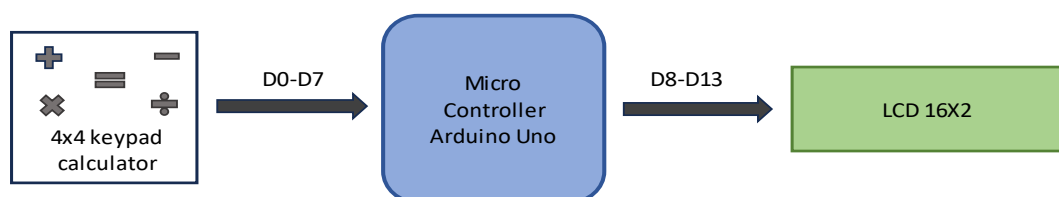


# 4X4 KEYPAD CALCULATOR USING ARDUINO

**Description:** Here we will build our own calculator with Arduino. The values can be sent in through a keypad (4×4 keypad) and result can be viewed on a LCD screen (16×2). This calculator could perform simple operations like Addition, Subtraction, Multiplication and Division with whole numbers. Keypad is used as an input device to read the key pressed by the user and to process it. 4x4 keypad consists of 4 rows and 4 columns. Switches are placed between the rows and columns.

## Block Diagram:



# Inputs and Outputs:

S.No	Description	Name	Type	Data Direction	Specification	Remarks
1	Keypad row 1	A	INP	DI	Digital	Active High
2	Keypad row 2	B	INP	DI	Digital	Active High
3	Keypad row 3	C	INP	DI	Digital	Active High
4	Keypad row 4	D	INP	DI	Digital	Active High
5	Keypad column 1	1	INP	DI	Digital	Active High
6	Keypad column 2	2	INP	DI	Digital	Active High
7	Keypad column 3	3	INP	DI	Digital	Active High
8	Keypad column 4	4	INP	DI	Digital	Active High
9	LCD RST	RS	OUT	DO	Digital	Active High
10	LCD EN	EN	OUT	DO	Digital	Active High
11	LCD Data Pin	D4	OUT	DO	Digital	Active High
12	LCD Data Pin	D5	OUT	DO	Digital	Active High
13	LCD Data Pin	D6	OUT	DO	Digital	Active High
14	LCD Data Pin	D7	OUT	DO	Digital	Active High

## Source Code:

```
#include <LiquidCrystal.h>

#include <Keypad.h>

const byte ROWS = 4;

const byte COLS = 4;

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 };
```

```
byte colPins[COLS] = { 4, 5, 6, 7 };
```

```
Keypad kpd = Keypad( makeKeymap(keys), rowPins, colPins, ROWS, COLS );
```

```
const int rs = 8, en = 9, d4 = 10, d5 = 11, d6 = 12, d7 = 13;
```

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

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

```
char key,action;
```

```
boolean result = false;
```

```
void setup() {
```

```
    lcd.begin(16, 2);
```

```
    lcd.print("Nandini");
```

```
    lcd.setCursor(0, 1);
```

```
    lcd.print("CALCULATOR");
```

```
    delay(2000);
```

```
    lcd.clear();
```

```
}
```

```
void loop() {
```

```
    key = kpd.getKey();
```

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

```
        DetectButtons();
```

```
        if (result==true)
```

```
            CalculateResult();
```

```
            DisplayResult();
```

```
}
```

```
void DetectButtons()
```

```
{
```

```
    lcd.clear();
```

```
    if (key=='*')
```

```
{Serial.println ("Button Cancel"); Number=Num1=Num2=0; result=false;}
```

```
    if (key == '1')
```

```
{Serial.println ("Button 1");
```

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

```
        Number=1;
```

```
    else
```

```
        Number = (Number*10) + 1;
```

```
}
```

```
    if (key == '4')
```

```
{Serial.println ("Button 4");
```

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

```
        Number=4;
```

```
    else
```

```
        Number = (Number*10) + 4;
```

```
}
```

```
    if (key == '7')
```

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

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

```
Number=7;

else

Number = (Number*10) + 7;

}

if (key == '0')

{Serial.println ("Button 0");

if (Number==0)

Number=0;

else

Number = (Number*10) + 0;

}

if (key == '2')

{Serial.println ("Button 2");

if (Number==0)

Number=2;

else

Number = (Number*10) + 2;

}

if (key == '5')

{Serial.println ("Button 5");

if (Number==0)

Number=5;

Else

Number = (Number*10) + 5;
```

```

}
    if (key == '8')

    {Serial.println ("Button 8");

        if (Number==0)

        Number=8;

    else

    Number = (Number*10) + 8;

    }

    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;

    }

    if (key == '6')

    {Serial.println ("Button 6");

    if (Number==0)

    Number=6;

    Else

```

```

    Number = (Number*10) + 6;

}

    if (key == '9')

{Serial.println ("Button 9");

    if (Number==0)

Number=9;

    else

    Number = (Number*10) + 9;

}

if (key == 'A' || key == 'B' || key == 'C' || key == 'D')
{

    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);

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

    if (result==true)
    {lcd.print(" ="); lcd.print(Number);}

    lcd.setCursor(0, 1);

    lcd.print(Number);
}
```



# Schematic:

