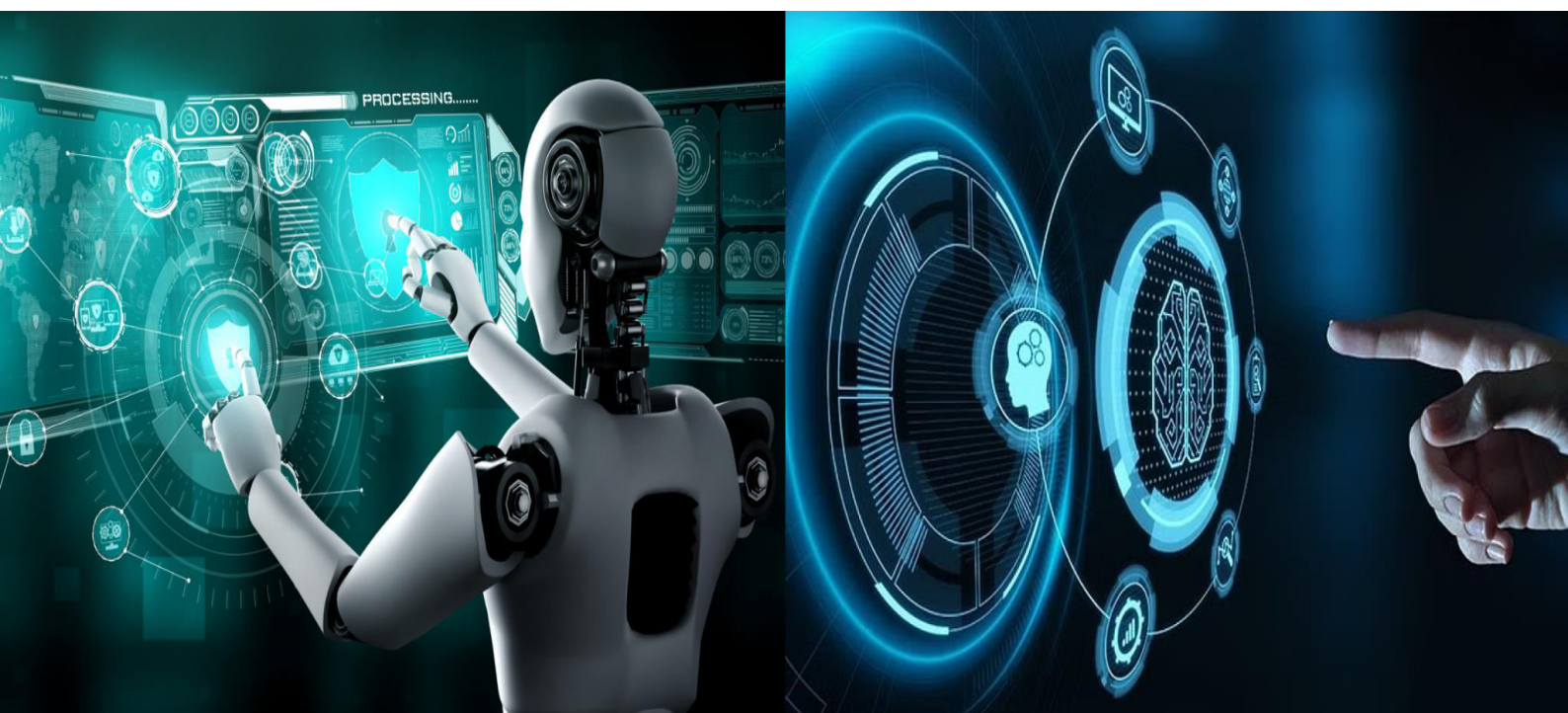# International Journal of Innovative Research in Computer and Communication Engineering

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AI Powered Face Recognition for Secure & Scalable Voting System

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ABSTRACT: The Smart Voting System Using Face-Based Database with Face Recognition is an innovative approach to secure and efficient electronic voting. This system leverages Raspberry Pi, a camera module, and an SD card to authenticate voters through facial recognition, ensuring a fraud-proof and tamper-resistant electoral process. The system captures real-time images of voters, matches them against a pre-registered face database, and grants voting access upon successful authentication. The integration of artificial intelligence (AI)-driven facial recognition algorithms enhances accuracy while eliminating the need for traditional voter ID cards. The system stores and processes voting data securely, ensuring privacy and integrity. Designed for scalability, this solution can be deployed in elections at various levels, from institutional to governmental, ensuring a transparent, efficient, and modernized voting experience.

KEYWORDS: Rasipberry Pi Pico,ESP- 32 CAM, MONITOR
Coverage.

I. INTRODUCTION

In the modern era of digital transformation, ensuring the security and integrity of voting systems is a critical challenge. Traditional voting methods, such as paper ballots and electronic voting machines, often suffer from issues like voter fraud, duplication, and inefficiency. To address these challenges, this project proposes a Smart Voting System that leverages face recognition technology for authentication and verification. By implementing a face-based database, the system ensures that only legitimate voters can cast their votes, eliminating impersonation and unauthorized access.

The system is built using Raspberry Pi Pico and ESP32-CAM, which work together to capture and process facial images for voter authentication. The ESP32-CAM module is responsible for capturing real-time facial images, which are then compared with a pre-registered database to verify voter identity. The Raspberry Pi Pico serves as the main processing unit, handling authentication logic and interfacing with a monitor to display voting status and system responses. This combination of hardware components ensures a seamless and efficient voting experience.

One of the key advantages of this system is its ability to provide a secure, transparent, and efficient voting process. By utilizing biometric authentication, the risk of multiple voting and fraudulent activities is significantly reduced. Additionally, the system can be integrated with a database that stores voter information, making it easy to verify and manage voter records. The use of real-time face recognition not only enhances security but also improves the overall speed and reliability of the voting process.

This project is particularly useful for elections at various levels, including universities, corporate organizations, and government bodies. By adopting a smart and automated voting mechanism, election organizers can streamline the voting process while ensuring fairness and accuracy. The implementation of this system demonstrates the potential of AI and IoT in revolutionizing traditional electoral systems, paving the way for a future-ready, technology-driven voting framework.

II. PROPOSEDSYSTEM

The Smart Voting System employs face recognition technology to enhance the security and efficiency of the voting process. The system utilizes a Raspberry Pi Pico as the central controller, while an ESP32-CAM module captures voter images for authentication. A monitor is used to display the status of the voting process, ensuring transparency and user interaction.

Initially, each voter's facial data is registered in a face-based database. On election day, when a voter approaches the system, the ESP32-CAM captures a real-time image, which is then processed and compared with the stored facial data. If a match is found, the system grants access to cast a vote, ensuring that only registered voters can participate. This eliminates the risk of fraudulent voting, such as impersonation or multiple votes by a single person.

To further enhance security, the system can integrate encryption and data logging features. Each successful vote is recorded in a secure database, preventing any unauthorized modifications. Additionally, the system can be programmed to detect anomalies, such as unregistered faces or repeated attempts, triggering an alert mechanism.

The proposed Smart Voting System not only ensures a seamless voting experience but also significantly improves accuracy, security, and efficiency in elections. By leveraging AI-driven face recognition and embedded systems, the solution provides a reliable, fraud-proof, and automated voting mechanism, paving the way for a futuristic and secure electoral process.
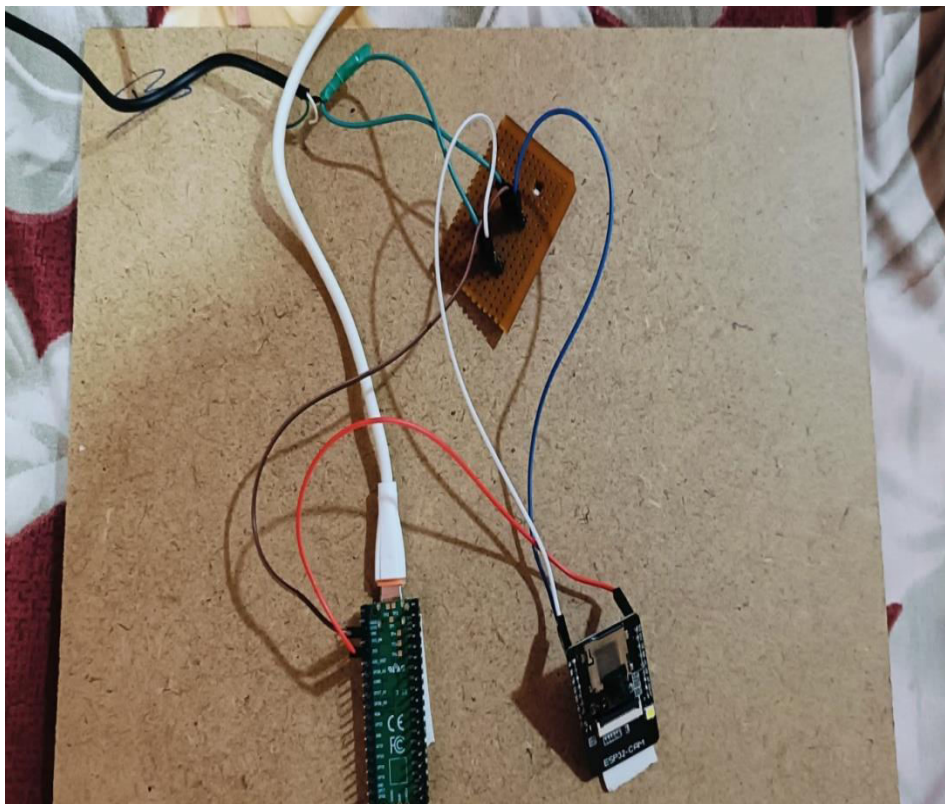
III. EXPERIMENTAL RESULTS
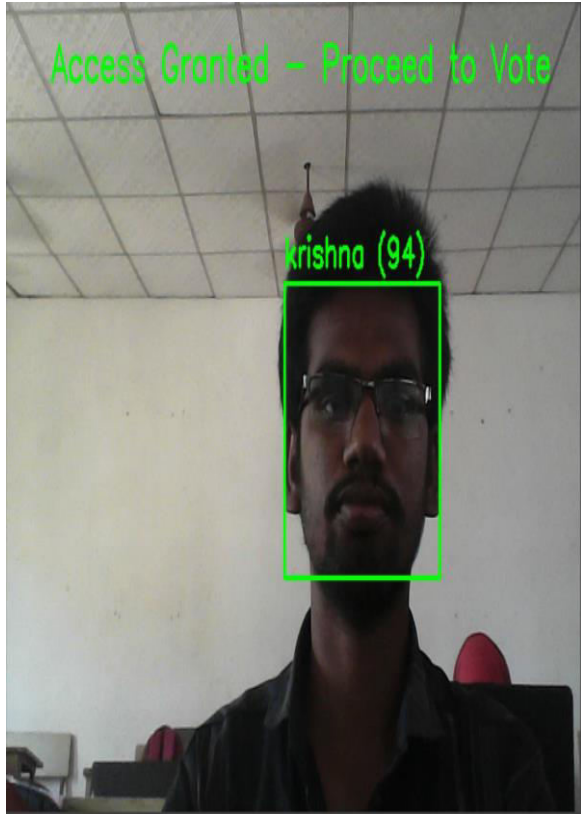

FIG NO : CIRCUIT DIAGRAM

Fig.2.Functional Result

IV. CONCLUSION

The smart voting system using face-based database and face recognition represents a significant advancement in the field of secure and efficient elections. by integrating raspberry pi pico, esp32-cam, and a monitor, the system ensures a seamless and automated voting process while eliminating traditional issues such as voter fraud, impersonation, and manual errors. the use of face recognition technology enhances authentication accuracy, making the voting system more reliable and transparent. this system not only improves election security but also streamlines the overall voting experience by reducing long queues and eliminating the need for physical identification documents. the automated facial verification process ensures that only legitimate voters can cast their votes, making the system more inclusive and accessible. additionally, the integration of a database for storing and verifying voter information adds another layer of security and efficiency to the electoral process. with further advancements and scalability, this smart voting system can be implemented on a larger scale, providing a futuristic approach to elections. future improvements may include cloud-based data storage, ai-powered voter analytics, and multi-factor authentication to enhance security. overall, the proposed system presents a revolutionary step toward digital democracy, ensuring a fair, secure, and tamper-proof voting mechanism for modern societies.

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