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DEVELOPMENT OF AN ANDROID-BASED SISKAMLING APPLICATION

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ABSTRACT

The development of information technology is progressing rapidly, currently entering the digital era 4.0, where internet networks and smartphone technology are evolving extraordinarily. Information delivery is no longer manual, posted on bulletin boards; instead, with technological advancements, information is conveyed through the internet regarding activities related to society from other communities. For example, in Kampong Sindangkasih, any information, including information about the neighborhood security system (Siskamling), is still manual and posted at the neighborhood watch post, causing residents to often receive information late. In this research, the system development method used is the Agile method with Scrum tools. Scrum is a framework for developing complex products, where the vision of Scrum is to create high-value products in terms of creativity and productivity. This method is chosen because Scrum allows the system development process to be more structured. The results of this study show that the neighborhood security system application can assist the neighborhood head (RT) and the community in facilitating the management of watch schedules and the dissemination of information, which was previously done manually, into a digital system.

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1. INTRODUCTION

The development of information technology is currently progressing rapidly, especially in the era of digital revolution 4.0, where internet technology and smartphones can deliver all types of information in real time [1][2]. Advanced smartphones are increasingly popular among millennials (youth) and adults alike for accessing desired information and insights without being hindered by any barriers, unlike manual information media that are always constrained by distance and time [3][4].

Efforts to convey information are no longer limited to bulletin boards; with the advancement of technology, information can also be shared through the internet, making it easier for communities to access information about activities related to other communities [5][6][7]. One such activity is community security, or SISKAMLING (Neighborhood Security System) [8][9]. So far, SISKAMLING in some communities has relied on bulletin boards at neighborhood watch posts to post information. When new information arises, it is simply attached again to the bulletin board. The existence of an application can facilitate the dissemination of information regarding SISKAMLING within the community, one of which can be an Android application.

Based on observations, the current system in Kampung Sindangkasih only utilizes written paper on bulletin boards at neighborhood watch posts to convey information related to environmental security. When new information is posted on the bulletin board or regarding other incidents, it is still very slow. The introduction of an application can facilitate the dissemination of information regarding SISKAMLING, particularly through an Android-based application, making the process more effective [10]. In light of these circumstances, the author has decided to develop an Android-based neighborhood security system application to make it easier for the community of Kampung Sindangkasih to access information [11][12].

2. METHOD

The following are the implementation steps for this research, following the predetermined order to ensure that the research complies with scientific principles and guidelines.

2.1 Research Object

This research is conducted in Kampung Sindangkasih, RT.02 RW.01, Desa Cidadap, Kecamatan Campaka, Kabupaten Cianjur, West Java Province. Cianjur Regency is bordered by West Bandung Regency, Garut Regency to the East, Bogor Regency and Purwakarta Regency to the North, Bandung Regency and the Indian Ocean to the South, and Sukabumi Regency to the West.

2.2 Research Method

In this study, the method used is qualitative with a descriptive approach.

2.3 Data Collection Method

The data collection methods employed in this research include the following:

2.3.1 Observation

The author conducted observations at the research site, which is in Kampung Sindangkasih, RT.02 RW.01. The author collected the necessary data to assist in the application development from the neighborhood head (RT) and several residents.

2.3.2 Interviews

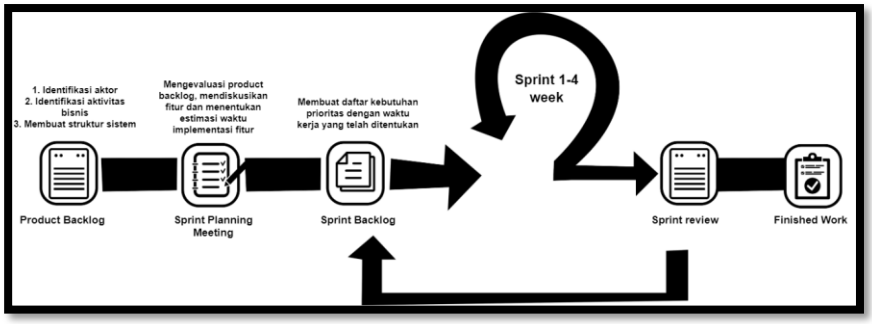
The author used interview techniques at the research site to fulfill the research requirements. The author posed questions to Mr. Saepudin Effendi, the neighborhood head (RT) located in Kampung Sindangkasih, RT.02 RW.01, Desa Cidadap, Kecamatan Campaka, Kabupaten Cianjur.

2.3.3 Literature Study

The author conducted a literature study to obtain theoretical aspects for data and information collection through reference books, scientific journals, and other materials related to the issues examined in this research process [14][15].

2.4 System Design Method

The system design method used by the researcher in this study is the Scrum method [16][17].



Gambar 1. Alur Proses *Scrum*

2.4.1 Product Backlog

Product Backlog is the first stage, where this stage results in several activities as follows: 1. Identification of actors, 2. Identification of business activities, 3. Creating the system structure, and 4. Identifying system requirements.

2.4.2 Sprint

Sprint is the second stage, where this stage includes two activities: Sprint Planning and Sprint Backlog.

2.4.3 Sprint Review

Sprint Review is the stage after a series of sprint cycles have been completed, resulting in an application that will first be demonstrated in the sprint review stage. The application will be periodically reviewed to monitor progress and evaluate whether the developed product meets the requirements. Then, testing will be conducted to check if the features from the previous sprint function as expected. If there are features that do not meet requirements, they will be corrected and further developed in the next sprint.

2.5 System Requirements Specification

To realize this Neighborhood Security System application and ensure the smooth development process, the researcher has grouped several required specifications into two categories:

2.5.1 Software Requirements

The software requirements to support the design of this graphic design marketplace website are as follows: Visual Studio Code, Firebase, Android Studio, and the Flutter framework.

2.5.2 Hardware Requirements

The hardware requirements to support the design of this graphic design marketplace website are as follows: 1.

Processor: Intel(R) Core(TM) i3-5005U CPU @ 2.00GHz 2.00 GHz, 2. *Memory*: 465GB HDD, 3. *RAM*: 10,0 GB, and 4. *System Type*: 64-bit operating system, x64-based processor.

3. RESULTS AND DISCUSSION

At this stage, the implementation of the research method or application development that has been planned is carried out. This section provides an explanation or execution of the research description conducted in accordance with the development method guidelines, starting from the analysis until the research conclusions are obtained.

3.1 System Analysis and Design

The Neighborhood Security System application is designed to help the community accelerate the process of delivering and receiving information related to neighborhood security in Kampung Sindangkasih. In designing this application, it is necessary to conduct an analysis of the system to be built so that the development process can proceed smoothly and systematically. Therefore, in this research, the author uses the Scrum method. To implement the Scrum method, a product backlog is first needed to generate several activities, including: actor identification, business activity identification, creating the system structure, and identifying system requirements. The second stage is the sprint, which includes two activities: sprint planning and sprint backlog. The final stage is the sprint review.

3.2 Product Backlog

The product backlog is the first stage, where this stage generates several activities: actor identification, business activity identification, creating the system structure, and identifying system requirements.

3.2.1 Actor Identification

After designing the business processes to be built, the next stage is actor identification using a use case diagram, where the aim of this stage is to identify the targets who will be involved in the system.

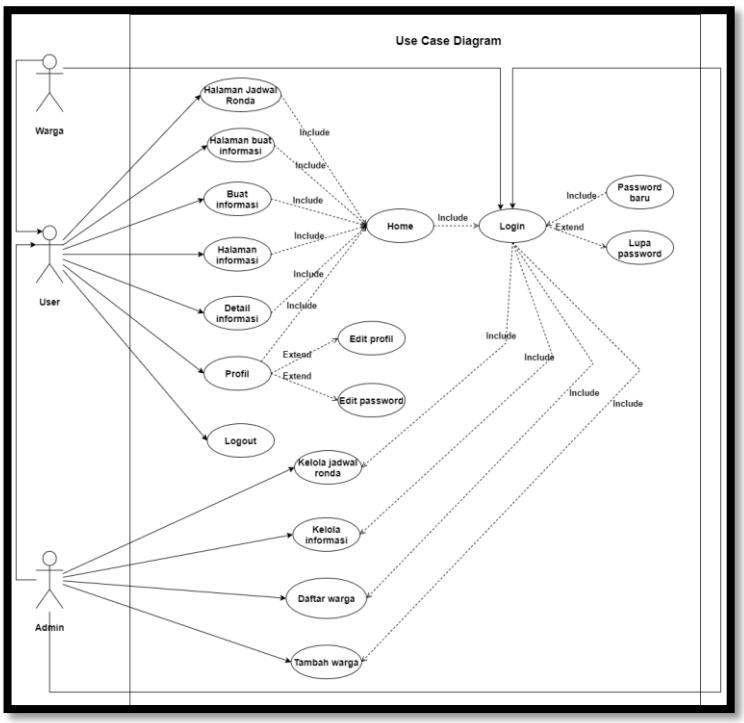


Figure 2. Siskamling Use Case Diagram

The use case diagram above explains the identified actors, which include residents and admin, as well as an additional actor that serves as a generalization. In the use case diagram, it is explained that the generalized user, representing both residents and admin, can access the schedule page, create information page, create information, information page, information details page, profile page, and log out. Additionally, residents can access login, while admins can access manage schedule, manage information, resident list, and add resident.

3.2.2 Business Activity Identification

Activity diagrams and sequence diagrams are used to identify business activities in the Siskamling application system, with the activity diagram created based on the use case diagram. Below is the activity diagram for the Siskamling application.

1. Resident Activity Diagram**:** Login, New Password, Forgot Password, Home, Schedule, Create Information, Information Creation Process, Information, Information Details, Profile, Edit Profile, Edit Password, Logout.

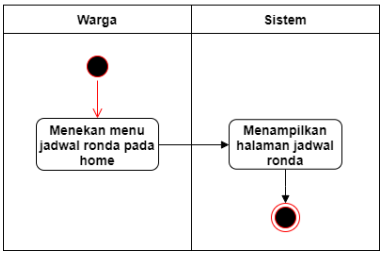


Figure 3. Resident Activity Diagram for the Schedule Page

This diagram explains the process when a resident accesses the schedule menu on the home page. On the schedule page, there is a list of schedules that have been created by the admin.

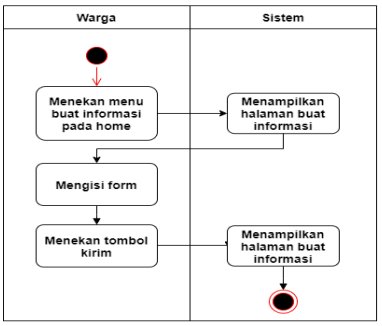


Figure 4. Resident Activity Diagram for Creating Information

This diagram explains the process when a resident accesses the create information menu on the home page. On this page, residents can create information by filling in the title, description, and uploading a photo, then pressing the submit button to send the report.

2. Admin Activity Diagram: Login, New Password, Forgot Password, Home, Schedule, Manage Schedule, Create Information, Information Creation Process, Information, Information Details, Manage Information, Profile, Edit Profile, Edit Password, Add Resident, Resident List, Logout.

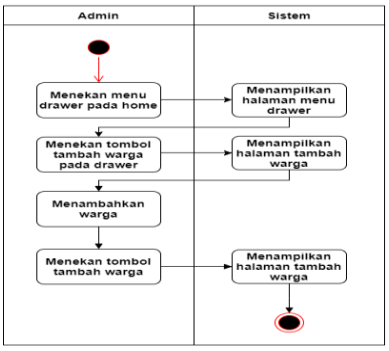


Figure 5. Admin Activity Diagram for Adding Resident Page

This diagram explains the process when an admin accesses the add resident menu in the drawer menu. On this page, there is a form to add residents by filling in the NIK, name, email, and user role to designate them as a resident or admin.

3.2.3 Creating System Structure

After designing business activities, the next stage is to create the system structure, which will be presented using a class diagram, sequence diagram, and user interface layout as shown in the following figures:

1. *Class* diagram

   Class Diagram After designing business activities, the next stage is to create the system structure, which will be presented using a class diagram, sequence diagram, and user interface layout as shown in the following figures.

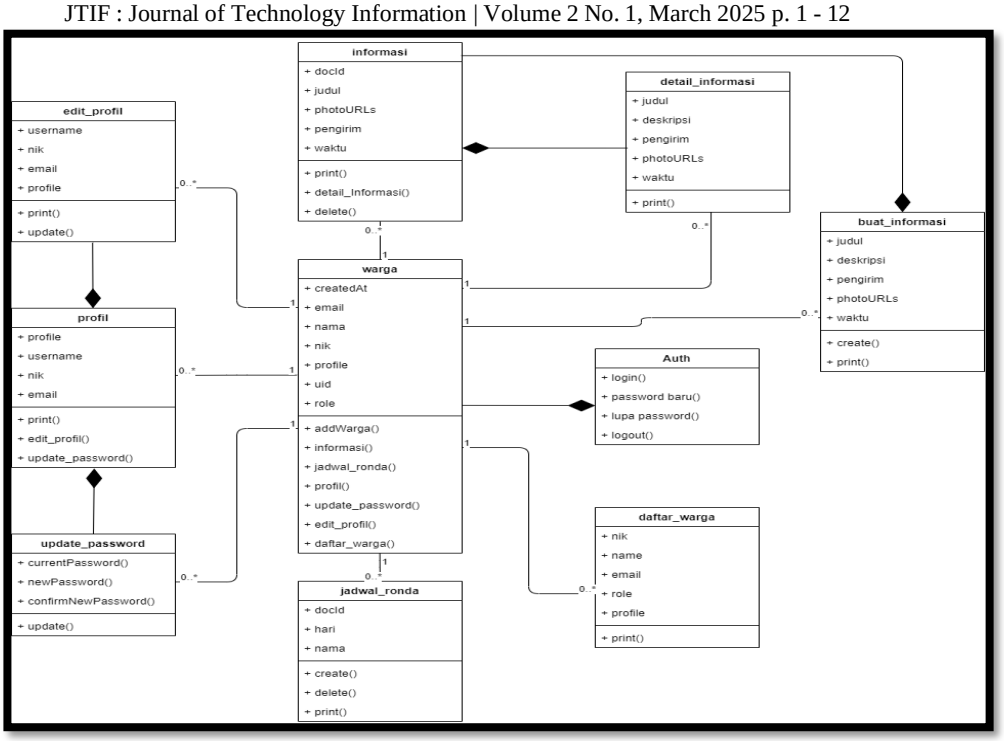


Figure 6. Class Diagram

2. Sequence Diagram
   a. Resident Sequence Diagram: Login, New Password, Forgot Password, Home, Schedule, Create Information, Edit Profile, Information Creation Process, Information, Information Details, Profile, Edit Password, Logout.

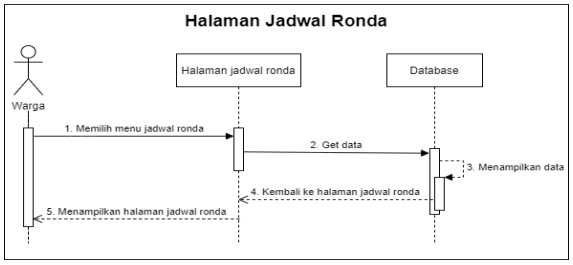


Figure 7. Sequence Diagram for the Schedule Page

   b. Sequence Diagram Admin

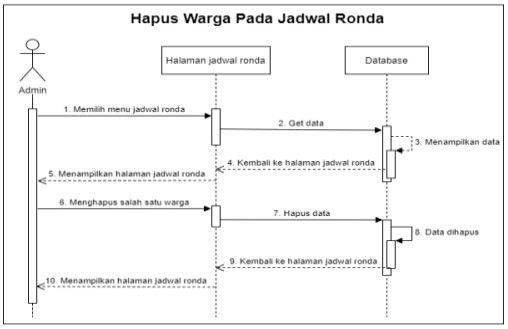
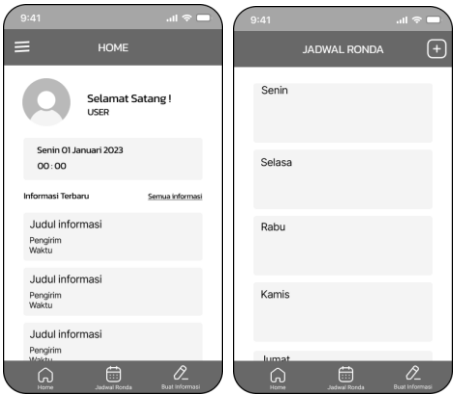


Figure 8. Sequence Diagram for Removing Resident from Schedule

This sequence diagram shows the process when an admin removes a resident from the schedule. The admin clicks the delete icon next to the resident's name they want to remove.

3. Layout

Layout The user interface layout is the design interface that will serve as the intermediary between the user and the developed software. The interface layout of the Siskamling application includes: Splash Screen, Login Page, New Password Page, Forgot Password Page, Home Page, Schedule Page, Add Resident to Schedule Page, Create Information Page, Information Page, Information Details Page, Drawer Menu, Profile Page, Edit Profile Page, Edit Password Page, Add Resident Page, Resident List Page.



(a) (b)

Figure 9. a.Home Page Layout, b. *Schedule Page Layout*

4. Database
   The database design for this application, which provides an overview of its data storage, is as follows: Resident database, Information database, Schedule database.

Table 1. Resident Database

Field	Tipe Data	Description
uid	String	primaryKey
nama	String	
nik	String	
email	String	
profile	String	
role	String	
createdAt	String	

Table 2. Schedule Database

Field	Tipe Data	Keterangan
docId	String	primaryKey
nama	String	
hari	String	

5. System Design Architecture

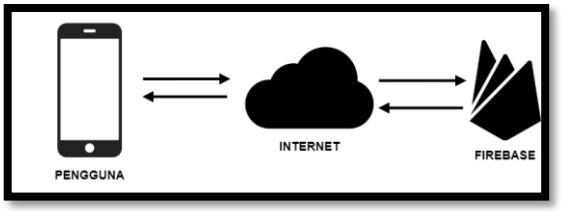


Figure 11. System Design Architecture

The following illustrates the system design architecture for the Environmental Security System Application being developed: The user retrieves data from Firebase, and Firebase then provides data to the user.

6. System Requirements Identification
   System requirements identification is the stage conducted to analyze the system's requirements from the perspective of the application program needs, as presented in the following table:

Table 3. *Backlog Item*

No	***Backlog Item***
1	To access the Siskamling application, new residents and admins must first be registered by the admin.
2	New residents and admins must verify their email once it has been registered by the admin.
3	New residents and admins can log in for the first time using the verified email and the default password.
4	New residents and admins will be directed to the new password page upon their first login.
5	Residents and admins can view the schedule page

6	Residents and admins can create information on the create information page
7	Residents and admins can view all information on the information page.
8	To see the details of a specific piece of information, residents and admins simply need to click on that information.
9	Residents and admins can view the profile page.
10	Residents and admins can edit their profile on the profile page.
11	Residents and admins can change their password on the profile page
12	Admins can add and remove residents from the schedule.
13	Admins can delete information on the information page
14	Admins can add residents.
15	Admins can view the list of residents already registered in the Siskamling application.
16	Residents and admins can log out.

3.3 Sprint

Sprint is the second stage, where this stage includes two activities: sprint planning and sprint backlog.

3.4 Sprint Review

At this stage, after a series of sprint cycles have been completed, an application will be produced and demonstrated first during the sprint review stage. The application will be periodically checked to assess the progress and evaluate whether the developed product meets the requirements. Subsequently, testing will be conducted to verify whether the features completed in the previous sprint are functioning correctly.

3.5 Testing

To see how the Scrum method can impact efficiency and effectiveness, testing is necessary. To evaluate the resulting product, testing will be conducted using the black box method. Black box testing focuses on the functionality of the software. The purpose of black box testing is to identify incorrect functions, interface errors, data structure errors, performance errors, initialization and termination errors. This is aimed at gaining insights into user experience while using the environmental security system application, with clarity, accuracy, stimulation, and novelty.

3.6 System Implementation

In this stage, the author will explain the hardware and software used to implement the designed system. In addition, the author will also describe the results of the system implementation.

3.6.1 Hardware Implementation

In developing the system that will be built, the author requires the following hardware:

1. Laptop HP Notebook: a. Processor : Intel(R) Core (TM) i3-5005U CPU @ 2.00 GHz, b. Grafis : Intel(R) HD Graphics 5500, c. RAM : 10 GB and d. HDD: 465 GB
2. Smartphone Android (Vivo Y55): a. Chipset: 1,4GHz Snapdragon, b. RAM: 2 GB, c. Memori: 16 GB, d. Jaringan: 4G

3.6.2 Software Implementation

In developing the system that will be built, the author requires the following software: a. Sistem operasi: Windows 10 Pro, b. Code editor: Visual Studio Code, c. Bahasa Pemrograman: Dart, d. Framework: Flutter, e. Database: Firebase, f. Github, g. Figma

3.6.3 Implementation of Sprint 1

At this sprint stage, there are several backlog items to be implemented, and the results of the sprint implementation can be seen in the sprint results.

Table 4. *Product Backlog Item Sprint* 1

No	Product Backlog Item
1	Splash Screen
2	Login Page
3	New Password Page
4	Forgot Password Page
5	Home Page

Example of Sprint 1 Results

a. Home page

The home page is the main page of this application, which will be displayed first after the user successfully logs in. On this page, there is a photo of the user, a welcome text, the user's name, and an icon with three lines to display the drawer menu. There is also a button to create information, and the latest information will be displayed on this page. Additionally, there is a bottom navigation bar to navigate to the schedule page and the information page, which displays a list of information. Below is the layout of the home page:

Figure 12. Implementation of the Home Page

b. Drawer Menu

The drawer menu is the menu that appears when the user taps the three-line icon on the home page. In this menu, users can see their profile photo, name, and email. There are buttons for the profile and logout options. For users with the admin role, there are buttons to add residents and view the list of residents. Below is the layout of the drawer menu:

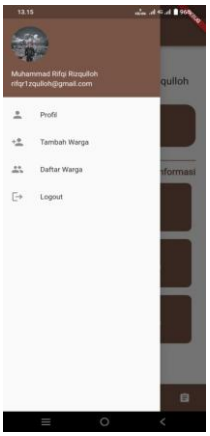


Figure 13. Implementation of the Drawer Menu

3.6.4 Implementation of Sprint 2

At this stage, there are several backlog items that will be implemented, and the results of the sprint implementation can be seen in the sprint results.

Table 5. Product Backlog Items for Sprint 2

No	Product Backlog Item
1	Add Resident Page
2	Resident List Page
3	Profile Page
4	Edit Profile Page
5	Update Password Page

Here is an example of the results from Sprint 2:
This page is displayed when a user with the admin role clicks the "Resident List" button in the drawer menu. On this page, there is a list of residents who have been registered in the application. Below is the display of the Resident List page:

Figure 14. Implementation of the Resident List Page.

3.6.5 Implementation of Sprint 3

At this stage, there are several backlog items to be implemented, and the results of the sprint implementation can be seen in the sprint results.

Table 6. *Product Backlog Item Sprint* 3

No	Product Backlog Item
1	Ronda Schedule Page
2	Add Residents to Ronda Page
3	Create Information Page
4	Information Page
5	Information Detail Page

Here is an example of Sprint 3 results:

The *Ronda Schedule Page* displays a list of ronda schedules. On this page, users can view the ronda schedules managed by the admin. Users with the admin role can see an add icon to include residents in the ronda schedule and a delete icon to remove residents from the schedule. Below is the display of the Ronda Schedule Page:

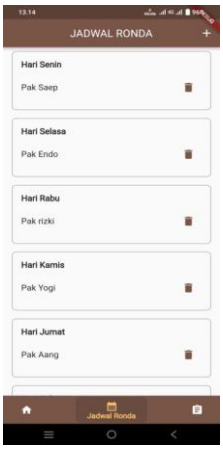


Figure 15. Implementation of the Ronda Schedule Page

3.7 System Testing

System testing is the final phase of this research. The testing of the Siskamling Application involves two stages: internal and external testing. In this research, testing was conducted only internally. During the internal testing, the author utilized the black-box testing method to evaluate the system. The objective of this testing is to determine whether the developed system functions correctly. Below are the results of the internal testing that was conducted:

Table 7. Internal Testing Results

Test Case	Test Scenario	Expectation	Status
Splash Screen Page	Display the logo and app name when the app is opened for the first time	When the user opens the app for the first time, the splash screen will be displayed for a few moments before transitioning to the login page	Success
Login Page	Display the logo and app name, along with email and password text fields, a "Forgot Password"	After displaying the splash screen for a while, the user will enter the login page, where they can see the logo and app name, as well as enter their	Success

	text button, and a "Login" button	registered and verified email and password. There will also be an option to reset the password, directing the user to the forgot password page, and a login button to take the user to the home page	
New Password	Display the "New Password" text, a text field for entering the new password, and a button to change the new password.	If the user logs in for the first time using a verified email and the correct default password, they will be directed to the new password page to change the default password to a desired one	Success
Forgot Password	Display the "Forgot Password" text, an email text field, and a "Reset Password" button.	On the forgot password page, the user can see the forgot password text, an email text field, and a reset password button. The user can reset their password by entering their email and pressing the reset password button, after which they will receive an email for password change.	Success
Home Page	Display the "Home" text, a drawer menu button, the user's photo, a welcome text, and the user's name, as well as the day, date, and time. Additionally, there should be a "Create Information" text button and the latest information displayed in the form of a container, with a bottom navigation bar at the bottom of the screen to navigate to the patrol schedule page and the information list page.	Once the user successfully logs in, they will be directed to the home page, where they can see the home text, a button to display the drawer menu, a welcome text, their photo, and their name. The user can then press the "Create Information" button to create new information, view the latest information, and at the bottom, there will be a bottom navigation bar to navigate to the patrol schedule page and the information list page.	Success
Patrol Schedule Page	Display the "Patrol Schedule" text, a "+" icon, and a list of patrol schedules from Monday to Sunday, along with a delete icon.	After successfully logging in, the user can view the patrol schedule by selecting it from the navigation bar. They will see the patrol schedule text and a list of patrol schedules from Monday to Sunday. Admin users will see a "+" icon on the right side of the app bar to add residents to the patrol schedule, along with a delete icon to remove residents from the schedule.	Success
Create Information Page	Display the "Create Information" text, a back arrow icon, the day, date, and time, along with text fields for the creator's name, the information title, the information description, a button to upload a photo, and a "Send" button.	Upon successfully logging in, the user can access the create information page by selecting the "Create Information" text button located above the latest information. The user will see the create information text, a back arrow icon, and the current day, date, and time, along with a text field for the creator's name, a title text field, a description text field, and the ability to upload up to three photos. They can then press the send button to submit the created information.	Success
Information Page	Display the "Information List" text, a list of all information, and a delete icon	Once logged in, the user can view the information page by selecting "Information" from the navigation bar. They will see the information list text and a list of all information displayed in a container. Admin users will see a delete icon next to each piece of information for removal. If a resident clicks on a container of one piece of information, they will be directed to the information detail page.	Success
Information Detail Page	Display the "Information Detail" text, a back arrow icon, the information title, sender, time, description, and photo.	When the user clicks on a piece of information from the information page, they will be directed to the information detail page. Here, they can view the information detail text, a back arrow icon, the information title, sender, time, description, and photo of that information.	Success
Drawer Menu	Display the profile photo, user's name, and email, along with text buttons for "Profile," "Add Resident," "Resident List," and	After successfully logging in, the user can access the drawer menu by selecting the three-line icon in the top left corner of the home page or swiping right. They will see their profile photo, name, and	Success

	"Logout"	email, along with text buttons for "Profile" and "Logout." Admin users will see additional text buttons for "Add Resident" and "Resident List" in this drawer menu	
Profile Page	Display the profile photo, name, and email of the user, along with text buttons for "Edit Profile" and "Update Password"	When the user clicks the "Profile" text button in the drawer menu, they will be directed to the profile page. Here, they can view their profile photo, name, and email, along with text buttons for "Edit Profile" and "Update Password"	Success
Profil Edit	Display the "Edit Profile" text, a back arrow icon, and text fields for NIK, email, name, profile photo, a delete button, a choose button, and an "Update Profile" button.	Upon clicking the "Edit Profile" text button on the profile page, the user will be directed to the edit profile page. They will see the edit profile text, a back arrow icon, and text fields for NIK, email, name, profile photo, a delete button, a choose button, and an update profile button. However, the user can only edit their name and profile photo	Success
Update Password	Display the "Update Password" text, a back arrow icon, and text fields for current password, new password, confirm new password, as well as a "Change Password" button.	When the user clicks the "Update Password" text button on the profile page, they will be directed to the update password page. They will see the edit profile text, a back arrow icon, and text fields for current password, new password, confirm new password, as well as a button to change the password.	Success
Add Resident	Display the "Add Resident" text, a back arrow icon, and text fields for NIK, name, email, a dropdown button for role, and an "Add Resident" button.	When an admin user clicks the "Add Resident" text button in the drawer menu, they will be directed to the add resident page. They will see the add resident text, a back arrow icon, and text fields for NIK, name, email, a dropdown button for role, and a button to add a resident. When pressing the button, the admin must first enter a validation password. If the password is correct, the added resident's data will be successfully saved	Success
Resident List	Display the "Resident List" text, a back arrow icon, and show the user's photo, NIK, name, email, and role displayed in a container.	If an admin user clicks the "Resident List" text button in the drawer menu, they will be directed to the resident list page. Here, they can see the text for the registered residents, a back arrow icon, and view the user's photo, NIK, name, email, and role displayed in a container.	Success
Logout	Display the login page	If the user clicks the "Logout" text button in the drawer menu, they will log out and be directed back to the login page	Success

Based on the results of the internal testing in Table 7, it can be concluded that the system developed functions as expected. However, there is still a possibility of errors occurring during system use.

4. DISCUSSION

This research on the development of the application is on a small scale, and the research variables are not very complex, so the use of database capacity is not extensive, as it only involves the SISKAMLING schedule data. If additional data is included, it will require more complex programming logic and greater storage capacity, making this research model suitable only for systems that are not overly complicated.

5. CONCLUSION

Based on the research conducted by the author on 'Designing an Environmental Security System Application (Siskamling) Based on Android Using the Scrum Method,' the author concludes that this environmental security system application can assist the neighborhood leaders and the community in managing patrol schedules and disseminating information that was previously done manually, resulting in slow information delivery to the public. Now, it has transformed into a digital system with the designed Environmental Security System Application

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