

ECE 476/676 - Homework #9

Heart Pulse Sensor, Acceleration, I2C

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 5ms 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 program

A program which reads the heart rate sensor and displays it on the LCD is on the back page

- optional starting code

Starting Code

```
# Pulse Sensor Code

import LCD
from machine import ADC
from time import sleep_ms

a2d1 = machine.ADC(1)
a2d2 = machine.ADC(2)
x0 = 0

def Read_Sawtooth():
    global x0
    x0 = (x0+1)%64
    y = 0x8000 + (x0-32)
    return(y)

def Read_Joystick():
    a2d = a2d1.read_u16()
    y = 0x8000 + (a2d - 0x8000) // 1024
    return(y)

def Read_Heartbeat():
    a2d = a2d2.read_u16()
    y = a2d
    return(y)

White = LCD.RGB(250,250,250)
Black = LCD.RGB(0,0,0)

LCD.Init()
LCD.Clear(Black)
LCD.Title('Pulse Sensor', White, Black)

npt = 480
x = 0
Y = [0]*480

while(1):
    sleep_ms(5)

    x = (x+1)%480
    LCD.Pixel(x, 185-Y[x], Black)

    #Y[x] = Read_Heartbeat()
    #Y[x] = Read_Joystick()
    Y[x] = Read_Sawtooth()

    LCD.Pixel(x, 185-Y[x], White)
```