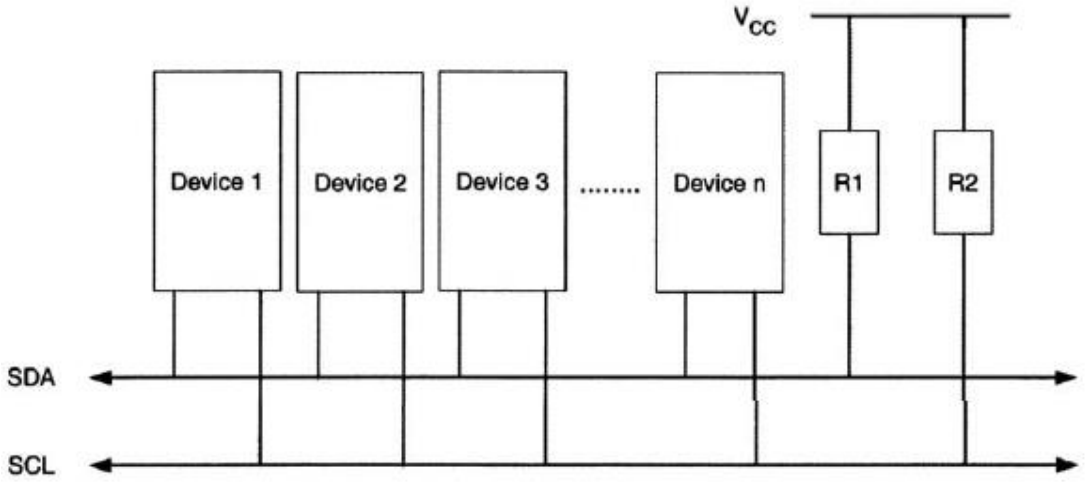
Balloon Satellite – Lesson 4

Two-wire Interface (TWI) or I2C

TWI (I2C) Interface

- I2C allows connections up to 128 different devices on a 2-wire bi-directional bus
  - Clock (SCL)
  - Data (SDA)
- Each line requires a pull-up resistor
- Typical operational voltage for TWI are 5V or 3.3V
  - Note that different voltages are not directly compatible!
- Standard TWI design has 7-bit of address values
  - Limits number of devices that can be connected to the bus
- Common data speed for TWI is 100kbit/s (Standard Mode) & 400kbit/s (Fast Mode)

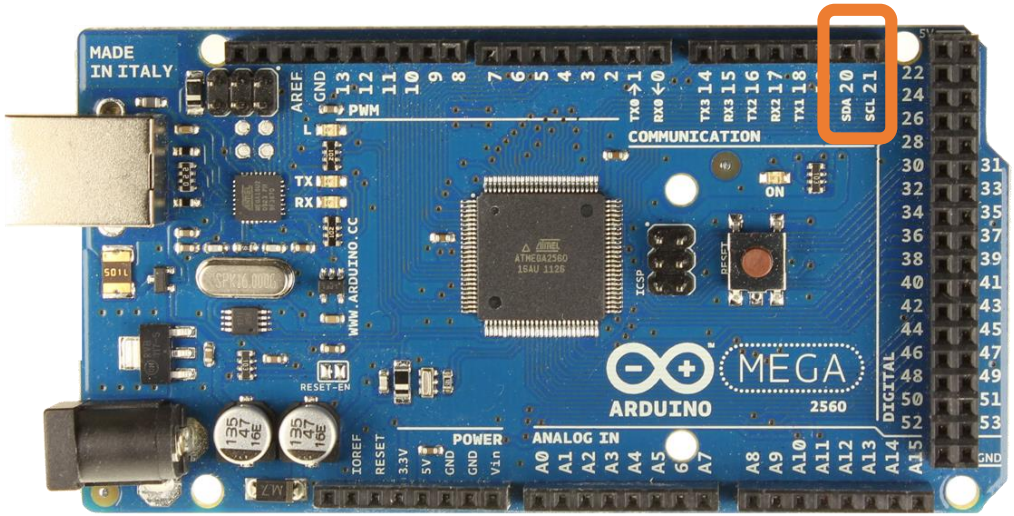


TWI (I2C) Terminology

Master	Device generates the SCL signal, initiates and terminates the transmission
Slave	Device that is being addressed by Master
Transmitter	Device that is placing data on the bus
Receiver	Device that is reading data from the bus

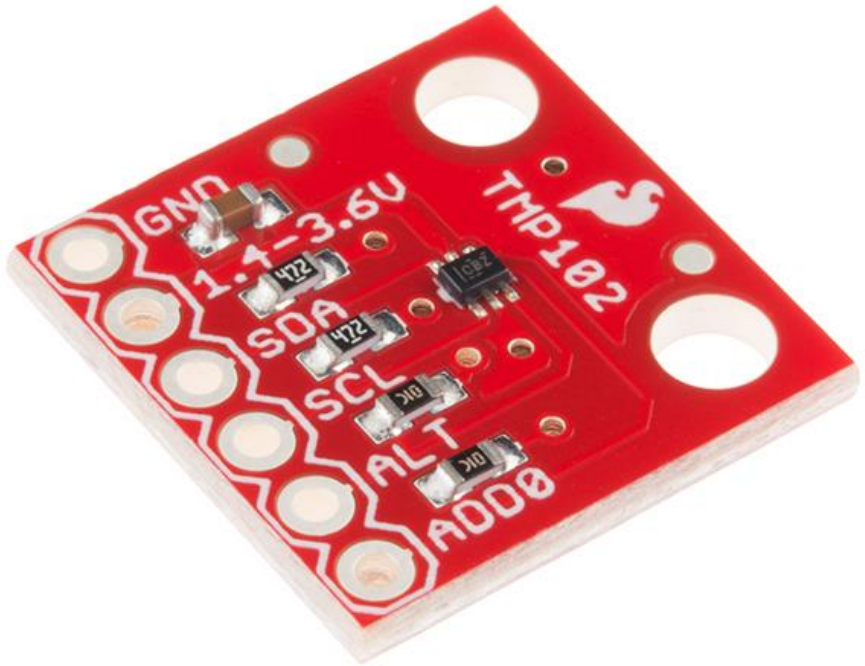
Wire Library

- Wire library allows connection with TWI (I2C) devices.
- On Mega, TWI (I2C) lines are found on 20 (SDA) & 21 (SCL)
- The operating voltage of TWI (I2C) lines on the Mega is _____V



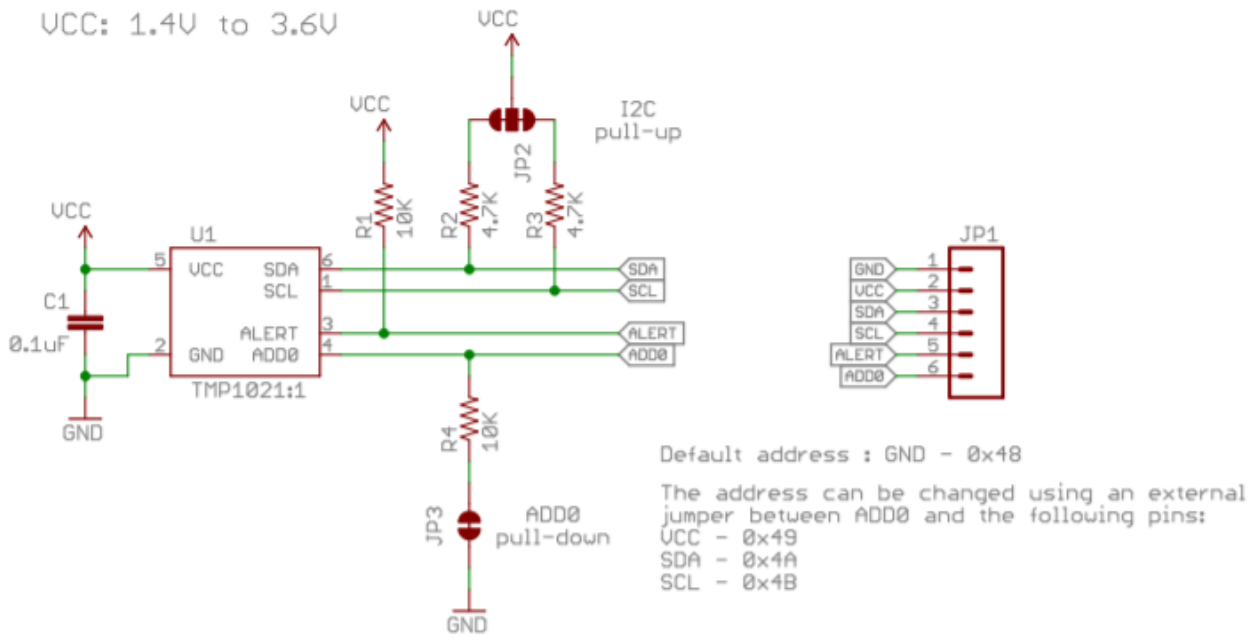
Digital Temperature Sensor – TMP102

- 12 bit temperature sensor
- Temperature Range: -40°C to 125°C
- Capable of reading temperatures to a resolution of 0.0625°C
- Accurate up to 0.5°C
- https://www.sparkfun.com/datasheets/Sensors/Temperature/tmp102.pdf



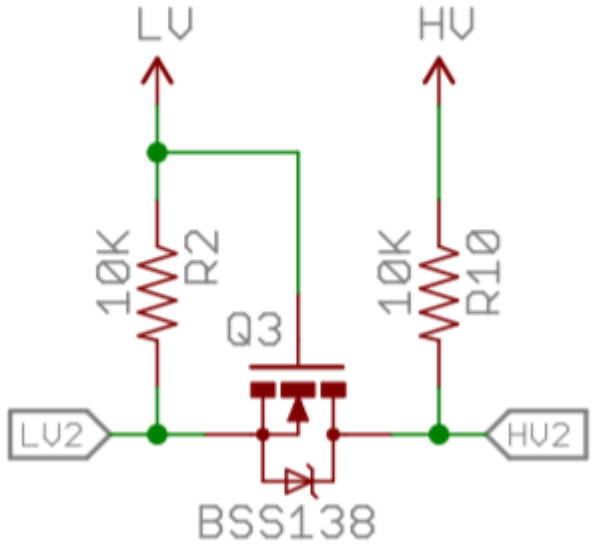
Digital Temperature Sensor – TMP102 (cont)

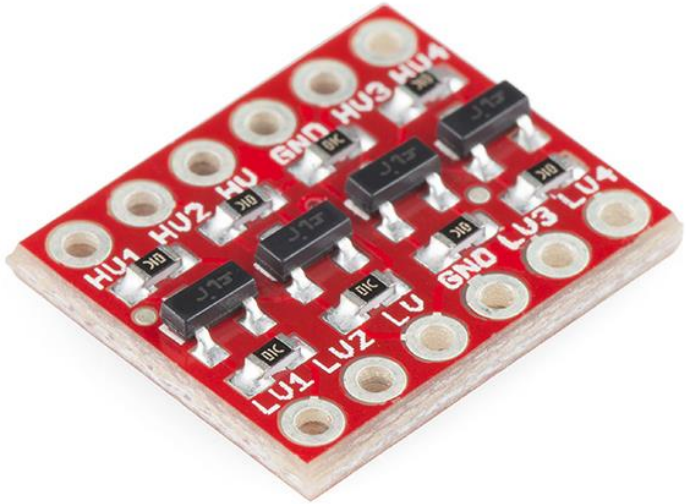
- Sensor operating voltage range: _____V
- Sensor I2C address is: _____
- Sensor board requires level shifters



Level Shifters

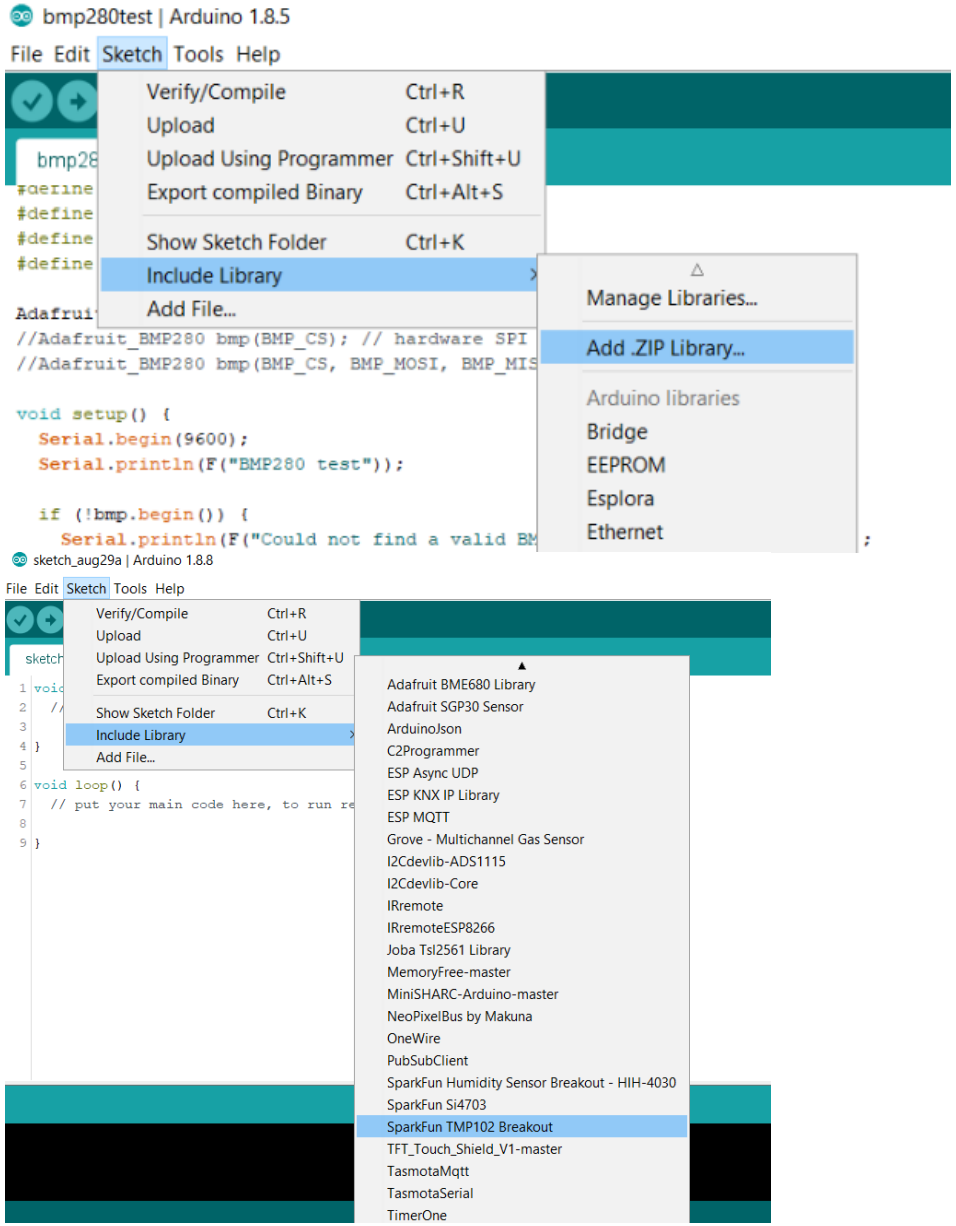
- Bi-directional level shifting
  - Shifts 3.3V to 5V and vice-versa
- LV goes to the lower voltage logic level
- HV goes to the higher voltage logic level
- Each LV/HV pair is for a single signal





Sample Code for TMP102

- https://github.com/sparkfun/Digital_Temperature_Sensor_Breakout_-_TMP102/tree/V_H13.0
- Add TMP102 Library to Arduino
  - https://github.com/sparkfun/SparkFun_TMP102_Arduino_Library/archive/master.zip
- Open example code, test if sensor is working



Task

- Write code to measure and retrieve temperature from the sensor.

- Observe temperature of your finger tip, is it as what you expect?

Thank You

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