

# Simple Calculator

## Abstract:

A calculator is a device that performs arithmetic operations on numbers. The simplest calculators can do only addition, subtraction, multiplication, and division.

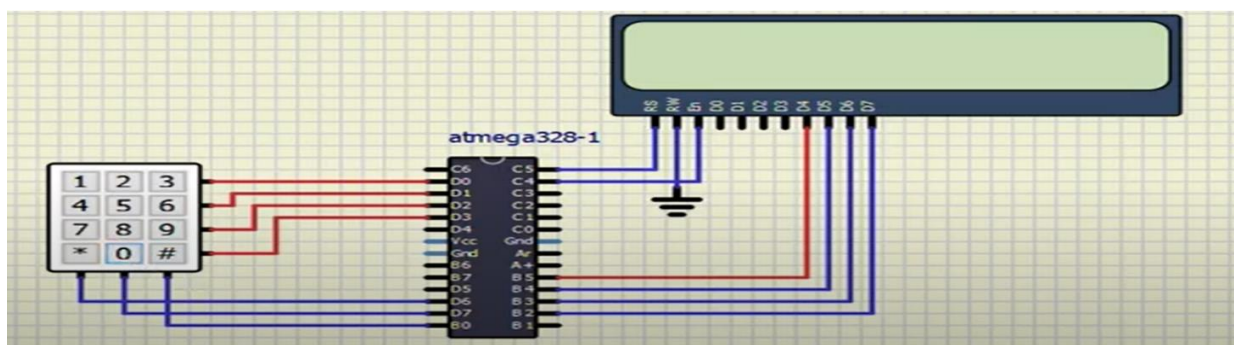
calculator is a machine which allows people to do math operations more easily. We begin with writing the software to read the keyboard for input, and display pressed keys on the LCD. Next, we wrote the code which would allow users to enter and edit numbers. Finally, we wrote the code which would allow user to perform calculations.

## Requirements:

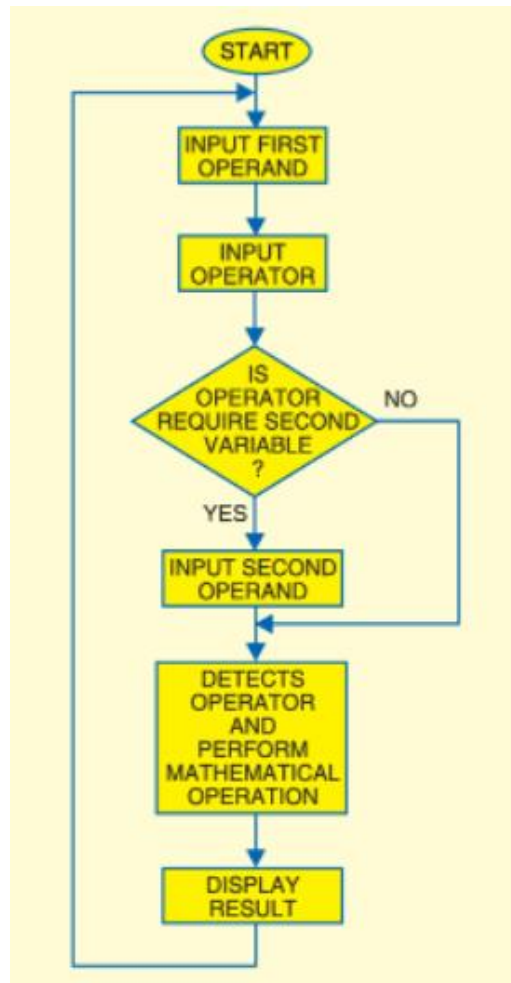
- Atmega328
- 16×2 LCD Display
- 4×4 Keypad
- 9V Battery
- Breadboard and Connecting wires

## Implementation:

Block Diagram:



## Flow Chart:



## Code:

```
#include<avr/io.h>

#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 }; // 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("DIY Calculator"); //Display a intro message
    lcd.setCursor(0, 1); // set the cursor to column 0, line 1
    lcd.print("-CircuitDigest"); //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  
}
```

## Expected Outcomes:

The purpose of a calculator is to do correct calculations, and to do so efficiently. To understand the basic functions of the calculator. It is clear that a calculator should relieve the user of the need to do mental operations and of the need to rely on paper, so far as possible. This technology allows students solve complicated problems quickly and in an efficient manner. Additionally, it can reduce the problem to simpler tasks and allows the student to devote more time in understanding the problem.