AUTHENTICATED VOTING SYSTEM USING RFID

EE6352 EMBEDDED SYSTEM DESIGN

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1 INTRODUCTION

1.1 INTRODUCTION TO THE PROBLEM OR THE SOLUTION

In today's democratic landscape, ensuring the fairness and security of elections is crucial. Electronic voting methods are becoming more common as a result of improvements in technology and providing enhanced accuracy and efficiency. However, they also bring challenges, particularly in verifying voters' identities securely.

In order to address this issue, our project provides an RFID based on authenticated voting system. Our goal is to develop a voting system that ensures that only qualified voters may cast votes using RFID tags. This method simplifies the voting process while enhancing security.

The main goal of our project is to design a voting machine that prevents unauthorized voting and electoral cheating. Through RFID tags assigned to registered voters, we establish a reliable way to verify their identities. This helps to maintain the integrity of the voting process by ensuring only legalized votes are counted.

Our Authenticated Voting System has its own set of challenges with its advantages. These include controlling RFID tags, making sure they can be read, taking care of security issues, controlling cost, being scalable, and complying to legal requirements. Overcoming these challenges is essential for the successful implementation and adoption of the system. Our main goal is to provide a simple yet effective solution to the complexities of modern elections. In an increasingly digital environment, we work to preserve democratic values and guarantee the integrity of the electoral process by utilizing RFID technology.

1.2 OBJECTIVE

Authenticated Voting System using RFID aims to achieve the following objectives,

1. System Security and Authentication:

Implement a secure authentication mechanism using RFID technology to ensure that only authorized voters can cast their votes.

2. User Interface and Interaction:

Design an intuitive user interface that provides clear instructions, displays candidate information, and updates vote counts in real-time on the LCD display.

3. Button Interaction and Feedback:

Develop a button handling module that accurately detects button presses/releases and triggers appropriate actions, providing feedback through LED indicators for user acknowledgment.

4. RFID Tag Management:

Address RFID tag management challenges by ensuring accurate distribution, release, and validation of RFID tags to eligible voters, minimizing the risk of tag duplication or damage.

5. System Reliability and Performance:

Create a reliable system that operates efficiently, with fast RFID tag detection and authentication, minimal delays in the voting process, and robust error handling.

6. Data Integrity and Privacy:

Maintain data integrity by securely storing voter information on RFID tags, protecting against unauthorized access, and ensuring compliance with data privacy regulations.

7. Scalability and Cost-Efficiency:

Design a scalable system architecture that can accommodate many voters while considering the cost-effectiveness of RFID readers, tags, backend systems, and maintenance.

1.3 PROJECT SCOPE

There are some limitations of this system when considering the practical usage with it.

The main concern is about RFID tag management. There may be issues related to the distribution and issuance of RFID tags. Managing the distribution and issuance of RFID tags for the eligible voters may be complex when considering about large scaled elections. There it is needed to ensure that each voter receives the correct tag and otherwise there may be problems with damaged or misplaced RFID tags. If there are duplicated tags, then it cannot be detected by the system as if the microcontroller is not programmed to detect the tag number.

There may be problem regarding the readability and interference. The reliability of the RFID tag detection depends on the sensitivity and quality of the RFID reader. If a low quality RFID reader is used, it may face to struggles when detecting the tags consistently, that may cause to authentication failures and delays in voting process. Further interferences from other electronic and related devices or some environmental factors can disturb to the RFID communication, and finally it can affect to the readability of tags.

There are some security concerns about the project. For example, storing voter information in RFID tags may affect to the data privacy and protection and further they can be used for unauthorized access to the voter data.

There are some considerations about the scalability and cost. When it comes to the real system's infrastructure, a considerable cost should be paid to RFID readers, tags and for data management and processing using backend systems. Further for regular maintenance and upkeep should be there to ensure the system's reliability and security. And further when scaling up the system the components which are using should be replaced with some advanced components which costs than the simple implementation.

Lastly, there are some legal and regulatory requirements that should be considered when using the system in advanced elections. For that, the necessary requirements also should be combined with the normal system in order to compliance with regulations.

2 SPECIFICATIONS

The specifications of the project can be mentioned as follows:

1. The system should be able to provide relevant guideline to the voter when voting.
2. The system should be able to allow for the voters with authenticated RFID tags to vote.
3. The system should be able to reject unauthorized tags.
4. The system should be able to display voting results in real time.
5. LED indicators should be able to signify voting authorization and system status.

3 BLOCK DIAGRAM

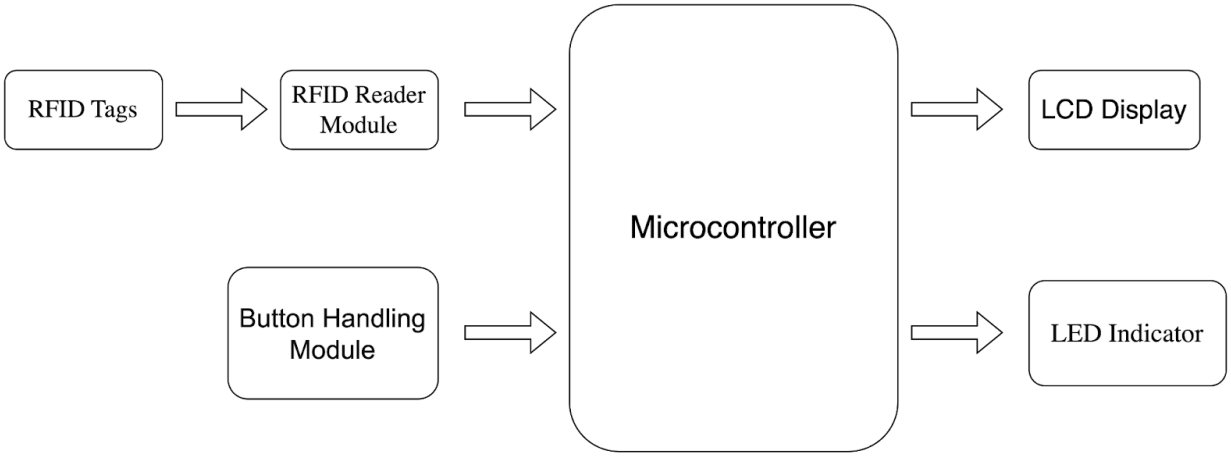

Figure 3-1 Block Diagram of the Authenticated Voting System

3.1 DETAILED DESCRIPTION

The function or the detailed description of the each block of the block diagram which is under the Figure 3-1 can be described as follows:

1. Microcontroller

ATmega328P microcontroller serves as the central processing unit controlling and coordinating all components. It controls all the other blocks and peripherals in the system. The microcontroller handles tasks such as reading button inputs, receiving data from the RFID reader module, processing this data, and updating the LCD display accordingly.

2. RFID reader module

When an RFID tag is scanned by the RFID reader module, it receives data containing information about the RFID tags scanned by the reader. It validates the received RFID data to determine if it corresponds to an authorized RFID tag. Upon successful validation, it signals the microcontroller to allow the user to cast a vote.

3. LCD Display

The LCD display module receives data from the microcontroller and updates the LCD display accordingly. It displays information such as candidate names, their respective vote counts, system messages, and instructions for the user. Additionally, it handles tasks such as initializing the display, sending commands and data to it, and formatting text for display.

4. Button Handling Module

This block interfaces with the buttons connected to the microcontroller. It detects button presses and releases and processes them accordingly. Upon detecting a button press, it triggers the corresponding action, such as displaying the total vote count for a candidate or resetting all vote counts.