UTILIZATION OF WEARABLE DEVICE AND SPOTIFY API TO RECOMMEND SONG BASED ON MOOD AND USER ACTIVITIES ANDROID-BASED

Anjas Lesmana [1], Eko Budi Setiawan [2]

[1,2] Informatics Engineering Study Program – Indonesian Computer University
112 Dipatiukur Street,West Java, Bandung
E-mail : alesna97@gmail.com [1], eko@email.unikom.ac.id [2]

ABSTRACT

In compiling a playlist one of the most extreme ways is selected each part and sequence of songs on the playlist manually carefully, and the other way is to compile a playlist randomly based on keep song collection. In the first way, it will be waiting the time longer to arrange the song playlist, whereas the second way will produce a useless playlist if the collection is random. Music or songs can affect a person's mood and activities. Lyrics and rhythm are several factors of song that can affect mood and activity. The purpose of this study is to develop applications that can provide the recommendation songs based on mood or activities by utilizing a wearable device as an input parameter psychological of a person's body in order to detect mood in real-time. Besides that, activities detection by using the Activity Recognition API that utilizes sensors on the smartphone. The results of the classification will be processed to get song and playlist recommendations based on mood or activity on the Spotify API.

Keyword: Wearable Device¸ Spotify API , Mood, Activity, Activity Recognition.

1. INTRODUCTION

1.1. Background

In carrying out daily activities humans sometimes need entertainment to relieve fatigue and stress to improve mood again. The mood is an emotional state that is in a person and can change over time [1]. The mood can be positive or negative, and both have many types, both positive and negative [2]. Relating to mood songs have been identified as new metadata types or aspects of music in recent years [3]. Changes in mood can be recognized from the reaction of the human body on emotions or moods of the heart, to detect these reactions, this study uses a wearable device as a source of data input from biosensors contained in a wearable device. The data obtained from wearable devices is psychological parameter data, and user behavior is detected through biosensors on wearable devices. Biosensors are commonly used in wearable devices to monitor health through psychological parameters such as pulse rate, respiratory rate, skin temperature, and also body movements [4]. The activity of listening to a song is almost done by someone every day of course, but listening to a song will, of course, be adjusted to something that is felt or done, music or song has a strong connection with human psychology, this indicates that music or song is related to certain emotions and moods in human self [5]. Usually, someone will play a song based on a playlist that was made or choose each song to be played. According to research conducted by Elias Pampalk et al. There are two ways to make playlists. One of the most extreme is to carefully select each part and sequence of songs on the playlist manually, in addition to those that make up random playlists based on the collection of songs that are stored, in the first way it is of course very time consuming just to compile a playlist from a collection of songs and the second method produces playlists that are not useful if the collection is random [6]. Thus the idea arose to use a wearable device so that mood and activity can be detected in realtime by systems built on Android devices. Android was chosen because it is an operating system with an open-source license so that it can be developed freely [7].

1.2. Purpose and Objective

The purpose of this research is to build a song recommendation application based on mood and user activity. The objectives of this research are as follows:

1. Make music listeners easier in compiling playlists to listen to songs.
2. Make it easier for music listeners to get song recommendations based on mood.
3. Make it easier for music listeners to get song recommendations based on activity.

1.3. Research methodology

The research methodology used in this study uses a descriptive research methodology that is arranged in several stages which can be seen in Figure 1.

Figure 1. Research Flow

1.4. Software Development Method

The software development method used to build this application is to use the waterfall method or sequential development method [8]. Can be seen in Figure 2.

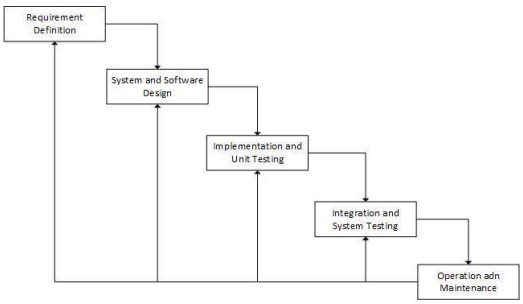

Figure 2. Waterfall Method (Ian Sommerville)

2. Literatur Review

2.1. Wearable Device

Wearable Device is a form of current device, embedded in sophisticated enhancements with intelligent technology that has a very small shape, and is light in weight so that it can be worn on one's body so that this device can usually be in the form of accessories such as watches, glasses, bracelets smart, or clothes. To be able to interact with this device usually uses a smartphone as a media control and system to regulate its use which is connected via Bluetooth. In this Wearable Device has sensors to detect a person's body, the purpose is to monitor health, activities, or other uses that can be implemented.

2.2. Spotify API

Spotify is an interactive music streaming service that was founded in Sweden. It currently operates in 28 countries, with more than 24 million users, of whom 6 million are reported to be paying customers. Spotify also provides an API that can be used by developers to build applications using data from the Spotify API. The data is in the form of a song catalog, artist / musician, song playlist, etc. Song playlists in the Spotify API provide a variety of playlists that can be adjusted such as Playlists based on Mood and also activities that will be used in this research. For documentation of the Spotify API can be accessed via https://developer.spotify.com.

2.3. Song

Song is the art of tone or sound in sequence, combination, and temporal relationship and is usually accompanied by music to produce a rhythm that has unity and continuity. Songs can be sung solo, duet, or vocal group. Songs have various types, ranging from genres such as rock, pop, metal, and also many more. Each genre has a characteristic usually from the rhythm and also the instruments used to accompany the song, such as rock genre songs that have a loud and high rhythm besides the musical instruments used usually consist of an electric guitar, drums, and bass.

2.4. Mood

Emotions are feelings directed at someone or something. Moods (Moods) are feelings that are less intense than emotions, which are not directed, and sometimes arise without any stimulating event [9]. this temporary emotional state can change over time. Moods are basically divided into positive moods and negative moods and each has its kind. Mood is very influential on a person's situation, especially when undergoing daily activities, to undergo strenuous activities of course a person must be in a very good mood to be eager to complete these activities, especially activities that rely on the brain and demand to think hard as if studying or doing analysis work so that the activity can be completed properly.

2.5. Activity

Activities in KBBI mean the activities or work activities carried out in each particular part of an organization that can be carried out by individuals or groups. Meanwhile, Tjokroamudiojo said that "Activities are efforts put forward to carry out all plans and discretionary policies determined to complete all the necessary equipment needs, who will carry out, where the pela and ends, and how to be carried out" .

3. Analysis and Planning

Systems analysis is a term that collectively describes the initial phases of system development [10]. Analysis of the system is the earliest stage of the construction of a system which aims to describe the system that will be built before it is implemented so that the system can be in accordance with the needs needed.

3.1. Problem Analysis

Every time someone will feel the mood changes as previously described it can be influenced by activity, social interaction, age, disasters, etc. The mood can of

course be influenced by songs with certain genres. The song can change the mood instantly through rhythm orlyrics in the song. In the song player application their own Playlists. Analysis of the problem in this study are: songs.

1. Difficult music listeners in compiling a playlist of song.
2. Difficult music listeners get song recommendations based on mood.
3. Difficult music listeners to get song recommendations based on activity.

3.2. System Architecture

3.3.

System architecture aims to describe how a system works and identify it based on an analysis of system requirements. The device used in this study consisted of an Android smartphone and a Smartband Wearable Device. The design of the system architecture to be built can be seen in Figure 3.

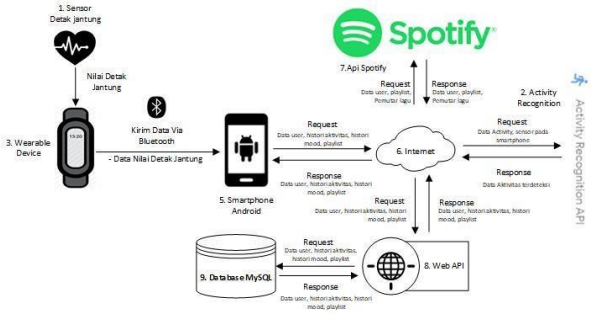

Figure 3. System Architecture

3.3. Technology Analysis

Technology analysis is a translation of how to use the technology used in this study to recommend songs based on mood or activity.

3.3.1. Spotify API

The use of the Spotify Web API aims to obtain information about recommended Playlists such as song titles, artists, genres and other information. In addition there are several endpoints that will be used as well as user profiles to get user Spotify account information, and also browse to display Playlist recommendations based on mood or activity.

3.3.2. Wearable Device

As previously described the use of Wearable Devices in this study uses the type of smartband, the selection of smartband is done because the form is easy to use and also has enough sensors to support this research. The Wearable Device here serves as a tool to detect movement and also reads the user's heart rate in realtime through sensors embedded in the Wearable Device which then the data recorded from the sensor will be sent to the Android system via a Bluetooth connection.

users will usually choose their own songs to play or compile

3.4. Analysis of Non-Functional Needs

As described in the non-functional analysis includes the elements or components needed for the system to be built. For specifications on non-functional requirements, see Table 1.

Table 1. Specifications of Non-Functional Needs

Code SKPL	Non Need Specifications Functional
SKPL-NF-001	The system is built based Android.
SKPL-NF-002	The Android operating system used uses Android version of at least 5.0 Lollipop and above.
SKPL-NF-003	The system built has hardware specifications Android that meets the standards
SKPL-NF-004	Wearable Device used have specifications that are meet the needs of that system

3.5 Functional Requirements Analysis

Functional requirements analysis is an analysis of the features that will be offered to users, and also the design of UML as an illustration for the implementation of the system to be built.

3.5.1. Use Case Diagram

Use Case is a technique used in the development of a software or information system to capture the functional needs of the system concerned, Use Case explains the interaction that occurs between "actors" as the initiator of the interaction of the system itself with the existing system, a Use Case is represented by simple sequence of steps. Use Case in the built system can be seen in Figure 4.

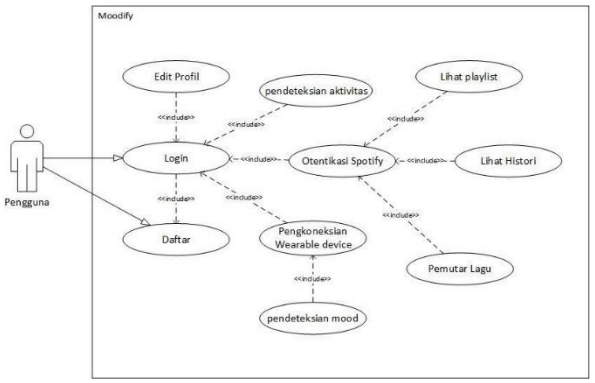

Figure 4 Use Case Diagram

3.5.2. Scenario Use Case

The Use Case Scenario is an illustration of the sequence of interactions between the actors and the Use Case, starting from the beginning of the actors interacting until they finish. The Use case scenario can be seen in Table 2.

Table 2 Scenario Use Case Authentication Spotify

Aksi Aktor	Reaksi Sistem
Skenario Normal	
1. Pengguna login ke dalam sistem untuk pertama kalinya.	
	2. Sistem menampilkan jendela otentikasi.
3. Pengguna menekan tombol izinkan.	
	4. Sistem terotentikasi ke akun Spotify pengguna.
Skenario Alternatif	
1. Pengguna login ke dalam sistem untuk pertama kalinya.	
	2. Sistem menampilkan jendela otentikasi.
3. Pengguna menekan tombol jangan izinkan.	
	4. Sistem gagal terotentikasi ke akun Spotify pengguna.

3.6. Diagram Activity

Activity diagram is a depiction of a stage that is more focused on the business process or workflow of the system on a feature or process carried out by the system to achieve the ultimate goal of the process. The activity diagram of this system can be seen in Figure 5.

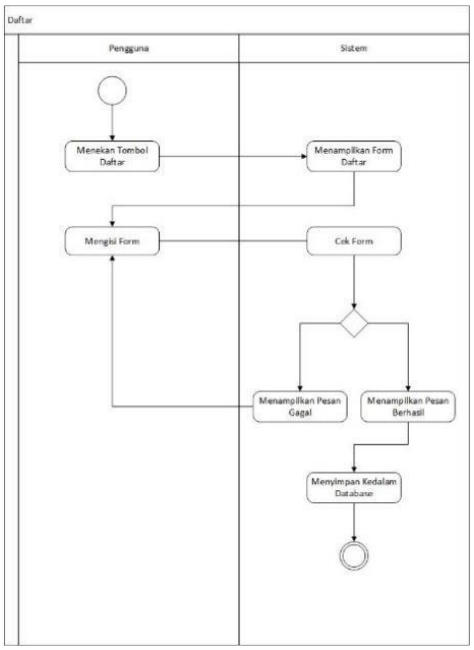

Figure 5 Acitvity Diagram Register

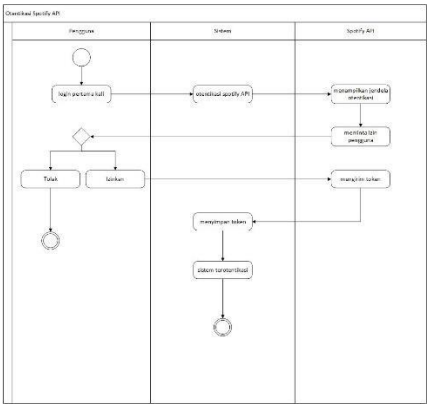

Figure 6 Spotify API Authentication Activity Diagram

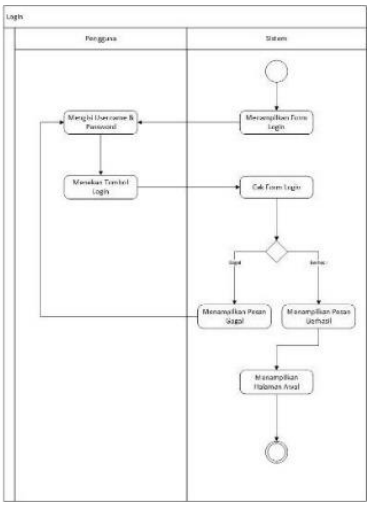

Figure 7 Login Activity Diagram

3.7. Class Diagram

Class diagram is the design of the classes in the program code that is the attributes in each class and also the methods used in each class to build the system. The class diagram of the system to be built can be seen in Figure 8.

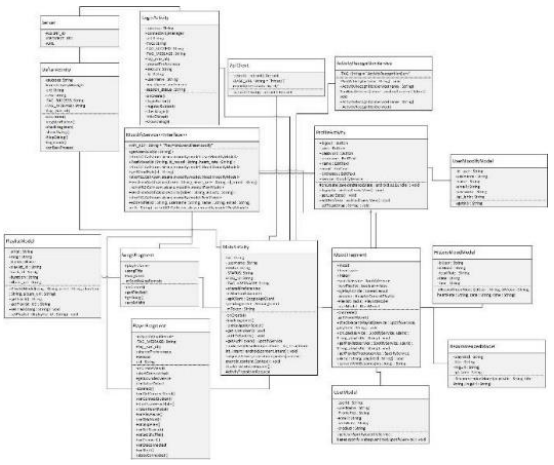

Figure 8 Class Diagram

3.8. Sequence Diagram

Sequence diagrams illustrate the interactions between objects and indicate communication between these objects. This diagram also shows a series of messages that are exchanged by objects that perform a particular task or action. The following sequence diagram will be drawn to build the system. The sequence diagram can be seen in Figure 9.

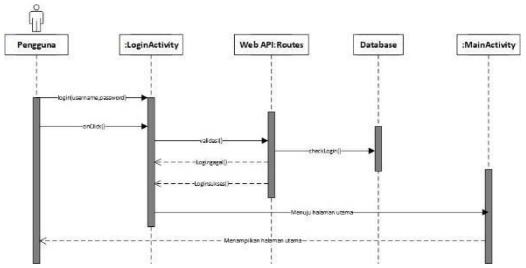

Figure 9 Login Sequence Diagram

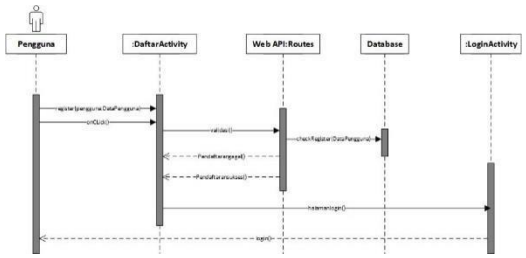

Figure 10 List Sequence Diagram

3.9. Interface Design

The design of the interface aims to provide an overview of the appearance of the system interface that will be built also based on the ease of use from the user's side. The following is the interface design for the system that will be built. can be seen in Figure 11.

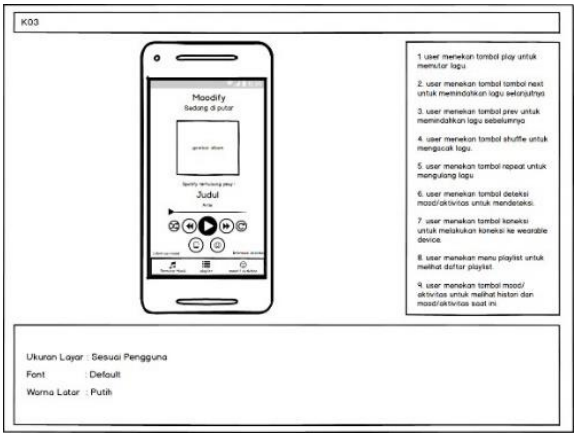

Figure 11 Display Design Music Player Interface

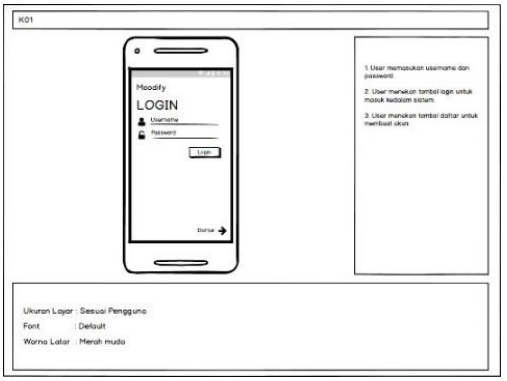

Figure 13 Display Interface Design Login

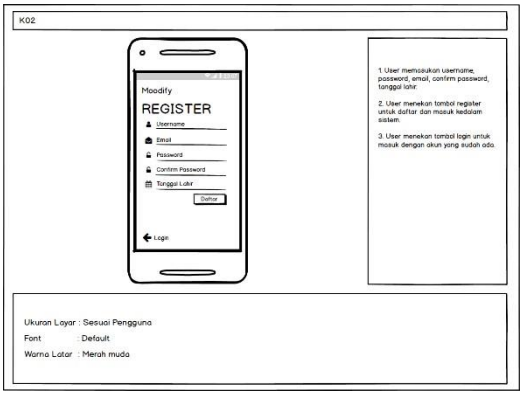

Figure 13 Display Interface Design Registration

4. Closing

4.1. Conclusion

Based on the results of the design the application design is in accordance with what was expected and then to be implemented.

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