ARDUINO-BASED FINGERPRINT VOTING SYSTEM: ENSURING ACCURATE AND FRAUD-FREE ELECTION

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Abstract-- The project aims to enhance the Indian voting system by implementing an Arduino-based biometric solution. It utilizes biometric authentication, specifically fingerprints, to ensure secure and accurate voter verification. The system maintains a registration database containing voter information, including fingerprints and phone numbers, to prevent fraudulent voting practices. A GSM module is employed to provide real-time feedback to voters, confirming successful vote casting and sending reminders to those who haven't voted. Duplicate voting attempts trigger alerts to the nearest police station. Google Spreadsheet is used for secure data storage, including the number of votes for each party and the final election results. By integrating biometric authentication, the project establishes a robust and transparent electoral process, eliminating fake voters and enhancing overall security. The system's features, such as real-time feedback, reliable data storage, and fraud prevention, contribute to a more efficient and trustworthy democratic system in India.

I. INTRODUCTION

The provided information discusses the integration of biometrics, specifically fingerprint recognition, in the voting process to ensure integrity and fairness. Biometrics, such as fingerprints, offer unique identifiers for authentication and verification purposes. The project focuses on fingerprint recognition as a biometric identifier due to its individuality and reliability.

The system enrolls eligible voters' fingerprints and stores them in a database. During the voting process, the system verifies the voter's identity by comparing their fingerprint with the enrolled data and their corresponding Aadhaar number. This authentication process prevents unauthorized voting and safeguards the integrity of the election.

To enhance accessibility and efficiency, the voting system is designed to operate online using platforms like Keypad. This allows voters to cast their votes remotely, from anywhere in the world. Real-time result computation and storage in the cloud provide faster and more streamlined election processes.

The traditional paper-based voting system was time-consuming and prone to errors. The

introduction of electronic voting machines brought some improvements but raised concerns about security and accuracy. The proposed Arduino-based biometric voting system aims to address these issues and ensure a secure and fraud-free electoral process.

The system's functionalities include fingerprint-based voter authentication, prevention of duplicate voting, real-time result storage in the cloud, and alert generation in case of malpractices. By leveraging biometrics, cloud technology, and Arduino programming, the project aims to create an efficient and reliable voting system.

The subsequent sections of the report will focus on the design, implementation, and evaluation of the Arduino-based biometric voting system. The effectiveness of the system in preventing malpractices and ensuring accurate election results will be assessed. The project ultimately aims to strengthen the Indian voting system, promoting transparency, trust, and the democratic values of the nation.

II.LITERATURE SURVEY

R. Murali Prasad, Polaiah Bojja, Madhu Nakirekanti (2016): The paper discusses user login using the Unique number and password for voting eligibility. It focuses on electronic data storage and transmission. The voter's fingerprint is verified using a reader, and the obtained information is checked against stored data. Voting is done using switches.

Rahil Rezwan, Huzaifa Ahmed, M. R. N. Biplob, S. M. Shuvo, Md. Abdur Rahman (2017): This paper proposes an electronic voting system based on a fingerprint database. It checks for voter registration and prevents multiple voting. Vote counting and result display are done efficiently, ensuring faster and accurate results.

Anandaraj S, Anish R, Devakumar P.V (2015): This survey discusses various existing voting methods, including electronic voting machines. It highlights the drawbacks of manual vote counting and proposes a secure biometric-based voting system. Fingerprint modules are used to authenticate voters, and a connected computer maintains the eligible voter database.

Rishav Chakraborty, Sujoy Deb, Amitava Mukherjee (2017): The paper presents an IoT-based voting system using fingerprint authentication. It emphasizes the need for secure voting and proposes a solution that ensures the integrity of the process. The system utilizes fingerprint recognition and IoT technologies to provide efficient and reliable voting.

N. S. Shrivastava, J. N. Jain, A. K. Sharma (2015): This survey explores the challenges in the existing voting systems and proposes an electronic voting system using biometric authentication. It discusses the advantages of biometrics in ensuring voter eligibility and preventing fraudulent activities.

V. S. Sowmya, G. Indumathi (2017): The paper presents a secure and efficient voting system using fingerprint recognition and encryption techniques. It highlights the importance of data security in the voting process and proposes a solution that ensures accurate and tamper-proof voting.

Ravi Kumar, Shiv Shankar Yadav, Anupam Mishra (2018): This survey discusses the use of biometrics, specifically fingerprints, in voting systems. It explores the benefits of biometric authentication in preventing impersonation and ensuring accurate voter identification.

M. Sudhakar, A. Dhanalakshmi (2019): The paper presents a secure electronic voting system using fingerprint recognition. It focuses on the importance of voter privacy and proposes a solution that guarantees confidentiality and integrity in the voting process.

Amol D. Dhumane, Atul R. Deshmukh (2016): This survey examines the challenges in the existing voting systems and proposes a biometric-based electronic voting system. It discusses the advantages of using fingerprints for authentication and highlights the need for secure and efficient voting processes.

B. K. Prasanna Kumar, G. V. Raghunadh (2016): The paper presents a comprehensive study on biometric-based voting systems. It discusses the advantages of biometrics in ensuring voter eligibility, preventing duplicate voting, and enhancing the security and accuracy of the electoral process.

III.METHODOLOGY

The methodology of the IoT-based voting machine with fingerprint verification involves several components and processes to ensure secure and accurate voting. The system comprises a controller (Arduino Uno), fingerprint module, Wi-Fi module (ESP8266), keypad, power supply, and cloud storage (Keypad). Here is the methodology explained in 200 words:

Verification Unit: This unit is responsible for enrolling and matching the fingerprints of the voters. The fingerprint module stores the fingerprint data of each voter in the database. The system also verifies the Unique number of the users stored in

the database to ensure eligibility. When a person attempts to vote, the system compares the scanned fingerprint with the stored data to authenticate the voter. If the fingerprint and Unique number match, the system allows the voter to proceed. In case of any mismatch, a message is displayed on the LCD screen.

Voting Unit: Once a voter is verified and deemed eligible, they can cast their vote through this unit. The voter selects their preferred candidate or party using the keypad. The vote is then recorded and stored. A register keeps track of the number of votes cast. The voting process is conducted through Keypad, an IoT platform, using the Wi-Fi module to establish the connection. This enables voters to vote from any location with an internet connection.

Result Compilation: The ballot paper and voting records are stored in the cloud storage system. Each candidate's vote count is stored in a separate field in the cloud. The final count for each candidate can be obtained from the Keypad platform. Additionally, the system can display the voting results on the serial monitor of the Arduino.

Security Measures: The system incorporates security measures to prevent malpractices such as multiple voting. If a person attempts to vote more than once, a buzzer is activated as an alert. The system ensures that each voter can only cast their vote once, enhancing the integrity of the election process.
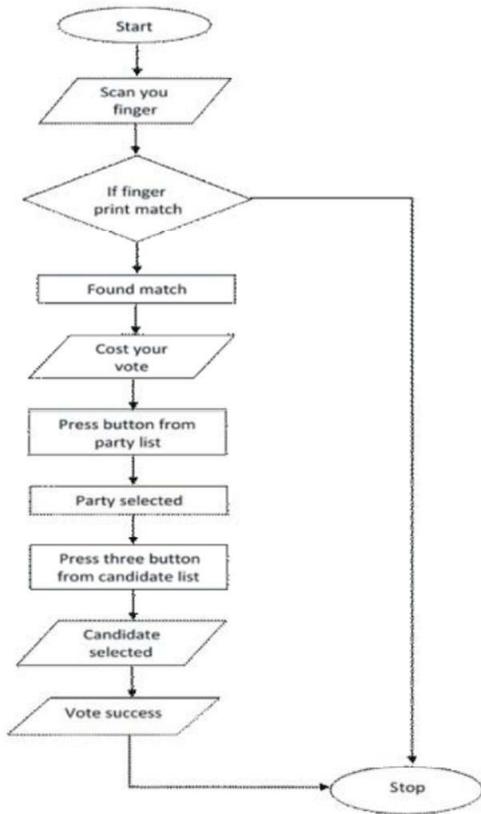
Fig: Flowchart of the fingerprint voting system.

By following this methodology, the IoT-based voting machine with fingerprint verification provides a secure, efficient, and transparent method for conducting elections, promoting accurate results and ensuring the democratic rights of citizens.

ALGORITHM:

Step 1: Start

Step 2: Scan your finger

Step 3: Finger Matched

Step 4: Found Match

Step 5: Cast your vote

Step 6: Press button from party list

Step 7: Party selected

Step 8: Press three button from candidate list

Step 9: Candidate selected

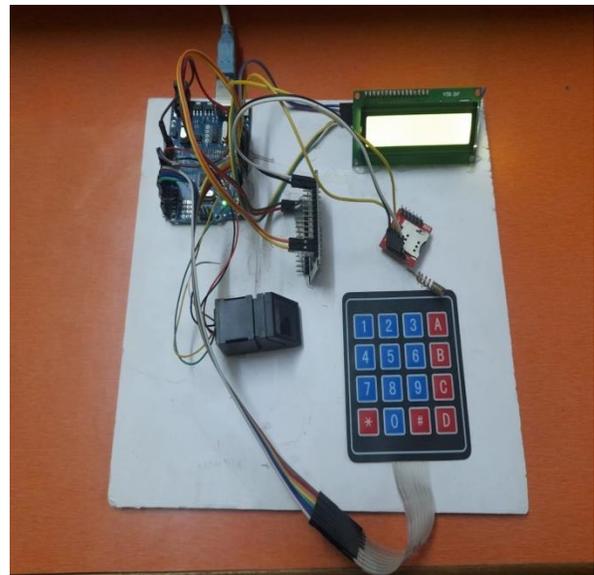Step 10: Vote Success

Step 11: Stop

IMPLEMENTATION AND RESULT:

Fig: Complete setup

Voting Data

Sheet1

	A	B	C	D	E
1	Date	Time	BJP	CONG	JDS
2	2023/05/13	1:19:20 AM	0	1	0
3	2023/05/13	1:19:01 AM	0	0	1
4	2023/05/13	1:18:16 AM	0	1	0
5	2023/05/13	1:18:06 AM	0	1	0
6	2023/05/13	1:17:06 AM	0	1	0
7	2023/05/13	1:16:54 AM	0	1	0
8	2023/05/13	1:01:57 AM	0	0	1
9	2023/05/13	1:01:48 AM	0	0	1
10	2023/05/13	1:01:16 AM	0	1	0
11	2023/05/13	1:00:16 AM	0	1	0
12	2023/05/13	12:55:42 AM	0	1	0
13	2023/05/13	12:55:16 AM	0	1	0
14	2023/05/13	12:50:59 AM	0	0	1
15	2023/05/13	12:50:35 AM	0	1	0
16	2023/05/13	12:50:25 AM	0	1	0
17	2023/05/13	12:48:52 AM	0	1	0
18	2023/05/13	12:48:03 AM	0	1	0
19	2023/05/13	12:47:10 AM	0	1	0
20	2023/05/13	12:45:41 AM	0	1	0
21	2023/05/13	12:44:51 AM	0	1	0
22	2023/05/13	12:44:41 AM	0	1	0
23	2023/05/13	12:44:02 AM	0	1	0
24	2023/05/13	12:43:49 AM	0	1	0
25	2023/05/13	12:43:12 AM	0	1	0
26	2023/05/13	12:43:02 AM	0	1	0
27	2023/05/13	12:42:53 AM	0	1	0
28	2023/05/13	12:42:43 AM	0	1	0
29	2023/05/13	12:42:30 AM	0	0	1
30	2023/05/13	12:42:13 AM	0	1	0
31	2023/05/13	12:41:35 AM	0	0	1
32	2023/05/13	12:41:08 AM	0	1	0
33	2023/05/12	8:28:25 AM	1	0	0
34	2023/05/12	8:24:08 AM	1	0	0
35	2023/05/12	8:23:39 AM	0	1	0
36	2023/05/12	8:23:08 AM	0	1	0
37	2023/05/12	8:22:13 AM	0	0	1
38	2023/05/12	8:22:00 AM	0	1	0
39	2023/05/12	8:08:47 AM	0	1	0
40	2023/05/12	8:08:36 AM	0	1	0

Fig: Result generated

V.CONCLUSION

The proposed concept is an IoT-based voting system aimed at digitizing the voting process in India, a democratic country where citizens have the right to choose their leaders. With the world becoming increasingly digitized, this project seeks to leverage technology to streamline the voting process. One significant advantage of this system is the reduction in the time required to announce election results. By incorporating biometric and Unique number verification, the system enhances security and ensures that each person can vote only once, thereby preventing multiple voting and fraudulent practices. Furthermore, this system has the potential to facilitate postal voting, expanding accessibility for citizens who are unable to physically visit polling stations. By embracing IoT technology, this voting system offers a more efficient, secure, and inclusive approach to elections, aligning with the digitization trends observed worldwide.

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