Bashar Elasmar

CS122A

Project 2

Youtube video: CS122A Project 2

LED Pop Matrix

Purpose

The purpose of this project was to do something I was interested in and how I can apply my skills to do so. Since I love pop music and night lights, I decided to create something that incorporated both elements. However, to add to the complexity of the project I also made distance an obstacle for this project as well.

For this system, my main components are an ultrasonic sensor, an 8x8 LED matrix, and a buzzer for tone. How it works is the ultrasonic sensor will detect an object at a certain range, and depending on that range the LED matrix will display a specific character and the buzzer will play the tune of a pop song I chose.

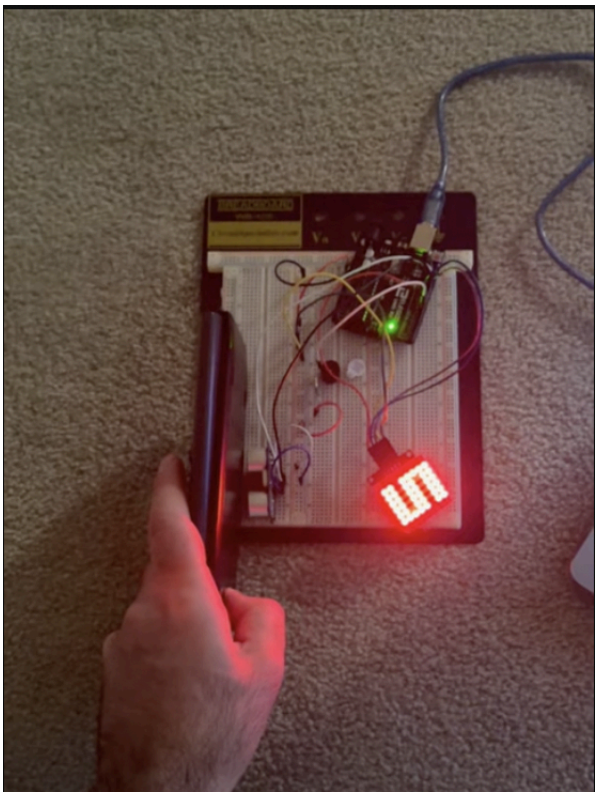
The original purpose of this project was to make it like a safe distance type of system, and instead of the pop melodies I was going to play alarming sounds to recognize danger. However, as I started to play with the buzzer I figured out how I can play certain notes at different frequencies and decided to get creative with it. Because I love pop music so much I decided to develop those melodies myself and play those instead of the alarm sounds.

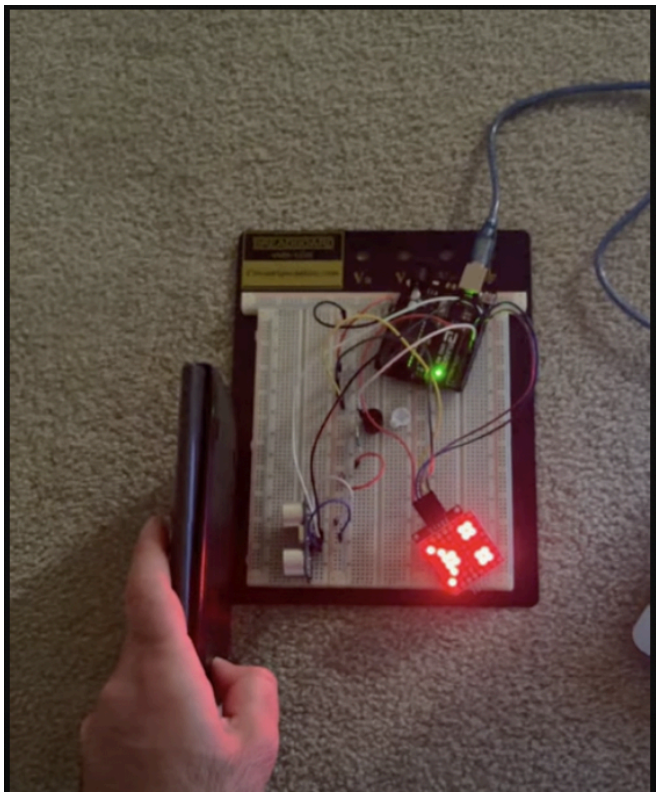
Functionality

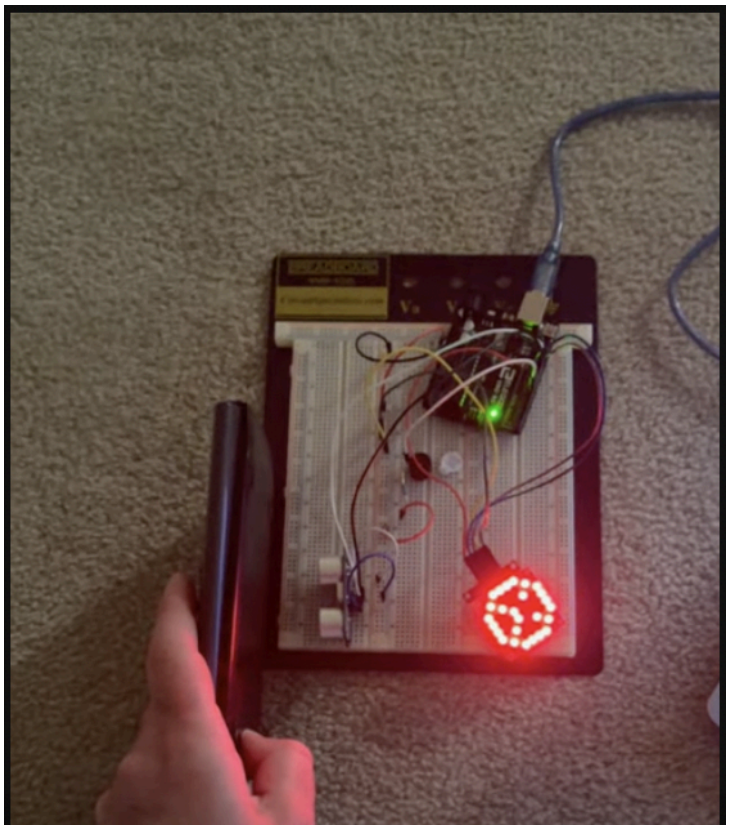
- For any object less than or equal to the distance of 2cm, the LED will flash the letters “S.O.S!” and my take on the Minecraft creeper expression. At this distance, the buzzer will play the melody of the song “I Wanna Go” by Britney Spears.
- For any object less than or equal to the distance of 8 cm, the LED matrix will display a sad face in the shape of a circle, and will play the melody of the song “California Gurls” by Katy Perry.

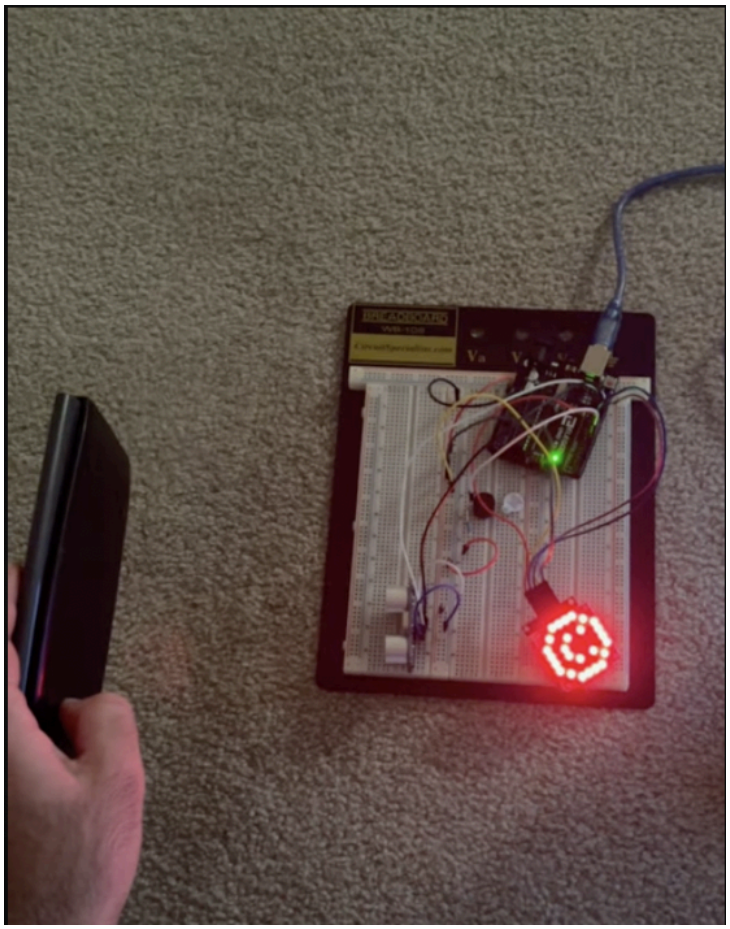
- For any object less than or equal to the distance of 15cm, the LED matrix will display a neutral face and play the song “21 Guns” by Green Day.
- For any object less than or equal to the distance of 25, the LED matrix will display a happy face and will play my attempt of the tune “Eye of the Tiger” by Survivor. This tune didn’t come out too accurately as it was one of the more complex ones to develop.

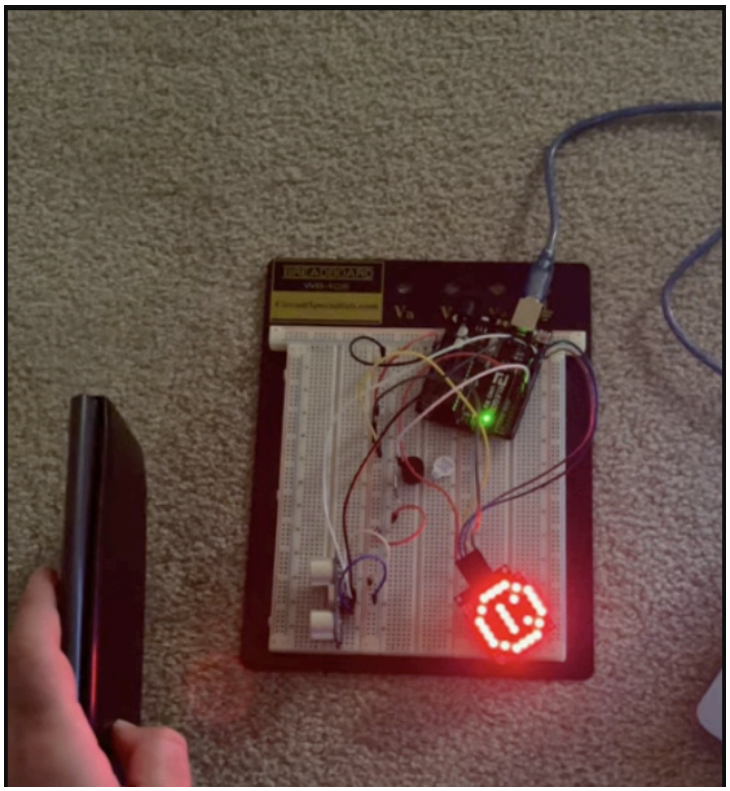
I played around with the buzzer for quite a while to figure out how the tones worked and if I can potentially play different melodies. After I figured out I can convert notes to frequencies, I decided to develop them into pop songs. I did extensive research on the specific notes and melodies for each song and translated that into my code. The frequency and duration of each note took a while to complete so it can sound as similar as the original songs.











Testing

The majority method of testing for this system was trial and error. Most of my time in testing went toward tuning the buzzer to the correct sounds of the songs I wanted to play. I researched all of the notes and melodies of the songs and translated that into my code using frequencies.

Challenges

One of the challenges for this project was figuring out the distance aspect and how I can incorporate the LED matrix characters and the songs to play at these specific distances. After watching numerous Youtube videos on the functionalities of the matrix and the buzzer, I came across developing a for loop that would solve the case and would successfully implement both elements in the body of my code.

The second challenge was creating the characters. I had to develop them using hexadecimal values that were written to the LED matrix. I used a converter for that which helped me formulate what I wanted to display on the screen. Once I got the hang of it, developing the other characters took less time.

The next challenge as mentioned earlier was tuning the buzzer to sound similar to the original songs. I tried to use songs that weren't too complex melodically, the most complicated one being "Eye of the Tiger". However, this was my favorite part of the project and I enjoyed it overall.