Electronic Model for Election of Governor of Student Executive Board (BEM) with Radio Frequency Identification (RFID) Reading on Student Identity Card

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Abstract. The Student Identity Card used at Immanuel Technology High School is planned to be completed with RFID in the Academic Year 2018/2019. Based on this then one of the RFID usage on Student Identity Card is for the election of the Governor of Student Executive Board (BEM). This is to help the election committee can quickly handle the selection process quickly and efficiently without having to do manual recording of student data that make the selection. RFID to be installed is RFID Tag Mifare, other than that required hardware such as Arduino Board and RFID Reader RC522. Data of students who have made the selection will be stored in the MySQL database. The results of this study is expected to help the selection process so it takes place with honest, fair, fast, and efficient.

1. Introduction

RFID technology (Radio Frequency Identification) is a wireless application commonly known for traceability, logistics, and access control. This technology becomes Ubiquitous in our industry and...
everyday life\cite{1}. RFID is a standardized technology and is commonly used for identification processes as well as low cost tag creation\cite{2}. In the process of its use RFID requires a standardization process which includes a benchmarking process to ensure its accuracy and efficiency\cite{3}. One of the things to consider when applying a new technology is the efficiency of its use, in the sense that it is expected that the results obtained can be proportional to the investment of resources that have been issued\cite{4}. The selection process that involves a number of candidates is basically an effort that requires a guarantee of justice and honesty in the process of implementation\cite{5}. RFID can also be utilized in the supply chain process, in particular to ensure that there is no misplaced inventory\cite{6}. The use of RFID can improve the comfort level of people who work especially in the field of work related to identification\cite{7}. The important thing to note is the use of RFID can also help in the decision-making process associated with the process of identifying data in the database\cite{8}. The selection process that involves a number of candidates is basically an effort that requires a guarantee of justice and honesty in the process of implementation\cite{5}. RFID can also be utilized in the supply chain process, in particular to ensure that there is no misplaced inventory\cite{6}. The use of RFID can improve the comfort level of people who work especially in the field of work related to identification\cite{7}. The important thing to note is the use of RFID can also help in the decision-making process associated with the process of identifying data in the database\cite{8}.

Therefore, a good data classification process is required\cite{9} to ensure data diversity\cite{10} as well as sensitivity\cite{11}. At this time along with the increasing popularity of RFID technology. The thing to note is the problem of network security in the process of transmitting information that is vulnerable to be exploited by unauthorized people\cite{12}. Narciandi et al. demonstrated the ability to resume the phase of the RFID tagged signal by using only the air-borne signal for multistage settings. Also, the unambiguous phase domain achieved by these settings compared to the monostatic regions is used to adjust the positioning system with centimeter accuracy to show the possible application of the present 50 phase recovery schemes\cite{13}.

2. Related Works
One of the main advantages of RFID is its ability to identify an object without the need to make contact with the object in question and can be used to process the identification of visitors at a large-scale event\cite{14}. If you need anonymity during the voting process then we can use RFID technology\cite{15}. Saad et al. using RFID technology for Smart e-Voting applications in a campus environment\cite{16}. Isong et al. using RFID technology to ensure voter secrecy in elections in South Africa\cite{17}.

3. Research Methodology
The research methodology can be seen in Figure 1. Based on Figure 1 can be seen the stages of the implementation of research. RFID to be installed is RFID Tag Mifare, other than that required hardware such as Arduino Board and RFID Reader RC522. Software used is Arduino IDE and Hyperterminal and database using MySQL with Visual Basic 6\cite{18}.

4. Results and Discussion
4.1. RFID System
The RFID System Design can be seen in Figure 2\cite{18}. The design of this system will be placed RC522 and Arduino on a container that has a hole for serial cable USB A-B connected PC. Next the programming and display process will be done on the PC. This system is a closed-loop control system where the control system refers to the output of identification and database. The feedback will be displayed by the PC to get a response from the user.

4.2. Context Diagram
The Context Diagram Design can be seen in Figure 3\cite{18}. Based on Figure 3 can be seen how the interaction between Students and admin to the system. Students can read UIDs and give choices and validate them by receiving voice mail and notification from the system. While the admin can make changes to voter data, system settings and perimtah see the results data on recapitulation after successful login and receive notification and recapitulation results.
Figure 1. Research Method

Figure 2. Design of RFID System

Figure 3. Context Diagram
4.3. Read and write memory tags on Arduino

Steps to read and write memory tags on Arduino are as follows[18].

1. Input library MFRC522 into program (#include MFRC522.h)
2. Create object MFRC522 by way of MFRC522 object name (parameter)
3. Create a structural key object by MFRC522 :: MIFARE_Key key
4. Initialize RFID with PCD_Init();
5. Check the presence of TAG / RFID Card
   if (! mfrc522.PICC_IsNewCardPresent()) return;
6. Select one TAG / RFID card
   if (! mfrc522.PICC_ReadCardSerial()) return;
7. Authentication using Key A or B. see green box in memory folder from TAG
   status = mfrc522.PCD_Authenticate(MFRC522 :: PICC_CMD_MF_AUTH_KEY_A,
   trailerBlock, & key, & (mfrc522.uid));
   if (status != MFRC522 :: STATUS_OK) {
      Serial.print("PCD_Authenticate () failed:");
      return;
   }
8. Reading Memory TAG / RFID Card
   status = mfrc522.MIFARE_Read(addressBlock, buffer, &size);
   if (status != MFRC522 :: STATUS_OK) {
      Serial.print("Read failed: ");
   }
9. Write to memory TAG
   status = mfrc522.MIFARE_Write(addressBlock, dataBlock, 16);
   if (status != MFRC522 :: STATUS_OK) {
      Serial.print("Write failed: ");
   }
10. When finished reading or writing closed with the following command:
   // Halt PICC
   mfrc522.PICC_HaltA();
   // Stop encryption on PCD
   mfrc522.PCD_StopCrypto1();

5. Conclusion

The conclusions that can be obtained from the results of this study are as follows. First, the implementation of elections without RFID can be difficult when identifying voter data. Secondly, the use of RFID can guarantee the anonymity of the following voter data with its choice. Third, RFID technology can ensure the implementation of elections quickly and efficiently.

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