

Lab Objective:

The objective of is to increase the volume of a buzzer as the distance between an ultrasonic sensor and an object decreases. Two Chips were connected to each other and communicated through UART. Chip1 was connected to Ultrasonic Sensor and Buzzer. The volume of buzzer changed according to the distance of an object from the ultrasonic sensor. The distance of the object from the ultrasonic sensor was sent from the Chip 2 using UART and that distance was displayed on a quad digit seven-segment LED display.

Tables, Figures:

	Pins
UART Tx	P1.2
Identifier Pin	P1.4

Table 1 – Connection for Chip 1

Ultrasonic Sensor	Pins
VCC	VCC
Trigger	P1.5
Echo	P1.6
GND	GND

Table 2 – Ultrasonic Sensor Connections on Chip 1

Buzzer	Pins
VCC	P2.2
GND	GND

Table 3 – Buzzer Connections on Chip 1

Quad digit 7-segment display	Pins
A	P2.0
B	P2.1
C	P2.2

D	P2.3
E	P2.4
F	P2.5
G	P2.6
DP	P2.7
D1	P1.0
D2	P1.5
D3	P1.6
D4	P1.7

Table 4 - Quad digit 7-segment display connections for Chip 2

	Pins
UART Rx	P1.1
Identifier Pin	P1.4

Table 5 – Other pins connected to chip 2

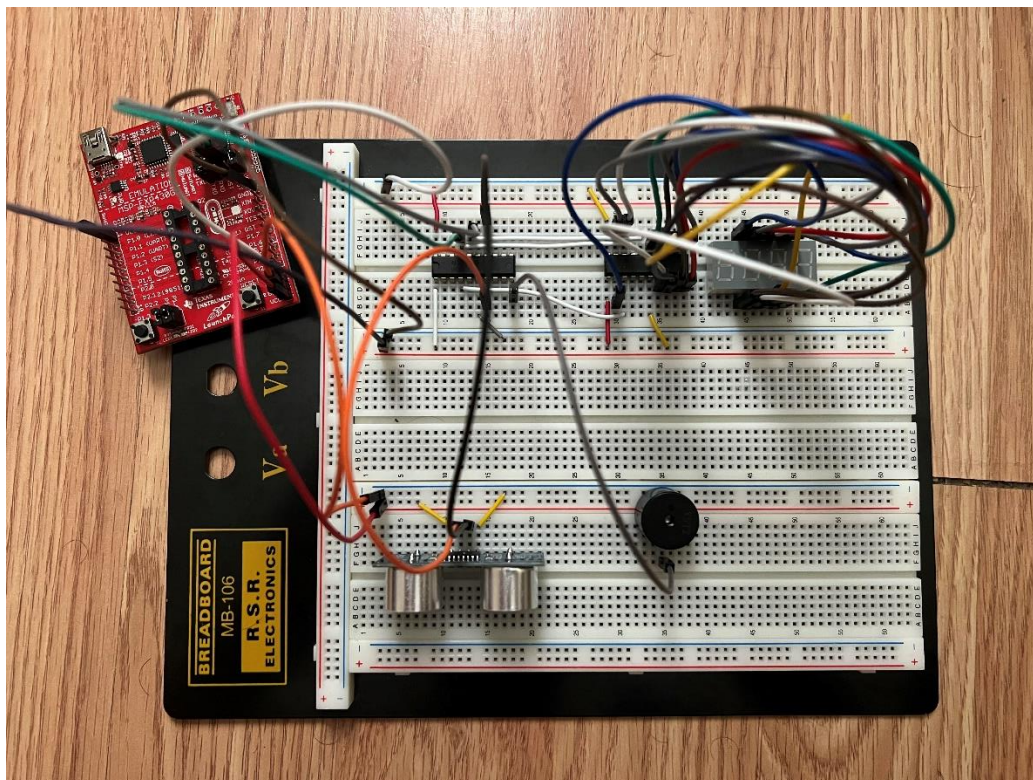


Figure 1 – Circuit Connection

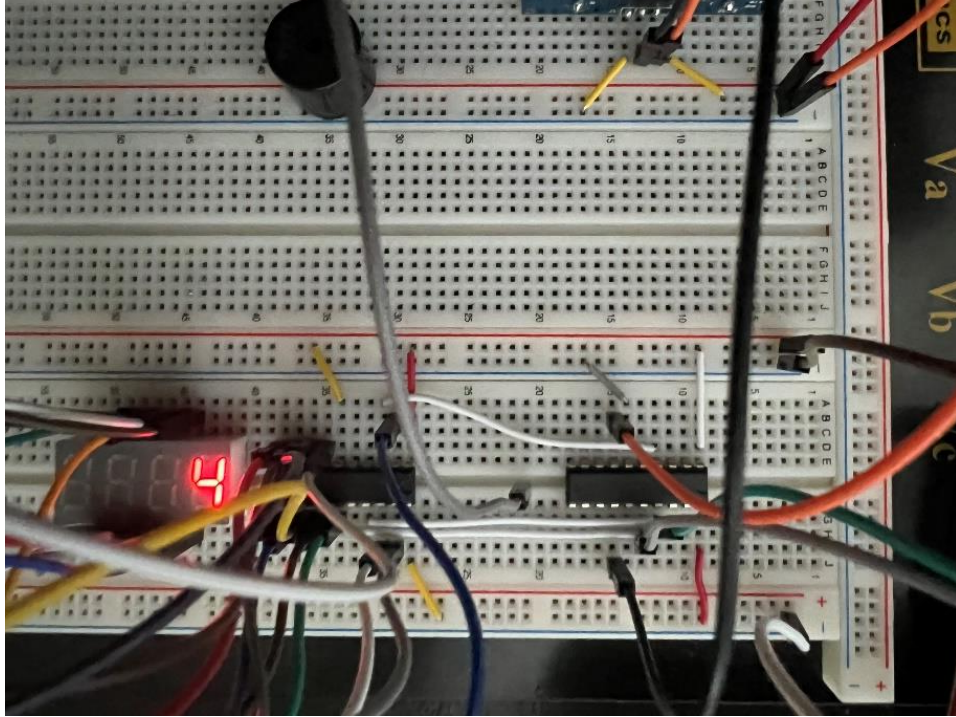


Figure 2 – Quad Digit 7-segment LED displaying 4CM using Ultrasonic Sensor

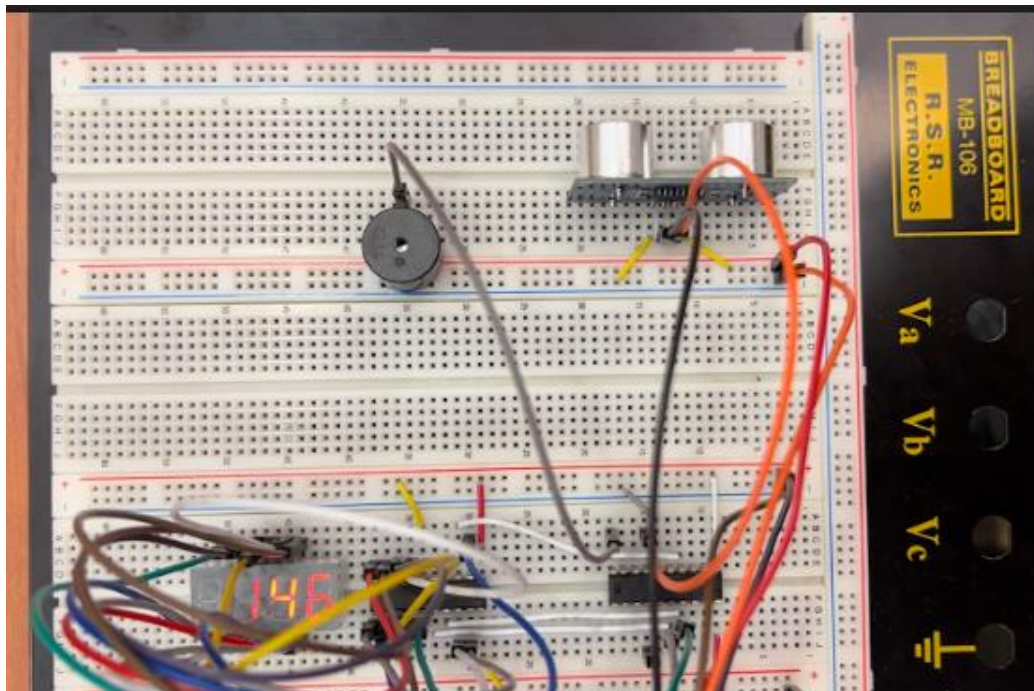


Figure 3 – Quad Digit 7-segment LED displaying 146CM using Ultrasonic Sensor

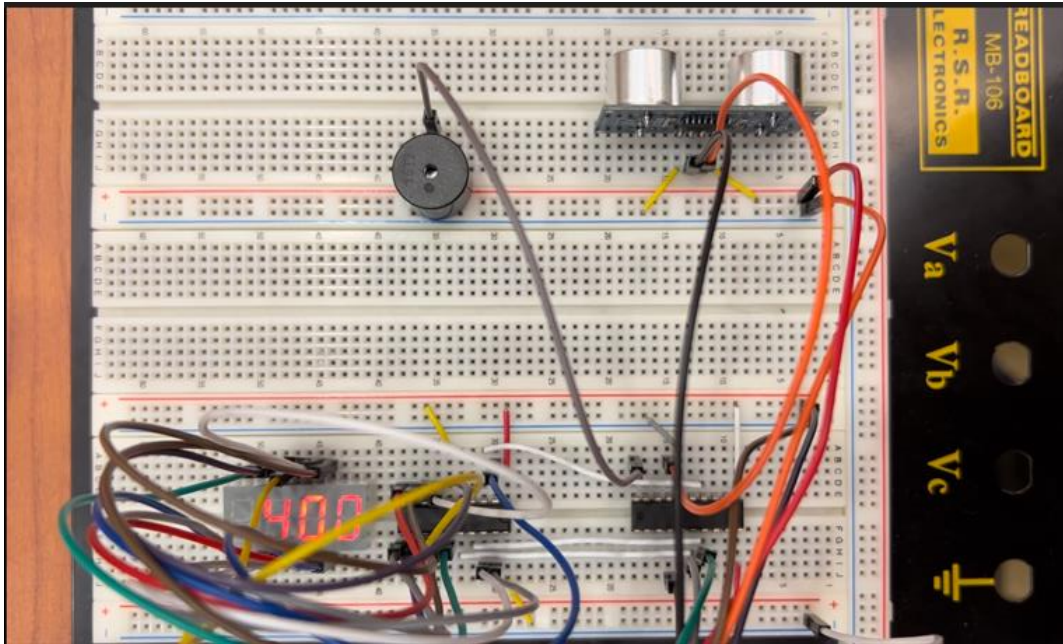


Figure 4 – Quad Digit 7-segment LED displaying 400CM using Ultrasonic Sensor

Commentary and Conclusion:

The first and the most difficult part was to get the ultrasonic sensor working. Understanding how an ultrasonic sensor work, setting up the trigger and echo pins to produce and receive a pulse was quite a task. After setting those pins correct, setting up a timer to get the distance was also quite challenging. Finally, after researching on timers and ultrasonic sensors, we were able to successfully able to make the ultrasonic sensor work and it was capable to getting the distance and converting it into CM. Then setting up the buzzer to buzz at 5 different levels of volume and setting up PWM was a bit challenging as well but eventually figured out that as well. Finally combined both the ultrasonic and buzzer code and were able to complete the lab. Overall, very interesting lab and got to learn a great deal about timers and PWM.