# Electronic Voting Machine using Auduino

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# Project Report: Electronic Voting Machine(EVM)

## 1. Introduction

Electronic Voting Machines (EVMs) are technological solutions developed to improve the efficiency and reliability of election processes. Traditional ballot systems often suffer from issues such as vote tampering, human error, and time-consuming counting procedures. EVMs mitigate these issues by providing a streamlined, accurate, and tamper-resistant voting process. This project focuses on developing a basic prototype of an EVM using the Arduino UNO microcontroller. The system allows voters to cast votes using push buttons, confirms their input with LED indicators, and displays confirmation messages on an LCD screen.

## 2. Objective

The main objective of this project is to design and implement a functional prototype of an Electronic Voting Machine that can:

- Register votes through button presses.
- Display real-time voting feedback on an LCD.
- Indicate successful voting through LED indicators.
- Store vote counts temporarily for final tallying.

This project serves as an educational tool to understand the workings of embedded systems in practical applications such as voting.

## 3. Why We Chose This Project

The Electronic Voting Machine (EVM) project was chosen for its relevance to modernday democratic processes. It provides a practical demonstration of embedded systems in realworld applications. This project allowed us to explore core electronics concepts like interfacing, input handling, output display, and microcontroller programming.

Additionally, it offers great educational value and addresses the need for more transparent and efficient voting mechanisms in developing regions.

## 4. Components and Explanation

### Arduino UNO (1x)

The Arduino UNO is an open-source microcontroller board based on the ATmega328P. It has 14 digital I/O pins, 6 analog inputs, a 16 MHz quartz crystal, USB connection, power jack, and a reset button. In this project, it serves as the brain of the EVM, processing inputs from the push buttons and controlling the LCD and LEDs accordingly.

### 16x2 LCD Display (1x)

This display unit is capable of showing 16 characters on two lines. It communicates with the Arduino via digital I/O pins and is used to display prompts, voting confirmation, and result messages. It enhances the user interface by providing visual feedback.


### 10k Ohm Potentiometer (1x)

A potentiometer is used to adjust the contrast of the LCD. Without it, the text on the LCD may be too faint or too dark to read.


Push Button Switches (3x to 5x)

Each button represents a candidate. Pressing a button triggers the Arduino to register a vote for the respective candidate.

220 Ohm Resistors (2x)

These resistors are used in series with LEDs to limit the current and protect the LEDs from burning out.

5mm LEDs (2x)

One LED is used to confirm that a vote has been successfully cast. A second LED can be used as a power or error indicator.

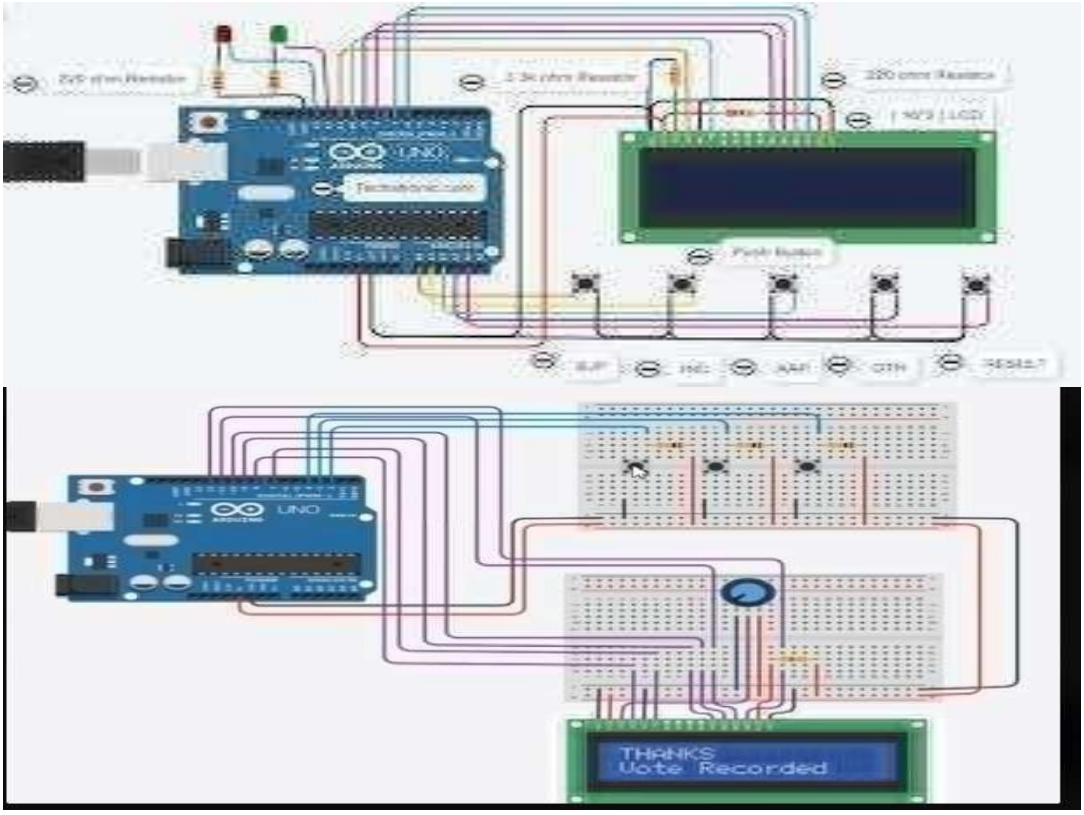
Jumper Wires

Jumper wires are used to make electrical connections between components and the Arduino board.

## 5. Circuit Diagram

A visual circuit diagram includes connections:

- LCD to Arduino digital pins (usually pins 12, 11, 5, 4, 3, 2)
- Buttons to digital pins with internal pull-up resistors
- LEDs to digital pins through 220 ohm resistors
- Potentiometer to LCD contrast pin
- Power and GND connections to all components




## 6. Working Principle

Once powered, the EVM initializes and displays "EVM Ready" on the LCD. Each candidate is linked to a specific push button. When a voter presses a button:

• A vote counter variable for that candidate is incremented.

• The LED turns on briefly to indicate the vote was received.

• The LCD displays a message like "Vote Casted: Candidate X." - After a short delay, the system resets to accept the next vote.

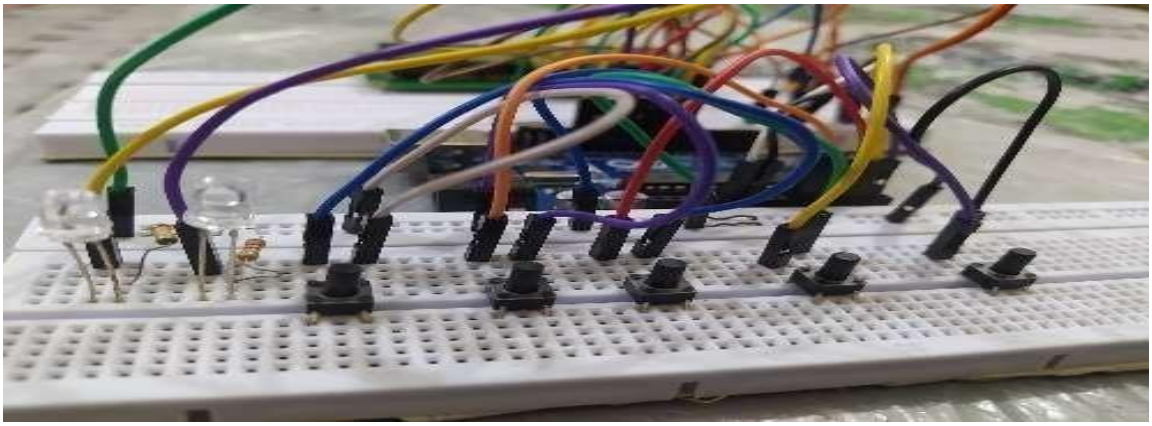
All vote counters remain stored in Arduino's memory until the system is reset or powered off.

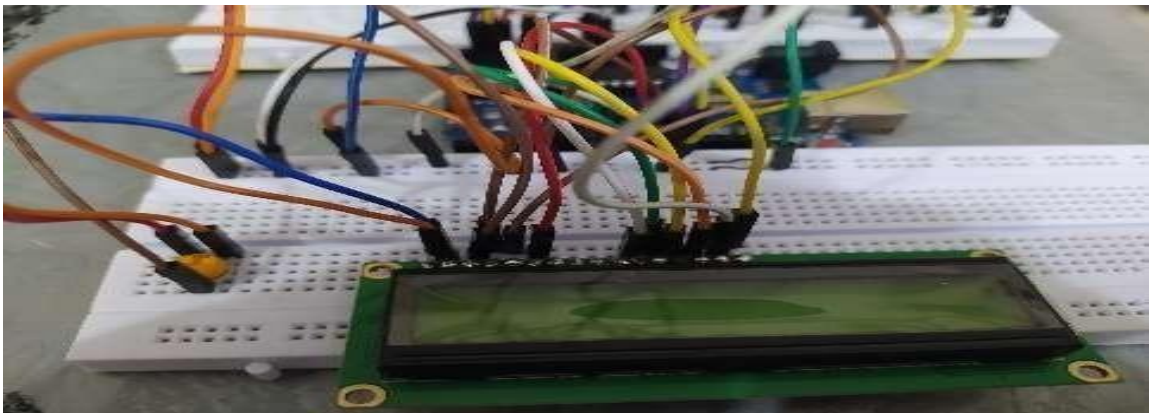
## 7. Arduino Code Overview

The code utilizes the Liquid Crystal library to control the LCD. Button states are read using digital Read () on assigned pins. Votes are tallied in an array. LEDs are controlled via digital Write () to provide visual feedback. The main loop continuously monitors button presses and updates the system state accordingly.

## 8. Assembled EVM Project

The assembled EVM (Electronic Voting Machine) project shown below represents the final implementation of the designed circuit. It consists of essential components such as input buttons for casting votes, indicator LEDs or a display for vote confirmation, and a control section that processes the inputs. All components are securely mounted on a breadboard or PCB, with proper connections made as per the circuit schematic. The setup demonstrates the working of a basic voting system where each vote is registered electronically, simulating a real-world voting process.





## 9.Applications

- Educational demos in electronics and computer science classes
- Mock elections in schools and colleges
- Demonstration systems for NGOs and civic organizations
- Development and testing platform for future voting technologies

## 10.Future Enhancements

- Password-Protected Results: Only authorized personnel can view vote totals.
- Result Display Function: A dedicated button or mode switch displays the total votes per candidate.
- Data Persistence: Storing votes in EEPROM or SD card so data isn't lost on reset.
- Biometric or RFID Voter Authentication: Prevents multiple votes and improves security.
  - Wireless Functionality: Using Bluetooth or Wi-Fi modules to send vote data to a central server.
- Touchscreen Integration: Replacing buttons with a user-friendly graphical interface.
- Real-Time Clock Module: For timestamping votes to track voting windows.

## 11.Conclusion

This EVM prototype demonstrates the practical application of microcontrollers in the field of secure and efficient voting systems. While it serves as a basic model, it lays the foundation for more complex and secure systems. This project not only teaches hardware software integration but also highlights the importance of reliability, user interface, and expandability in real-world electronic systems.

## 12.References


1. https://youtu.be/yeEX9Z7e64I?si=tjdbQY_sb4TmxjKBLiquidCrystal Library -
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3. 1x 16x2 Lcd display
4. 1ok ohm potentiometer https://amzn.to/3Fog49W
5. 5x Push button switches https://amzn.to/3EYw8xn
6. -2x 220 ohm resistors https://amzn.to/3VItz9y
7. 2x 5mm LED https://amzn.to/3gwz901
8. Jumper wires https://amzn.to/3uicE1N