Department of Computer Science and Engineering

Project Report of

Course Code: EEE-2422

Course Title: Electrical Drives and Instrumentation

Design and Implementation of an Arduino-based Smart Electronic Voting Machine

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CHAPTER 1
INTRODUCTION

1.1 Introduction:

An electronic voting machine (EVM) is a portable instrument for the purpose of conducting elections to the parliament, legislature and local bodies like panchayats and municipalities.

Our project is about an Arduino based EVM which is designed to modernize the election procedure and there is no scope for invalid votes and total secrecy of voting data is maintained and it also facilitates quick and accurate counting.

1.2 Objective:

- ✧ Electronic voting technology intends to speed the counting of ballots, reduce the cost of paying staff to count votes manually and can provide improved accessibility for disabled voters. Also in the long term, expenses are expected to decrease.
- ✧ Results can be reported and published faster.
- ✧ Voters save time and cost by being able to vote independently from their location. This may increase overall voter turnout. The citizen groups benefiting most from electronic elections are the ones living in rural areas far away from polling stations and the disabled with mobility impairments.

CHAPTER 2
PROTOTYPE DESIGN & IMPLEMENTATION

2.1 Equipment Description:

• Software:

- ➢ Proteus ,
- ➢ Arduino IDE

• Hardware:

1. Arduino UNO Board :

Arduino board is a micro-controller that is used to accept inputs from sensors connected and provide an output action on the desired device connected to it. The sensor inputs can be from light-detecting

sensors, motion sensors (Ultrasonic or IR), temperature sensors, etc. The output from this device can be received through other output devices such as LED, Buzzer, Serial monitor, etc.

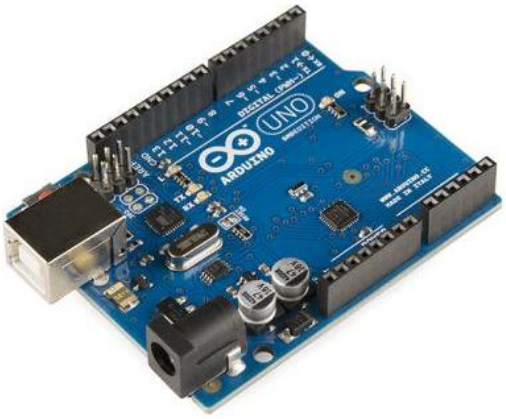

Fig – 1 : Arduino UNO Board

2. Push-Button Switch:

Push Button Switch is widely used as a standard input "buttons" on electronic projects. These work best when you mount it on PCB but can also be used on a solderless breadboard for temporary connections in prototypes. The pins are normally open and when the button is pressed they are momentarily closed and complete the circuit. This tactile switch also offers reliable dome contact technology and strong tactile feedback, with multiple operating forces to choose from.

Fig – 2 : Push-Button Switch

3. LCD display:

An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data.

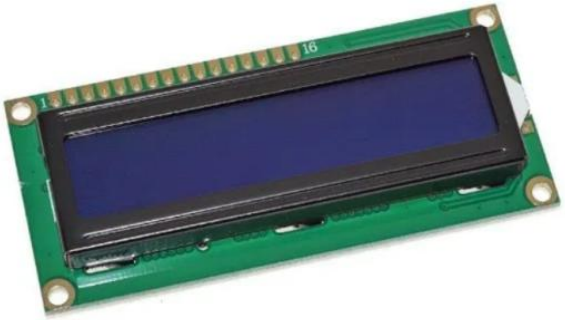

Fig – 3 : LCD Display (16*2)

4. Resistor:

Resistors are passive devices that restrict the flow of current or divide the voltage through the circuit. The input power passes through these resistors and then to the sensors to avoid damage.

Fig – 4 : Resistor

5. Breadboard :

The breadboard is the basic component of any circuit building process. All components, be it input sensors or output display devices are connected to the power supply, microcontroller using wired

connections through a breadboard. The holes in the breadboard are in series.

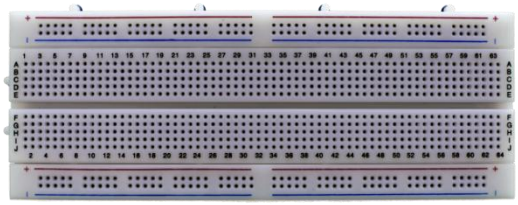

Fig – 5 : Breadboard

6. LED :

Light Emitting Diode(LED) is a commonly used light source. It is a semiconductor that emits light when current flows through it.

Fig – 6 : LED

7. Potentiometer :

The potentiometer is used to control volume and contrast of an electrical devices by comparing voltage with a known voltage.

Fig – 7 : Potentiometer

8. Jumper Wires :

These are the main components that are used to establish the connections between different devices of the circuit.

Fig – 8 : Jumper Wires

2.2 Circuit Diagram:

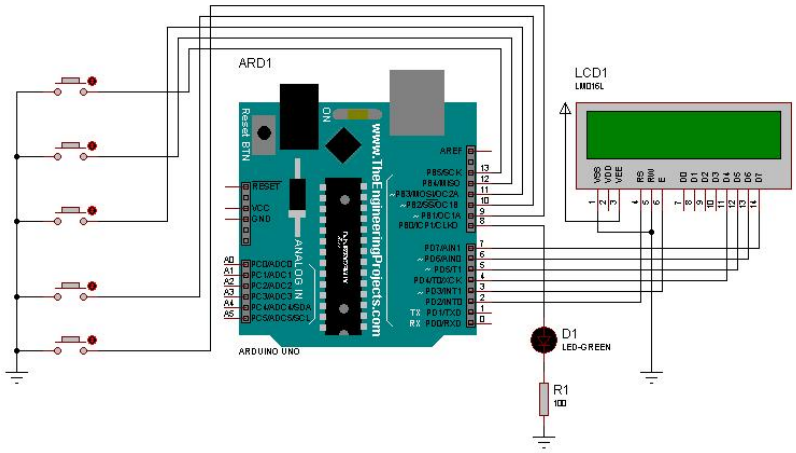

Fig. 9. An illustration of overall circuit diagram of the system

The connections to be made are given below:

Assemble the circuit as shown in the figure above. Connect the 5 push buttons to digital pin 13, 12, 11,10,9 of Arduino. Similarly connect pin 4,6,11,12,13,14 of LCD to digital pin 2, 3, 4, 5, 6, 7 of Arduino.

2.3 Hardware Setup:

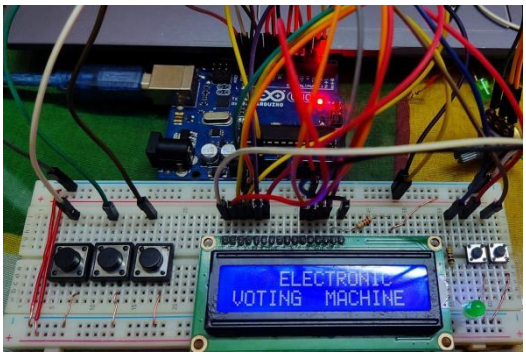

Fig. 10. Hardware setup of the system

Fig.11. Final look of the implemented system

CHAPTER 3
WORKING PROCEDURE & APPLICATION

3.1 Working Principle:

Here Arduino is the heart and brain of this system. Arduino controls the complete voting processes like reading button, incrementing vote value, generating a result, and sending vote and result in LCD Display.

We have added three buttons that are assigned for team IIUC, team NSU, team EDU, and the other two buttons for reset and calculating or displaying results. Here's, how the system works:

- ⇨ At the booth, a presiding officer will enable the voting system after the voter enters the polling compartment. As soon as he starts the system, LCD Display will show the teams that are seeking to be elected.
- ⇨ A voter needs to press the button against the team of his/her choice and then a green light glows which confirms the polling of a particular vote.
- ⇨ Once the officer has pressed the reset button, our system will be ready to receive the next vote. This process shall continue until all the voters have conducted casting their votes.
- ⇨ When voting process is completed, presiding officer can press Result button and the LCD will show the number of votes against the name of the teams. And will display a verdict of the election.

3.2 Applications:

Electronic Voting Machine (EVM) is used for various purposes, such as-

- ☑ To elect candidate in National Elections along with local bodies like panchayats and municipalities.
- ☑ Parliaments use EVM to pass proposed legislation to governments.
- ☑ Taking mass opinions.
- ☑ To select a deserving candidate for a particular designation in schools, businesses, and organizations.

CHAPTER 4
OBSERVATION & DISCUSSION

4.1 Observation:

Updates on the LCD Display throughout each process, are demonstrated below -

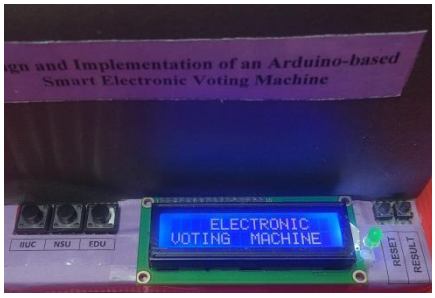

Fig 12: Welcome Note

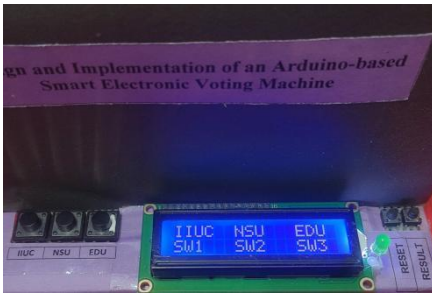

Fig 13: Voting Candidates

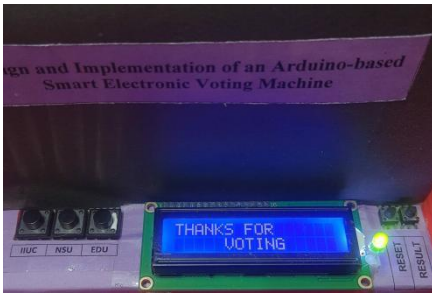

Fig 14: Notification after Voting

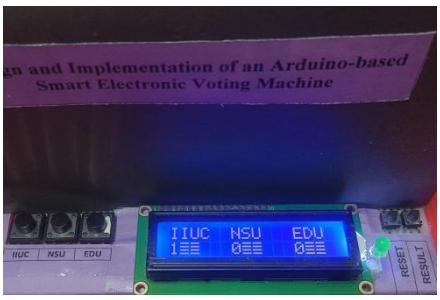

Fig 15: Vote Count

Fig 16: Election Verdict

4.2 Discussion:

In this project we describe the design, construction and operation of a digital voting machine using an Arduino profoundly. Again we also portray counting system of votes, and cost analysis. We have implemented the system in such a way that it can detect if any of the teams get same number of votes and it shows a message accordingly. Also, if no vote is casted, the system also recognizes it.

CHAPTER 5
COST ESTIMATION & FUTURE SCOPE

5.1 Cost Analysis:

Table I shows the entire feasibility assessment for this project. Here 'Tk' is referred to Bangladeshi Currency- Taka (BDT).
Total Installation Cost = Component Cost + Miscellaneous (variable) Cost = (1662+100) = 1762Tk.

TABLE I: COST ESTIMATION TABLE OF THE IMPLEMENTED PROTOTYPE

Component Name	***Component Type***	***Item Quantity***	***Unit Price (BDT)***	***Total Price (BDT)***
Arduino Board	Arduino UNO R3 Development Board	1	1100	1100
Push-Button	Push-To-ON Reset Tact Switch	5	5	25
LCD display	Standard LCD 16x2 Display	1	250	250
Resistor	1kΩ, 100Ω	2	5	10
Breadboard	GL-12 Breadboard (Large-830)	1	105	105
LED 5V	5V	1	5	5
Potentiometer	10K	1	17	17
Jumper Wires	8.5 inch Jumper Wire	20	7.5	150
	Miscellaneous Cost (BDT)			*100Tk*
	Total Installation Cost (BDT)			***1762Tk***

5.2 Future Scope:

Coming to the future scope of this project is that we can increase the number of the team/candidate as per requirement. Furthermore, we can combine our proposed system with Biometric Technology using finger print sensor which will enhance the overall security & performance of the electronic voting machine.

APPENDIX

```
#include<LiquidCrystal.h>
LiquidCrystal lcd(2,3,4,5,6,7);
int sw1=13;
int sw2=12;
int sw3=11;
int sw4=10;
int sw5=9;
int a=0;
int b=0;
int c=0;
#define led 8

void setup() {
  pinMode(sw1,INPUT);
  pinMode(sw2,INPUT);
  pinMode(sw3,INPUT);
  pinMode(sw4,INPUT);
  pinMode(sw5,INPUT);
  pinMode(led,OUTPUT);
  Serial.begin(9600);

lcd.begin(16,2);
lcd.setCursor(4,0);
lcd.print("ELECTRONIC");
lcd.setCursor(0,1);
lcd.print("VOTING");
lcd.setCursor(8,1);
lcd.print("MACHINE");
delay(1500);
lcd.clear();

digitalWrite(sw1,HIGH);
digitalWrite(sw2,HIGH);
digitalWrite(sw3,HIGH);
digitalWrite(sw4,HIGH);
digitalWrite(sw5,HIGH);
lcd.begin(16,2);
```

```
lcd.setCursor(0,0);
lcd.print("IIUC");
lcd.setCursor(6,0);
lcd.print("NSU");
lcd.setCursor(12,0);
lcd.print("EDU");
lcd.setCursor(0,1);
lcd.print("SW1");
lcd.setCursor(6,1);
lcd.print("SW2");
lcd.setCursor(12,1);
lcd.print("SW3");
delay(500);
}
void loop()
{
if(digitalRead(sw1)==LOW)
{
   a=a+1;
   digitalWrite(led,HIGH);
   lcd.clear();
   lcd.setCursor(0,0);
   lcd.print("THANKS FOR");
   lcd.setCursor(5,1);
   lcd.print("VOTING");
   while(digitalRead(sw4)== HIGH);
   digitalWrite(led,LOW);
   admin();
   }

else if(digitalRead(sw2)== LOW)
{
   b=b+1;
   digitalWrite(led,HIGH);
   lcd.clear();
   lcd.setCursor(0,0);
   lcd.print("THANKS FOR");
   lcd.setCursor(5,1);
   lcd.print("VOTING");
   while(digitalRead(sw4)==HIGH);
```

```
    digitalWrite(led,LOW);
    admin();
  }
  else if(digitalRead(sw3)== LOW)
  {
    c=c+1;
    digitalWrite(led,HIGH);
    lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("THANKS FOR");
    lcd.setCursor(5,1);
    lcd.print("VOTING");
    while(digitalRead(sw4)==HIGH);
    digitalWrite(led,LOW);
    admin();
  }
  if(digitalRead(sw5)== LOW)
  {
    lcd.begin(16,2);
    lcd.setCursor(0,0);
    lcd.print("IIUC");
    lcd.setCursor(6,0);
    lcd.print("NSU");
    lcd.setCursor(12,0);
    lcd.print("EDU");
    lcd.setCursor(0,1);
    lcd.println(a);
    lcd.setCursor(6,1);
    lcd.println(b);
    lcd.setCursor(12,1);
    lcd.println(c);
    delay(5000);
    lcd.clear();
    int d=a+b+c;
    if(d)
    {
    if(a>b && a>c )
    {
     lcd.setCursor(0,0);
     lcd.print("CONGRATS");
```

```
  lcd.setCursor(5,1);
  lcd.print("IIUC WINS");
  delay(5000);
  lcd.clear();
 }
 else if(b>a && b>c )
 {
  lcd.setCursor(0,0);
  lcd.print("CONGRATS");
  lcd.setCursor(5,1);
  lcd.print("NSU WINS");
  delay(5000);
  lcd.clear();
 }
 else if(c>b && c>a )
 {
  lcd.setCursor(0,0);
  lcd.print("CONGRATS");
  lcd.setCursor(5,1);
  lcd.print("EDU WINS");
  delay(5000);
  lcd.clear();
 }
 else
 {
 lcd.setCursor(0,0);
 lcd.print("NO RESULT");
 lcd.setCursor(0,1);
 lcd.print("OR TIE");

 delay(5000);
 lcd.clear();

 }
 }
 else
 {
 lcd.print("NO VOTE");
 delay(5000);
 lcd.clear();
```

```
    }
}
}
int admin()
{
   if(digitalRead(sw4)== LOW)
{
   lcd.begin(16,2);
   lcd.setCursor(0,0);
   lcd.print("IIUC");
   lcd.setCursor(6,0);
   lcd.print("NSU");
   lcd.setCursor(12,0);
   lcd.print("EDU");
   lcd.setCursor(0,1);
   lcd.print("SW1");
   lcd.setCursor(6,1);
   lcd.print("SW2");
   lcd.setCursor(12,1);
   lcd.print("SW3");
   delay(500);
}
}
```

- end -