**PUNE INSTITUTE OF COMPUTER TECHNOLOGY, PUNE - 411043**

# Department of Electronics & Telecommunication

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**REPORT**

**Project Based Learning**

**Academic Year: 2021-2022**

**(Semester –I )**

**Class : TE-8** **Course Name: Microcontroller**

**Group No.:- 04**

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**Problem Statement:**

## Implementing Simple Calculator Using Arduino on Proteus

**Theoretical Background:**

## Arduino:

- Arduino is an open-source electronics platform based on easy-to-use hardware and software.
- Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.
- Arduino has been used in thousands of different projects and applications.
- The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users.
- It runs on Mac, Windows, and Linux.
- Teachers and students use it to build low cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics.

Library Used in arduino code:

**Keypad.h ->** Keypad is a library for using *matrix* style keypads with the Arduino. As of version 3.0 it now supports mulitple keypresses.**It** won't need external resistors or diodes because the library uses the internal pullup resistors and additonally ensures that all unused column pins are high-impedance.

**System Design :**

**Arduino Code:**

```
#include<Keypad.h>
const byte ROWS = 4; //four rows
const byte COLS = 4; //four columns
char keys[ROWS][COLS] = {
  {'7','8','9','/'},
  {'4','5','6','*'},
  {'1','2','3','-'},
  {'c','0','=','+'}
};

byte rowPins[ROWS] = {2,3,4,5}; //connect to the row pinouts of the keypad
byte colPins[COLS] = {6,7,8,9}; //connect to the column pinouts of the keypad
int i=0;
double d=0,result=0;
char arr[10], prev_key=0;
Keypad keypad = Keypad( makeKeymap(keys), rowPins, colPins, ROWS, COLS );
void setup(){
   Serial.begin(9600);
}
void loop(){
  char key = keypad.getKey();

  if (key){
     Serial.print(key);
     if(key == '+' || key == '-' || key == '*' || key == '/')
     {
        if(prev_key==0)
          result=atol(arr);
        i=0;
     }
     else
     {
       arr[i++]=key;
       arr[i]=NULL;
     }
```

```
    if(key == '+' || key == '-' || key == '*' || key == '/')
    {
       calculate(prev_key);
       prev_key=key;
    }

    if(key == '=')
    {
      calculate(prev_key);
      d=(long int)result;
      if(d==result)
      {
        Serial.println(result,0);
      }
      else
      {
        Serial.println(result);
      }
      arr[0]=NULL;
    }

    if(key == 'c')
    {
     Serial.println(" ");
    }
  }
}
  int calculate(char ch)
  {
   switch(ch){
    case '+':
     result=result+atol(arr);
     break;
    case '-':
     result=result-atol(arr);
     break;
    case '*':
     result=result*atol(arr);
     break;
    case '/':
     result=result/atol(arr);
     d=1;
     break;
     case 'c':
      result=0;
      arr[0]=NULL;
      i=0;
      prev_key=0;
     break;
     default:
      int j=0;
```

```
  }
 }
```

**Implementation:**

D0

1st pin of the keyboard

D1

2nd pin of the keyboard

D2

3rd pin of the keyboard

D3

4th pin of the keyboard

D4

5th pin of the keyboard

D5

6th pin of the keyboard

D6

7th pin of the keyboard

D7

8th pin of the keyboard

D8

Register select pin of LCD (pin 4)

D9

Enable pin of LCD (pin 6)

D10

Data pin 4 (pin 11)

D11

Data pin 4 (pin 11)

D12

Data pin 4 (pin 11)

D13

Data pin 4 (pin 11)

+5V

Connected to Vdd pin of LCD (pin 2)

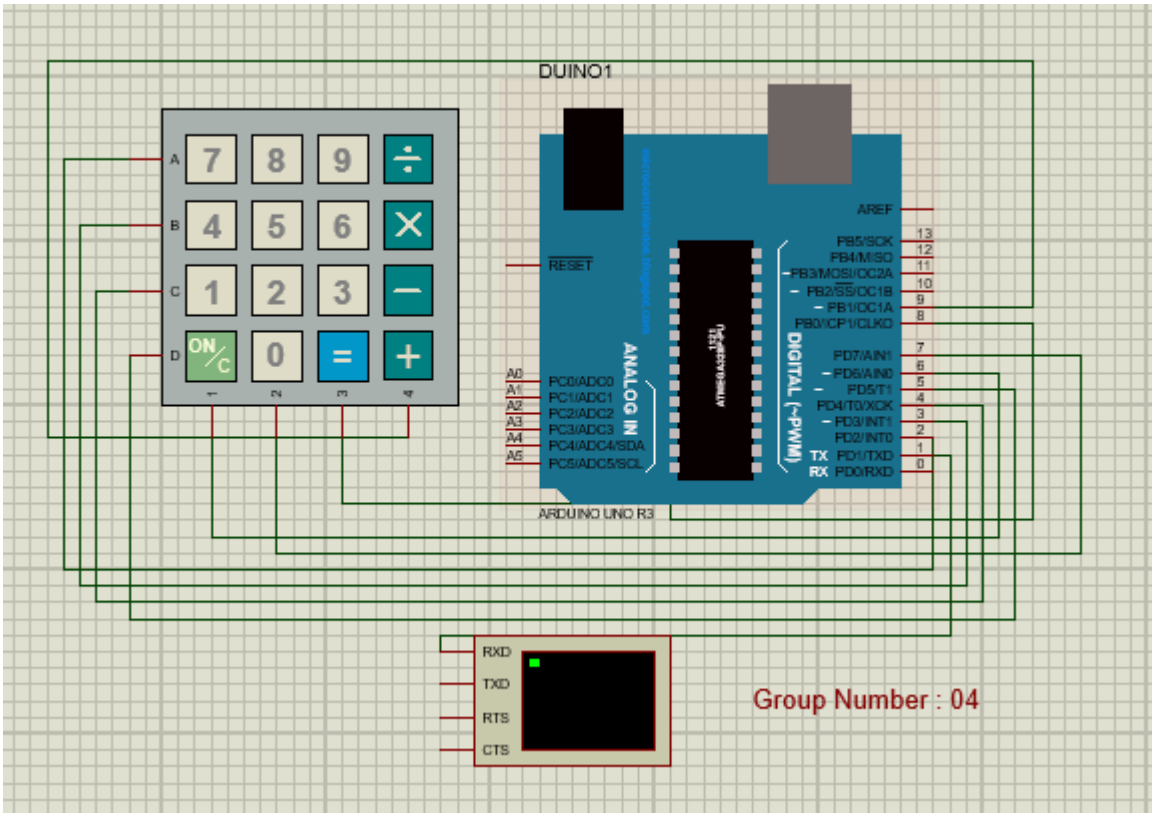
Ground

Connected to Vss, Vee and RW pin of LCD (pin 1, 3 and 5)

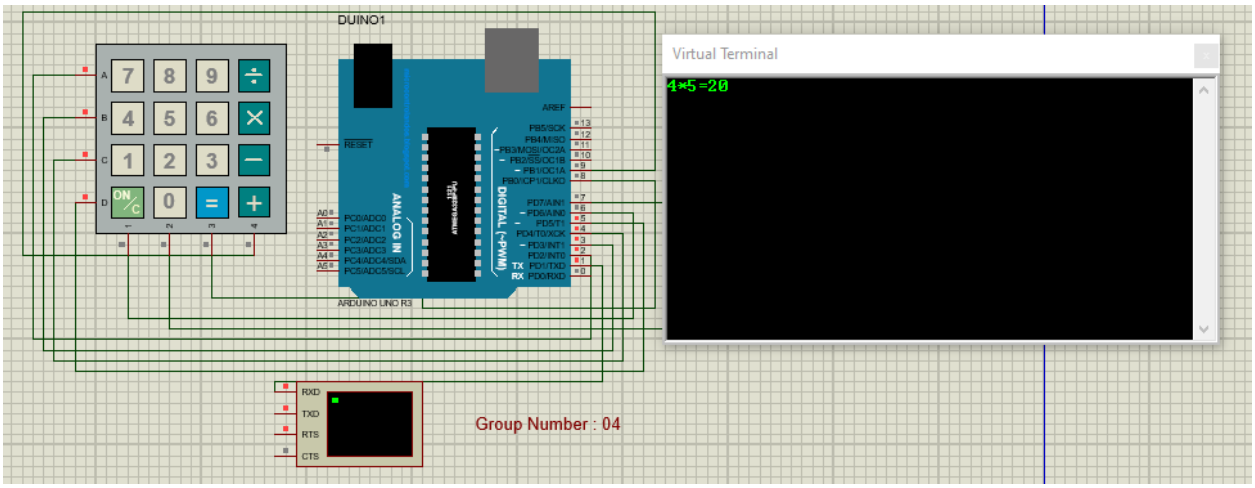
**Uploaded URL:**

**https://drive.google.com/drive/folders/1LbPcekSMqP-5lGg9plPQPL-LhtHwYjBr?usp=sharing**

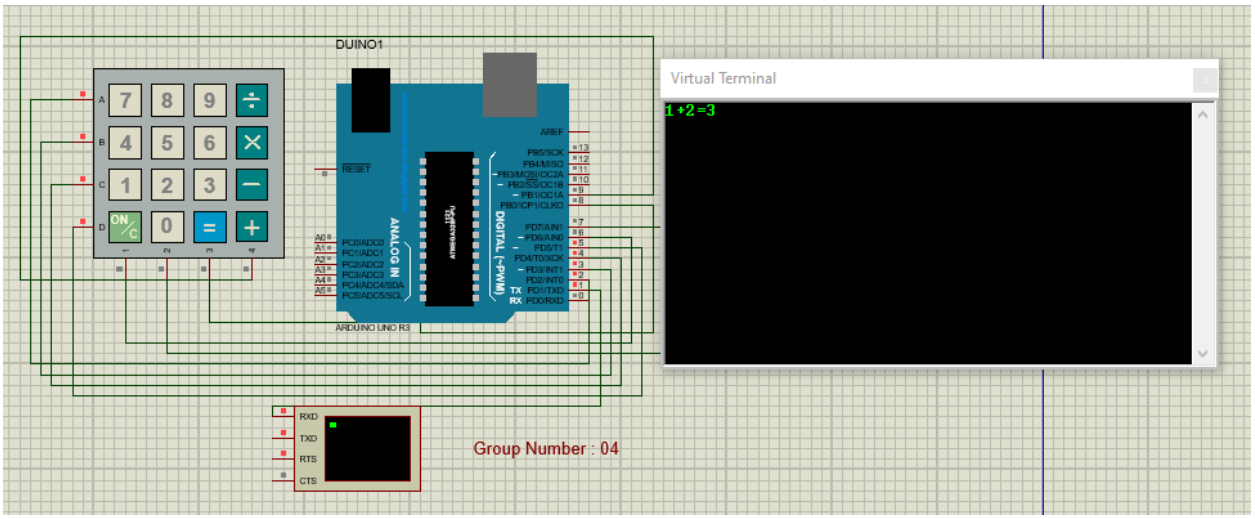
**Snapshot:**



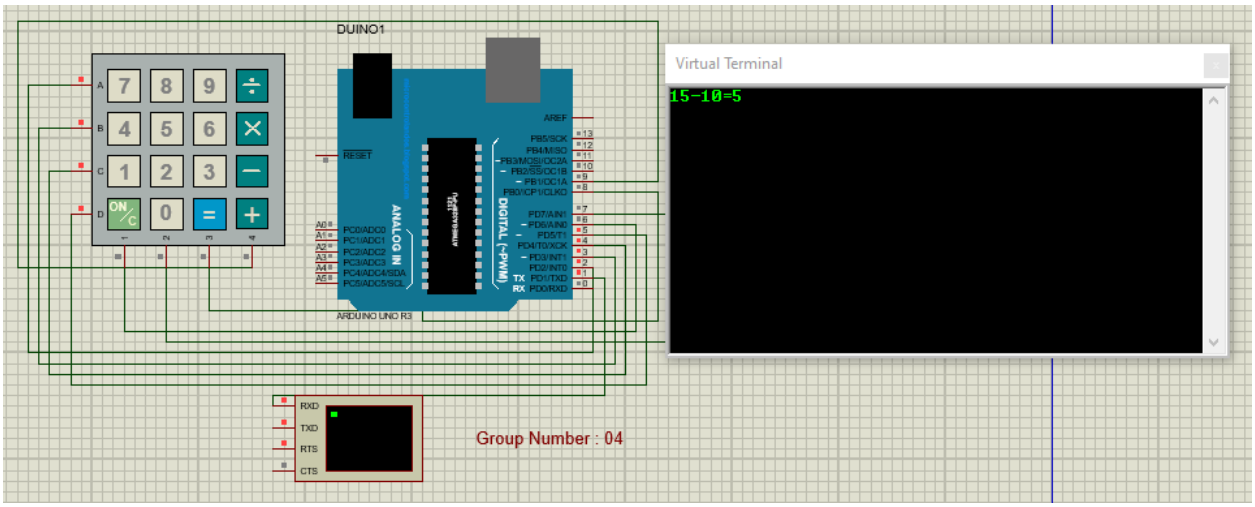
**Multiplication:**



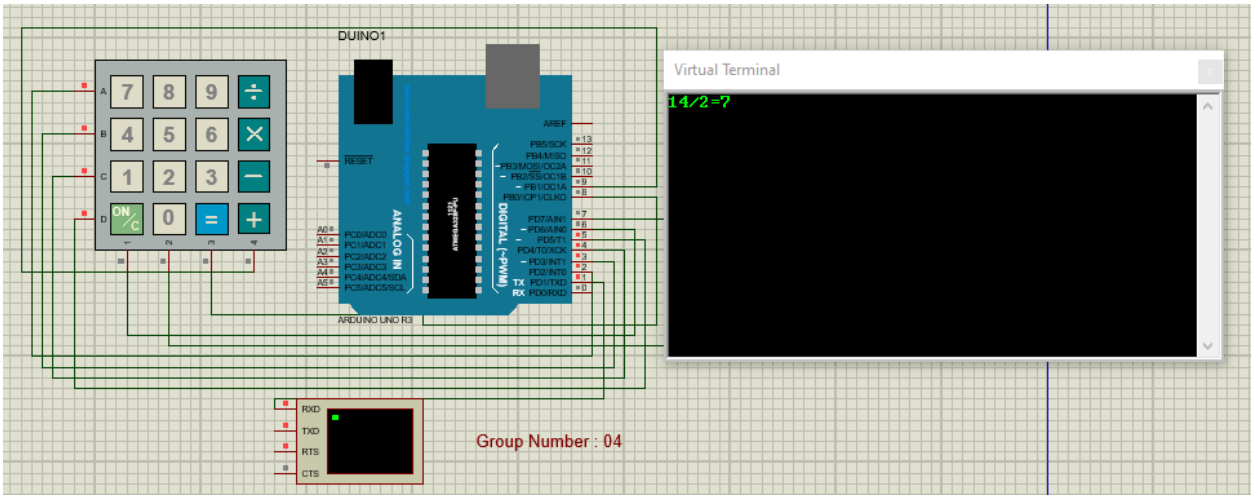

**Addition**:




**Subtraction:**



Division:




**Learning Outcomes:**

- **Learned how to interface keypad hardware with arduino**
- **Learned to Import arduino files and its respective libraries in proteus.**
- **Learned how to use Keypad.h library.**
- **Implemented Arduino code to work with keypad and to be used as calculator.**

**Conclusion:**

**Successfully Implement Arduino project to perform Arithmetic operations using keypad hardware and keypad.h library.**