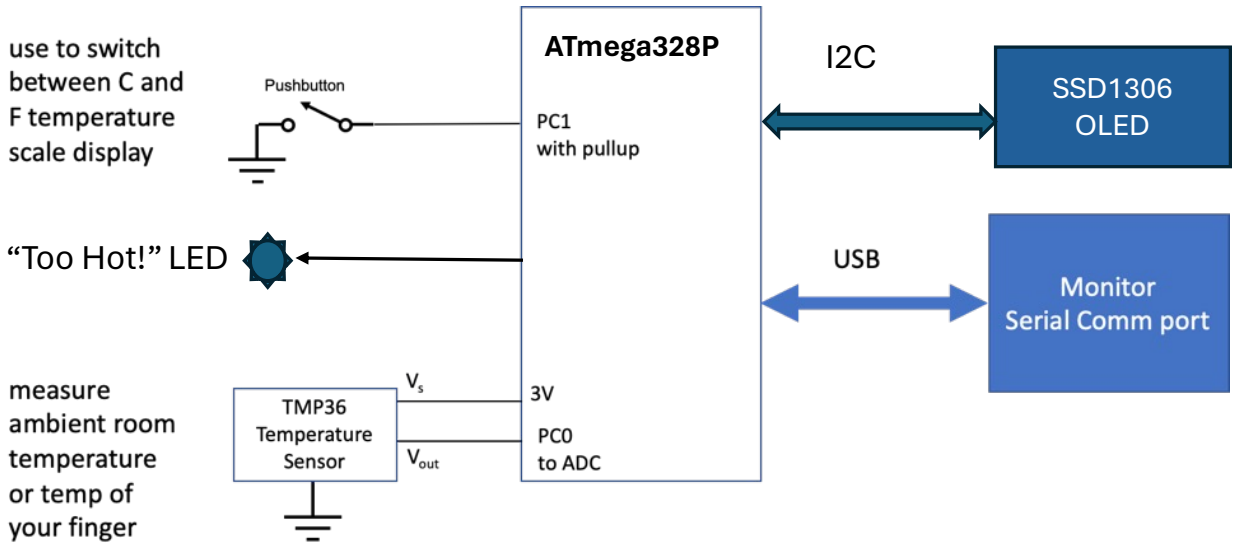
ECE-231 Lab Assignment #8.2
Due: 11:59 pm, Saturday 4/25/25

In this assignment, you will implement a digital thermometer that displays ambient temperature on both a laptop display (serial monitor) and on an SSID 1306 OLED Display. Your system should display termperature in either degrees F or degrees C based on the position of a push-button switch. Your system will also have an LED that glows when the temperature exceeds a pre-set "Too Hot" value.



User-contributed libraries: For this project, you will make use of several user-contributed libraries:

- SSD1306.c and i2c.c are libraries for the OLED display
- my_adc_lib.c and my_uart_c are libraries for the ADC converter and UART peripheral

You need to include the .h files for these four libraries at the top of your source code file and you will need to list these four .c files, along with your own main function in your makefile. This will all be demonstrated in class.

Specification:

1. When a momentary push-button switch is pressed, display temperature in degrees Celcius. When the button is not pressed, display the temperature in degrees Farenheit.

2. Display the temperature on both your laptop monitor and the OLED with a precision of 0.1 degrees, followed by the letter C or F. For example 70.0F, or 21.1C.

3. Illuminate a red LED whenever the temperature exceeds a pre-determined "Too_HOT" level. Test your system using "TOO_HOT" values of 60 and 80 degrees F.

4. Write your main() function in one ssource code file, and include the user-contributed files as discussed above.

What to submit:

• Video showing functioning system. The video should show both the OLED display and your monitor display and demonstrate the functionality and performance described in the specification given above.
• Copy of your main() source code. No need to submit copies of any of the user-contribued libraries.

Course code policies:

With the exception of user-contributed libraries, the code you submit must be your own individual work. Code-simularity software will be used to scan submissions to identify cases in which code copying or sharing has taken place, and these cases will be investigated. Submissions found to have been the work of multiple authors will receive a maximum score of 30%.

Late submissions will be accepted, subject to a 20% per day late penalty.

Hardware components needed:

- Arduino Uno dev board with USB cable
- TMP36 sensor
- OLED display
- SPST momentary push-button switch
- red LED
- current-limiting resistor for the LED
- breadboard wires

TMP36 Temperature Sensor
Sparkfun TMP36 SEN-10988
You can find the datasheet for this device at the Sparkfun URL. See figure 4 of the datasheet for the pin configuration. Note that a BOTTOM VIEW is given. The device only needs 3 wires: V_s, ground, and V_{out}. Connect V_s to either the 3.3 or 5V pin on your Arduino Uno, connect V_{out} to an analog input pin, PC0 - PC5. As noted in the datasheet, this device produces an output voltage of 750 mV at 25^{o}C, increasing by 10 mV/^{o}C.

This is version 2.2 of this document. Updated 1/4/25 bty D. McLaughlin