

Lab 01

## **Print LCD**

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# 1 Executive Summary

In this lab, the objective is to output a recipe to a Liquid Crystal Display (LCD). To use the LCD, it must be wired properly. The wiring is rather simple and can be followed in the circuit diagram in Figure 1. There are two modes on the LCD, a 4-bit operation mode, and an 8-bit operation mode. In this lab the 4-bit operation mode is utilized. The way the 4-bit mode works is that the Arduino board sends two sets of data. The first four bits is the first four bits of the byte, and the last four bits is the last four bits of the byte for a total of 8 bits. A potentiometer was used to adjust the brightness of the LCD backlight. A pushbutton was used as user input to cycle to the next recipe item. To use the push button we learned how to set a GPIO pin to input and read the pin. AutoCad was used to draw up the circuit diagram and LucidChart was used in creating the program flowchart.

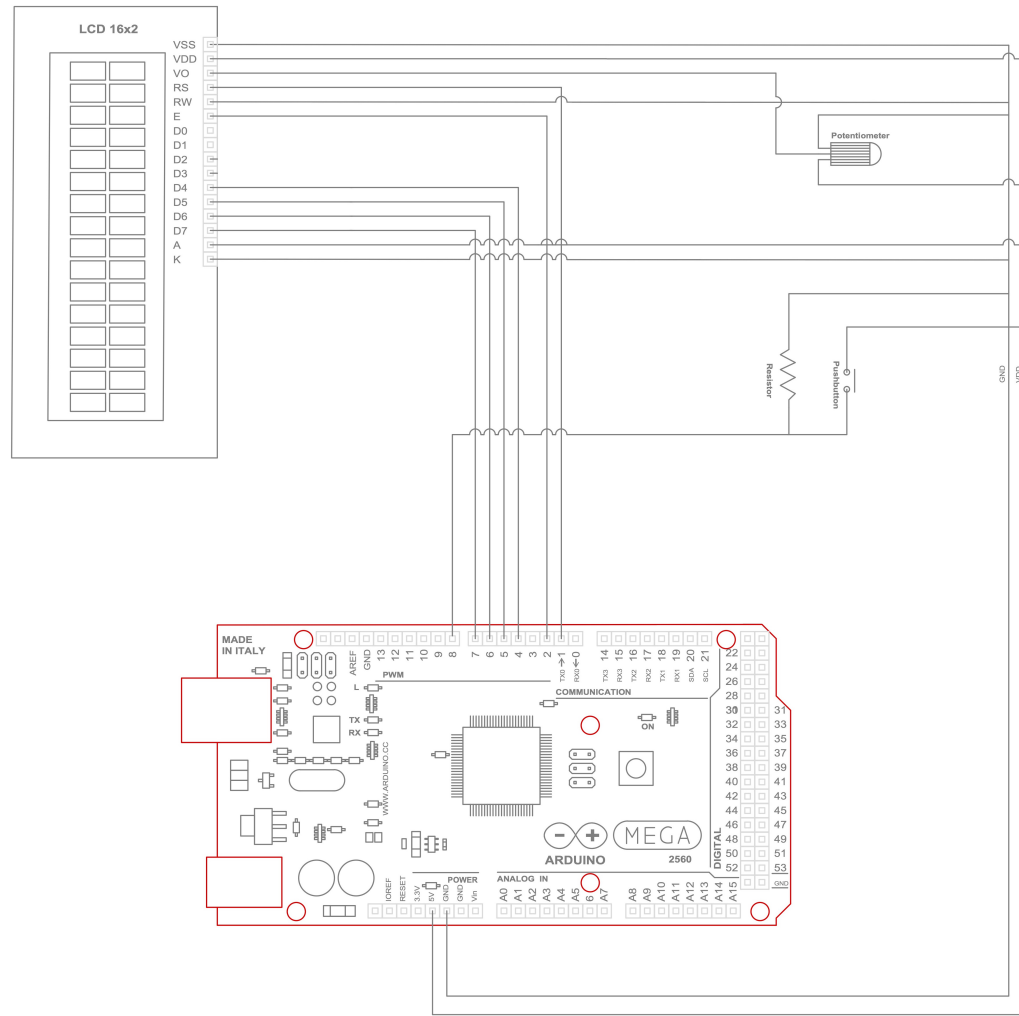


Figure 1: Circuit Diagram

## Lab 01 Recipe LCD Program FlowChart

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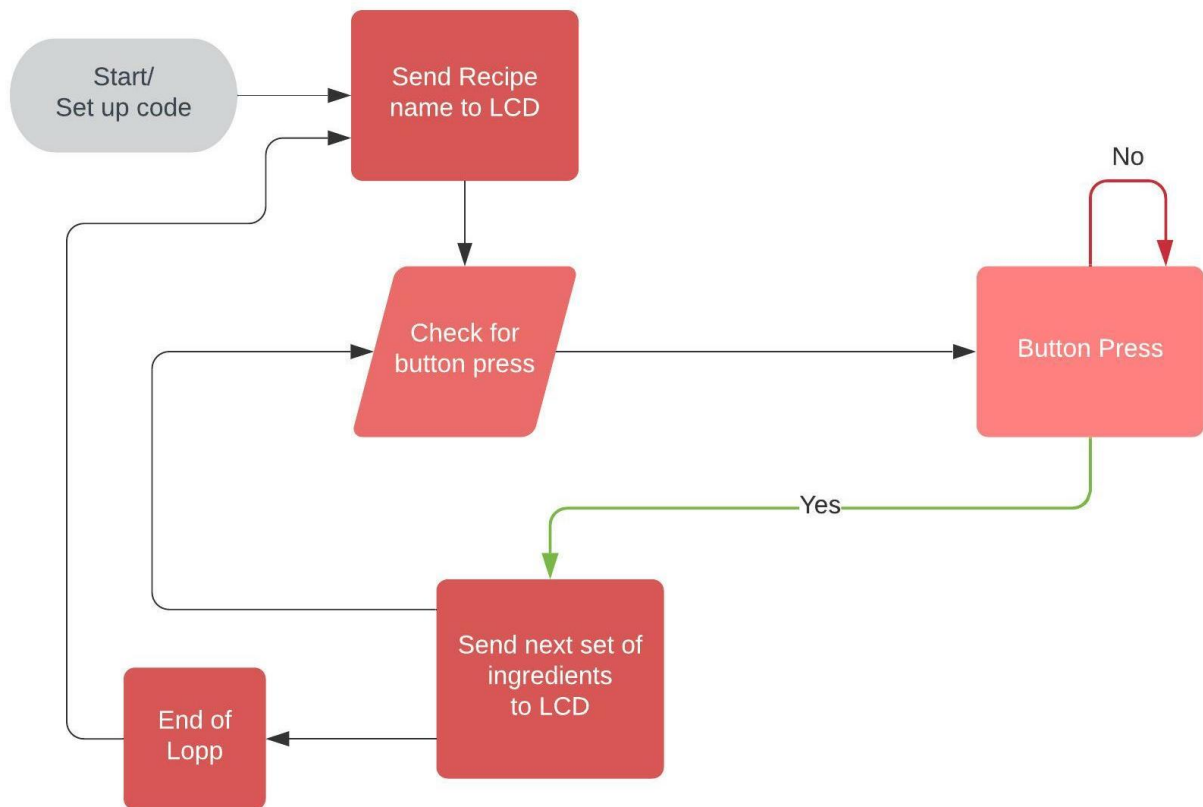


Figure 2: Program Flowchart

## 2 Source Code

```
1
3 #include <LiquidCrystal.h> // includes the LiquidCrystal Library
LiquidCrystal lcd(1, 2, 4, 5, 6, 7); // Creates an LC object. Parameters: (rs,
enable, d4, d5, d6, d7)
5 const int buttonPin = 8;

7 void setup() {
  lcd.begin(16,2); // Initializes the interface to the LCD screen, and specifies
the dimensions (width and height) of the display }
9 // initialize the pushbutton pin as an input:
  pinMode(buttonPin, INPUT);
11 }

13 void loop() {
  lcd.clear();
15  lcd.print("Use Pushbutton"); // Prints text onto LCD
  lcd.setCursor(0,2);
17  lcd.print("To begin recipe");

19  buttonWait(8); // waiting for button press
  lcd.print("Double Chocolate"); // Prints text onto LCD
21  lcd.setCursor(0,2);
  lcd.print("Flower Brownies");

23  buttonWait(8);
25  lcd.clear();
  lcd.print("1/2 cup ");
27  lcd.setCursor(0,2);
  lcd.print("unsalted butter");
29  buttonWait(8);
  lcd.clear();
31  lcd.print("1 gram");
  lcd.setCursor(0,2);
33  lcd.print("flower");

35  buttonWait(8);
  lcd.clear();
37  lcd.print("1/4 cup ");
  lcd.setCursor(0,2);
39  lcd.print("cocoa powder");

41  buttonWait(8);
  lcd.clear();
43  lcd.print("1/2 cup ");
  lcd.setCursor(0,2);
45  lcd.print("chocolate chips");

47  buttonWait(8);
  lcd.clear();
49  lcd.print("1 tablespoon");
  lcd.setCursor(0,2);
51  lcd.print("molasses");

53  buttonWait(8);
  lcd.clear();
55  lcd.print("1 teaspoon");
```

```

57   lcd.setCursor(0,2);
    lcd.print("vanilla extract");

59   buttonWait(8);
    lcd.clear();
61   lcd.print("2 large eggs");

63   buttonWait(8);
    lcd.clear();
65   lcd.print("1/4 teaspoon");
    lcd.setCursor(0,2);
67   lcd.print("kosher salt");

69   buttonWait(8);
    lcd.clear();
71   lcd.print("3/4 cup");
    lcd.setCursor(0,2);
73   lcd.print("all-purpose flour");
    buttonWait(8);
75 }

77 /* function for waiting for button press*/
79 void buttonWait(int buttonPin){
    int buttonState = 0;

81   while(1){
83     buttonState = digitalRead(buttonPin);
        if (buttonState == HIGH) {
85         delay(200);
            return;
87     }
    }
89 }

```

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