**CPEN 291 - Lab 3 Questions**

*Lab section: \_\_\_L2A\_ (example: L2A) Team (Bench) #: \_\_A\_T20\_\_\_ (example: A-T2)*

Answer the following questions. Submit the completed document (in word or pdf, one per team) to Canvas by the deadline.

Q1 – Teamwork: Explain in details the methods your team has used for the labs so far to communicate effectively among team members.

Q2 – Ultrasonic Sensor: Include the portion of your Python code for interfacing with the ultrasonic sensor here, and explain in plain English how it is implemented.

    # turn off the trigger pin

    GPIO.output(TRIGGER, False)

    time.sleep(2)

    # turn on the trigger pin

    GPIO.output(TRIGGER, True)

    #send out the 10us pulse

    time.sleep(0.00001)

    # turn off the trigger pin

    GPIO.output(TRIGGER, False)

    # record last lowstamp for ECHO

    while GPIO.input(ECHO)==0:

      start = time.time()

    # record last highstamp for ECHO

    while GPIO.input(ECHO)==1:

      stop = time.time()

    # calculate pulse length

    elapsed = stop-start

    # calculate the distance

    length = (elapsed \* (33150.0 + 0.6 \* temp / 2)) / 2

We first turn on the trigger to send the 10us pulse.

We time the last moment the Echo pin is goes high (right after transmission of pulse),

Then we time the last moment the Echo pin goes low (end of receiving the echoed signal).

This time difference would be the time it takes for the pulse to hit the object and come back.

We then calculate time \* speed to find the distance.

Q3 – Shift Register:

1. Explain what the RCLK signal is for.

RCLK signal signals when to send the data to the shift register.

Whenever the signal goes high, it will send the data 0 or 1 according to the Data signal to the shift register.

1. Explain what the signal is for.

Output enable signal sends all output at once.

1. From the datasheet explain what values we can use for tw (used in slide 3-26)?

Q4 – DHT11: The DHT11 sends a sequence of 40 bits for the measurements. Refer to the datasheet and explain how we can differentiate between a 0 and a 1.

Q5: In your implementation explain and justify the followings:

1. How long does it take for your sonar to scan 0 to 180? State the default as well as the possible range.
2. How often do you read the DHT11 sensor? Why?
3. What are the servos steps (in degrees and/or dutyCycle)? (in other words, going from 0 to 180, how do you increase the servo position?)

Q6 – Challenges: Explain at least one aspect of the lab that was challenging for your team to make it work.

The challenging part