ECE 476/676 - Homework #8

Heart Pulse Sensor, Motor Angle Control, Pressure, Humidity Sensors
Due Monday, October 28st

Heart Sensor

Write a Python program which

- Uses the Heart & Pulse sensor to record your pulse
- Detects each pulse automatically,
- Computes your heart rate in beats-per-minute, and
- Displays your pulse as a graph on the graphics display as well as your beats-per-minute.

1) Write a Python program which measures and displays your pulse

- Give the program listing as well as the result on your graphics display

2) Write a Python program which detects each beat

- Flash an LED for 100ms each pulse
- Beep the beeper for 100ms each pulse

3) Write a Python program which measures the time between pulses with a resolution of 1us

- Display the results on the terminal window
- Give the results of your program

4) Modify this program to output on the graphics display

- The measured pulse signal as a graph
- The time between pulses in micro-seconds, and
- Your beats-per-minute, with a resolution of 0.01bpm

5) Demonstrate your progam

Weather Station (over)

Weather Station

Use a BME280 sensor to measure temperature, humidity, and air pressure. Display this data on the screen.

6) Write a Python program to read a BME280 sensor. Display as text on the LCD display
   • Temperature
   • Humidity, and
   • Air pressure

7) Modify this program to record temperature, pressure, and humidity for one minute with a sampling rate of one second (60 data points). After one second, display the data on the terminal window.

8) Modify this program to display each of these data sets as a graph on the LCD display,
   • Start with displaying temperature for 60 seconds
   • Each time you press GP15, you switch to the next data set (Temperature >> humidity >> pressure >> repeat)
   • Give the results after one minutes of data collection (60 points)

9) Demonstrate your program
   • In-person or video

Bonus (10 points)

Measure the temperature, humidity, and air pressure of your car when parked in the sun.
   • extending the time for longer than 60 seconds might help

(to make this program execure on power-up, save it as *main.py* on your Pi-Pico.)