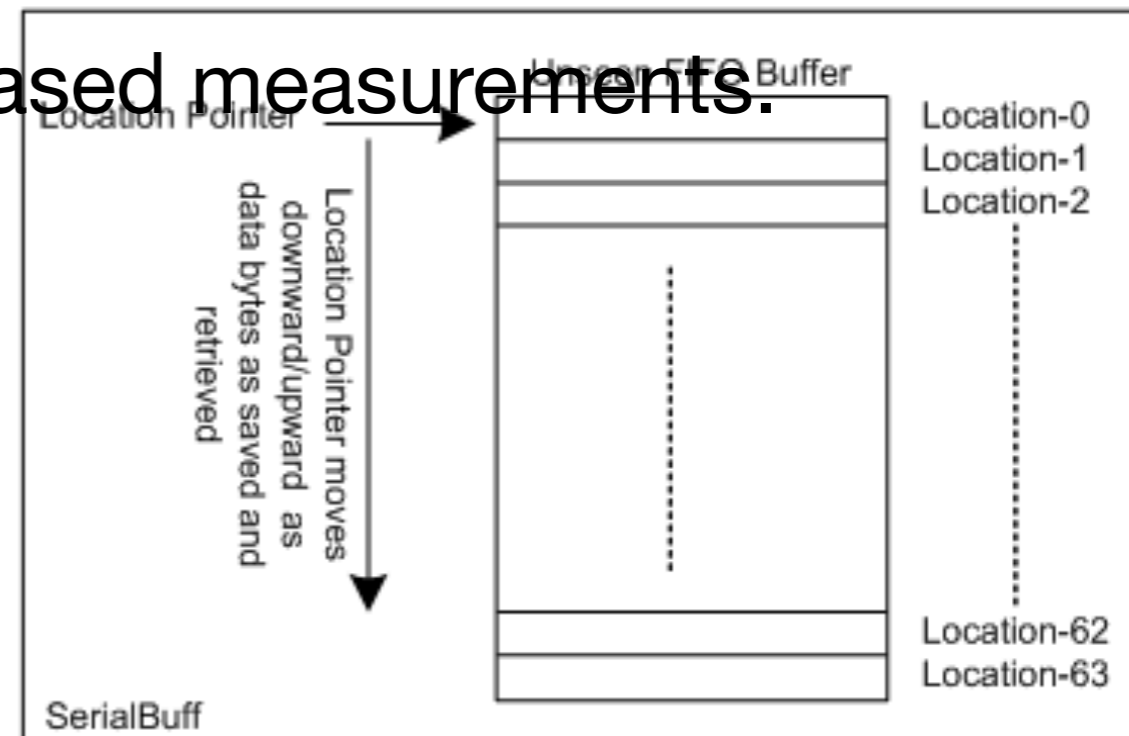
- Continuous measurement protocol.

Flow control and buffer

- Continuous data transfer interacts with the serial buffer.

- At 9600 baud and 8-N-1, data transfer is 960 bytes/sec.

- Software buffer is 64 bytes.

- Flow control tells instrument to stop sending, once the buffer is filled.

- Buffer is FIFO: First in First Out.

Flow control and buffer

- At 9600 baud, 64 byte buffer will fill in 0.53 seconds.

- If we choose delta t = 2 seconds, FIFO buffer will create an 8 second lag.

- If delta t = 10 seconds, FIFO buffer will create a 40 second lag.

- This can introduce a bias in time-based measurements.

Unseen FIFO Buffer

Location Pointer

Location Pointer moves downward/upward as data bytes as saved and retrieved

Location-0
Location-1
Location-2

Location-62
Location-63

SerialBuff

Serial algorithm

Considerations:

- How frequently to measure? How frequently to record?

  - Using delay(); and t.sleep(); to help with flow control.

- Polled measurement protocol:

  - Buffer will not fill up. No lag introduced.

  - Data capture requires two software encoding/decoding steps.

- Continuous measurement protocol.

  - Buffer can fill up, causing a time lag.
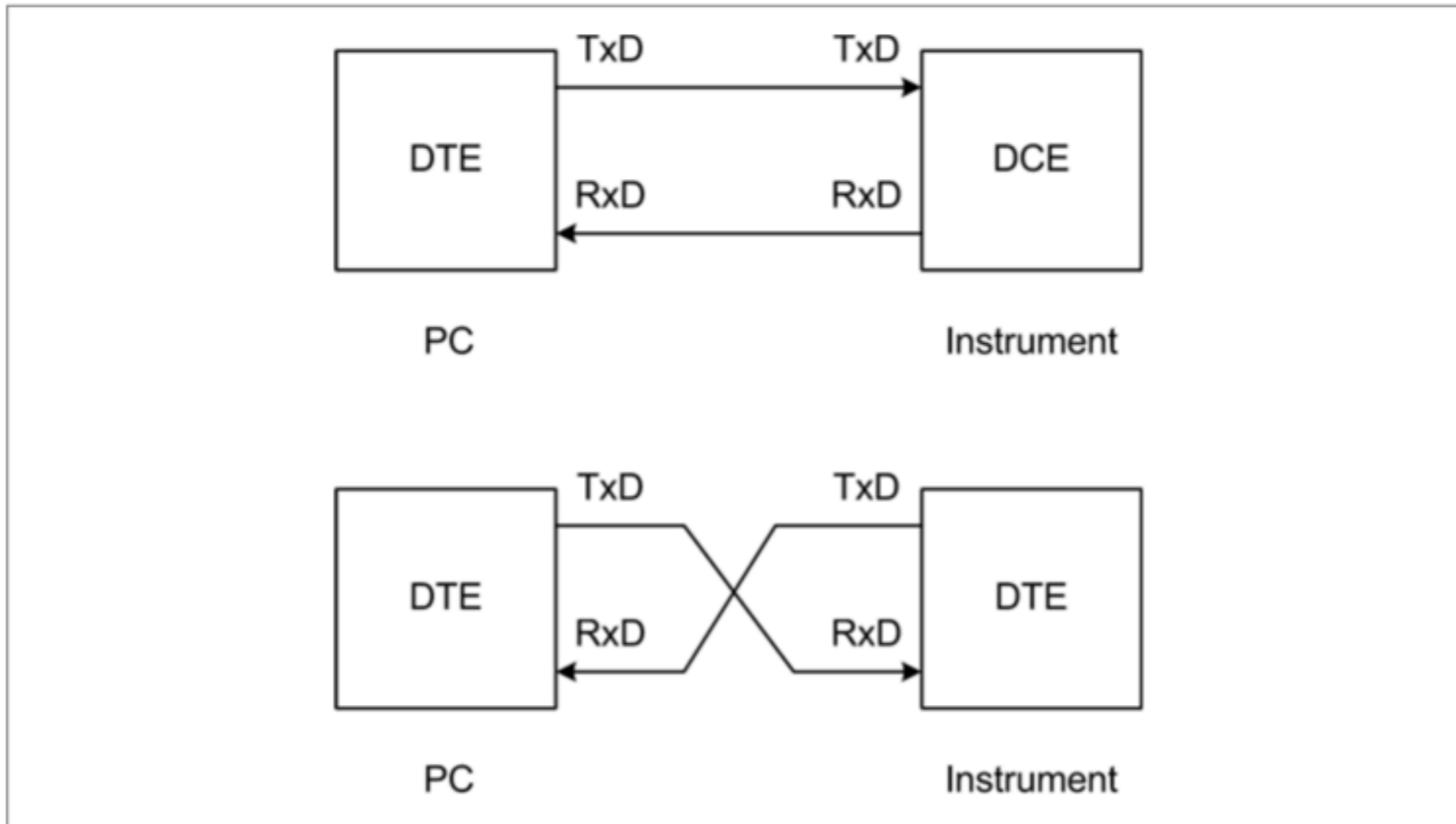
  - Easier to program.

Install pyserial

>> conda install -c anaconda pyserial

Figure 7-21. Crossover or null-modem interface