LAB REPORT 8

(Names) Giancarlos Marte
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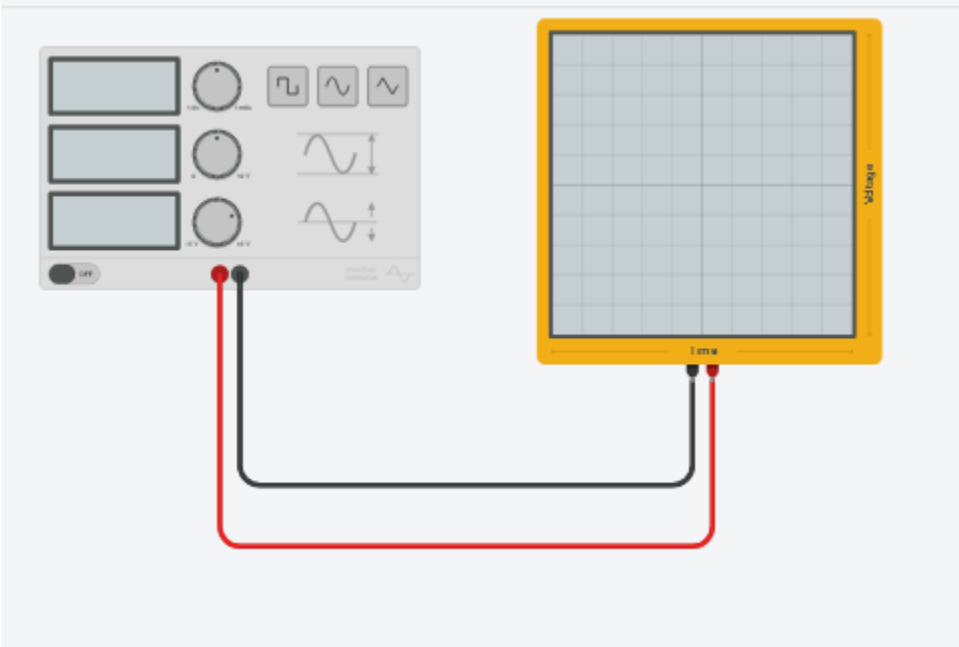
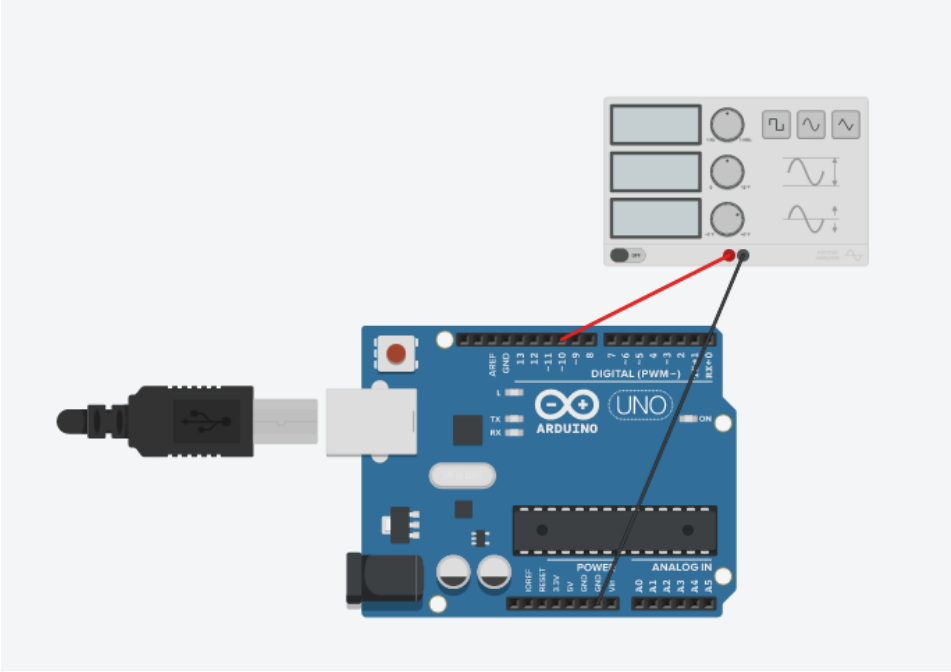
Screenshot + components:





Oscilloscope: It was used to visualize waves that were created by the function generator.
Function Generator: It was used to output a wave like signal into the arduino and the oscilloscope.

Summary:

For the first part of this experiment I hooked up an oscilloscope to a function generator. This was done so that I could visualize the waves that were being created by the generated. This part was mostly just to experiment and see what the two components do. For the second part I connected the generator to the arduino. The arduino was basically an oscilloscope substitute. It could not visually show the waves, but it was used to calculate properties that it had. The main ones being the period and frequency. To do this I used the given pseudocode and details in the instruction to formulate the calculations.

Results:

The results of this experiment showed the frequency and period of the wave signals being generated.

Serial monitor output:
Hello world. Watch me measure the frequency.
period: 0.00 | frequency: 1024.59
period: 0.00 | frequency: 1004.02
period: 0.00 | frequency: 1004.02
period: 0.00 | frequency: 1004.02
period: 0.00 | frequency: 1004.02
period: 0.00 | frequency: 1024.59
period: 0.00 | frequency: 1020.41
period: 0.00 | frequency: 1020.41
period: 0.00 | frequency: 1033.06
period: 0.00 | frequency: 1004.02
period: 0.00 | frequency: 1024.59
period: 0.00 | frequency: 1020.41
period: 0.00 | frequency: 1020.41
period: 0.00 | frequency: 1020.41
period: 0.00 | frequency: 1020.41

Conclusions:

I learned that a function generator can create waves by making signals, which resemble them. I also learned that an oscilloscope can be used to visually display wave-like signals generated by electrical components.

The major mistakes I made was when I was trying to calculate the period. The confusing part was trying to get the pulse widths of when the pin was high and low. I also had trouble trying to make period print out all the digits involved because it kept displaying 0.00 and nothing else.

Code:

```
/*
  Program to measure the pulse duration of a pulse generator.
 */


// Define function for Pins:
int wave = 10;/* pulse generator input pin */

// the setup routine runs once when you press reset:
void setup() {
   // initialize the digital pins
   pinMode(wave, INPUT);

   // Add a line printed to the serial monitor
   Serial.begin(9600);
   Serial.println("Hello world.  Watch me measure the frequency.");
}

// the loop routine runs over and over again forever:
void loop() {
   while (digitalRead(wave)) {    } //skip the first positive level
   while (!digitalRead(wave)){    } //wait until the next positive level
   long count = 0;  //count how many times it polls
   //Note: this variable is just to see how many times we poll, it shouldn't be used in calculations


     // ******* modified in lab 8 *********************************
   unsigned long start_time;
   unsigned long curr_time;
     unsigned long widthHigh;
           unsigned long widthLow;
     double period;
     double frequency;

     // high pulse width
     start_time = micros();  //measure the current time in usec
     while (digitalRead(wave) == HIGH) {
           count++;
          }
     curr_time = micros();
     widthHigh = curr_time - start_time;

     // low pulse width
     start_time = micros();
     while (digitalRead(wave) == LOW) {
           count++;
          }
     curr_time = micros();
```

```
    widthLow = curr_time - start_time;

    // freq & period calculations
    period = (double) 0.000001 * (widthHigh + widthLow);
    frequency = (double) 1 / period;

    // print
    Serial.print("period: ");
    Serial.print(period);
    Serial.print(" | frequency: ");
    Serial.print(frequency);
    Serial.println();
    //************************************************************


/* Your code should look something like this:
    *
    * while (wave_still_high)
    *      increment count
    * read_time
    * while (wave_still_low)
    *      increment count
    * read_time_again
    *
    * calculate the period in seconds
    * calculate the frequency in seconds
    */

    //Serial.println(frequency, 5); //the second argument shows more decimal places

   delay(5000); //wait 5 seconds and do the test again
}
```

Rubric:

Each lab is graded out of 10. Labs are due at midnight a week after they are assigned. Labs turned in late receive a max of 7 points:

Item	Points worth
Code correctness	3
Submission form correct	3
Report contains accurate information	2
Some effort put into report*	2

*No answer is too short to properly address the lab report section and I can tell you tried at least just a little.