

# LCDs, Sensors, and Actuators

Calvin Reese  
cjreese@fortlewis.edu

2/3/22

## 1 Introduction

This HW we created a DC Power Regulator where we could choose between 5V, 3.3V, 1A, and 3A and connect it to a bread board with ease.

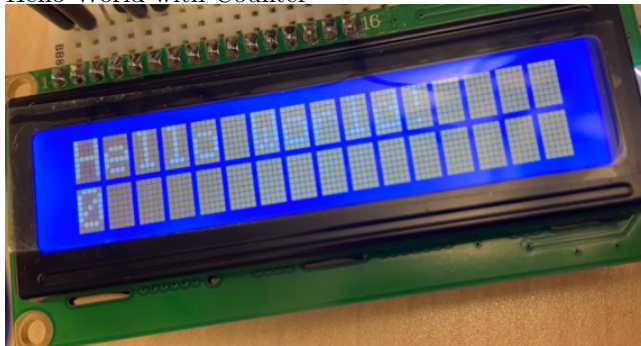
## 2 Materials and Methods

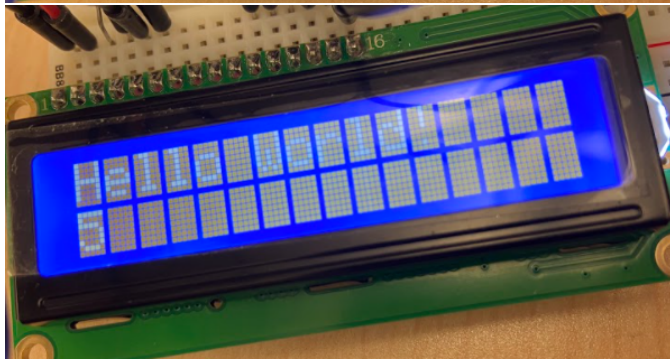
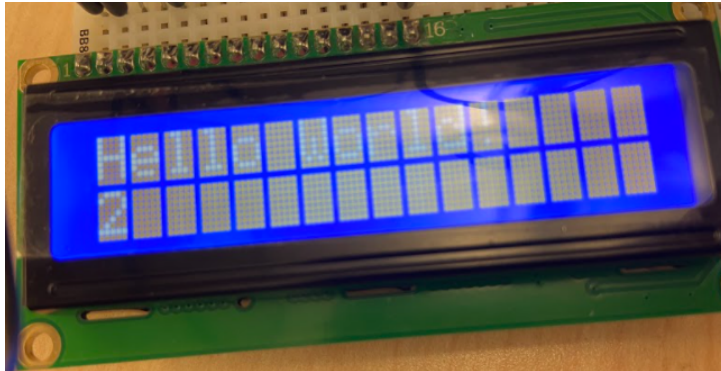
The tutorial this DC regulator is based on is found: [http://www.yilectronics.com/Courses/CE351\\_Microcontrollers/s2022/lectures/powerSupply/powerSupply.html](http://www.yilectronics.com/Courses/CE351_Microcontrollers/s2022/lectures/powerSupply/powerSupply.html)

## 3 Results

### 3.1 Task 1-2

Hello World with Counter





Hello World with Counter Code

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(7,8,9,10,11,12);

void setup() {
  // put your setup code here, to run once:
  lcd.begin(16,2);
  lcd.print("Hello World!");
}

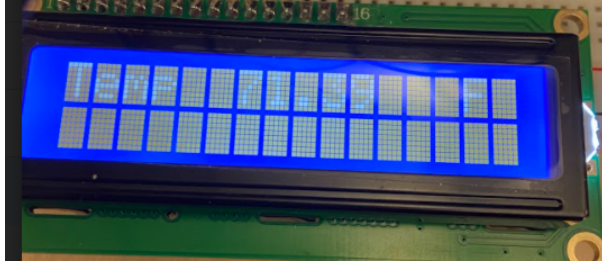
void loop() {
  // put your main code here, to run repeatedly:
  lcd.setCursor(0,1);
  lcd.print(millis()/1000%6);
}
```

### 3.2 Task 3

Scrolling Text Demonstration: <https://youtu.be/0g8cjJS2HCQ>

### 3.3 Task 4

Resistor Temperature Output (Temp 71.39 F)



### 3.4 Task 5

DHT11 Code

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(7,8,9,10,11,12);

int sensorPin = A0;

#include <SimpleDHT.h>

int pinDHT11 = 2;
SimpleDHT11 dht11;

void setup() {
  lcd.begin(16,2);
}

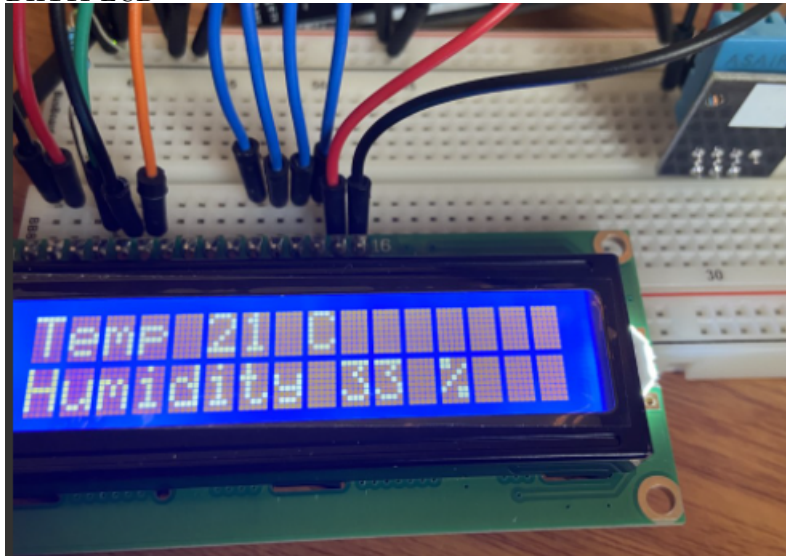
void loop() {
  byte temperature = 0;
  byte humidity = 0;
  byte data[40] = {0};
  if (dht11.read(pinDHT11, &temperature, &humidity, data)) {
    Serial.print("Read DHT11 failed");
    return;
  }
  lcd.setCursor(0, 0);
  lcd.print("Temp    C");
  lcd.setCursor(5,0);
  lcd.print(temperature);
  lcd.setCursor(0, 1);
  lcd.print("Humidity  %");
  lcd.setCursor(9,1);
  lcd.print(humidity);

  delay(2000);
}
```

### DHT11 Serial

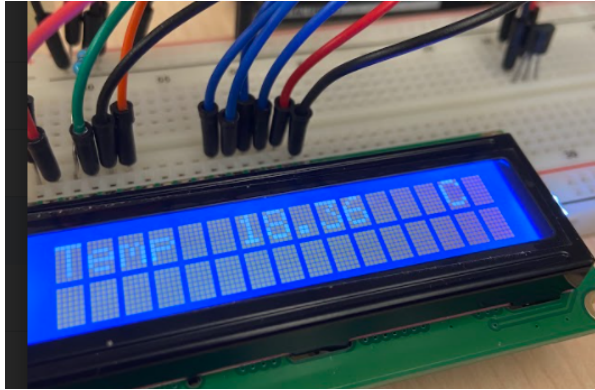
```
Sample DHT11...
Sample RAW Bits: 0001 1000 0000 0000 0001 0101 0000 0100 0011 0001
Sample OK: 21 *C, 24 %
=====
Sample DHT11...
Read DHT11 failed=====
Sample DHT11...
Sample RAW Bits: 0001 1000 0000 0000 0001 0101 0000 0011 0011 0000
Sample OK: 21 *C, 24 %
=====
Sample DHT11...
Read DHT11 failed=====
Sample DHT11...
Sample RAW Bits: 0001 1000 0000 0000 0001 0101 0000 0011 0011 0000
Sample OK: 21 *C, 24 %
=====
```

### DHT11 LCD



### 3.5 Task 6

Transistor Temperature Output



### 3.6 Task 7

Remote Code Adjustment

```
case 0xFF629D: lcd.print("UP           "); break;
case 0xFF22DD: lcd.print("LEFT          "); break;
case 0xFF02FD: lcd.print("OK            "); break;
case 0xFFC23D: lcd.print("RIGHT         "); break;
case 0xFFA857: lcd.print("DOWN         "); break;
case 0xFF906F: lcd.print("UP           "); break;
case 0xFF9867: lcd.print("2            "); break;
case 0xFFB04F: lcd.print("3            "); break;
case 0xFF6897: lcd.print("1            "); break;
case 0xFF30CF: lcd.print("4            "); break;
case 0xFF18E7: lcd.print("5            "); break;
case 0xFF7A85: lcd.print("6            "); break;
case 0xFF10EF: lcd.print("7            "); break;
case 0xFF38C7: lcd.print("8            "); break;
case 0xFF5AA5: lcd.print("9            "); break;
case 0xFF42BD: lcd.print("*           "); break;
case 0xFF4AB5: lcd.print("0            "); break;
case 0xFF52AD: lcd.print("#            "); break;
case 0xFFFFFFFF: lcd.print("REPEAT       "); break;
default:
lcd.print("INVALID      ");
```

Remote Demonstration: <https://youtu.be/mmrj8fZqDxM>

### 3.7 Task 8

Exported Chip Demonstration: <https://youtu.be/eJCj5lpyLqs>

### 3.8 Task 9

Temperature and Humidity Code

```
#include<SimpleDHT.h>
int latchPin=11;// RCLK
int clockPin=9;// SRCLK
int dataPin=12;//SER
int pinDHT11=2;
SimpleDHT11 dht11;
int temper1;
int temper10;
int hum1;
int hum10;

byte SSDs=0x3F; // in binary

void setup() {
  pinMode(latchPin,OUTPUT);
  pinMode(dataPin,OUTPUT);
  pinMode(clockPin,OUTPUT);
  pinMode(4,OUTPUT);
  pinMode(5,OUTPUT);
  pinMode(6,OUTPUT);
  pinMode(7,OUTPUT);
  noInterrupts();
  TCCR1A=0;
  TCCR1B=0;
  TCNT1=0;
  OCR1A=256;
  TCCR1B|=(1<<WGM12);
  TCCR1B|=(1<<CS12);

  TCCR1B|=(1<<CS10);
  TIMSK1|=(1<<OCIE1A);
  interrupts();
  Serial.begin(9600);
}
```

```

void loop()
{
  byte temperature = 0;
  byte humidity = 0;
  byte data[40] = {0};
  dht11.read(pinDHT11, &temperature, &humidity, data);
  temper1=temperature%10;
  temper10=(temperature-temper1)/10;
  hum1=humidity%10;
  hum10=(humidity-hum1)/10;
  delay(2000);
  Serial.println(temperature);
  Serial.println(humidity);
}

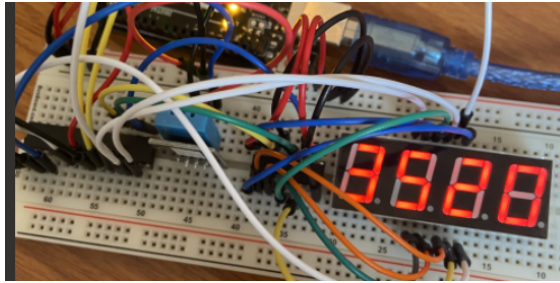
ISR(TIMER1_COMPA_vect)
{
  digitalWrite(4,LOW);
  segPrint(temper10);
  digitalWrite(4,HIGH);
  delay(5);
  digitalWrite(5,LOW);
  segPrint(hum1);
  digitalWrite(5,HIGH);
  delay(5);
  digitalWrite(6,LOW);
  segPrint(hum10);
  digitalWrite(6,HIGH);
  delay(5);
  digitalWrite(7,LOW);
  segPrint(temper1);
  digitalWrite(7,HIGH);
  delay(5);
}

void segPrint(int num)
{
  switch(num) {
  case 1:
    SSDs=0x06; //1
    updateShiftRegister();
    break;
  case 2:
    SSDs=0x5B; //2
    updateShiftRegister();
    break;
  case 3:
    SSDs=0x4F; //3
    updateShiftRegister();
    break;
  case 4:
    SSDs=0x66; //4
    updateShiftRegister();
    break;
  case 5:
    SSDs=0x6D; //5
    updateShiftRegister();
    break;
  }
}

```

Humidity(left) and Temperature(right) Output





## 4 Discussion

The only issue I ran into was the images of the LCD did not turn out very well. I didn't have a potentiometer, so i just used a resistor. It looked good enough to the eye, but it is difficult to read in the pictures, so I put the output in parenthesis above them to help you understand what they say. Besides that, any code I didn't include in this report was given in your tutorial.