Research Report - Arduino Typewriter

Designed By: Arsy

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IMMEDIATE GOALS
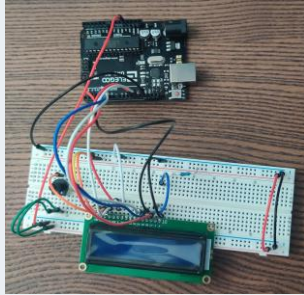
LCD with Potentiometer

LCD with Potentiometer will be used to change the brightness of the display due to the change in resistance.
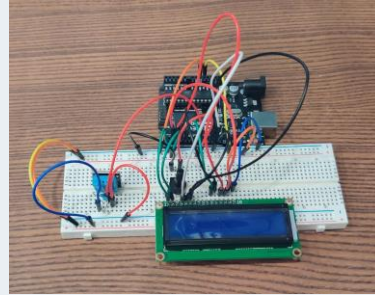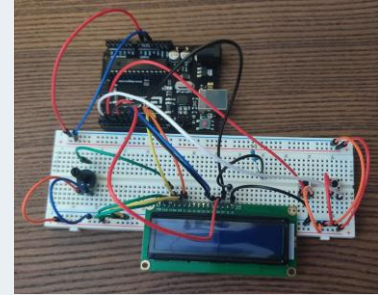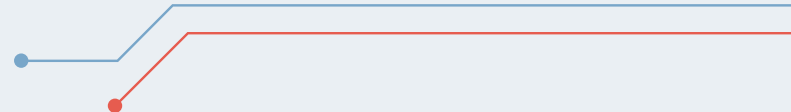

LCD with DHT11

Using the LCD with the DHT11 will help in ensuring that the LCD can update in real-time


LCD with Button

The button will contribute by changing the text on the display using switch cases

LONG-TERM GOALS

Arduino Typewriter

The main objective is it create an Arduino Typewriter that will allow a user to cycle through letters and positions on the LCD to type a message of their choice. This will be done through a series of buttons, specifically 3, which can change the letters, move to the next space, and reset the screen, respectively. The potentiometer will be used to change the brightness of the typewriter and the DHT11 wont be used in the final project but will aid in gaining a better understanding of how to out messages in real-time.
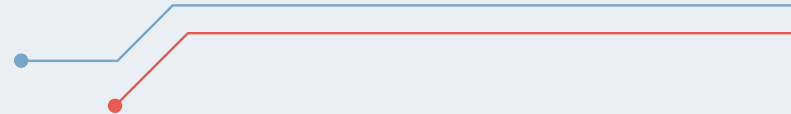
16 Character LCD Display
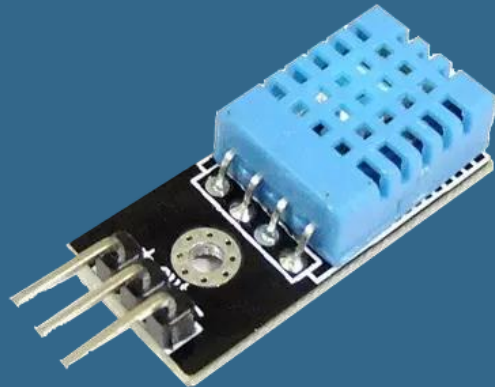
3 Experiments

Experiment 1 - LCD with Potentiometer

Figure 1: Error with setting up LCD Screen

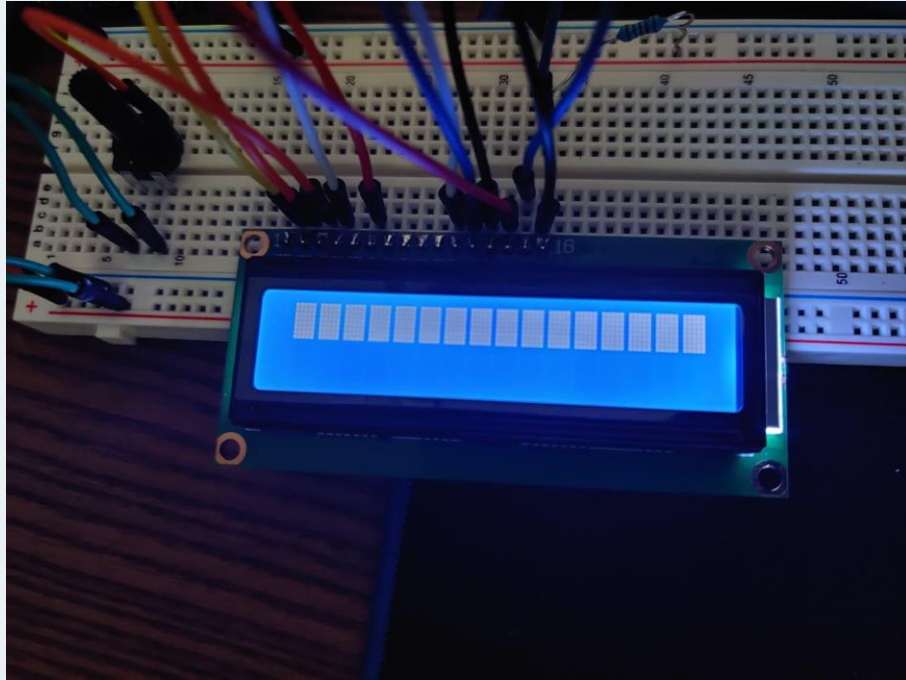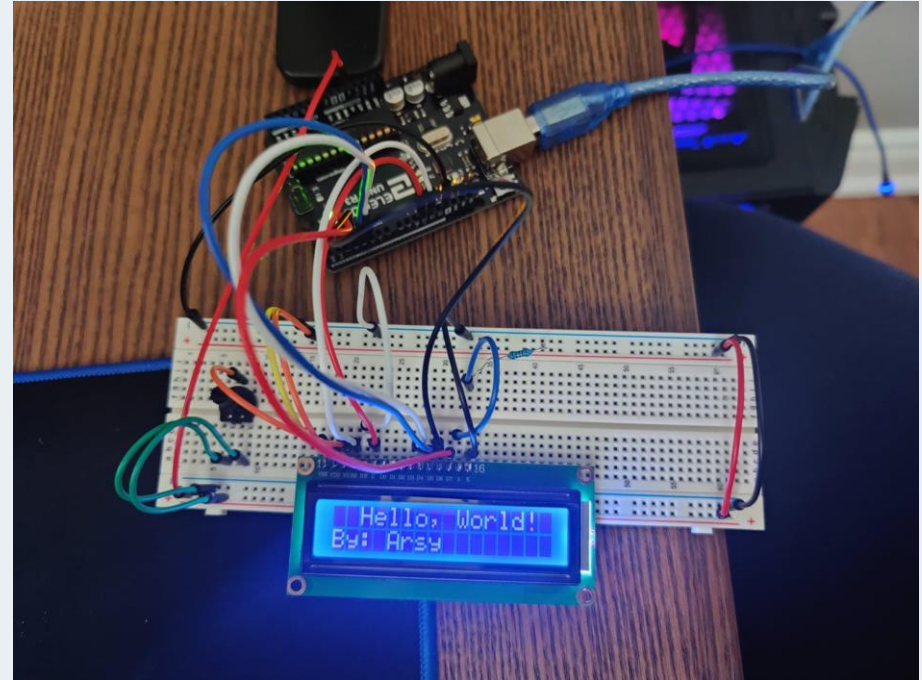Figure 2: Properly working LCD Wiring

Experiment 1 - LCD with Potentiometer

Figure 3: Hello World Video

Experiment 1 - LCD with Potentiometer

In Figure 1, I was missing some connections to ground and enable which caused the code to not properly function on the LCD. This caused the display to show white squares with no text on the first row. After talking to Professor Field, the wiring issues were fixed and the display on Figure 2 was outputted.

From this experiment, I was able to change the text that would be displayed on the LCD screen along with getting familiar with how to change the position of the text using cursor manipulation. This can be seen in Figure 2, where "Hello World!" is centered but the "By: Arsy" text is left justified. In addition, I discovered that changing the potentiometer, resistor value, allows the user to change the brightness of the display and text, as seen in the video in Figure 3.

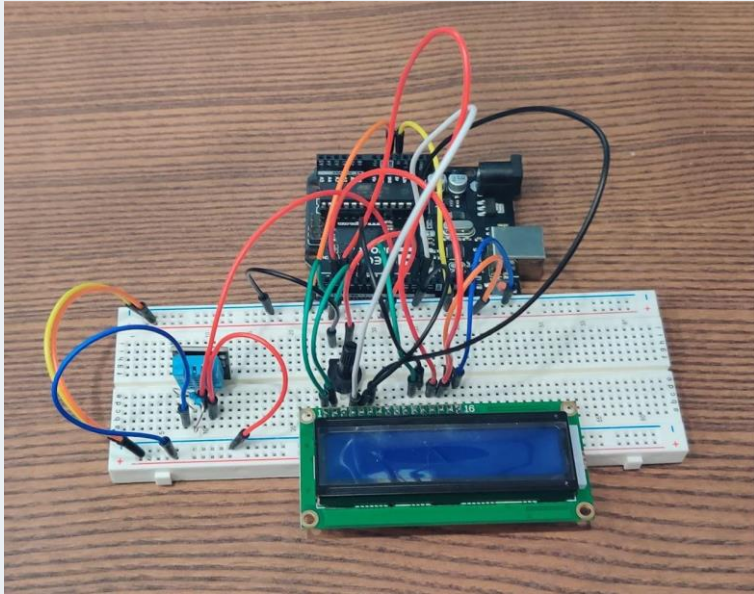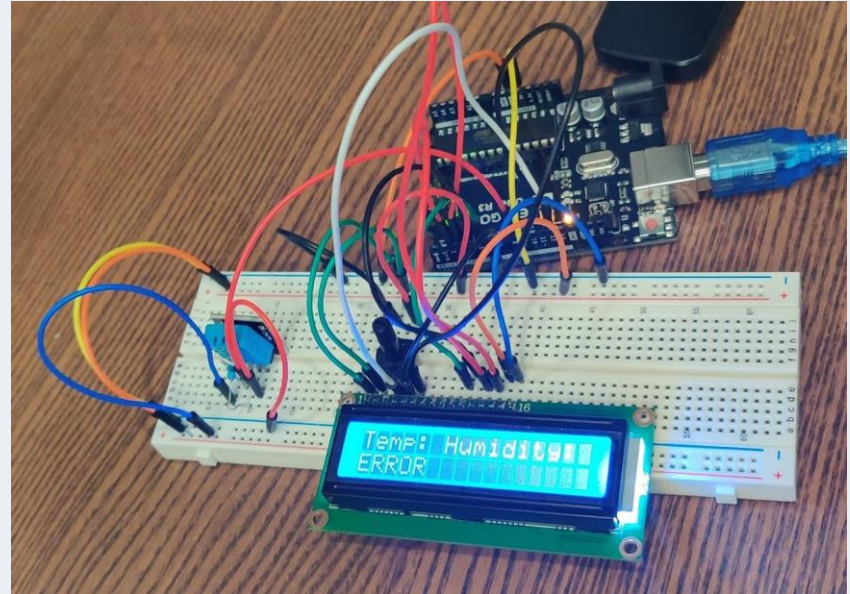# Experiment 2 - LCD with DHT11

Figure 4: Wiring of LCD with DHT

Figure 5: Final View of Circuitry
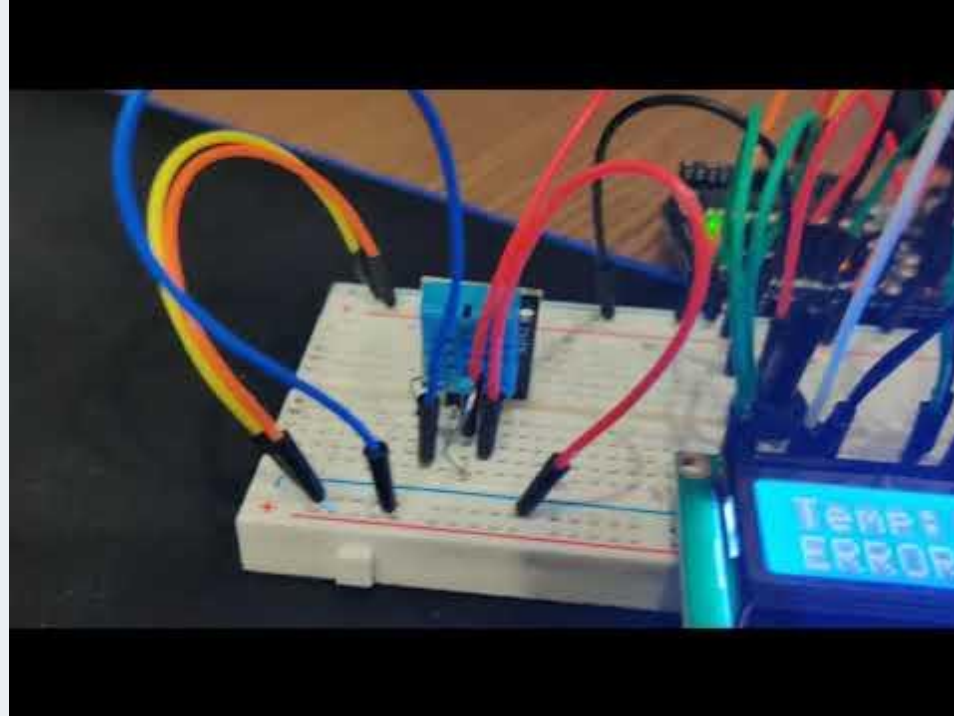
Experiment 2 - LCD with DHT11

Figure 6: Video of LCD with DHT (not working correctly)

Experiment 2 - LCD with DHT11

There are a few explanations that I have concluded for this experiment to not work correctly. When I first wired my DHT with the LCD circuit, I connected my DHT incorrectly as it started to heat up. This could be due to incorrect wiring to different pins causing the polarity to of the current to not match. From Figure 5, it is clear that the LCD is wired correctly and is functioning as expected, however, the reason the text "Error" is appearing is because it is not able to read the data from the DHT11. The same can be said for why the humidity data is not being outputted.

Some of the measures I took to try to fix this problems was that I tried increasing and decreasing the resistance value on Pin 1 and 2, on the DHT11, in hopes that the resistance was too high for the data to be read. Secondly, I double checked the wiring of all the components as my LCD was initially not turning on. Once, I fixed an issue with the wiring, I rechecked all the wiring of the other components and was still facing this error. I did do some research and found that the LCD with the I2C compatibility maybe be easier for the DHT11 experiment. Thus, I have ordered the LCD I2C component on Amazon and wish to perform this experiment on that once it arrives.
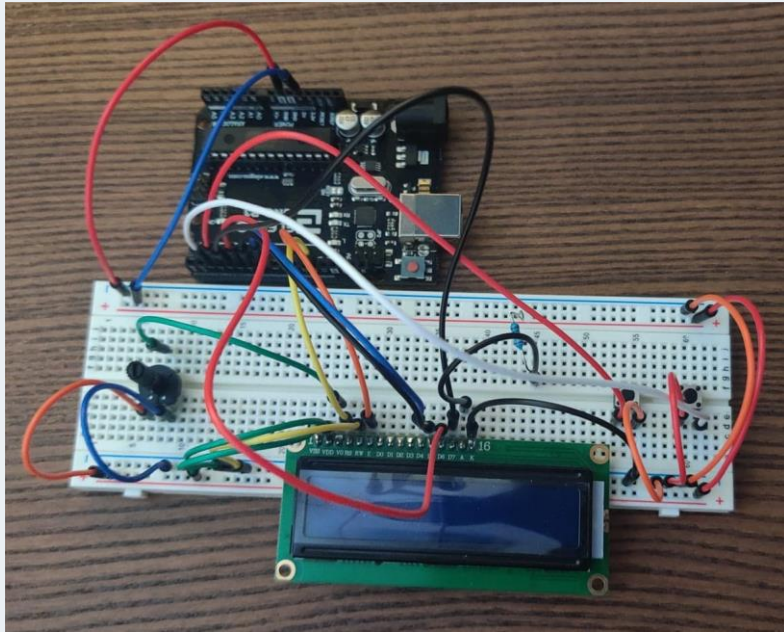
Experiment 3 - LCD with Buttons
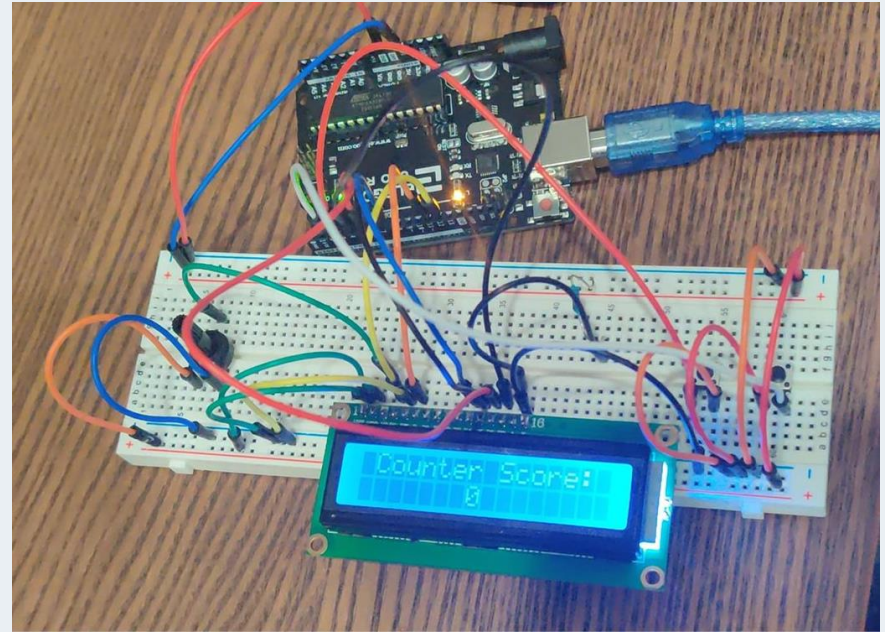

Figure 7: Wiring for LCD with Button

Figure 8: Functioning Counter Program

Experiment 3 - LCD with Buttons
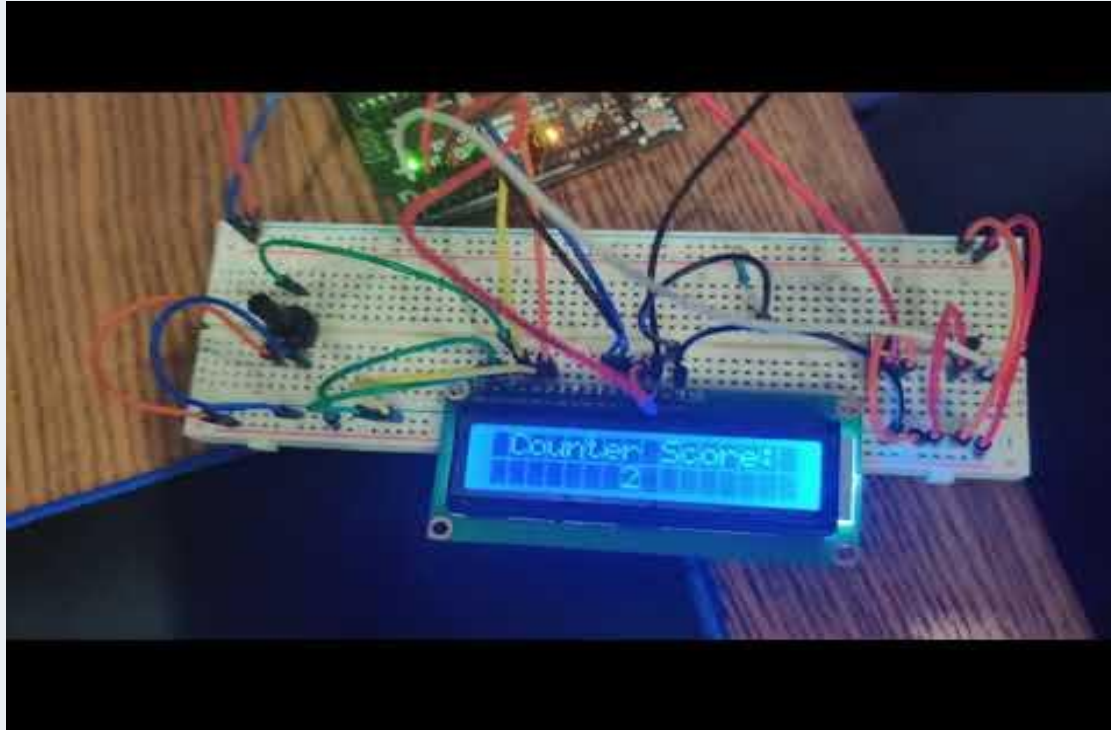
Figure 9: Counter Video

Experiment 3 - LCD with Buttons

The LCD with buttons were operating properly. I did use the sites mentioned in the coding files. The wiring was straight forward however, the code did give many compiling errors when using the switch cases so I decided to follow a site that helped explain some of the button layout functions. In the code file, I explained majority of the lines of code to display my understanding of what is going on.

The buttons are used to increment and decrement the counter and helps demonstrate how counters can be used. This counter can be used to increment and decrement through the letters when making a typewriter. This helped me understand how to write different functions and sub-functions and how to store and use counters.

Important Questions/Conclusion
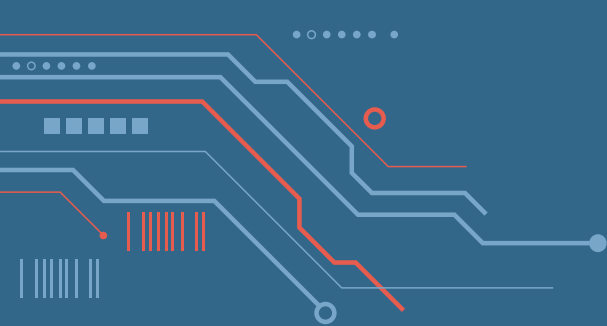
1.   How can your findings be used for making your final project in this course?

The 3 experiments used are to help contribute to the final project of this course which is to make a typewriter. The first experiment, LCD with a potentiometer, is used to help change the brightness and visibility of the typewriter, along with outputting simple text. The second experiment, LCD with a DHT11 - which unfortunately did not work, was aimed to help with outputting real-time data. Specifically the temperature and humidity data. Outputting the data in real-time can be useful in future experiments if we are trying to create a more complex machines, other than a typewriter, that could read different signals and data from different places. Lastly, the LCD with buttons experiment was used to help understand counters and sub-functions better in the arduino programming language as this counter can be stored and used to iterate through the letters when creating a typewriter.

Important Questions/Conclusion

2. **How can this research be useful in future projects? Or what did you learn that could be used in doing another artistic research experiment?**

Overall, these experiments has taught me a lot about coding in arduino. I do have some knowledge in previous coding languages such as C/C++ and Scheme, however, there are various functions in arduino that I did not know about. For instance, the switch cases that Professor Field's mentioned to me was a very interesting way of using the buttons. Although, these switch functions did not work for me, due to compiling issues, I still was able to get a thorough understanding of how switch cases are used and when they are useful. In addition, like mentioned earlier, learning how to program counters is very useful for any type of project as they can be used for various functions. Lastly, I was able to learn more of what the different pins and ports on the LCD meant and the functions each one plays. For instance, when I was having issues with my first experiment and asked assistance from Professor Fields, she brought to my attention that I was missing a few wires to ground that completely made the LCD useless. After routing the wires to ground, the LCD was able to function correctly and outputted the text. LCD displays, in general, are used in our everyday lives whether it is our phones, monitoring devices, microwaves, fridge, etc. which allows future projects to have an LCD display that can notify the user what is happening.

THANK YOU!