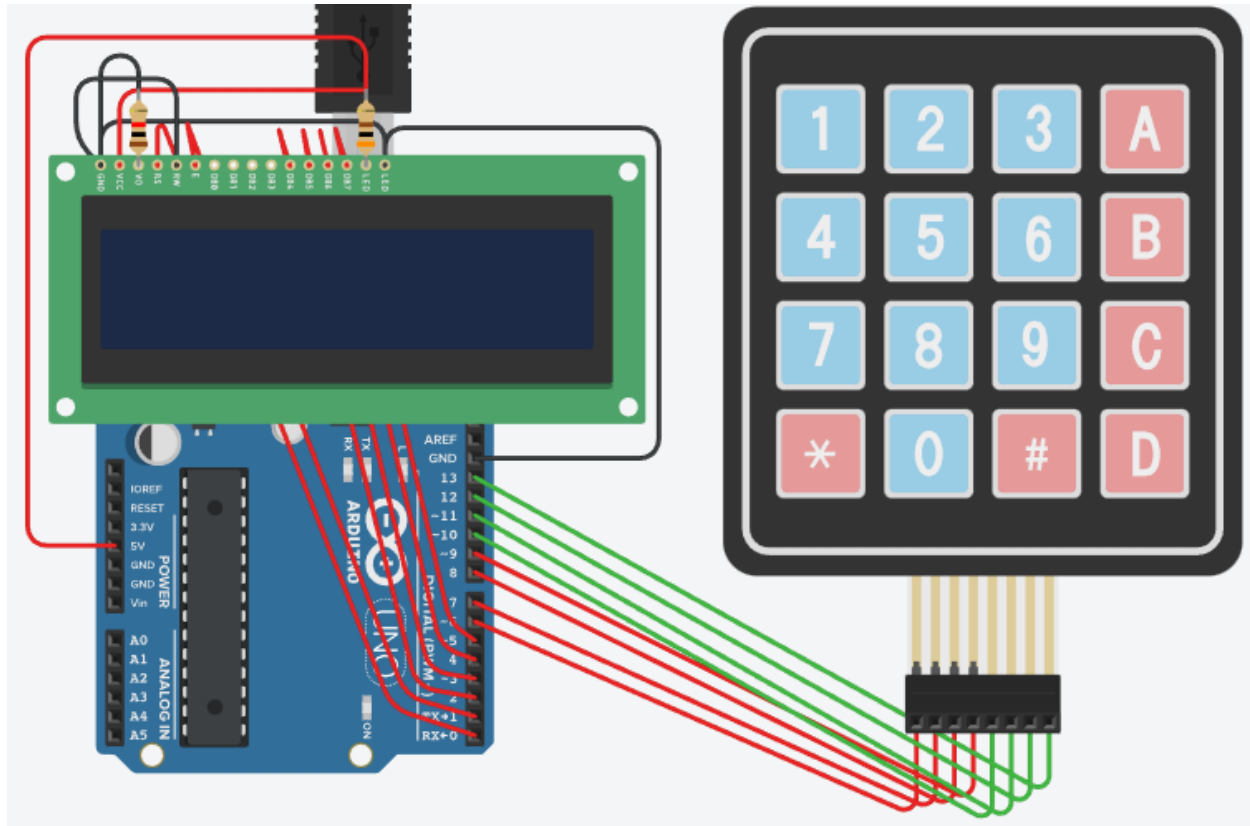Write a program to interface LCD and keypad (4 X 4) , to exhibit the
functionality of a basic calculator.


```
#include <Keypad.h>
#include <LiquidCrystal.h>
LiquidCrystal lcd(0, 1, 2, 3, 4, 5);
byte row = 4;
byte col = 4;
char keys[4][4] = {
  { '1', '2', '3', '+' },
  { '4', '5', '6', '-' },
  { '7', '8', '9', '*' },
  { 'C', '0', 'E', '/' }
};
byte rowpin[4] = { 6, 7, 8, 9 };
byte colpin[4] = { 10, 11, 12, 13 };
Keypad mykeypad = Keypad(makeKeymap(keys), rowpin, colpin, row, col);

long num1 = 0;
```

```
long num2 = 0;
double total = 0;

void setup() {
  lcd.begin(16, 2);
  lcd.print("Enter a Number");
  delay(1000);
  lcd.clear();
}
void loop() {
  char value = mykeypad.getKey();
  switch (value) {
    case '0' ... '9':
      lcd.setCursor(0, 0);
      num1 = num1 * 10 + (value - '0');
      lcd.print(num1);
      break;
    case '+':
      num1 = (total != 0 ? total : num1);
      lcd.print('+');
      num2 = secondNumber();
      total = num1 + num2;
      lcd.setCursor(0, 2);
      lcd.print(total);
      num1 = num2 = 0;
      break;
    case '-':
      num1 = (total != 0 ? total : num1);
      lcd.print('-');
      num2 = secondNumber();
      total = num1 - num2;
      lcd.setCursor(0, 2);
      lcd.print(total);
      num1 = num2 = 0;
      break;
    case '*':
      num1 = (total != 0 ? total : num1);
      lcd.print('*');
      num2 = secondNumber();
      total = num1 * num2;
      lcd.setCursor(0, 2);
      lcd.print(total);
      num1 = num2 = 0;
      break;
    case '/':
```
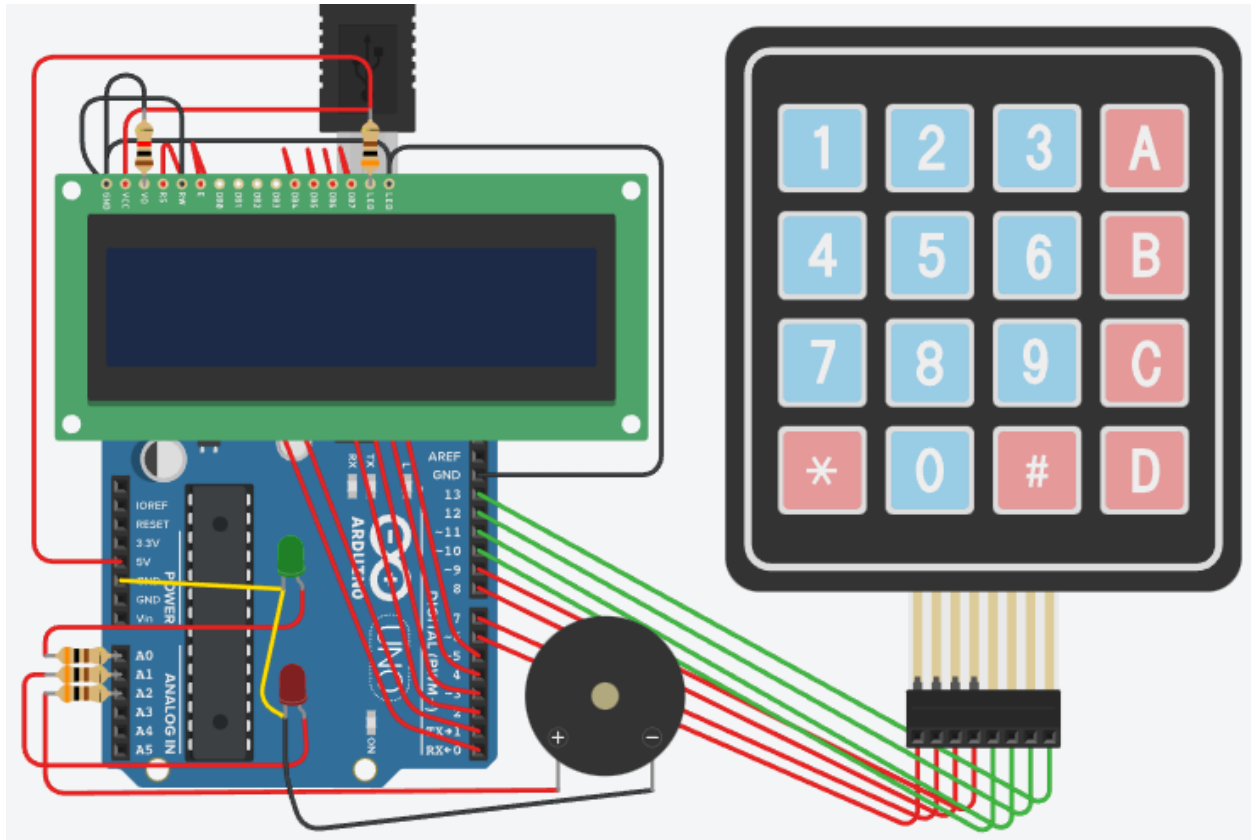
```
        num1 = (total != 0 ? total : num1);
        lcd.print('/');
        num2 = secondNumber();
        lcd.setCursor(0, 2);
        num2 == 0 ? lcd.print("Invalid") : total = (float)num1 / (float)num2;
        lcd.print(total);
        num1 = num2 = 0;
        break;
      case 'C':
        total = num1 = num2 = 0;
        lcd.clear();
        break;
    }
}

long secondNumber() {
  while (1) {
    char value = mykeypad.getKey();
    if (value >= '0' && value <= '9') {
      num2 = num2 * 10 + (value - '0');
      lcd.setCursor(7, 0);
      lcd.print(num2);
    }
    if (value == 'E') break;
  }
  return num2;
}
```

Write a program using LCD, LEDs, Buzzer and keypad to simulate a password based security lock system. User enters 4-digit password and if the password is correct buzzer and Green LED is put on. But if the password is incorrect Red LED is put on. After three incorrect attempts Red LED along with buzzer blinks continuously.


```
#include <Keypad.h>
#include <LiquidCrystal.h>
LiquidCrystal lcd(0, 1, 2, 3, 4, 5);
byte row = 4;
byte col = 4;
char keys[4][4] = {
    { '1', '2', '3', 'A' },
    { '4', '5', '6', 'B' },
    { '7', '8', '9', 'C' },
    { '*', '0', 'E', 'D' }
};
byte rowpin[4] = { 6, 7, 8, 9 };
```

```
byte colpin[4] = { 10, 11, 12, 13 };
Keypad mykeypad = Keypad(makeKeymap(keys), rowpin, colpin, row, col);

String pass;
int c = 0;
int a = 0;
void setup() {
  lcd.begin(16, 2);
  lcd.print("UPCISS");
  delay(1000);
  lcd.clear();
}
void loop() {
  char key = mykeypad.getKey();
  if (key) {
    pass = pass + key;
    c++;
    if (c > 5) {
      lcd.clear();
      lcd.print("Access Denied");
      c = 0;
    }
    lcd.print('*');
    if (key == 'A') {
      lcd.setCursor(1, 0);
      lcd.clear();
      lcd.print("Enter Password");
      lcd.setCursor(3, 1);
      pass = "";
    } else if (key == '*') {
      lcd.clear();
      c = 0;
      a = 0;
      analogWrite(A1, 0);
      analogWrite(A2, 0);
    }
    if (key == 'E') {
      lcd.setCursor(3, 1);
      lcd.clear();
      if (pass == "1234E") {
        lcd.print("Access Granted");
        c = 0;
        analogWrite(A0, 255);
        analogWrite(A2, 255);
        delay(200);
```

```
        analogWrite(A0, 0);
        analogWrite(A2, 0);
      } else {
        lcd.print("Access Denied");
        c = 0;
        analogWrite(A1, 255);
        analogWrite(A2, 255);
        delay(200);
        analogWrite(A1, 0);
        analogWrite(A2, 0);
        a++;
      }
      if (a == 3) {
        analogWrite(A1, 255);
        analogWrite(A2, 255);
      }
    }
  }
}
```

It takes a lot of hard work to make notes, so if you can pay some fee 100, 200 rupees which you think is reasonable, if you are able, Thank you...

नोट्स बनाने में बहुत मेहनत लगी है , इसलिए यदि आप कुछ शुल्क 100, 200 रूपए जो आपको उचित लगता है pay कर सकते है, अगर आप सक्षम है तो, धन्यवाद ।

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