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# Improved Campus Security Tracking Technology With NFC System

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***ABSTRACT***
*Smart Card is the main support in the gate system. This study aims to apply smart cards to smart gates among the academic community as users. This system uses a MIFARE type Near Field Communication (NFC) smart card as an identity for identification and authentication. The read/write process is configured where data blocks can be read using the Arduino integrated hardware. Information security on NFC tags is carried out using Caesar Chipper encryption and the rotary letter method. The time needed to read information from the database to the NFC tag without a barrier is the fastest time of 1.49 deTechnology and the longest 2.26 deTechnology with an average processing time of 1.84 deTechnology, while for testing using the fastest time barrier it is obtained 1, 53 deTechnology and the longest time is 2.21 deTechnology with an average processing time of 1.83 deTechnology. This shows that the time used in the process of writing information is efficient and is not affected by obstacles.*

***Keywords :*** ***Security System, NFC Analysis, Information Accuracy***

## INTRODUCTION

The presence and rapid development of technology today cannot be denied in the service of human life, as well as in campus life. Technology cannot be separated from improving the quality and service in universities, such as the lecture process, research (research). , libraries and can also improve the quality of management services of a university. This technology has long been applied by developed countries in Asia, such as Singapore, Japan, Korea, China, and so on. The show went well. The Medan Aviation Polytechnic (Poltekbang) already has an information system built within the Poltekbang environment to improve services to stakeholders. The existing information systems include the New Taruna Registration System (Sipencatar), Academic Information System (SIAKAD), Financial Information System (SIMKEU).

However, to further improve Academic and Campus Management services for Stakeholders, Poltekbang will develop a smart card-based service system, so that it will facilitate access for cadets and also the Poltekbang academic community and improve ICT facilities towards Smart Campus. A smart card is a card that contains a microprocessor and electronic memory that is used to store information. The use of smart cards is common, such as credit cards, multifunction identity cards. Smart cards require a reader to read the information contained in them.

One of the contactless smart cards is a smart card that uses Near Field Communication (NFC) technology. Near Field Communication (NFC) technology is a wireless communication technology that uses magnetic induction technology based on Radio Frequency Identification (RFID) technology within a few centimeters. NFC operates at a frequency of 13.56 MHz with an average transfer rate of 106 Kbps to 424 Kbps. NFC technology is integrated into a smart card with several advantages, including not easily damaged and can be used on mobile devices, especially Android which have low prices. NFC technology that is integrated with smart cards is expected to replace cadet identity card technology which functions as a multifunction card to access several facilities at the Medan Aviation Polytechnic. This card will be active if the cadets have paid academic fees according to the dates and conditions required by the Medan Poltekbang.

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## METHODS

This method will discuss the stages carried out on the application that is being built, namely input, process, and output. The input to the system designed by the author is an electronic ID card. If the NFC reader is given a voltage source, the NFC reader will automatically emit an F wave (active) and is always ready to accept the existing ID card input. Smart card technology is brought closer to NFC, NFC will read the id embedded on the card chip according to the database we created, then the results of the id reading are sent to the Arduino Uno board. Then the id that has been read is hashed using the MD5 algorithm to check the data on the server using a wifi shield to send data to the server.

After checking is complete, the process continues if the data on the server matches the database id. then the door will open and it will be recorded in google spreadsheet. But if it can't detect then the door won't open and the LCD will display an "access denied" notification. For hardware in the input section, in that section there is an NFC smart tag and the Arduino wifi Shield functions as a microcontroller that runs the program from the system that is being created, while the wifi radio functions as a communication medium between Arduino and the web server, the data stored on the webserver will be matched with input from arduino uno. While the output hardware is a door lock (electric lock). The explanation of each stage can be detailed based on the general architectural drawings that are built.

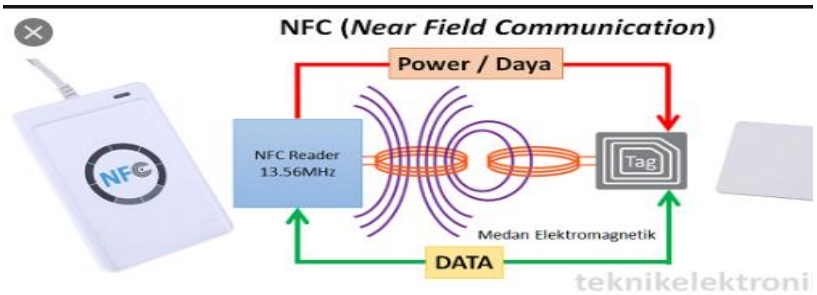


**Figure 1. NFC method**

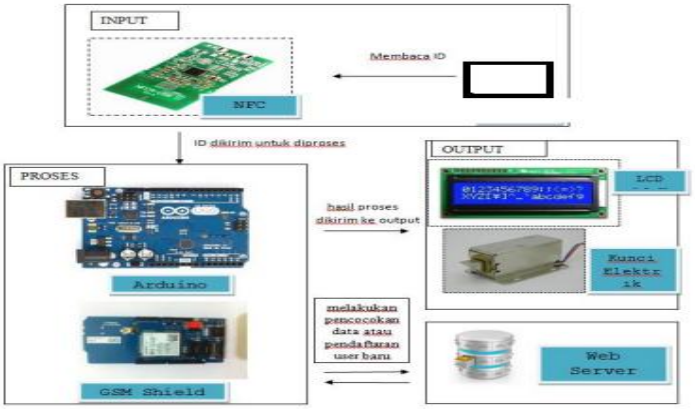


**Figure 2. A hardware of the system**

The simulation of id matching and new user registration can be seen in Figure 3 flowchart of the system built as follows.

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Volume 3 Number 1 page 213 - 218

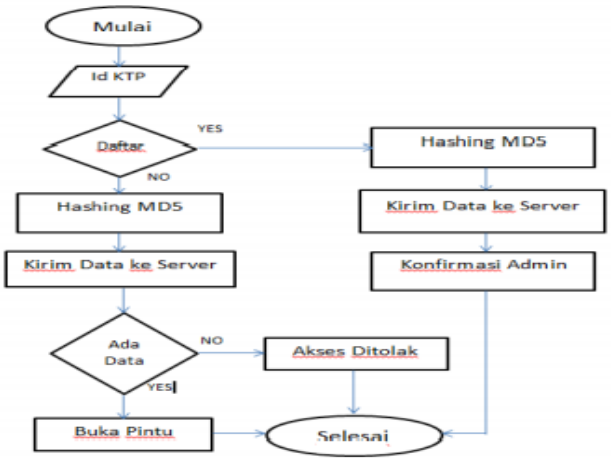


**Figure 3. Flowchart System**

The id that is read from the student data will be matched with the id stored on the server, after the ID is received by Arduino, using the MD5 algorithm the NFC id will be hashed and the hashing results will be checked to the server, sending data to the server using GSM Shield. Arduino will send hashing data to the server using the get method by accessing a web page on the server. GSM Shield is used as a wireless sensor network which is a medium for sending data from Arduino Uno to the server. Technology data has been received by the server, then the ID stored in the database server is checked, if the data sent is in the Arduino database, it will receive input again to unlock the door, otherwise the LCD will display the access denied display for registration.

The ID that is read from the E-KTP by the NFC reader will be forwarded to Arduino, after the ID is received by Arduino, using the MD5 algorithm the E-KTP id will be hashed and the hashed result will be sent to the database server, sending data to the server using GSM Shield. Arduino will send hashing data to the server using the get method by accessing a web page on the server. GSM Shield is used as a wireless sensor network which is a medium for sending data from Arduino Uno to the server. technology data is received and stored in the database server, to make it a new user the admin must confirm by logging into the web page to provide a new name for the incoming data, if it is not accepted the admin can refuse by deleting the data. Arduino has several pins that function as data and power processors. This system uses an NFC Reader module whose function is to read the ID from the smart card input. The NFC reader will connect to analog input pins A1, A2, A3, and A4. The connected pins of the NFC reader are the SCK, MISO, MOSI, and SS pins. The design between NFC and Arduino Uno is in the Figure below.

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Volume 3 Number 1 page 213 - 218

**Figure 4. NFC and arduino**

## RESULTS AND DISCUSSION

### Launch Test.

At this stage the MD5 hashing algorithm will be implemented into the system in the form of the C programming language according to the design that has been done and the google spreadsheet interface which will be implemented in the form of an interface between Arduino and the database. Index page The index page is a page for viewing and confirming new users to be added. On this page there is a delete menu and an additional menu. The delete menu is used if the admin does not want to create potential users who have registered users and will delete them from the list of potential users. While the add menu is used if the prospective user listed will be added to the database user. The index page display can be seen in the image below.


**Figure 5. Viewed From Database Page**


**Figure 6. Encoding arduino.ide**

### System Performance Testing.

System Performance Testing System performance testing is carried out to determine the performance of the system in implementing NFC for door security systems with smart card locks. This

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test uses electronic smart card tags using a matched MD5 hashing algorithm. The main purpose of system testing is for the web server system and assembled hardware to function as expected.

In this test, the delay in sending data when the program is uploaded to the hardware for the first time, and the hardware that gets a network connection to communicate directly to the server takes approximately 25 deTechnology when connected to the network and can communicate with the server, the delay in sending data on the server between 5 deTechnology and 10 deTechnology. The delay time is obtained from the time difference between the smart card tag input time and the door unlock time. The initial conditions when the hardware circuit is activated, Arduino will first connect to the server via GSM Shield. The hardware display when connecting can be seen in Figure 7 below.

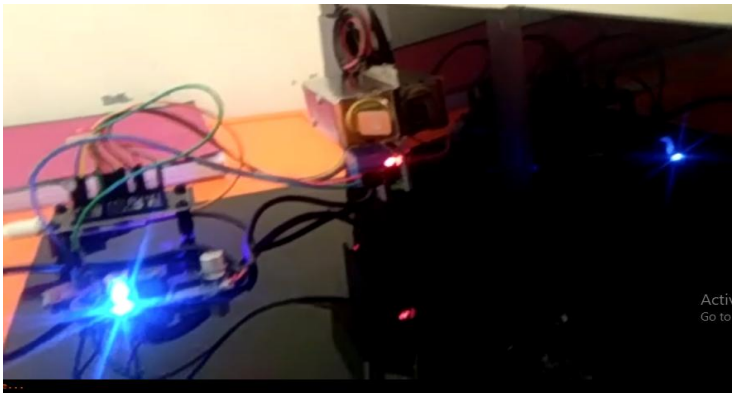

**Figure 7. NFC Hardware System**

The card tag used to register new users is the E-KTP card, with the name and ID hashed MD5, the MD5 hashing on the system is the result of online MD5 hashing,

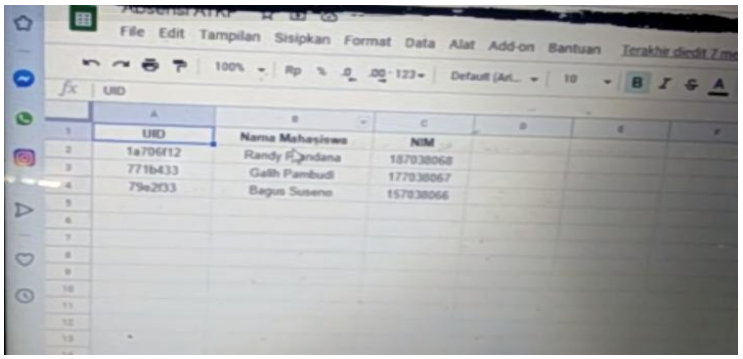


**Figure 8. New System List**

Registration is done to the "waiting card" hardware technology. Registration is done by first entering the card registration mode, along with bringing the card closer to be read by the NFC reader.

**System Testing.**

System testing was carried out 50 times, the performance of the system being tested was divided into 4. The first test was a test conducted to test the detection of smart card tags. The second test was conducted to test the new user registration. The third test was conducted to test the door opening with

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registered users, and the fourth test was carried out to test the system's resistance to unregistered users trying to log in. In order, each test is as follows.

a. Smart card tag detection (Successful Jl.: Experiment number) X 100% = (50:50) x 100% = 100%
b. New user registration test (Number of Success: Number of Experiments) x 100% = (50:50) x 100% = 100%
c. The test was opened by the user (Number of Success: Number of Experiments) x 100% = (45:50) x 100% = 90%
d. Testing by users who do not have access rights (Jlh. Success: jlh. Experiment) x 100% = (94: 100) x 100% = 94% Where Jl. Success: Number of successful attempts Jl. Experiments: Sum of all trials.

## CONCLUSION

The conclusions that can be drawn based on testing the NFC implementation for a door security system with a smart tag key can be drawn from several conclusions, namely:

1. Devices built using NFC readers can correctly read smart card ID for system processing.
2. The system is capable of hashing the id of the smart card tag by implementing the MD5 algorithm.
3. Storage of the MD5 id hashed results from the smart card tag to the server can be done properly.
4. The system can perform an MD5 hashing check to the webserver to open the door.

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