Activity Worksheet

Part 2: Understanding the Arduino Microcontroller

Instructions: Implement a code to turn the LED on for 300 ms, off for 100 ms, on for 500 ms, and then off for 500 ms.

Part 3: Understanding the MAX30102 Spectrometer

Instructions: After watching this video, https://www.youtube.com/watch?v=MHPgamGQmDY (7:36 minutes), explain the importance of red light, infrared light, and the optical sensors to measure blood oxygen rate in MAX30102.

Part 4: Understanding the AD8232 Sensor

Instructions: First, view the video on Slide 15, https://www.youtube.com/watch?v=01y_Vu_sAQU&t=463s
 (8:59 minutes), which shows how to connect the Arduino to the AD8232 sensor. Then:
1. Connect the AD8323 sensor to the Arduino as in the video.
2. Copy and paste the program in Slide 18.
3. Compile and run.
4. Choose serial plotter to capture ECG.
5. Place the leads on the right position as in the video.
6. Compute the peaks for 15 seconds.
7. Save or take screenshots of heart rate and oxygen level readings.

Data Collection

Instructions: Collect data from the sensors.

1. Test the MAX30102 and AD8323 on three students.
2. For each student tested, write down the oxygen level and heart rate (HR) using MAX30102.
3. Use serial plotter for AD8323 to calculate the (HR) = 4 * number of the peak per 15 seconds.
4. Complete the data table below.

Student Name	Oxygen Level Using MAX30102	HR Using MAX30102	Calculated HR Using AD8323	Arrhythmia Tachy or Brady	Reason for Arrhythmia Case

Reflection Questions

1. Think about and write down the reasons for getting different HR measurements for the same student. Which one is more accurate?

2. How could you improve the design to get more accurate results?

Optional: Application of Computational Thinking:

3. How did you apply decomposition, pattern recognition, abstraction, and algorithm design in this activity?

4. Can you think of other real-world applications where similar data analysis techniques might be useful?

TeachEngineering **ncwit.org**