

Arduino Calculator Using 4x4 Keypad

Description:

In this project the device Arduino calculator is performs the basic arithmetic operations using Arduino Uno microcontroller board and LCD display. This project connects the LCD display to Arduino board and programming the board to read the input from keypad and display the result on the screen of LCD. The calculator can perform many operations like Addition, Subtraction, Multiplication, and Division operations.

Block Diagram:



Table:

S.NO	Description	Name	Type	Data Direction	Specification	Remarks
1	4x4 keypad(columns)	1	INP	D1	Digital	Active high
2	4x4 keypad(columns)	2	INP	D1	Digital	Active high
3	4x4 keypad(columns)	3	INP	D1	Digital	Active high
4	4x4 keypad(columns)	4	INP	D1	Digital	Active high
5	4x4 keypad(row)	A	INP	D1	Digital	Active high
6	4x4 keypad(row)	B	INP	D1	Digital	Active high
7	4x4 keypad(row)	C	INP	D1	Digital	Active high
8	4x4 keypad(row)	D	INP	D1	Digital	Active high
9	LCD RST	RS	OUT	D0	Digital	Active high
10	LCD EN	EN	OUT	D0	Digital	Active high

11	LCD DATA PIN	D4	OUT	D0	Digital	Active high
12	LCD DATA PIN	D5	OUT	D0	Digital	Active high
13	LCD DATA PIN	D6	OUT	D0	Digital	Active high
14	LCD DATA PIN	D7	OUT	D0	Digital	Active high

CODE:

```
#include <LiquidCrystal.h> //Header file for LCD from
https://www.arduino.cc/en/Reference/LiquidCrystal

#include <Keypad.h> //Header file for Keypad from https://github.com/Chris--A/Keypad

const byte ROWS = 4; // Four rows

const byte COLS = 4; // Three columns

// Define the Keymap

char keys[ROWS][COLS] = {

    {'7','8','9','D'},

    {'4','5','6','C'},

    {'1','2','3','B'},

    {'*','0','#','A'}

};

byte rowPins[ROWS] = { 0, 1, 2, 3 };// Connect keypad ROW0, ROW1, ROW2 and ROW3
to these Arduino pins.
```

```
byte colPins[COLS] = { 4, 5, 6, 7 }; // Connect keypad COL0, COL1 and COL2 to
these Arduino pins.
Keypad kpd = Keypad( makeKeymap(keys), rowPins, colPins, ROWS, COLS ); // Create
the Keypad
```

```
const int rs = 8, en = 9, d4 = 10, d5 = 11, d6 = 12, d7 = 13; //Pins to which LCD
is connected
```

```
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
```

```
long Num1,Num2,Number;
```

```
char key,action;
```

```
boolean result = false;
```

```
void setup() {
```

```
    lcd.begin(16, 2); //We are using a 16*2 LCD display
```

```
    lcd.print("POORVI GS"); //Display a intro message
```

```
    lcd.setCursor(0, 1); // set the cursor to column 0, line 1
```

```
    lcd.print("CALCULATOR"); //Display a intro message
```

```
    delay(2000); //Wait for display to show info
```

```
    lcd.clear(); //Then clean it
```

```
}
```

```
void loop() {
```

```
    key = kpd.getKey(); //storing pressed key value in a char
```

```
    if (key!=NO_KEY)
```

```

DetectButtons();

if (result==true)

CalculateResult();

DisplayResult();

}

void DetectButtons()

{

    lcd.clear(); //Then clean it

    if (key=='*') //If cancel Button is pressed

    {
        Serial.println ("Button Cancel"); Number=Num1=Num2=0; result=false;}
    if (key == '1') //If Button 1 is pressed

    {
        Serial.println ("Button 1");

        if (Number==0)
Number=1;

        else

        Number = (Number*10) + 1; //Pressed twice

    }

    if (key == '4') //If Button 4 is pressed

    {Serial.println ("Button 4");

    if (Number==0)

```

```
Number=4;
```

```
else
```

```
Number = (Number*10) + 4; //Pressed twice
```

```
}
```

```
if (key == '7') //If Button 7 is pressed
```

```
{Serial.println ("Button 7");
```

```
if (Number==0)
```

```
Number=7;
```

```
else
```

```
Number = (Number*10) + 7; //Pressed twice
```

```
}
```

```
if (key == '0')
```

```
{Serial.println ("Button 0"); //Button 0 is Pressed
```

```
if (Number==0)
```

```
Number=0;
```

```
else
```

```
Number = (Number*10) + 0; //Pressed twice
```

```
}
```

```
if (key == '2') //Button 2 is Pressed
```

```
{Serial.println ("Button 2");

    if (Number==0)
Number=2;

    else

    Number = (Number*10) + 2; //Pressed twice

}

    if (key == '5')

{Serial.println ("Button 5");

    if (Number==0)

    Number=5;

    else

    Number = (Number*10) + 5; //Pressed twice

}

    if (key == '8')

{Serial.println ("Button 8");

    if (Number==0)

    Number=8;

    else

    Number = (Number*10) + 8; //Pressed twice

}
```

```
if (key == '#')

{Serial.println ("Button Equal");

Num2=Number;

result = true;

}


if (key == '3')

{Serial.println ("Button 3");

if (Number==0)

Number=3;

else

Number = (Number*10) + 3; //Pressed twice

}


if (key == '6')

{Serial.println ("Button 6");

if (Number==0)

Number=6;

else

Number = (Number*10) + 6; //Pressed twice

}


if (key == '9')
```

```

    {Serial.println ("Button 9");

    if (Number==0)

    Number=9;

    else
    Number = (Number*10) + 9; //Pressed twice

    }

    if (key == 'A' || key == 'B' || key == 'C' || key == 'D') //Detecting
Buttons on Column 4

    {

    Num1 = Number;

    Number =0;

    if (key == 'A')

    {Serial.println ("Addition"); action = '+';}

    if (key == 'B')

    {Serial.println ("Subtraction"); action = '-'; }

    if (key == 'C')

    {Serial.println ("Multiplication"); action = '*';}

    if (key == 'D')

    {Serial.println ("Devesion"); action = '/';}

    delay(100);

    }
}

void CalculateResult()

```



```

{

    if (action=='+')

        Number = Num1+Num2;

    if (action=='-')

        Number = Num1-Num2;

    if (action=='*')

        Number = Num1*Num2;

    if (action=='/')

        Number = Num1/Num2;

}

void DisplayResult()

{
    lcd.setCursor(0, 0);    // set the cursor to column 0, line 1

    lcd.print(Num1); lcd.print(action); lcd.print(Num2);

    if (result==true)

    {lcd.print(" ="); lcd.print(Number);} //Display the result


    lcd.setCursor(0, 1);    // set the cursor to column 0, line 1

    lcd.print(Number); //Display the result

}

```

Schematic:

