

Design and Development of Electronic Voting Machine (EVM) Using Arduino

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Abstract:

The Design and Development of Electronic Voting Machine (EVM) using Arduino aims to provide an innovative and efficient solution for the electoral process. This project explores the utilization of Arduino microcontroller boards to create a functional EVM that can be used in voting systems. The EVM is designed to provide a user-friendly interface, accurate vote counting, and secure data storage.

1. Introduction

The project involves software development and testing procedures. The software development phase focuses on designing the user interface, which guides voters through the voting process. The interface displays candidate names OR party symbols, and input mechanisms like buttons that allow voters to make their choices. Security measures are implemented to prevent multiple voting and ensure data integrity through encryption and authentication techniques. Vote storage and result calculation are essential components of the EVM. This system securely stores vote data to maintain confidentiality and integrity. Result calculation logic is implemented based on specific requirements, such as majority voting. The testing and calibration procedures are also conducted to ensure the functionality, accuracy, and reliability of the EVM.

2. METHODOLOGY

The proposed system of EVM is a set of majorly 3 components that is the Push Buttons, Arduino UNO as Interfacing Device and the LCD Display. The EVM machines are used to cast the votes during the elections. Whenever the voter push the Button to cast his or her vote to the candidate or to the party, the number of votes will be displayed in the provided LCD Screen. The Screen will also display that how many votes have been casted in real time. As soon as the voting is completed, the Final result can also be displayed on the LCD Screen that which party or the Candidates have won during the election.

3. Arduino UNO:-

The Arduino Uno is a microcontroller board, specifically the ATmega328P, which has an onboard Analog to Digital Converter (ADC) for receiving real-time analog sensor data. By employing control algorithms stored in its flash memory, the microcontroller processes the digital equivalent of the analog data. These algorithms are designed to extract the actual temperature, voltage, and current values from the sensor output signals.

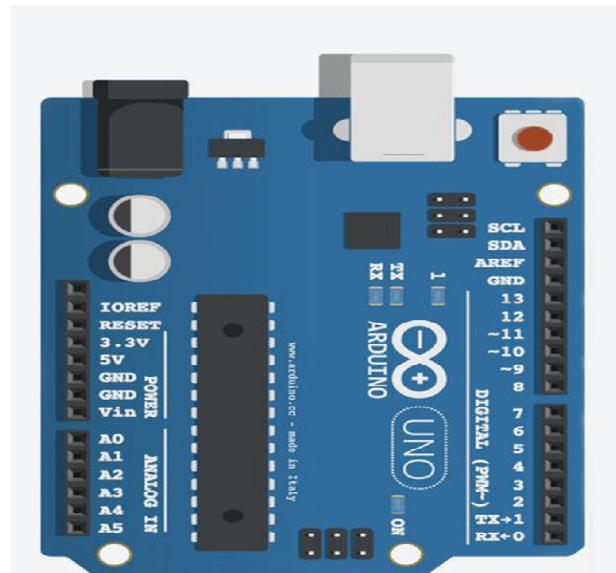


Figure 1: Arduino UNO Board

One notable feature of the Arduino Uno is its software-based reset mechanism. Instead of requiring a physical press of the reset button, the board enables a connected computer to initiate the reset process through a hardware flow control

line (DTR) of the ATmega8U2/16U2, connected to the reset line of the ATmega328 via a 100 nF capacitor. Activation of the DTR line (bringing it low) causes a brief drop in the reset line, triggering a reset of the microcontroller chip. However, this setup has specific implications. When the Arduino Uno is connected to a computer running Mac OS X or Linux, each software connection established via USB results in a reset. During this short period (approximately half a second), the Uno's boot loader becomes active. While the boot loader is programmed to ignore any malformed data (anything other than a valid code upload), it does intercept the initial few bytes of data sent to the board immediately after the connection is opened.

CONNECTIONS:-

- PIN A1 to Button 1 namely BJP
- PIN A2 to Button 2 namely INC
- PIN A3 to Button 3 namely AAP
- PIN A4 to Button 4 namely OTH
- PIN A5 to Button 5 for Final Result
- The other terminals of all the buttons to be grounded

4. 16*2 LCD Display

A "16 by 2 LCD display" is a widely used alphanumeric liquid crystal display (LCD) module. The "16 by 2" specification indicates that the display has 16 columns and 2 rows, allowing it to show 16 characters per line and 2 lines of text. The LCD module has control pins (RS, RW, E) and data pins (D4-D7). In our project, we will utilize a 16 by 2 LCD display to numbers of votes casted to each party and the candidate. The LCD display comprises two registers: the Command register and the Data register. The Command register stores instructions for the LCD, such as initialization, screen clearing, setting cursor position, and display controlspeed.

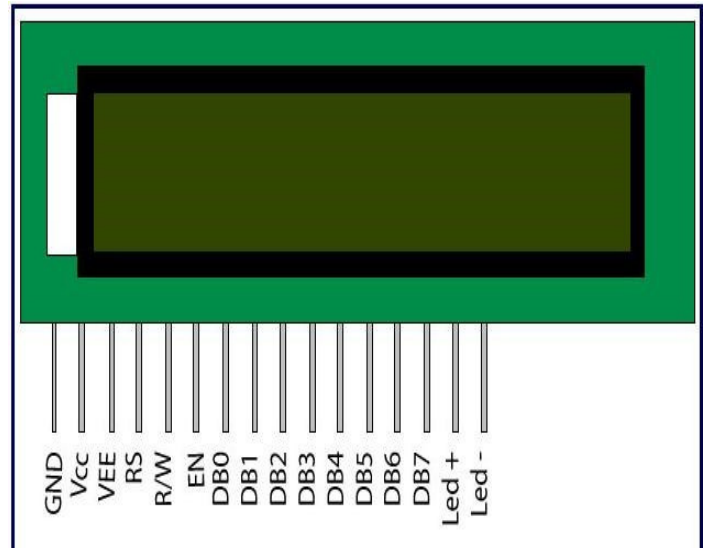


Figure 2: 16*2 LCD Display

On the other hand, the Data register holds the actual data that should be displayed on the LCD. This data corresponds to the ASCII value of the character that needs to appear on the screen.

CONNECTIONS

- Connect the VDD Pin 2 of LCD Display to the Power Supply
- Connect the VEE Pin 3 of LCD Display to the Potentiometer
- Connect the PIN 4 (RS) of LCD Display to PIN 12 of Arduino UNO
- Ground the PIN 5(RW) of LCD Display to Ground
- Connect the PIN 6 (E) of LCD Display to PIN 11 of Arduino UNO
- Connect the PIN 11 (D4) of LCD Display to PIN 5 of Arduino UNO
- Connect the PIN 12 (D5) of LCD Display to PIN 4 of Arduino UNO
- Connect the PIN 13 (D6) of LCD Display to PIN 3 of Arduino UNO
- Connect the PIN 14 (D7) of LCD Display to PIN 2 of Arduino UNO
- Short Circuit the VSS Pin 1 of LCD Display to Pin RW 5 of the LCD Display

5. Assembly of the Electronic Voting Machine(EVM)

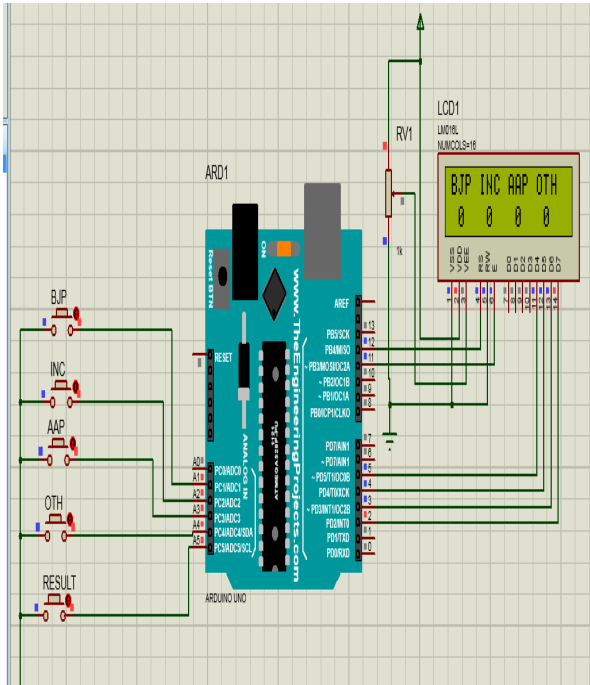


Figure 3: Assembly of Components

6. Programming and Illustration

This section of the paper depicts the development of the Software part. In recent times there are many EVMs in working stage, but it might be costly and expensive with use of multiple sensor such as IR Sensor or etc. In our proposed system there is negligible use of any sensor. The flow chart representation is given below.

The next Flowchart represents the sequential flow to run the program to perform the simulation. When the processing Unit Arduino process the data of Votes from the Input side, the same information is converted into Digital Signal. The processing device segregate the data appropriately which is transmitted to the receiving unit and displays the Number of votes casted to each party with final results on the LCD Screen.

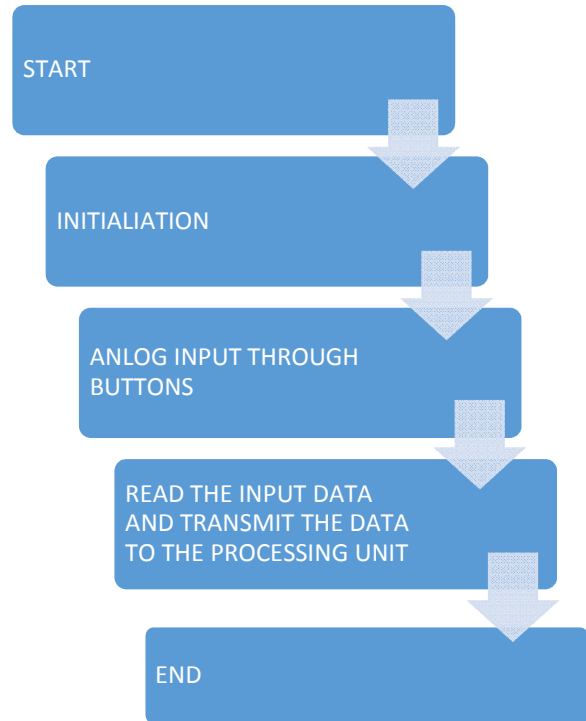


Figure 4: Flowchart representation of Input

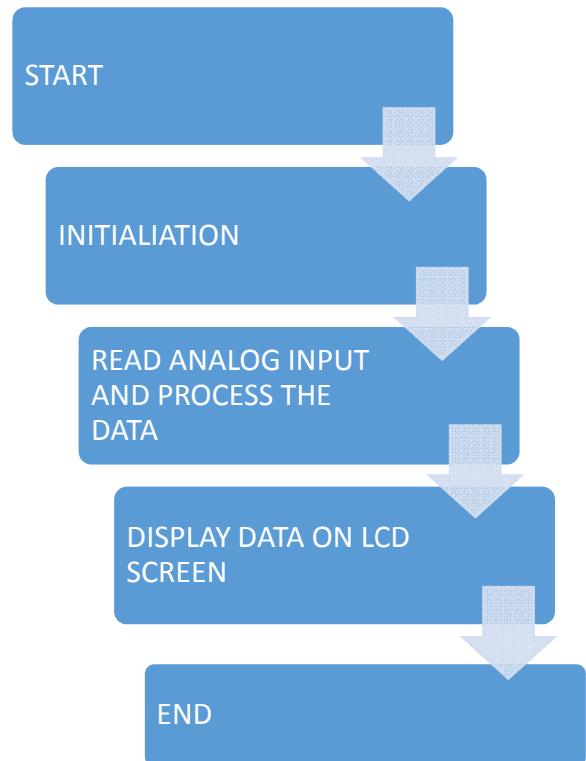


Figure 5: Flowchart Representation of Output

7. RESULT AND DISCUSSION

The initial setup of the Electronic voting machine is shown above, here the LCD and Push buttons are interfaced to the Arduino according to the pin connection. The above image shows the polling count of the vote for individual party. The polling is done by pressing the Push button followed by display of the Result after pressing RESULT push button.

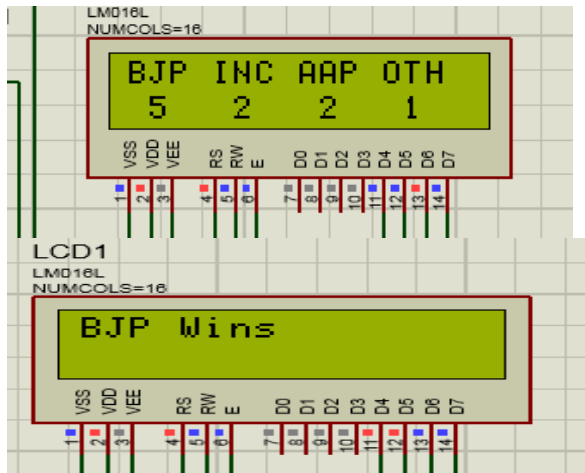


Figure 6: Testing 1 of the Project with Result

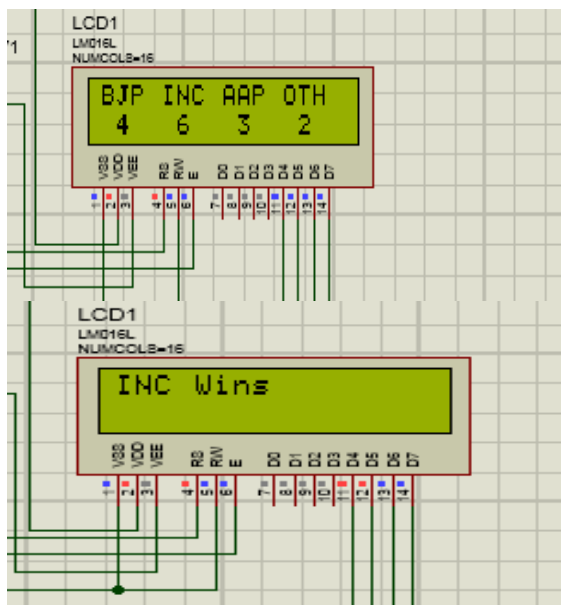


Figure 7: Testing 2 of the Project with Result

CONCLUSION AND FUTURE SCOPE: -

This project aims to provide a practical and cost-effective electronic voting solution using Arduino, which can be utilized in various voting scenarios. The EVM design

adheres to legal requirements, implements robust security measures, and undergoes comprehensive testing to ensure the accuracy and integrity of the voting process. The outcome of this project can contribute to the advancement of electronic voting systems by providing an accessible and efficient technology solution

Funding Source

None

8. References

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