A Report on

**Smart Electronic Voting Machine Using Arduino**

**Digital Clock Using Raspberry Pi Pico**

for

**Mini Project 1-b (REV- 2019 'C' Scheme) of Second Year, (SE Sem IV)**

in

**Electronics & Telecommunication Engineering**

by


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**UNIVERSITY OF MUMBAI**

**AY 2022-2023**

# CERTIFICATE

This is to certify that the project entitled **Smart Electronic Voting Machine and Digital Clock using Raspberry Pi Pico** is a bonafide work of

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submitted to the University of Mumbai in partial fulfillment of the requirement for the award of **Mini Project 1-b (REV- 2019 'C' Scheme) of Second Year, (SE Sem-IV)** in **Electronics & Telecommunication Engineering** as laid down by **University of Mumbai** during academic year **2022-23**

(_____)
**Examiner/Reviewer-1**

(_____)
**Examiner/ Reviewer -2**

**Name of Guide**

**Head of Department**

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# 1. INTRODUCTION

- **Arduino Uno**

## 1.1 Need

Electronic voting machines are needed to ensure that elections are fair and secure. Smart electronic voting machines are able to validate voter identity and securely store votes, as well as provide an auditable record of the election results. By using smart electronic voting machines, the voting process can be made faster, more secure, and more accurate .They are also designed to be more accessible and user-friendly, with features such as touchscreen interfaces and audio assistance.

## 1.2 Definition

Electronic voting (also known as e-voting) is voting that uses electronic means to either aid or take care of casting and counting ballots. Depending on the particular implementation, e-voting may use standalone electronic voting machines (also called EVM) or computers connected to the Internet (online voting).

- **Raspberry Pi Pico**

## 1.3 Need

Digital alarm clocks are available in various types and designs with different features and writing needs. Some digital alarm clocks come with a built-in pen holder and a memo pad for writing notes or reminders[1]. Others come with a built-in LED display that can be used as a writing board for writing notes or drawing pictures[1]. Some digital alarm clocks also come with a voice recorder feature that can be used for recording important notes or reminders

## 1.4 Definition

A digital clock using Raspberry Pi Pico is a time-keeping device that uses the Raspberry Pi Pico microcontroller board as its main component. The Raspberry Pi Pico is a small, low-cost microcontroller board that is ideal for simple projects such as a digital clock.

# 2. MINI PROJECT DESIGN (PRINCIPLE AND WORKING)

- Arduino Uno

## 2.1 Block Diagram

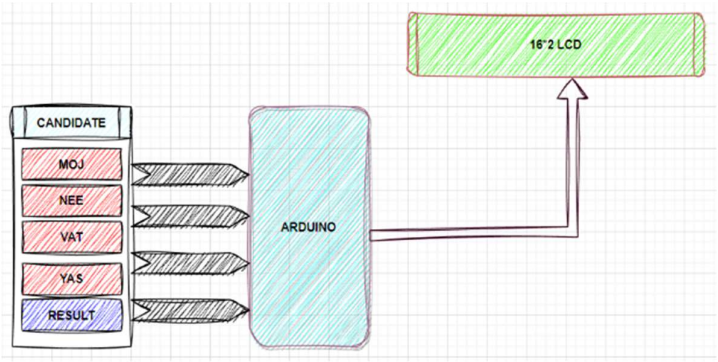


Fig: 2.1: Block Diagram of EVM

## 2.2 Block Diagram Description

Smart Electronic Voting Machine Using Arduino, we have used four pushbuttons for four different candidates who are taking part in the election. We can increase the number of the candidate as per requirement. When any voter press any of four buttons then respecting voting value will increment by one each time. After the whole voting process, the result button can be pressed to display the result.

## 2.3 Circuit diagram and Working

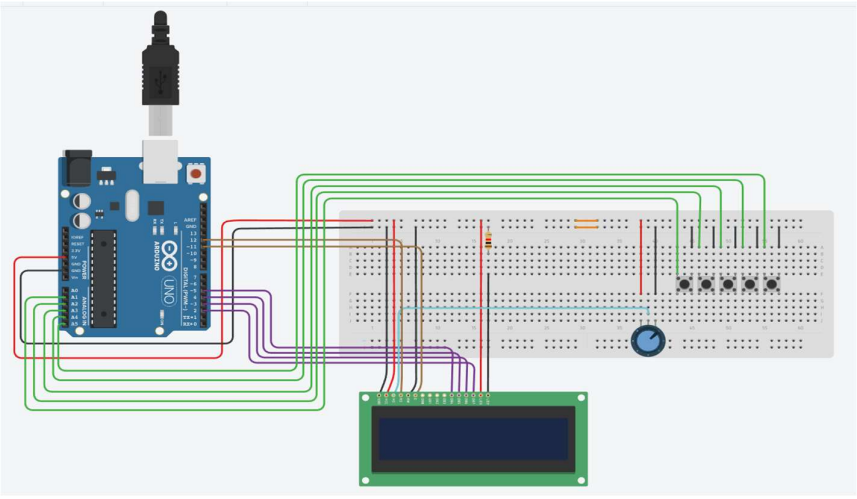

Fig: 2.2: Circuit Diagram of EVM

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.

Here we have added five buttons that are assigned for Mojes, Neeraj, Vatsal, Yash, and the last button is used for calculating or displaying results.

- Raspberry Pi Pico

## 2.4 Block Diagram

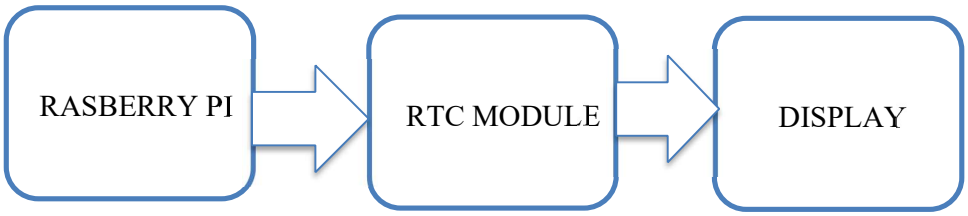


Fig: 2.3: Block Diagram of Digital Clock

## 2.5 Block Diagram Description

The RTC module provides accurate timekeeping even when the Raspberry Pi is powered off or restarted. The display block receives the time information from the timekeeping block and updates the display accordingly. The input block can use various input devices, such as buttons, switches, or a touch screen, to receive input from the user.

## 2.6 Circuit diagram and Working

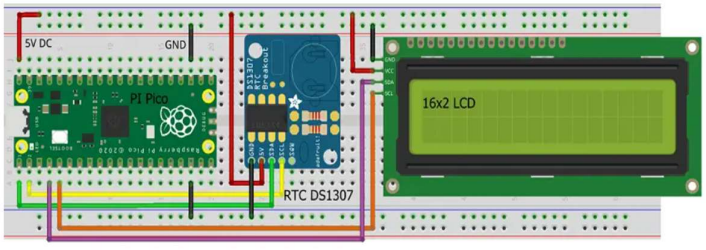


Fig: 2.4**:** Circuit Diagram of Digital Clock

The working of this project is simple. The RTC and LCD is connected with Raspberry Pi Pico using I2C protocol. The PICO acts as a brain of this project by running the micro python code in it. The RTC is responsible for storing the date and time. With the help of LCD display the date and time is displayed.

# 3. COMPONENTS/TOOL TO BE USED BY

- Arduino Uno

## 3.1 Components (with features related to project)

| Components | Specification |
|---|---|
| Arduino Uno | 1 |
| LCD 16*2 | 1 |
| 250KΩ Potentiometer | 1 |
| Pushbutton | 5 |
| 1KΩ Resistor | 1 |
| Breadboard | 1 |
| Jumpers Wires | As per required |

## 3.2 Software tools Description

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Tinkercad is an online simulation and modeling tool that allows users to design and test circuits before implementing them in real life. Tinkercad provides a virtual environment where users can design and simulate circuits using a graphical user interface.

- Raspberry Pi Pico

### 3.3 Components (with features related to project

| Components | Specification |
|---|---|
| Raspberry PI PICO | 1 |
| 16×2 LCD (I2C) Display | 1 |
| Micro USB data cable | 1 |
| Breadboard | 1 |
| Jumper Cables | As per required |

### 3.4 Software tools Description

Thonny is a popular Integrated Development Environment (IDE) that can be used to write and execute Python code on the Raspberry Pi. When using Thonny on the Raspberry Pi, you can use it to write and run Python scripts that interact with the hardware and peripherals connected to the Raspberry Pi.

## 4. MINI PROJECT IMPLEMENTATION STEPS USING ARDUINO

### 4.1 Implemented Steps (Snapshots/photos…)…

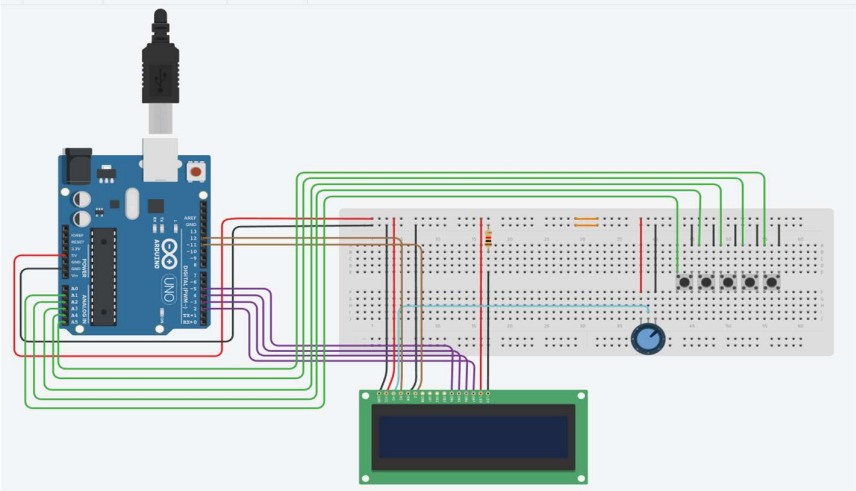

Fig: 4.1: Implementing Circuit in Tinker Cad

## 4.2 Simulation Results if any:

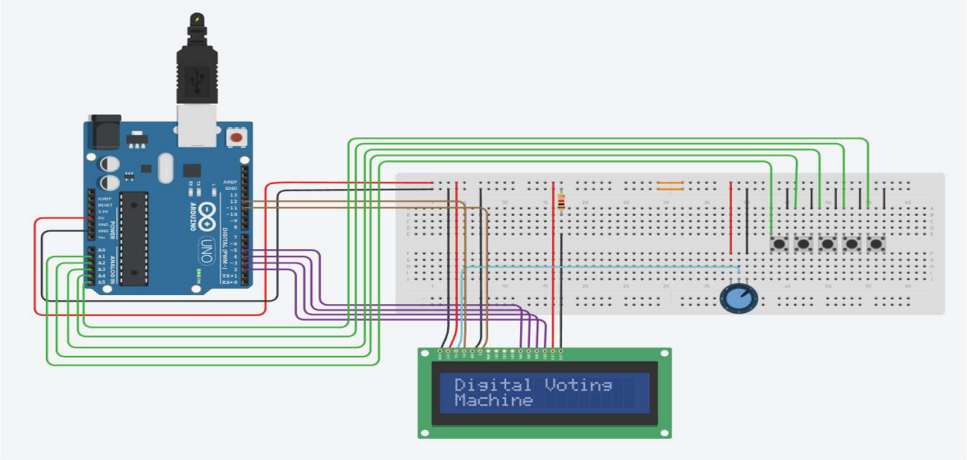


Fig: 4.2: Simulation in Tinker Cad

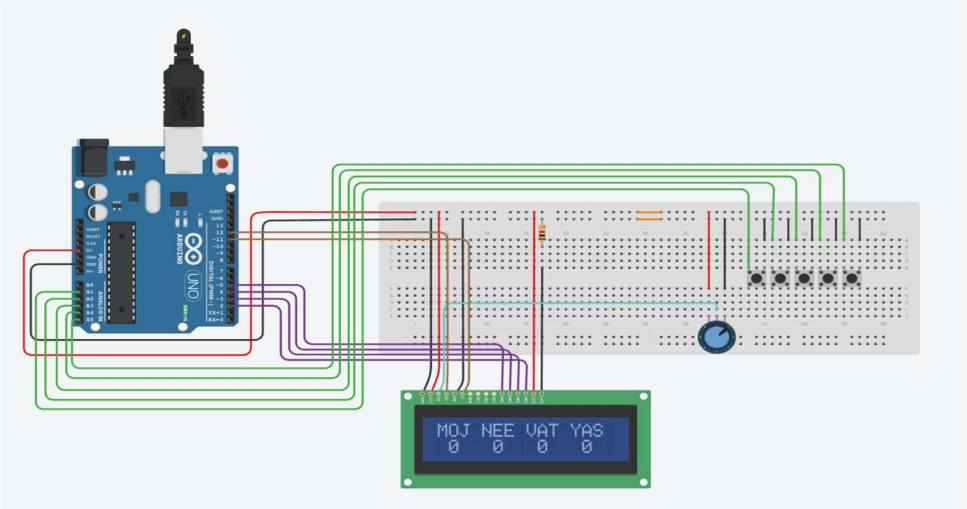


Fig: 4.3:Display the Number of Candidates on the LED Screen

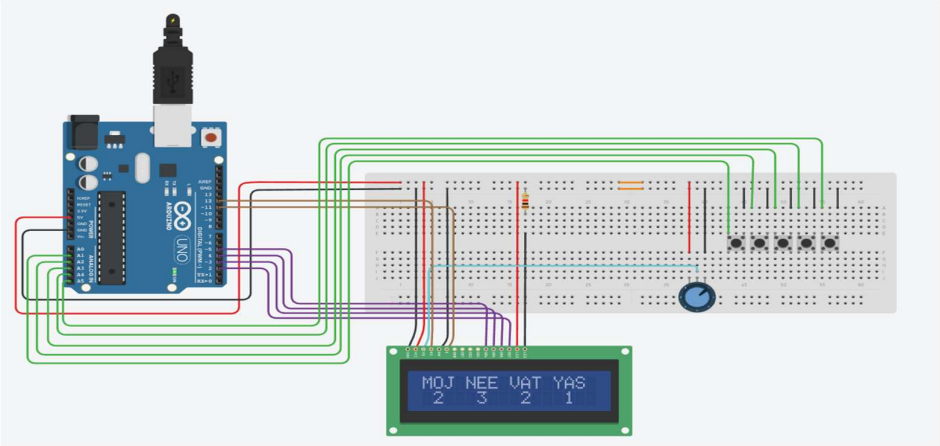

Fig: 4.4: Pressing keys to Vote

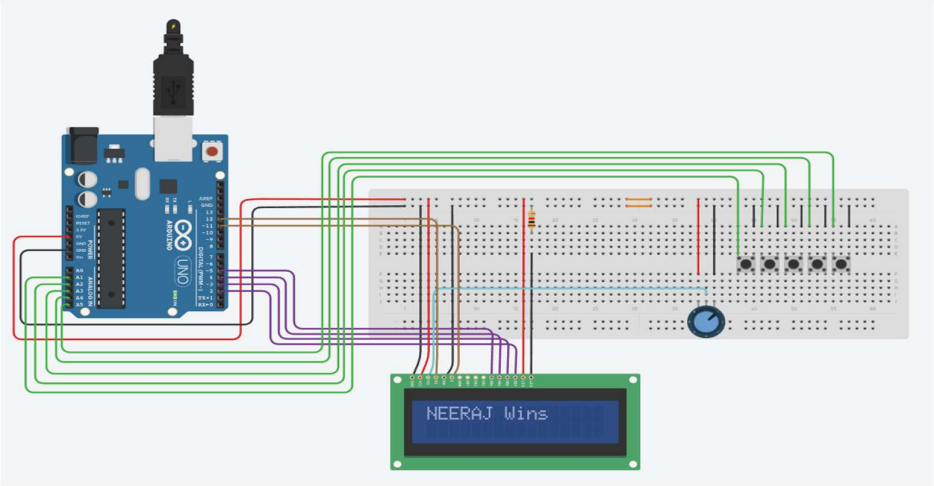


Fig: 4.5: Display Result

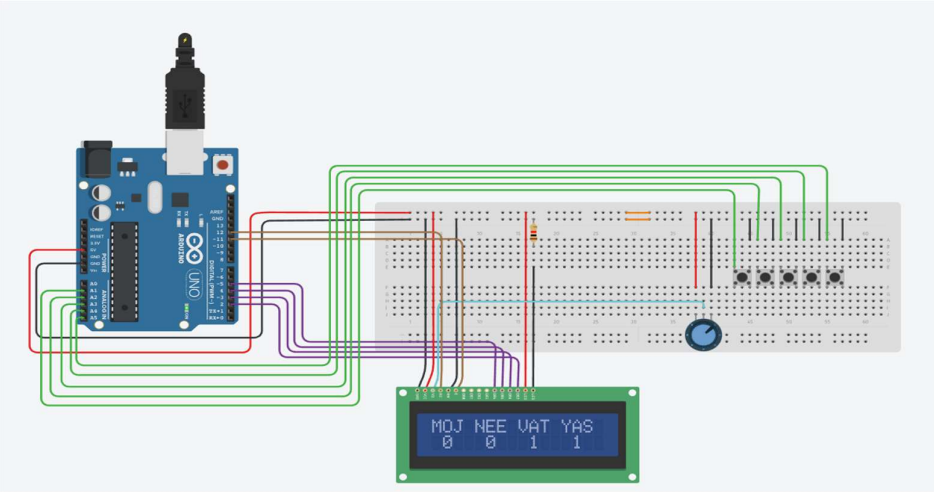


Fig.4.6: Two candidates getting equal number of votes.

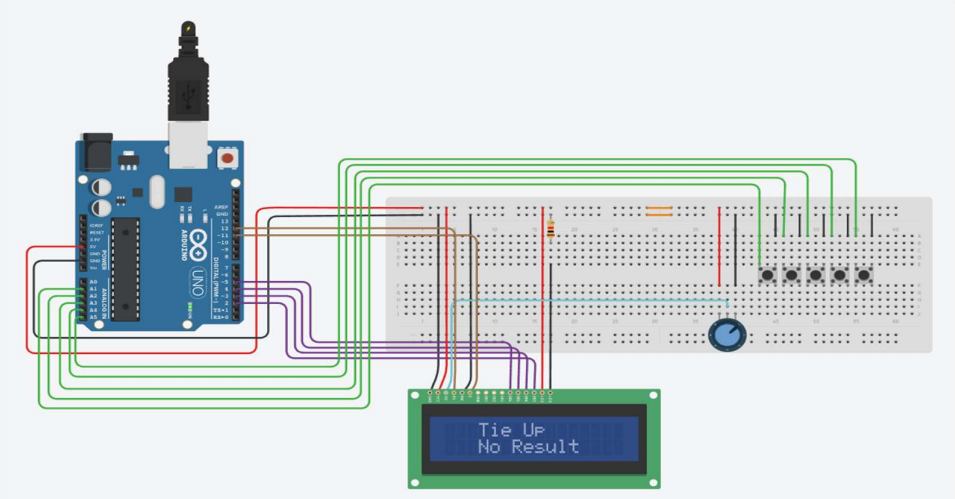


Fig: 4.7: Tie condition.

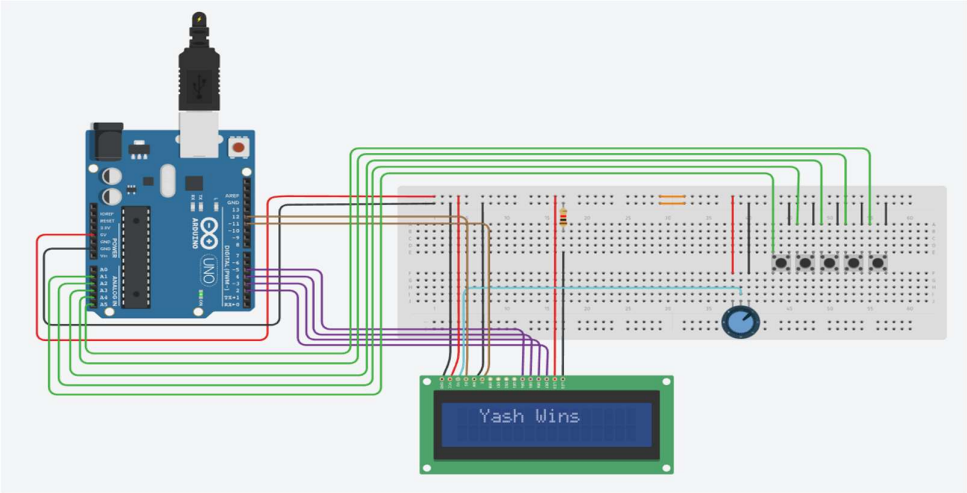


Fig: 4.8:Final Result

## 4.3 Results & discussion

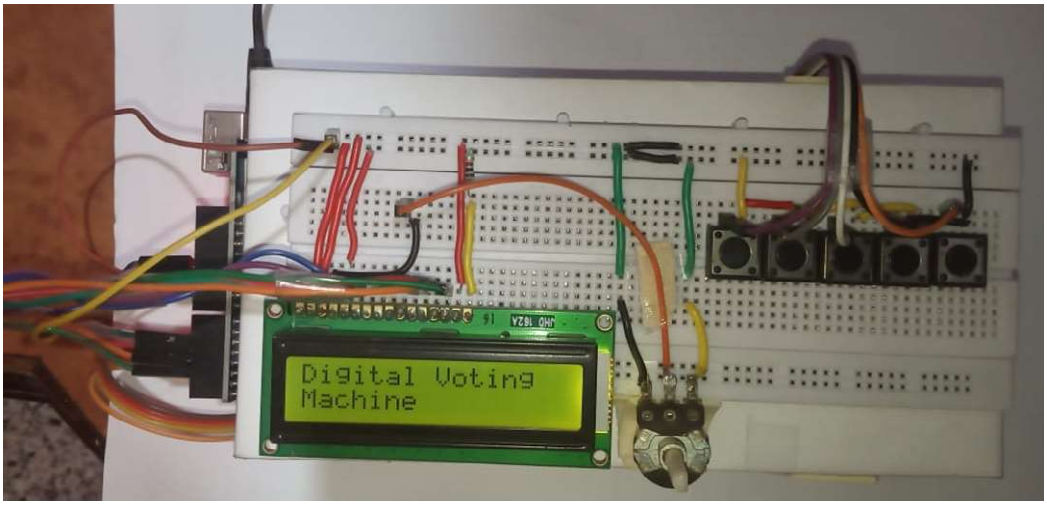


Fig: 4.9:Initialization of Hardware circuit

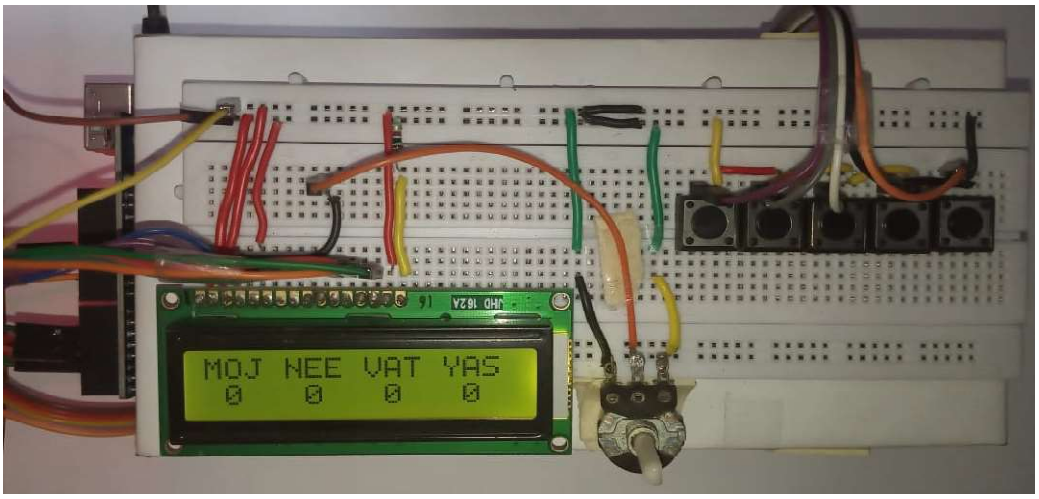


Fig: 4.9:Displaying the Candidates

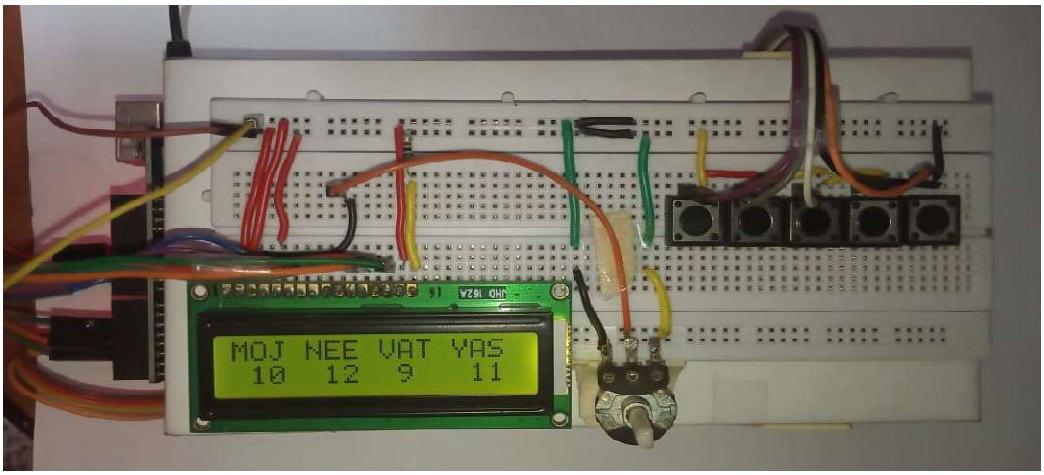


Fig: 4.10:Voting to Candiadtes

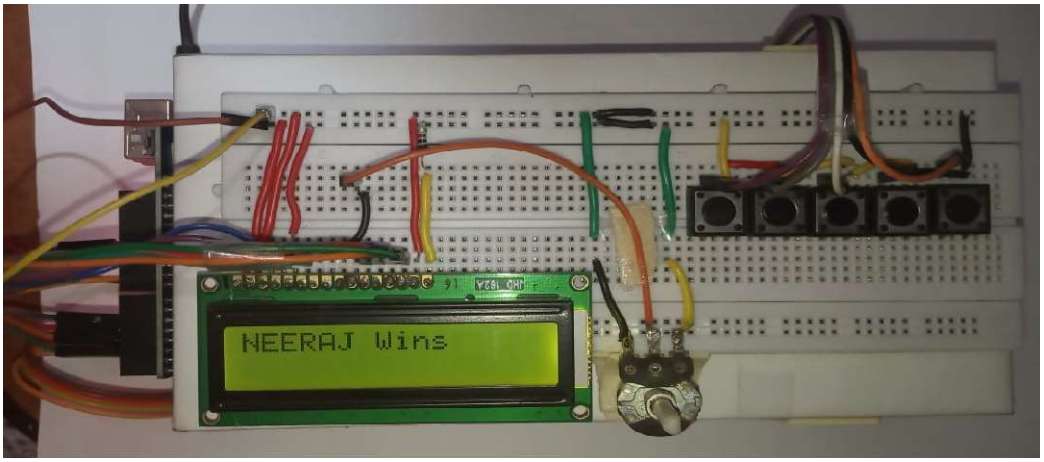


Fig: 4.11:Final Result

An electronic voting machine (EVM) using Arduino is a project that can be used to develop a low-cost and customizable voting system. The system can be designed to support multiple candidates and provide accurate and secure vote counting.One of the main advantages of using Arduino in the EVM system is its flexibility and ease of programming. Arduino boards are equipped with digital and analog input/output pins that can be used to interface with various components such as keypads, LCD displays, and RFID readers. This allows the system to be easily customized to fit the specific requirements of the voting process.

# 5. MINI PROJECT IMPLEMENTATION STEPS USING RASPBERRY PI PICO

## 5.1 Implemented Steps (Snapshots/photos)

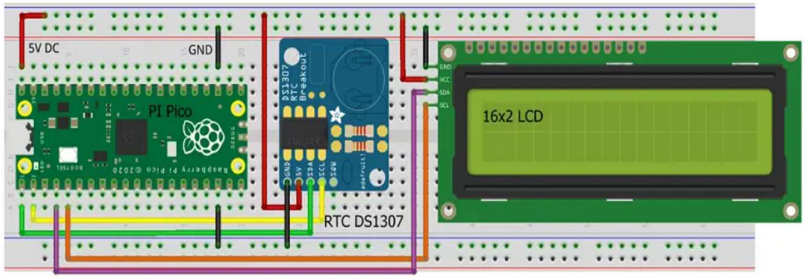


Fig: 5.1: Implementing The Circuit of Digital Clock

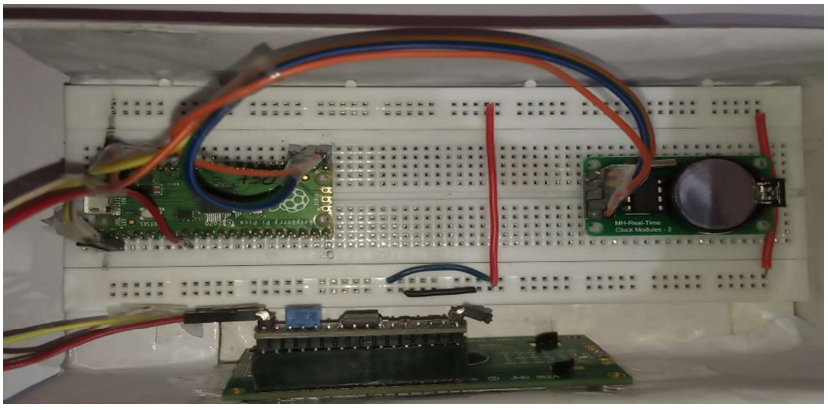

Fig: 5.2:Implementing Hardware

### 5.2 Results & discussion

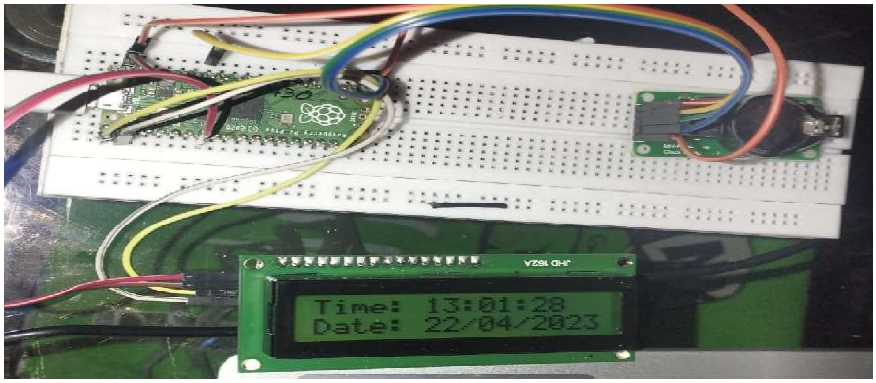


Fig: 5.: Final Result

Building a digital clock using Raspberry Pi Pico is a great way to learn about microcontrollers, programming, and electronics. Raspberry Pi Pico is an ideal platform for building digital clocks because of its low cost, small size, and high performance. It can be programmed using the Python language, making it accessible to beginners as well as experienced programmers. A digital clock built using Raspberry Pi Pico can have various features, including the ability to display time in different formats, set alarms, and adjust for daylight saving time.

## References:


### For Arduino

1. https://how2electronics.com
2. https://linuxhint.com
3. https://circuitdigest.com

### For Raspberry Pi Pico

1. https://www.instructables.com/Raspberry-Pi-Pico-Alarm-Clock/