Pulse Oximetry

Experiment 1.1:
A)

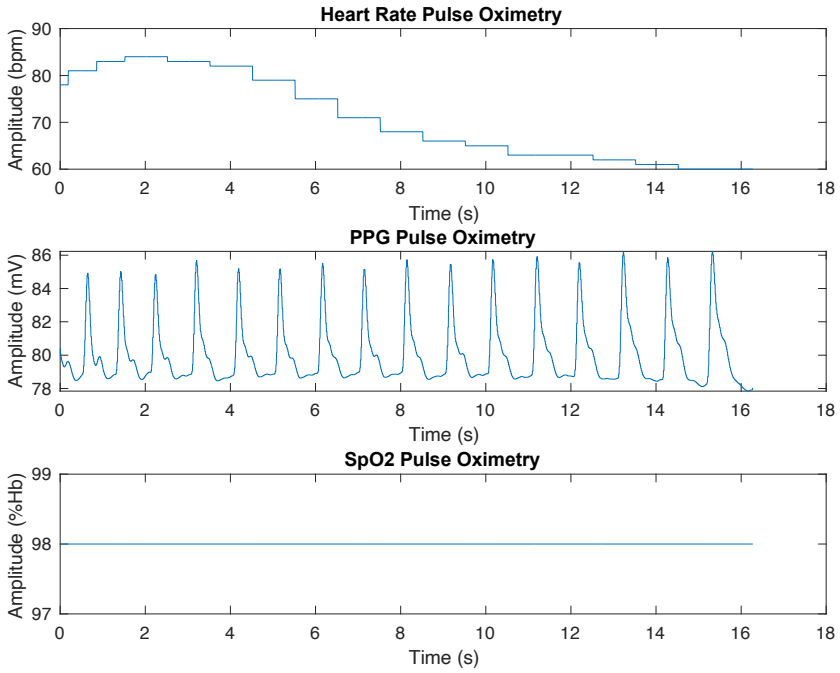

Figure 1: HR, PPG & SpO2 Oximetry Graphs

B)

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Editor - Lab1_Exp1.m

H_mean =

   70.7344

PPG_mean =

   79.9962

SpO2_mean =

    98

H_std =

    8.8548

PPGstd =

    1.8980

SpO2std =

     0
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Figure 2: Mean value and Standard division of HR, PPG, and SpO2 for resting

Experiment 1.2:

A)

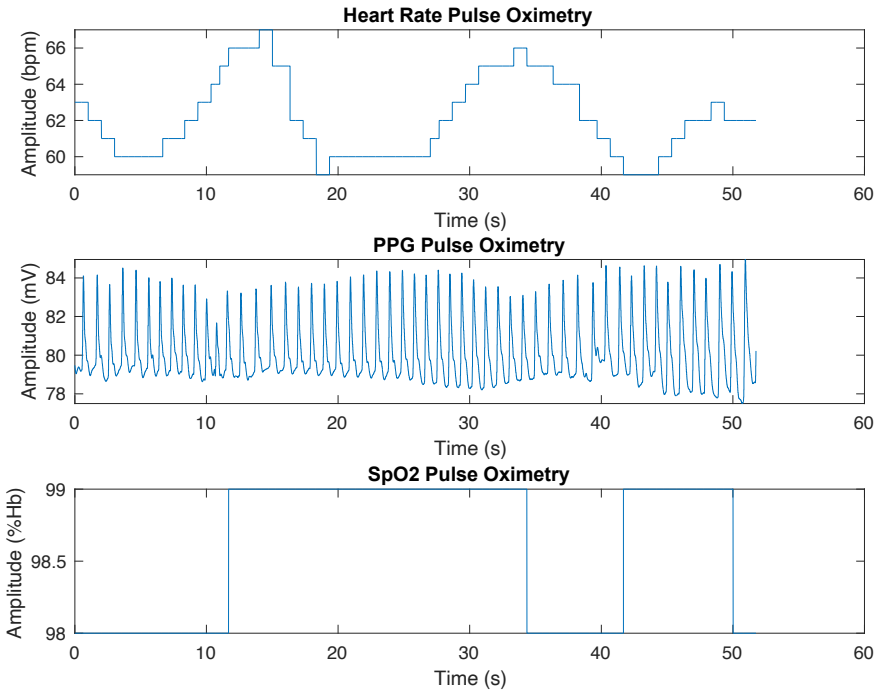

Figure 3: HR, PPG & SpO2 Oximetry Graphs for holding breath

B)

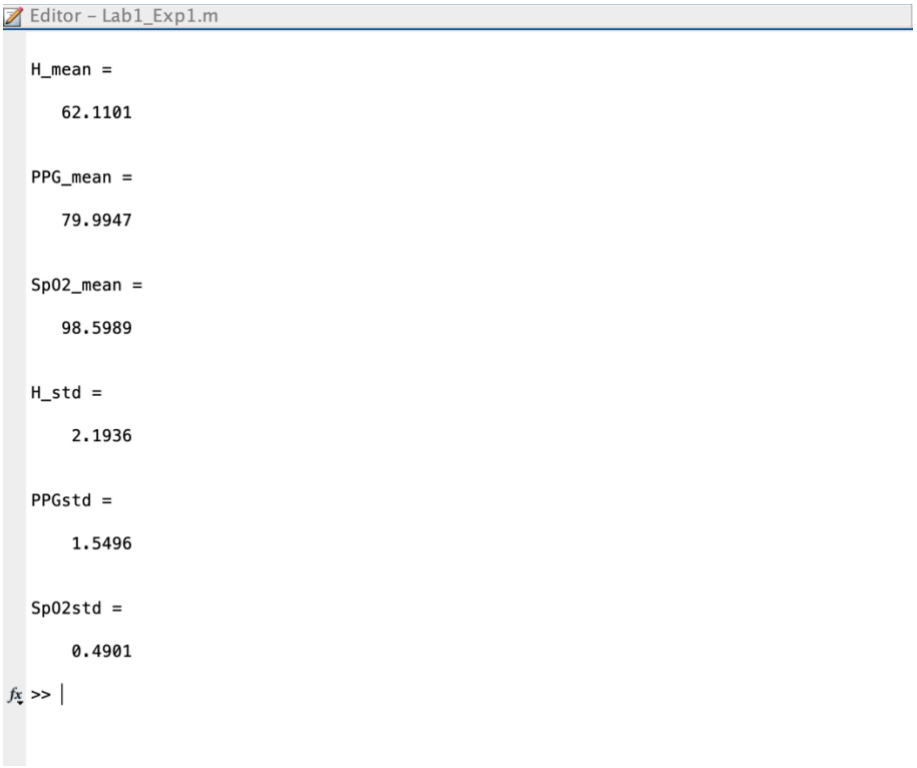

Figure 4: Mean value and Standard division of HR, PPG, and SpO2

Blood Pressure

Experiment 2.1:

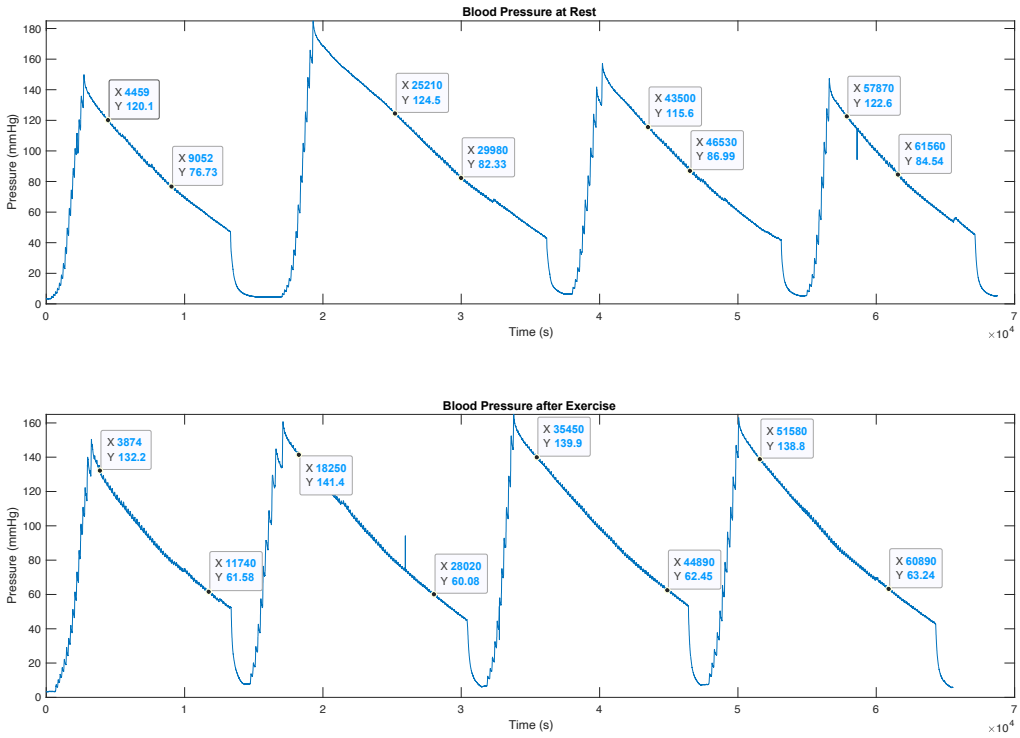

Figure 5:Blood Pressure before and after exercise

Experiment 2.2:

Formula for calculating MPA is 1/3*(Avg. of systolic pressure) + Avg. of diastolic pressure.

	BP before exercise	BP after exercise
1	120/76	132/61
2	124/82	141/60
3	115/86	139/62
4	122/84	138/63

Table 1: Blood pressure of each trial after and before exercise

Avg. of Systolic pressure	Avg. of Diastolic pressure	MPA
120.7000	82.6475	122.8808
138.0750	61.8375	107.8625

Table 2: Average of systolic and Diastolic pressure and MPA value

Post Lab Questions

1. What are differences between measurements and plots exist for “holdSpO2” and “restingSpO2” data? Explain.

   As it shown in Fig.1 the heart graph is a normal graph that varies time to time. However, in the Fig.2 the heart beat graph has a huge difference and it is as a result of holding breath. The graph is understandable because heart is pumping so fast to provide oxygen to the organs. PPG in Fig.2 is denser in than the one in in Fig.1 due to the fact that with lack of oxygen, blood is travelling faster than usual as result of high heart rate; therefore, blood volume increases and PPG increases. Also, SpO2 represents what percentage of the blood is saturated. In Fig.2 of SpO2, because the level of oxygen is dropping it is different from the one in Fig.1 where the oxygen level is stable. The fluctuation of SpO2 in Fig.2 is as result of shortage of oxygen in the blood.

2. What was the average value of your blood pressures for the resting trials? What was the average value for the exercise trials? Which was higher? Is this what you would expect?

   The results show that the atrial mean pressure for rest and exercise tests is 107.86 and 122.88 respectively. With rest and exercise tests the mean blood pressure thresholds are 120/82 and 138/61. Blood pressure is higher, based on these values, and can be understood by means of aerobic pumping, which enables a more rapid rise of systemic body blood pressure. Muscles strength and oxygen sustain the body's homosexuality during the exercise and thus require additional blood supply.

3. How would you design an automated system to monitor blood pressure?

   In the absence of a clinician, blood pressure is tested for electrical pressure transducers and computer applications. [1] The blood pressure cuff in this situation will be draped over the upper arm, the brachial artery will be elevated to the arm, and the blood pressure will drop again and again as data is collected and analyzed on the transducer on a PC. In other words, the sound can be heard due to the pulsation of the blood as the cuff pressure decreases into the systolic pressure, when the blood will flow into the brachial artery; the sound can then be detected by sensors, and transduced to electrical signals and sent to the computer. [1] These impulses continue to generate too many sounds until the pressure of the cuffs decreases to diastolic pressure. Therefore, for further study the signal produced is used.

References

[1] “Pulse Oximetry and Blood Pressure Measurement.” Ryerson University, Toronto, pp 1-5, 2021. Retrieved from https://courses.ryerson.ca/d2l/le/content/456645/viewContent/3401000/View