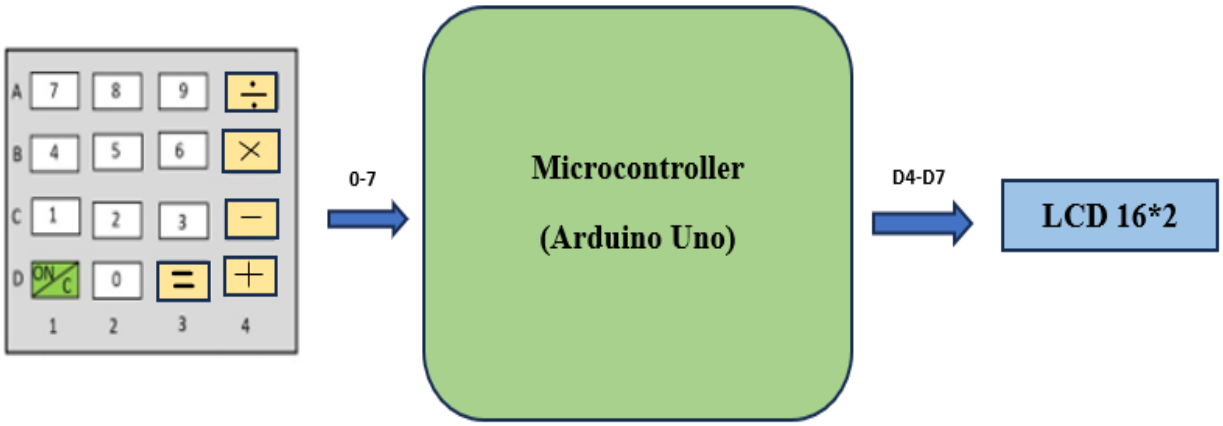
Arduino Calculator Using 4x4 keypad

Description:

In this project we'll be interfacing a 4x4 keypad with an Arduino board and lcd display. This device perform basic arithmetic operations like addition, subtraction, multiplication and division. Keypad and LCD display are connected to Arduino board in which keypad reads the input from user end and display the output in LCD screen.

Block Diagram:



Input and Output:

S.No	Description	Name	Type	Data Direction	Specification	Remarks
1	4X4 KEYPAD(COLUMNS)	1	INP	DI	Digital	Active High
2	4X4 KEYPAD(COLUMNS)	2	INP	DI	Digital	Active High
3	4X4 KEYPAD(COLUMNS)	3	INP	DI	Digital	Active High
4	4X4 KEYPAD(COLUMNS)	4	INP	DI	Digital	Active High
5	4X4 KEYPAD(ROW)	A	INP	DI	Digital	Active High
6	4X4 KEYPAD(ROW)	B	INP	DI	Digital	Active High
7	4X4 KEYPAD(ROW)	C	INP	DI	Digital	Active High

8	4X4 KEYPAD(ROW)	D	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; //

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. }; byte

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

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("KOKILA S"); //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

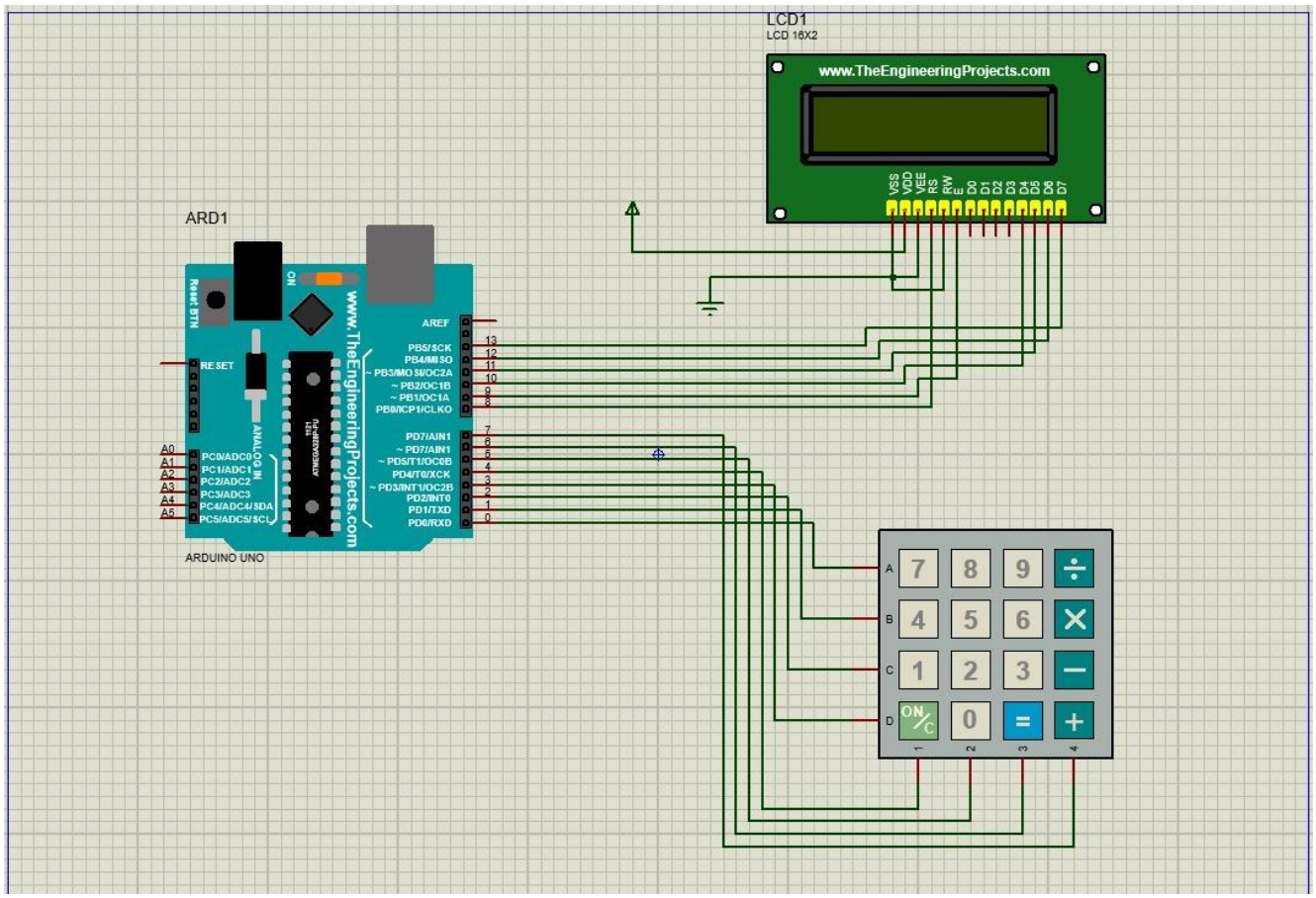
```
} void loop() { key = kpd.getKey(); //storing pressed key
value in a char if (key!=NO_KEY) DetectButtons(); if
(result==true)
CalculateResult();
DisplayResult();
} void
DetectButtons()
{     lcd.clear(); //Then clean it  if
(key=='*') //If cancel Button is pressed
 {
Serial.println ("Button Cancel"); 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:


LCD1
LCD 16X2
www.TheEngineeringProjects.com
VSS VDD VEE RS RW E D0 D1 D2 D3 D4 D5 D6 D7
ARD1
Reset BTN
ON
RESET
AREF
PB5/SCK
PB4/MISO
~ PB3/MOSI/OC2A
~ PB2/OC1B
~ PB1/OC1A
PB0/ICP1/CLKO
PD7/AIN1
~ PD6/AIN0
~ PD5/T1/OC0B
PD4/T0/XCK
~ PD3/INT1/OC2B
PD2/INT0
PD1/TXD
PD0/RXD
A0 PC0/ADC0
A1 PC1/ADC1
A2 PC2/ADC2
A3 PC3/ADC3
A4 PC4/ADC4/SDA
A5 PC5/ADC5/SCL
ANALOG IN
www.TheEngineeringProjects.com
ARDUINO UNO
A 7 8 9 ÷
B 4 5 6 ×
C 1 2 3 −
D ON/C 0 = +
1 2 3 4