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 for one hour. Display this data on the screen.

6) Write a Python program to read a BME280 sensor. Display on the graphics display

- Temperature
- Humidity, and
- Air pressure

7) Modify this program to record temperature, pressure, and humidity for 10 minutes with a sampling rate of second (600 data points). Use a circular stack (new data over-writes data from 600 samples ago and keeps on recording).

8) Modify this program to display each of these data sets, switching to the next data set each time you press button GP15.

- Give the results after 10 minutes of data collection

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.

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