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Utilization of E-KTP as Home Safety Using Arduino Nano Based on Android

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Abstract- Security is an absolute necessity for every homeowner so that he can create a sense of security and calm when the house is left to travel by the owner of the house. Poor security makes the house a target for theft. Home security currently used still uses conventional methods. E-KTP (Electronic Identity Card) provided by the government to every citizen has a technology in which there is an RFID chip that can be used as a substitute for conventional door locks. In order for the e-KTP to be able to access the home door, an application needs to be made that can be used on android smartphone. The application makes it easy for homeowners in the E-KTP registration process that can be used to open the door. In addition, the application can send notifications to homeowners if the house is entered by thieves via SMS (Short Message Service) and Call / Call through the SIM800L module which is controlled using an Arduino Nano Microcontroller.

Keywords **- E-ID, door, home, home security, RFID.**

I. INTRODUCTION

Security is an important thing in everyday life. Security provides comfort and tranquility for everyone so that they can carry out their daily routine well. Security can be started from small things that are home and family security [1], [2]. The house becomes a place of refuge for every family member that is available. Home keys play an important role in the home security system. Poor home security systems result in homes being subjected to theft or other crimes. Therefore, home security is needed and is absolute [3]–[6].

Current technological developments are very rapid, and almost all systems in our lives use technology, one of which is e-KTP. e-KTP is standing for Electronic KTP. e-KTP is a government program to replace a conventional KTP [7]. The function of the e-KTP is to make the population data of Indonesia more uniform, and the data is centered and controlled. In its implementation, residents can only have one e-KTP. This electronic KTP is valid for a lifetime. In e-KTP, there is an RFID tag that we can use as an ID for home security.

Home security that is commonly used today is to use conventional means of using a lock or padlock, of course, this is less efficient at the present time while securing conventional housing is easy to burglary because the house is not monitored. In-State research, the use of electronic control systems almost covers most of the daily lives of humans. The electronic control system is practical and efficient, so many people like it. Digital electronic control systems are made to replace analog systems because they have advantages, namely practical, efficient, and more futuristic [8]–[11].

Based on the problems described above, the solution made is to use e-KTP as Android home security. This security is used by homeowners to house in their monitoring. In making the programming language that is used to write to the microcontroller using C language, and for contacting made a mobile application that is Android with a system development method used is the System Development Life Cycle (SDLC) waterfall model [12], [13].

II. METHOD

A. Research Material

The research material used is by reading books, journals about Arduino microcontrollers, RFID Reader, Android, SDLC Waterfall software testing [14], [15].

B. Research Tools

The tools used are in the form of hardware and software, as in the following table:

Table 1. Hardware description

No	Hardware	Specification
1	Computer/Laptop	1,6GHz, RAM 2GB, HDD 500GB, Display 1024MB.
2	SIM800L Module	Frequency: QuadBand850/900/1800/1900Mhz
3	Relay	5 volt
4	Solenoid Door Lock	Size: L27mm X W29mm X H18mm, DC 12V.
5	Step Down Converter	Input 3volt-40volt, Output 1.5volt - 35volt.
6	Buzzer	5 volt.
7	Bluetooth Module	HC-05
8	RFID Reader Module	3.3 volt
9	LCD Display Ic2	16x2, Blue color, 5volt
10	Microcontroller	Arduino Nano ATMega328
11	e-KTP	-
12	Smartphone Android	Kitkat

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Table 2. Software Description

No	Software	Function
1	Ubuntu 16.04 64 bit	Operation System.
2	Java Development kit 7	Runtime Development for android. Software development kit available library
3	Android SDK	Android SDK for android.
4	Liber Office Version: 5.1.6.2	Prepare reports and activities
5	Libre Office Impress	Creating Presentation Slides
6	Dia Diagram	Making UML, Flowchart, circuit design, Use case design, Class diagram design and display design
7	Android Eclipse	Platform for make android application
8	Inkscape	Design of PCB Lines
9	Arduino IDE	To write C code and to upload the code to the microcontroller.
10	Gantt Chart	To compile and schedule projects.

C. Waterfall Software Development Life Cycle
The following are the stages of Software Development Life Cycle (SDLC) using Waterfall method [12], which will be shown in the image below:

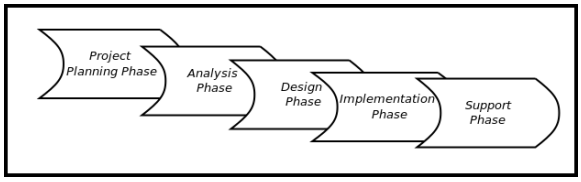

Figure 1. Stage of SDLC using Waterfall

1. Project Planning Phase
In this planning phase, it uses several stages including the problem identification phase, scheduling, conforming project feasibility, the project team, until the project launch.

2. Analysis Phase
   a. The results of this stage are the analysis of a running system in the form of graphics and narration. In the graphic form, the writer uses a flowchart, while the narrative form uses the description table.

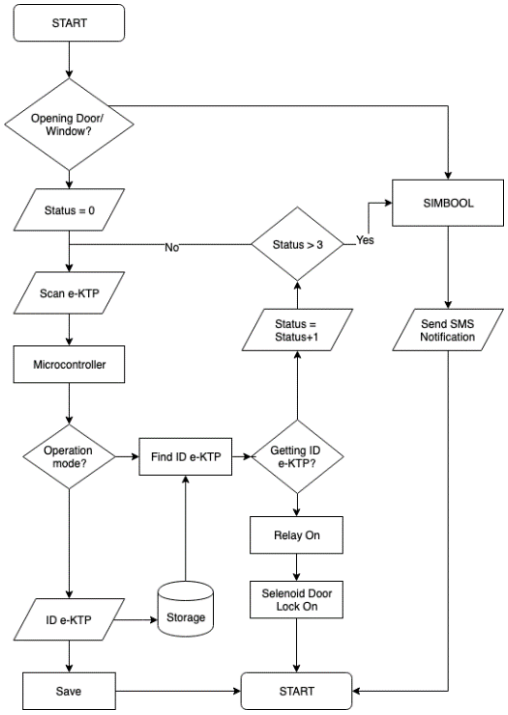

Figure *2. Flowchart of System*

b. Analysis of the circuit scheme of designing a home security system using e-KTP.

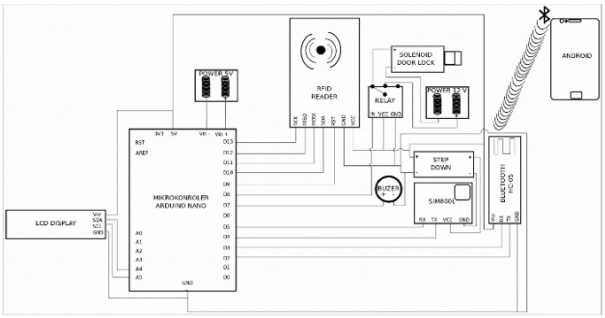

Figure 3. Schematic

3. Design Phase
Object-Oriented Design (OOD) is used in this phase. The stage of designing this application are :
1) Design of Interface

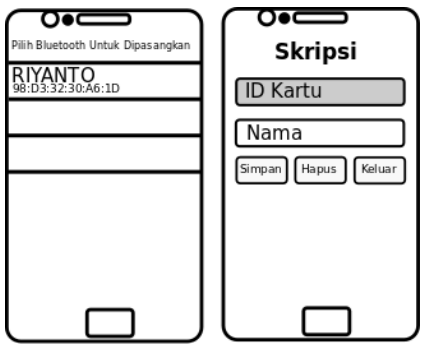

Figure 4. Application Design

2) System Architecture Design

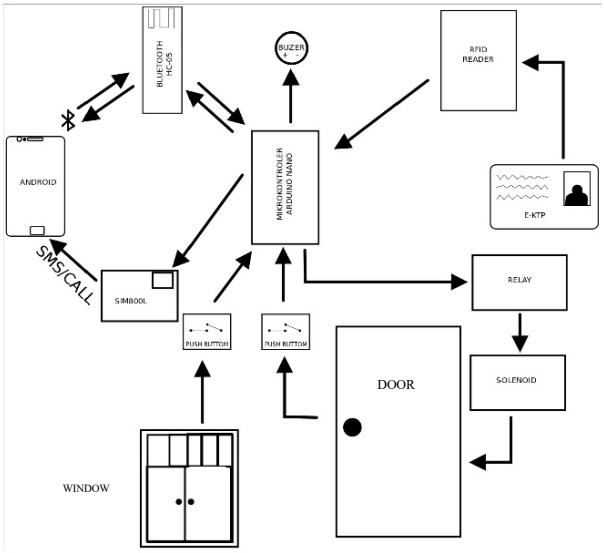

Figure 5. System Architecture Design

III. RESULT AND DISCUSSION

A. Stage of Planning

At the planning stage, the details of each stage of activity are carried out. The stage is starting from problem identification, collecting data, make a schedule, and define system requirement.

B. Stage of Analysis

Decomposition of the stages of making an application to use E-KTP as home security into its components with the intention of identifying and evaluating problems and obstacles. The following analysis consists of use case diagrams, class diagrams, sequence diagrams, and activity diagrams

1. System Activities
   a. Defining Actor
      The actor of this system consists of two actors, namely user actors and admin actors. Description of the user actor is that the user can open the door with an e-KTP attached to the RFID Reader module that has been registered in advance by the admin. Description of actor admin is someone which can register, change, and delete data who can access the door through E-KTP with android phone via Bluetooth connection.

   b. Definition of Use Case Diagram
      It is a relation system that uses a use case diagram modeling approach to explain the flow from the user to the Arduino microcontroller device.

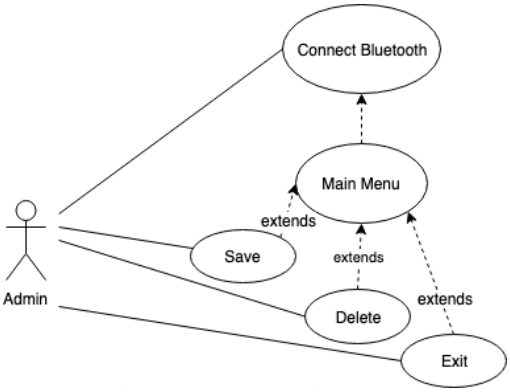

Figure 6. Use Case Diagram

Table 3. Use Case Description

No	*Use Case*	Description
1	Admin	The person who manages the data.
2	Bluetooth Connection	Displays a list of Bluetooth devices to be paired with an Android cell phone.
3	Main Menu	Display main menu
4	Save	Save the E-KTP id to the microcontroller
5	Delete	Delete the id that is already stored on the microcontroller.
6	Exit	Exit the application program.

   c. Use Case Scenario
      The following is each scenario of the use case that was previously described as follows:
      1) Scenario Use Case Save
         Scenario use case save will be shown in table 4 below :

Table 4. Save Scenario

Use Case Name	Save
Scenario	Store e-KTP card ID Data
Trigger	Saving an e-KTP card ID can be done after scanning the e-KTP on the tool and filling in the name on android
Short description	If the actor wants to save the e-KTP card ID, then the actor must enter the main menu.
Actor	User
Related Use case	Extend: the main menu
Stakeholder	User
Condition Before	Actor wants to store the E-KTP Card ID
Condition After	Actor managed to save the E-KTP card ID

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Activity Flow	**Actor Action**	**System**
	1. Open the application	1.1 Display Bluetooth connection
	2. Choose Bluetooth	2.1 *Connecting*
		2.2 Display Main Menu
	3. *Scan* e-KTP on RFID Reader module on the device	3.1 Display e-KTP card ID on android
	4. Choose Save button	4.1 The tool will sound and display text on the "Data Berhasil disimpan"
Exception conditions	If the e-KTP ID data already exists, the save process fails. The tool will sound and display "Data Sudah Ada"	

2. Class Diagram
Class diagram provides an overview of the application and relations that occur within it.

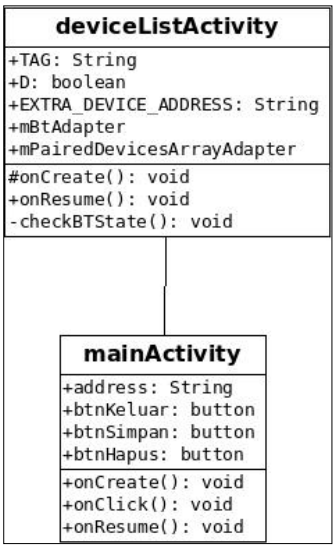

Figure 7. Class Diagram

Table 5. Description of Class Diagram

No	Class Name	Description
1	deviceListActivity	It is a class that displays Bluetooth lists to connect with devices
2	mainActivity	It is the main class that contains operations for configuration tools

3. Sequence Diagram
Sequence diagram use to describe the course of the application that will be used on the system starting from connecting Bluetooth to the configuration of e-KTP both save and delete. Sequence diagram save will be shown in figure 8 below:

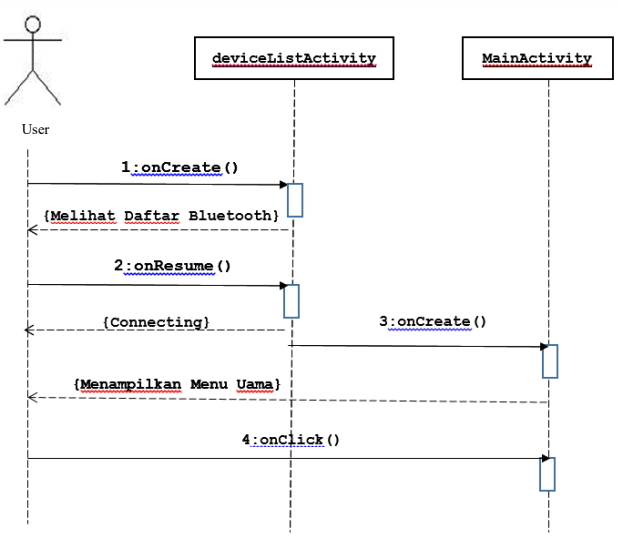

Figure 8. Sequence Diagram Saving Data

4. Activity Diagram
The activity diagram is an illustration of the interaction between the user and the system to be run. The following is an activity diagram that describes the activities in the program, as follows:

a. Activity Diagram Save
Activity diagram save will be shown in figure 9 below:

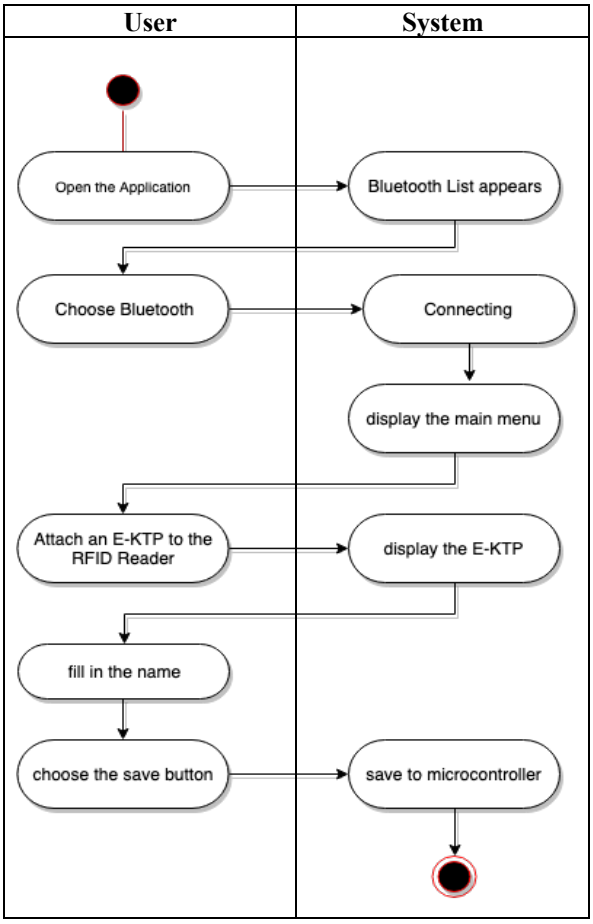

Figure 9. Activity Diagram for Saving Data

C. Design Stage

In the design phase, Object-Oriented Design (OOD) is used, in the form of interface design, block design circuit diagrams.

1. Process Design

The design process of this application will be poured in the form of a flowchart. The following is the process design for the user actor which will be shown in Figure 10 below.

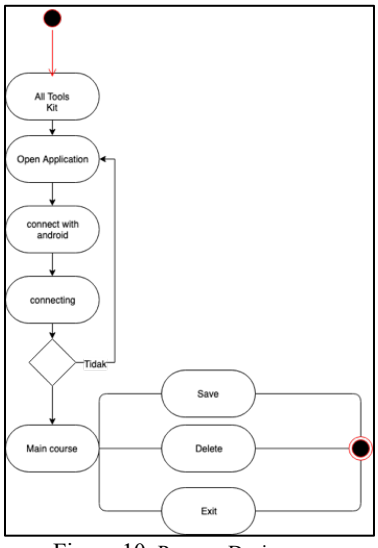

Figure 10. Process Design

2. Interface Design

Following this the interface design of this application is as follows :

a. *Bluetooth* connection Interface Design

Connecting Bluetooth interface design is a display where users can choose Bluetooth to pair the device with Android. The Bluetooth interface design will be shown in figure 11.

b. Main Menu Interface Design

The design of the main menu interface is a display where users can save and delete E-KTP ID data on the microcontroller. The design of the main menu interface will be shown in figure 11.

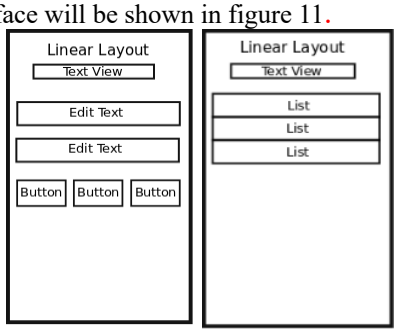

Figure 11. Connection Bluetooth and Main Menu Interface Design

c. Hardware Interface Design

The hardware interface design is an illustration of the actual doors and windows, this hardware is made to make it easier for exposure. The following is the interface design of the hardware which will be shown in figure 12 below:

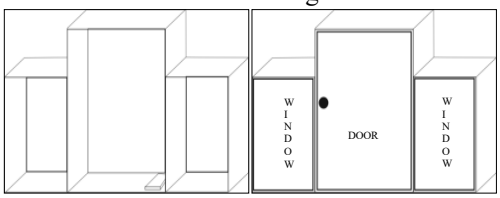

Figure 12. Front and Rear Hardware Interface Designs

3. Implementation

This implementation phase is a continuation of the system design analysis stage, with the aim of testing the system that has been made whether it is in accordance with the expected goals. So that users can provide input for system development later.

a. Hardware Implementation

Hardware is equipment in the physical form that runs the computer. Hardware is used to run software. In order for this application to run, smartphone or tablet hardware is needed with the following specifications:

1) Minimum 1.2 GHz processor
2) RAM with a minimum capacity of 512MB
3) Internal Storage with a minimum capacity of 512MB

b. Software Implementation

The software needed in using this application is the Jellybean Android minimum operating system. The steps to run this application are as follows:

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1) Connect the 12 volt and 5 volt power supply to the power supply
2) Wait until the tool appears “Tempelkan E-KTP”

Figure 13. Display Device

3) Open the application and connect
4) Attach the e-KTP on the device


Figure 14. Attaching E-KTP to the device (RFID Reader Module)

5) Fill in the name on android

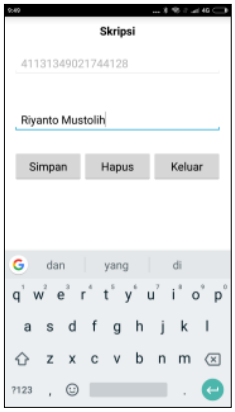

Figure 15. Fill in the Name on the application

6) Choose Save Button.

c. Software Implementation

In the implementation of the software is a software interface display menu to control the device via an Android smartphone via Bluetooth connection. In the main menu, the user can save and delete the E-KTP ID which is used to open the door access of the house. The following are the stages of the application that have been made:

1) Bluetooth List
   Bluetooth List is the first display and is asked to connect Bluetooth with the device. The Bluetooth list will be shown in figure 20.
2) Main Menu
   The main menu is the main display for saving and deleting E-KTP IDs. The main menu will be shown in figure 18

Figure 16. Bluetooth list view and Main Menu

1) Hardware Results
   Hardware is a set of tools for receiving commands through microcontrollers and modules. Door and window simulations are made to facilitate exposure. The following is a picture of hardware results:


Figure 17. Front view of Door and Window Simulation

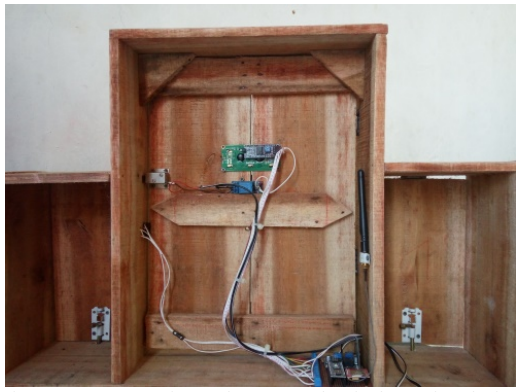
Figure 18. Rear View of Door and Window Simulation

IV. CONCLUSION

Based on the results of data analysis and discussion of research results, it can be concluded that the home security system by utilizing e-KTP as an electronic key through an Android-based smartphone application is very easy to use and effective in protecting the home from theft.

The use of the Arduino Nano microcontroller as the main controller in this security system is easily implemented on Android-based smartphone applications.

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