Smart Gate System Using Internet of Things and Kontlin Interfaces System

E Handoyo[1], Muhammad Arfan[2], IG Randa [3]

Department of Electrical Engineering, Undip, Central Java, Indonesia
arfan.undip@gmail.com

Abstract: At this time the industry is in the Industry 4.0 era, which means that there is computer interference in human business processes. Not only in the form of conventional computers and mobile phones, but also in the form of Machine Learning and Artificial Intelligence. Therefore, an Internet of Things (IoT) system is very possible to be created and then used to help human work. IoT system is the concept of a device capable of transferring data without the need to be connected to humans, but the internet as the medium. And at a time when the Covid-19 virus is still very vicious at this time, of course the government recommends closing some public places and opening some of them with the conditions of health protocols. In this case, an application will be made that is part of an IoT system. This IoT system will be tasked with monitoring data in public places, in this case specifically for mosques. The application that will be made is an android application that serves to display data from the database.

Keywords—Android; IoT System; Kotlin; Smart Gate

1. INTRODUCTION

The use of applications is something that cannot be separated from humans today. In this digital era, applications are required to be more efficient in terms of performance, appearance, and usability[1]. Android applications are one of the most popular media being developed today because of the convenience it offers and the number of active users of 2.5 billion worldwide.

During a pandemic like this, the Indonesian government enforces Enforcement of Community Activity Restrictions or commonly called PPKM. When PPKM takes place, usually many public places are closed or their capacity is limited. And if it is opened, visitors are required to comply with Health Protocols such as wearing masks, using hand sanitizers, body temperature must be below 38°, etc. However, there are still frequent violations of the Health Protocol in Indonesia.

In this report, an android application that is part of the IoT Smart Gate System will be designed using the Android Studio software. This application will later be used to view data from a database that has been arranged in such a way. This system was created with the aim of preventing the occurrence of the Health Protocol subscription during the PPKM period in mosques in Indonesia.

2. METHODOLOGY

2.1 IoT Smart Gate Systems

The increasing number of goods that use electricity as the main power source is of course also followed by the increasing demand for Li-Ion batteries. Li-Ion battery itself has a lithium base material which is known that resources such as lithium are very valuable. Therefore, recycling batteries is also economically beneficial. This is so that the waste batteries that are no longer in use have more value and important content/elements can be reused [2].

The IoT system is the concept of a device capable of transferring data without the need to connect with humans, but the internet as the medium. Simply put, humans don't need to control these IoT objects/devices directly. But humans can control these objects from a distance. The IoT system has 3 components, namely Things (Physical Goods), Internet, and Database (Cloud) [3].

System Smart Gate is a system designed to monitor data in public places, in this case specifically for mosques. System build background Smart Gate because when PPKM was implemented in Padang, the mosques were guarded by the Municipal Police who was in charge of checking the temperature of the worshipers who would enter the mosque. If the congregation is wearing a mask and the body temperature is less than 38°C, then they are allowed to enter. If the congregation is not wearing a mask or the body temperature is more than 38°C, then the congregation is not allowed to enter. The problem here is that when the time for Iqamah comes, the Municipal Police also participates in praying, so that the entrance gate to the mosque is not guarded, at that time worshipers who were originally not allowed to enter the mosque can enter the mosque because there is no Municipal Police. This is certainly very disturbing for pilgrims who have implemented health protocols correctly. Because of that, the system was created Smart Gate which replaces the function of the Municipal Police. System Smart Gate work the way the congregation does scan face at the gate. This gate is a special gate that is equipped with a temperature sensor and camera and is equipped with Machine Learning to check whether the congregation is wearing a mask or not. If the congregation is wearing a mask and the body temperature is less than 38°C, then the gate will open and the congregation will be allowed to enter. If the congregation does not wear a mask or the body temperature is more than 38°C, then the gate will not open and the congregation will not be allowed to enter. Then the gate will send data todatabases. The data sent is the number of pilgrims who are allowed to enter, the number of pilgrims who are not allowed to enter, and the average temperature of the

pilgrims. Then the mosque administrator will be able to see all the data to monitor through the applicationSmart Gate [4].

2.2 Kotlin for Android

The Android is a software operating system based on the Linux kernel and some opensource software. Android is developed by Google [5]. Android was originally developed for the use of smartphones and tablets, but along with the development of today's era, android is also used in smartwatches and android televisions.

Android Studio is an IDE for Android Development which was introduced by Google at the 2013 Google I/O event. Android Studio is a development of the Eclipse IDE, therefore Android Studio has many new features compared to the Eclipse IDE [6]. Android Studio is the official IDE for Android application development. With Android Studio, developers can choose to use Java or Kotlin. Unlike Eclipse which uses Ant, Android Studio uses Gradle as the build environment. Android Studio has features that can improve developer performance such as emulators, Instant Run, integration with github, Google Cloud Platform support, and more.

3. RESULT

In making the Smart Gate System, the development team is divided into several sections with their respective responsibilities. Some are assigned to make gate mockups, some are making Machine Learning modules, some are working on Cloud Computing, some are making databases, and some are making android applications. In this report I will explain the steps for making an android application.

To create android apps, use Android Studio with Kotlin Language. Fill in the project name and press Finish. The name of this project will be the name of the application. Then connect the project to Firebase by pressing tools, then pressing Firebase. Firebase was chosen because it's very easy to use, doesn't require hosting, has lots of features, and is free for limited use. A dialog will appear, select Realtime Database to overwrite user data into the database by selecting Get started with Realtime Database. select Connect to Firebase, then it will be redirected to the Firebase web. While on the Firebase web press Create a project.
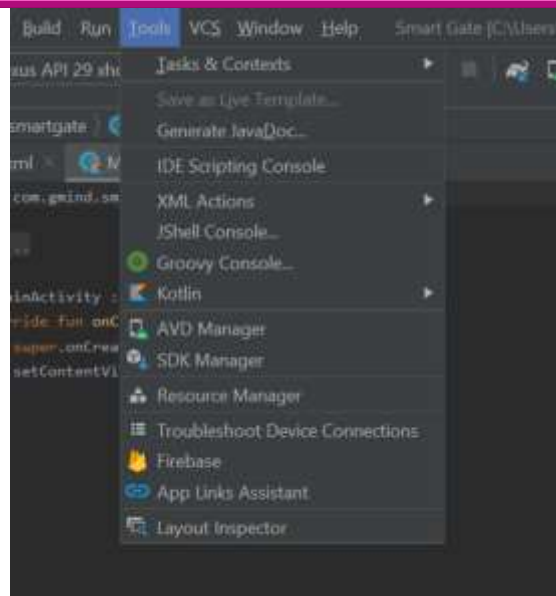

Fig 1 Press tools then select *Firebase*

Finally, complete content and organizational editing before formatting. Please take note of the following items when proofreading spelling and grammar:

3.1 CONNECTING FIREBASE

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable [7].

The web view will be like in the image which means Firebase is already connected to the project. In android studio, press Add the Realtime Database SDK to your app to add the Firebase Realtime Database library to the project. When the process of adding the library is complete, the library can be checked by pressing Gradle Scripts, then selecting module level build gradle.

Fig 2 Checking the build.gradle file

Connect the project with Firebase Cloud Storage to save user photos into the database by selecting Cloud Storage for Firebase and then selecting Get started with Cloud Storage, then press Add the Cloud Storage SDK to your app to add the Firebase Storage library to the project.

3.2 MOBILE INTERFACE

The application theme by selecting res, then values, then theme, then selecting the themes.xml file. There are two theme files, namely themes.xml and themes.xml(night). The themes.xml file is used when the smartphone uses a normal theme, and the themes.xml (night) file is used when the smartphone uses a dark theme [8].

Notice the code, the application is still using the Action Bar. This application does not use the Action Bar so it must be removed by changing the code from Dark Action Bar to No Action Bar. Also change the colorPrimaryVariant from purple_700 to dark green, then change the application icon by selecting res folder, then right-clicking on the mipmap folder, then selecting New, then pressing Image Asset.

A new dialog will appear, find the image to use, then press on the image, then press Ok. Select Launcher Icons (Adaptive and Legacy) in the Icon Type section. This will make the application icon usable on the old version of the Android operating system (legacy) and also the new version (adaptive) because the new version of the Android operating system uses an adaptive icon (can change). Then adjust the size of the image by sliding the dialog on the resize until it is what you want then press Background Layer.

Fig 3 Select the icon background color

After all the assets have been added, it is time to code the application, right-click on the com.gmind.smartgate folder then select New, then select Activity, then press Empty Activity. Activity is one of the important components in Android that serves to display the user interface to the user's screen that allows interaction such as pressing a button (such as a web page).

3.3 ASSET MANIFEST

The Koltin Class which will contain the application code for SplashSreenActivity. The second file is in the layout folder with the name activity_slash_screen.xml. This file is an xml file that serves to set the appearance of the application in SplashSreenActivity, then do the coding on the SplashSreenActivity as desired. And set the display of SplashSreenActivity in activity_slash_screen.xml as desired.

Fig 4 Display on OnboardingThreeActivity

Meanwhile, MainActivity, which functions to display data from the database, was not created because it was already there when the project was created, then create a Kotlin Class file by right-clicking on the com.gmind.smartgate folder then selecting New and then pressing Kotlin Class/File. The new dialog will appear, name it User because this file will be the model class for the user. Then press enter. This model class will be the data link in the database with the application.
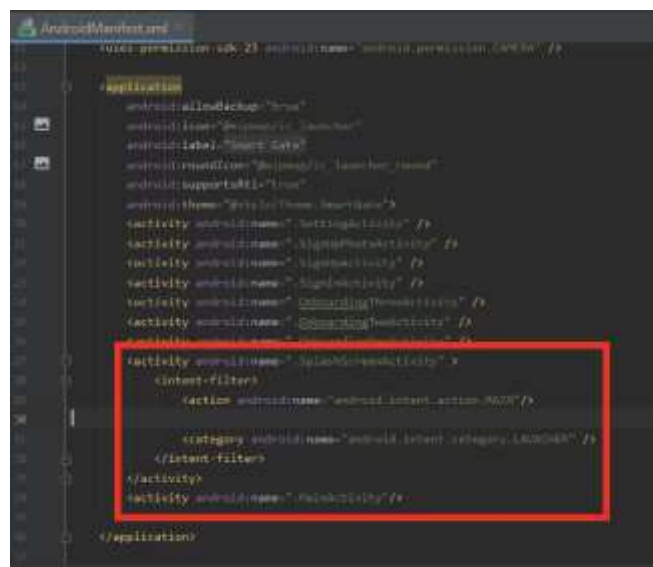

Fig 5 Renew AndroidManifest.xml

Then add the code like in the fig 5 so that the application can use internet and wifi access and also use the smartphone camera. Go to the manifest folder and press the AndroidManifest.xml file and changing the code.

Repeat the above steps to create a class called Preferences that serves as a helper for entering and retrieving data and all classes in the application and layout will be proper.

4. DISCUSSION

To create native android applications using Android Studio because it supports the Java and Kotlin programming

languages and has complete supporting features. The Java and Kotlin programming languages are equally good when used to create native Android applications, but the Kotlin language is simpler and easier to understand. Using Firebase in a project can make it easier for developers because developers don't need to host the database because it's already cloud-based which is managed by Google.

5. CONCLUSION

In order to use Firebase, the project first needs to be connected to Firebase via Android Studio. Firebase Realtime Database is one of the features of Firebase that serves to store data in the form of strings in the cloud. Firebase Storage is one of the features of Firebase that serves to store photos or videos in the cloud. View Binding is currently the best choice for declaring a user interface in an Activity because of the many advantages it offers.

Hardcodedon the string data type is not recommended, therefore it should be stored in the strings.xml file. The advantage of storing string assets in the strings.xml file is that developers don't need to type text repeatedly and make it easier for developers to create applications with multiple languages. Android applications currently have two types of themes, the first is themes.xml which is used when the smartphone uses a normal theme, the second is themes.xml(night) which is used when the smartphone uses a dark theme. Asset Images on Android can use the .png or .svg format, but the .svg format is more flexible so it's easy to use.

Based on the conclusions obtained, there are several suggestions that can be applied to save a user's password, it is best to hash it first to make it more secure. For the next update, you should change the image assets using the .svg format.

6. REFERENCES

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