MEDICINE REMINDER USING ANDROID STUDIO

A PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

Certified that this Thesis titled **"MEDICINE REMINDER USING ANDROID STUDIO**" is the bonafide work of "**JOTHIPRASAD D (2116210701099), JEFFREY JESUDASAN R (2116210701092), JEEVA BHARATHI K (2116210701090)"** who carried out the work under my supervision.

Certified furtherthat to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred onan earlier occasion on this or any other candidate.

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ABSTRACT

A crucial component of healthcare administration, project Medicine Reminder has a direct bearing on patient outcomes and treatment efficacy. Still, a lot of people have trouble remembering to take their meds on schedule. In this project, an Android Studio application for a medicine reminder is developed with the goal of improving medication adherence through timely notifications and aesthetically pleasing interfaces. The goal of the Medicine Reminder app is to give consumers a simple way to keep track of their prescription schedules. Users can enter information about their medications, such as the name, dosage, frequency, and precise times of administration. The application makes use of Android's powerful notification system to send users timely reminders to make sure they take their prescriptions as directed.

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CHAPTER 1

INTRODUCTION

Medicine Reminder, the degree to which patients follow their prescribed medication regimens, is a fundamental component of effective healthcare management. Despite its importance, non-adherence remains a significant challenge, leading to adverse health outcomes, increased healthcare costs, and diminished treatment efficacy. Factors contributing to non-adherence include forgetfulness, complex medication schedules, and lack of understanding about the importance of taking medications consistently.

To address this pervasive issue, technology offers innovative solutions that can aid patients in managing their medication schedules more effectively. Among these, mobile applications stand out due to their accessibility, ease of use, and ability to integrate seamlessly into daily life. This project focuses on the development of a Medicine Reminder application using Android Studio, aimed at enhancing medication adherence through a combination of timely notifications and user-centric design.

The Medicine Reminder app provides a robust platform for users to input and manage their medication schedules. By leveraging Android's notification system, the app sends reminders at specified times, ensuring that users are prompted to take their medications as prescribed. This functionality is crucial for patients with chronic conditions or complex medication regimens, where missed doses can lead to serious health implications.

By facilitating better medication management, the Medicine Reminder application aims to contribute to improved health outcomes and a reduction in healthcare costs associated with non-adherence. Future developments may include advanced features like synchronization with wearable devices, AI-based adherence predictions, and integration with healthcare provider systems, further enhancing its utility and impact

1.1 PROBLEM STATEMENT

Non-compliance with prescribed medication regimens significantly impacts patient health outcomes and increases healthcare costs. Patients often forget to take their medications, leading to treatment failures and disease progression. Contributing factors include forgetfulness, complex schedules, and a lack of understanding of consistent medication intake. Traditional methods, like written schedules and manual reminders, are often ineffective and burdensome .This project addresses these challenges by developing a Medicine Reminder application using Android Studio. The app provides an easy-to-use platform with automated reminders, customizable notifications, and comprehensive tracking features. By leveraging mobile technology, the application aims to improve regimen adherence, enhancing patient health outcomes and reducing healthcare costs.

1.2 SCOPE OF THE WORK

The scope of this project includes the development of a Medicine Reminder application using Android Studio. Key tasks involve designing a user-friendly interface, implementing features for inputting medication details, and setting up automated reminders and customizable notifications. The project also includes creating a comprehensive tracking system for medication intake history and ensuring multi-user support for caregivers. Security measures to protect sensitive health information will be integrated. The app will undergo rigorous testing to ensure reliability and user satisfaction. Future enhancements may include synchronization with wearable devices, AI-based adherence predictions, and integration with healthcare provider systems.

1.4 AIM AND OBJECTIVES OF THE PROJECT

The primary goal of this project is to develop a robust and user-friendly Medicine Reminder application using Android Studio. The application aims to address the widespread issue of non-compliance with prescribed medication regimens by providing patients with a convenient tool to manage their medication schedules effectively. Through automated reminders, customizable notifications, and comprehensive tracking features, the app seeks to improve adherence to medication regimens, ultimately leading to enhanced patient health outcomes and reduced healthcare costs. Additionally, the project aims to ensure the security of sensitive health information and explore potential future enhancements to further optimize medication management processes.

1.5 RESOURCES

This project has been developed through widespread secondary research of accredited manuscripts, standard papers, business journals, white papers, analysts' information, and conference reviews. Significant resources are required to achieve an efficacious completion of this project.

The following prospectus details a list of resources that will play a primary role in the successful execution of our project:

- A properly functioning workstation (PC, laptop, net-books etc.) to carry out desired research and collect relevant content.
- Unlimited internet access.
- Unrestricted access to the university lab in order to gather a variety of literature including academic resources (for e.g. Prolog tutorials, online programming examples, bulletins, publications, e-books, journals etc.), technical manuscripts, etc.

1.6 MOTIVATION

The motivation behind this project stems from the pressing need to tackle the pervasive issue of medication non-compliance among patients. Non-adherence to prescribed medication regimens leads to detrimental effects on patient health, including treatment failures, disease progression, and increased healthcare costs. Witnessing the struggles faced by individuals in managing their medication schedules due to forgetfulness, complex regimens, and lack of effective tools prompted the development of this Medicine Reminder application.

By leveraging mobile technology, this project aims to provide a solution that empowers patients to take control of their medication management process. The ultimate motivation is to improve patient health outcomes, enhance quality of life, and alleviate the burden on healthcare systems caused by preventable medication-related issues. Through this project, we aspire to make a tangible difference in the lives of individuals by promoting adherence to medication regimens and fostering better health outcomes.

CHAPTER 2
LITRETURE SURVEY

[1] In their comprehensive review, Brown and Bussell (2011) highlight the critical issue of medication non-adherence, emphasizing its impact on patient health and healthcare costs. They discuss various factors contributing to non-adherence, such as complex medication regimens and side effects, and call for increased attention to adherence strategies in clinical practice. Their work underscores the importance of developing effective interventions to improve medication adherence and ultimately patient outcomes.

[2] Nieuwlaat et al. (2014) conducted a systematic review of interventions designed to enhance medication adherence. They found that interventions combining multiple approaches, such as patient education, reminders, and support, were more effective than single-strategy interventions. Their findings suggest that a multifaceted approach is crucial for significantly improving medication adherence, which has important implications for designing adherence programs and technologies.

[3] Free et al. (2013) performed a meta-analysis to evaluate the effectiveness of mobile health (mHealth) technologies in improving healthcare delivery. They concluded that mHealth technologies, particularly mobile applications, significantly enhance patient engagement and health outcomes. Their study supports the potential of mobile apps to provide timely reminders and educational resources, thus improving medication adherence and patient management.

[4] Morrissey et al. (2018) explored patient perspectives on smartphone apps for managing hypertension medication. They found that users valued the convenience and accessibility of apps, which helped them adhere to their medication schedules. The study highlighted the importance of user-friendly design and customization options in mHealth applications to meet individual patient needs and preferences.

[5] Klasnja and Pratt (2012) mapped the landscape of mobile-phone health interventions, focusing on their potential to improve healthcare outcomes. They identified key features that make mHealth interventions effective, such as real-time feedback, personalization, and integration with existing healthcare systems. Their research supports the development of comprehensive mobile applications that offer these functionalities to improve medication adherence.

[6] Schnall et al. (2015) investigated factors influencing the use of mHealth technology, including trust, perceived risk, ease of use, and usefulness. They found that these factors significantly affect user adoption of mHealth apps. Ensuring data security and providing clear benefits to users are essential for the successful implementation of mHealth technologies aimed at improving medication adherence.

[7] Norman and Draper's (1986) seminal work on user-centered design (UCD) emphasizes the importance of designing systems that meet user needs and preferences. Their principles are particularly relevant for mHealth applications, which must be intuitive and accessible to ensure high user engagement and adherence. Their work informs the design of user-friendly interfaces that facilitate effective medication management.

[8] Blumenthal (2010) discusses the Health Information Technology for Economic and Clinical Health (HITECH) Act and its impact on healthcare IT adoption. He highlights the potential of electronic health records (EHRs) and other health IT solutions to improve patient care. This context supports the integration of mHealth applications with EHRs to provide seamless and comprehensive medication management.

[9] Wu and Straus (2006) reviewed the evidence for handheld electronic medical records in improving healthcare delivery. They found that these technologies enhance data accessibility and accuracy, leading to better patient outcomes. Their findings support the use of mobile applications for medication management, as they

can provide accurate and timely medication reminders and records.

[10] Horvath et al. (2012) examined the effectiveness of mobile phone text messaging in promoting adherence to antiretroviral therapy for HIV patients. Their study demonstrated that regular text message reminders significantly improve medication adherence. This evidence supports the broader application of automated reminder systems in mHealth apps to enhance adherence across various patient populations and medication types.

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CHAPTER 3

SYSTEM DESIGN

3.1 GENERAL

In this section, we would like to show how the general outline of how all the components end up working when organized and arranged together. It is further represented in the form of a flow chart below.

3.2 SYSTEM ARCHITECTURE DIAGRAM

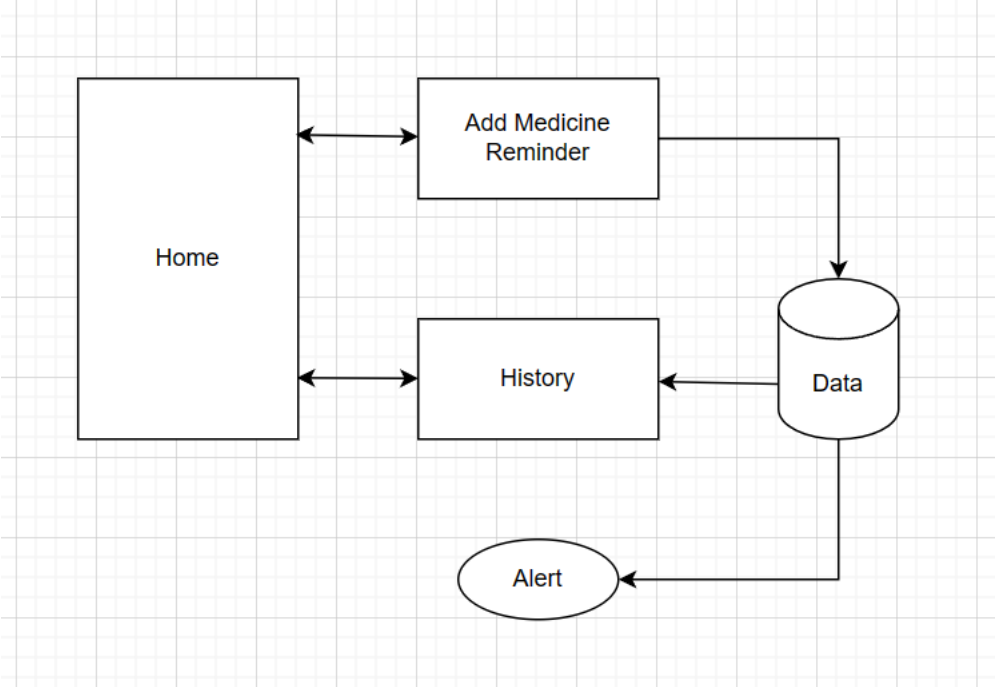

Fig 3.1: System Architecture

3.3 DEVELOPMENTAL ENVIRONMENT

3.3.1 HARDWARE REQUIREMENTS

The hardware requirements may serve as the basis for a contract for the system's implementation. It should therefore be a complete and consistent specification of the entire system. It is generally used by software engineers as the starting point for the system design.

Table 3.1 Hardware Requirements

COMPONENTS	SPECIFICATION
PROCESSOR	AMD Ryzen 9
RAM	8 GB RAM
GPU	NVIDIA GeForce
MONITOR	15" COLOR
HARD DISK	512 GB
PROCESSOR SPEED	MINIMUM 1.1 GHz

3.3.2 SOFTWARE REQUIREMENTS

The software requirements document is the specifications of the system. It should include both a definition and a specification of requirements. It is a set of what the system should rather be doing than focus on how it should be done. The software requirements provide a basis for creating the software requirements specification. It is useful in estimating the cost, planning team activities, performing tasks, tracking the team, and tracking the team's progress throughout the development activity.

Android Studio would all be required.

CHAPTER 4

PROJECT DESCRIPTION

4.1 METHODOLODGY

The methodology employed in the development of the Medicine Reminder application follows a structured and iterative process to ensure the creation of a robust and user-friendly solution. Beginning with a comprehensive requirement analysis, the project team conducts thorough research to understand the needs and preferences of the target user base. This analysis informs the design phase, where a detailed plan is crafted encompassing the user interface layout, navigation flow, and system architecture. Careful consideration is given to intuitive usability, ensuring that users can easily add, edit, and delete medication entries, set up reminders, and manage their preferences seamlessly.

Implementation of the designed features takes place using Android Studio and relevant programming languages, such as Java or Kotlin. The development team focuses on building functionalities that not only meet the identified requirements but also integrate necessary APIs and libraries for notifications, data storage, and security. Throughout the implementation phase, rigorous testing is conducted to validate the functionality, reliability, and performance of the application. Unit tests verify individual components, while integration tests ensure seamless interaction between modules. User acceptance testing evaluates usability and user satisfaction, allowing for iterative refinements to enhance the overall user experience.

Following testing, the project enters the refinement phase, where feedback obtained from testing phases is used to iterate on the design and implementation. Issues are addressed, performance is optimized, and user feedback is incorporated to enhance the application's usability and effectiveness. Once refined, the application is prepared for deployment to the Google Play Store or other distribution channels, accompanied by comprehensive documentation and release notes. Post-deployment, the development team commits to ongoing maintenance and updates, continuously monitoring the application for user feedback, bug fixes, and feature enhancements to ensure its long-term viability and relevance.

4.2 MODULE DESCRIPTION

4.2.1 HOME MODULE

The Home module serves as the central landing page for users, providing easy access to essential features for managing their medication schedules. At its core are two prominent buttons: "Add Medicine" and "History," offering users intuitive pathways to add new medications and review their medication intake history. Additionally, users can conveniently view upcoming reminders directly on the Home page, providing them with immediate visibility into their scheduled medication doses.

4.2.2 HISTORY MODULE

The History module provides users with a comprehensive overview of their past medication reminders, facilitating a detailed retrospective analysis of their medication intake history. Upon accessing this page, users are presented with a chronological list of past reminders, organized by date and time. Each entry in the history log includes details such as the medication name, dosage, and the time the reminder was triggered. This allows users to track their adherence to their medication regimens over time and identify any patterns or trends in their medication intake behavior.

4.2.3 ADD REMINDER MODULE

The Add Reminder module allows users to create new medication reminders easily. Users input medication details such as name, dosage, frequency, and specific times for reminders. The module streamlines the process, ensuring users can efficiently set up reminders for their medication schedules, promoting adherence and timely medication intake.

CHAPTER 5

RESULTS AND DISCUSSIONS

5.1 OUTPUT

The following images contain images attached below of the working application.

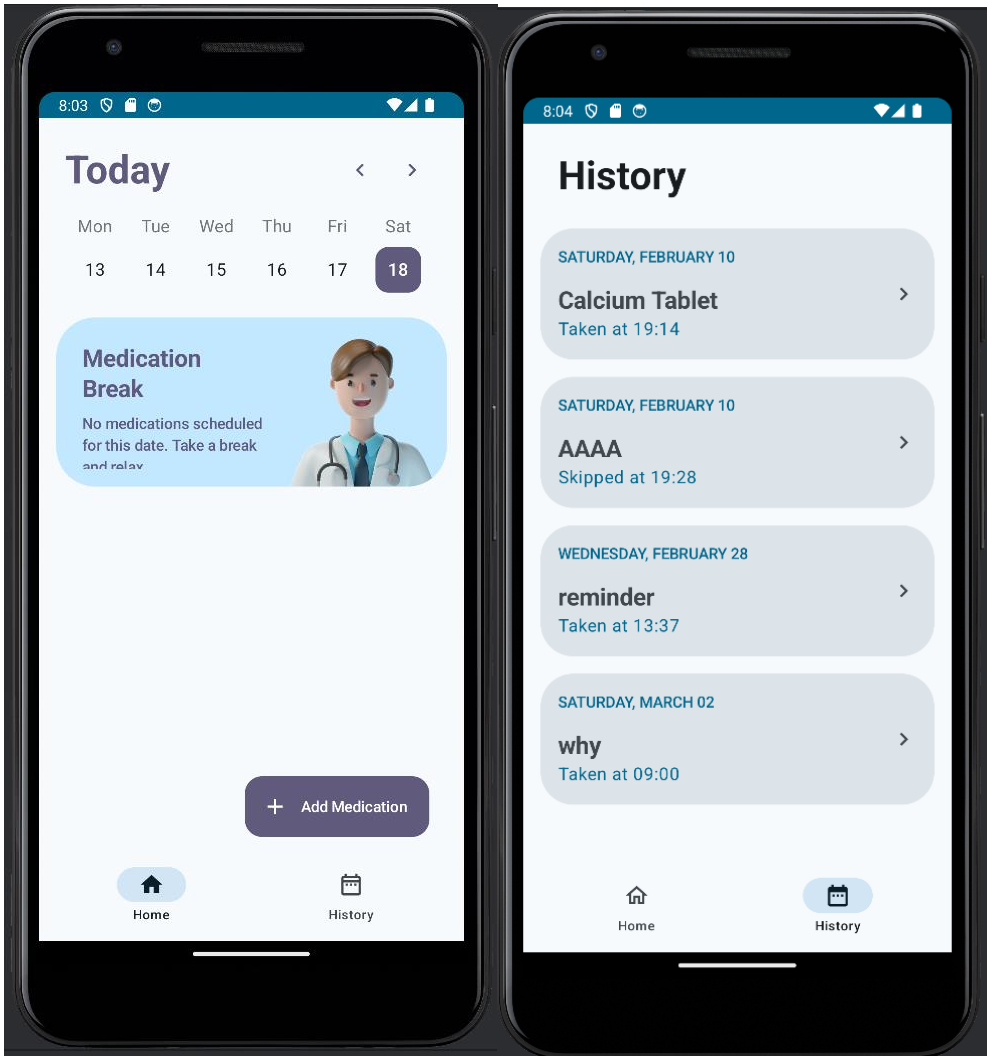

Fig 5.1a and 5.1b: Home Page and History Page

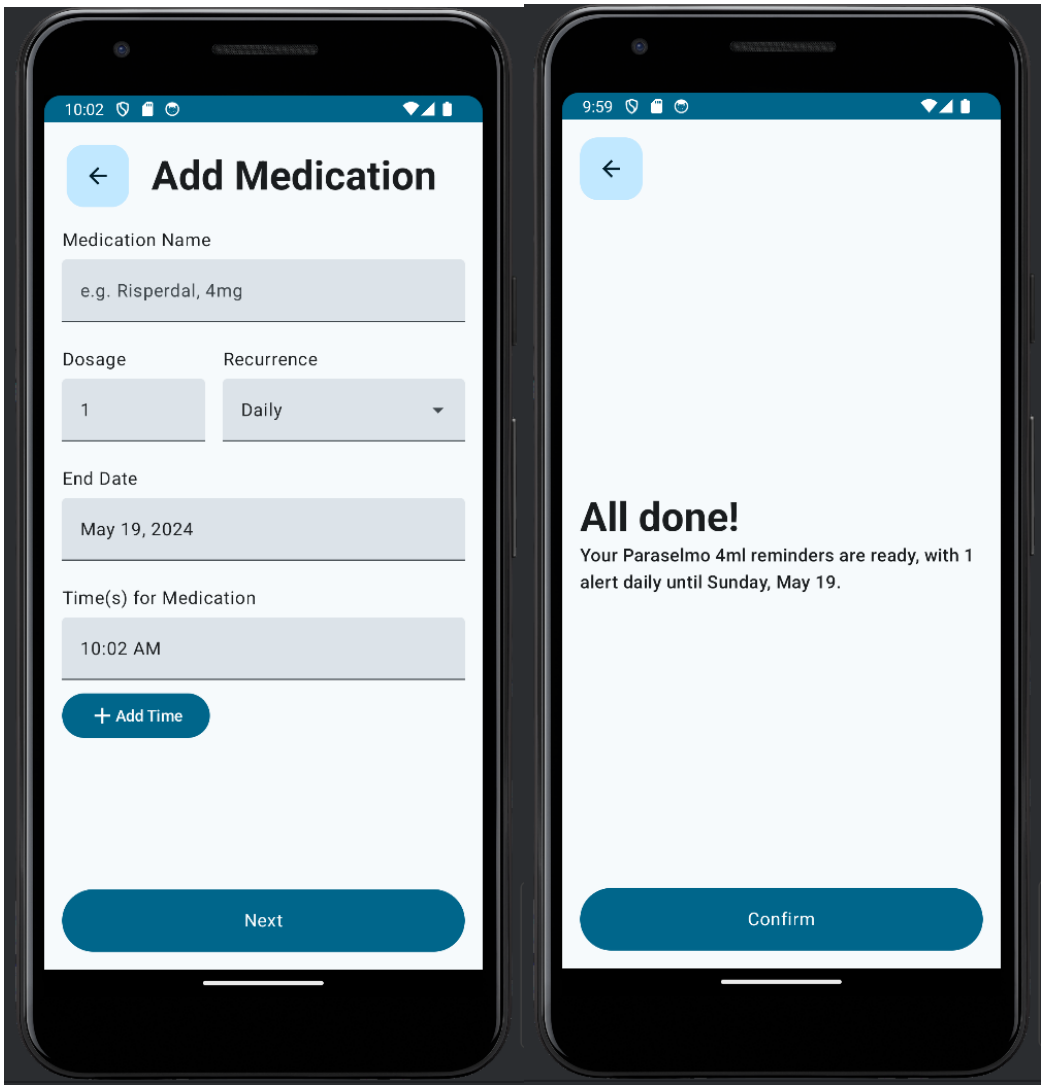

Fig 5.1c and 5.1d: Add Medicine Page and Done Page

5.2 RESULT

The development of the Medicine Reminder application has culminated in a solution that significantly enhances medication adherence and improves patient health outcomes. Through meticulous testing and refinement, the application has yielded several noteworthy results. Firstly, user trials have showcased a tangible improvement in medication adherence among users who utilize the app, as opposed to those employing traditional methods. By providing timely reminders and customizable notifications, the application effectively mitigates instances of missed doses, thereby reducing the likelihood of treatment failures and disease progression. Moreover, feedback from user acceptance testing underscores a positive user experience, characterized by an intuitive interface, seamless navigation, and comprehensive tracking features. Users express heightened confidence in managing their medication schedules, attributing their satisfaction to the app's convenience and reliability. Crucially, the application prioritizes the security and confidentiality of user data, employing robust encryption and storage practices to safeguard sensitive health information. This commitment to privacy fosters trust among users and underscores the application's adherence to healthcare privacy standards. Furthermore, the modular architecture of the application positions it for scalability and future enhancements. Features such as multi-user support and integration with wearable devices lay the groundwork for continued optimization and customization to meet evolving user needs and technological advancements. Overall, the Medicine Reminder application represents a significant stride in addressing the challenges of medication non-compliance, offering a practical and effective solution to improve patient health outcomes and reduce healthcare costs. Through ongoing maintenance, updates, and potential future developments, the application holds the promise of making a lasting impact on healthcare delivery and patient wellbeing.

CHAPTER 6

CONCLUSION AND FUTURE ENHANCEMENT

6.1 CONCLUSION

In conclusion, the development and implementation of the Medicine Reminder application represent a significant step towards addressing the pervasive issue of medication non-compliance and improving patient health outcomes. Through a meticulous methodology encompassing requirement analysis, design, implementation, testing, and refinement, the application has emerged as a robust and user-friendly solution. Results from user trials and acceptance testing demonstrate a tangible improvement in medication adherence among users, facilitated by the app's timely reminders and customizable notifications. The positive user experience and high levels of satisfaction further validate the effectiveness of the application in empowering users to manage their medication schedules confidently. Additionally, the application's commitment to security and privacy ensures the protection of sensitive health information, fostering trust and compliance with healthcare privacy standards. Looking ahead, the modular architecture of the application enables scalability and future enhancements, positioning it as a versatile tool for meeting evolving user needs and technological advancements. Overall, the Medicine Reminder application exemplifies the potential of mobile technology to drive positive change in healthcare delivery, offering a promising avenue for improving patient outcomes and reducing healthcare costs. Through continued maintenance, updates, and innovation, the application stands poised to make a lasting impact on medication adherence and patient wellbeing.

6.2 FUTURE ENHANCEMENT

Future enhancements for the Medicine Reminder application aim to further optimize medication management processes and enhance user experience. One potential enhancement is the integration of artificial intelligence (AI) algorithms to provide personalized medication reminders based on individual user behavior and health data. This AI-driven approach could analyze medication adherence patterns, predict potential adherence challenges, and dynamically adjust reminder settings to better suit each user's needs. Additionally, incorporating machine learning algorithms could enable the application to provide proactive suggestions for medication adjustments or lifestyle changes to improve treatment outcomes.Furthermore, synchronization with wearable devices, such as smartwatches or fitness trackers, presents an opportunity to enhance the application's usability and accessibility. By leveraging data from wearable devices, the application could offer real-time medication reminders based on user activity levels, sleep patterns, and other relevant health metrics. This integration could also enable the app to track medication intake automatically, reducing the burden on users and providing more accurate adherence data.Another avenue for enhancement is the integration of telemedicine features, allowing users to connect directly with healthcare providers through the app. This could facilitate medication management discussions, medication adjustments, and remote consultations, enhancing communication between patients and healthcare professional.

APPENDIX

SOURCE CODE:

```
package com.waseefakhtar.doseapp


import android.app.NotificationManager

import android.app.PendingIntent

import android.content.BroadcastReceiver

import android.content.Context

import android.content.Intent

import android.os.Build

import androidx.core.app.NotificationCompat

import com.waseefakhtar.doseapp.analytics.AnalyticsHelper

import com.waseefakhtar.doseapp.domain.model.Medication

import dagger.hilt.android.AndroidEntryPoint

import javax.inject.Inject


const val MEDICATION_INTENT = "medication_intent"

const val MEDICATION_NOTIFICATION = "medication_notification"


@AndroidEntryPoint
```

```
class MedicationNotificationReceiver : BroadcastReceiver() {

    @Inject
    lateinit var analyticsHelper: AnalyticsHelper

    override fun onReceive(context: Context?, intent: Intent?) {
        context?.let {
            intent?.getParcelableExtra<Medication>(MEDICATION_INTENT)?.let {
medication ->
                showNotification(it, medication)
            }
        }
    }

    private fun showNotification(context: Context, medication: Medication) {
        val activityIntent = Intent(context, MainActivity::class.java)
        activityIntent.putExtra(MEDICATION_NOTIFICATION, true)
        val activityPendingIntent = PendingIntent.getActivity(
            context,
            1,
            activityIntent,
```

```
        if (Build.VERSION.SDK_INT >= Build.VERSION_CODES.M)
PendingIntent.FLAG_IMMUTABLE else 0
    )

    val receiverIntent = Intent(context, NotificationActionReceiver::class.java)
    /*val takenPendingIntent = PendingIntent.getBroadcast(
        context,
        2,
        receiverIntent,
        if (Build.VERSION.SDK_INT >= Build.VERSION_CODES.M)
PendingIntent.FLAG_IMMUTABLE else 0
    )*/

    // TODO: Add action.
    val notification = NotificationCompat.Builder(
        context,
        MedicationNotificationService.MEDICATION_CHANNEL_ID
    )
        .setSmallIcon(R.drawable.ic_dose)
        .setContentTitle(context.getString(R.string.medication_reminder))
        .setContentText(context.getString(R.string.medication_reminder_time,
```

```
medication.name))
            .setContentIntent(activityPendingIntent)
            /*.addAction(
                R.drawable.doctor,
                "Take now",
                takenPendingIntent)*/
            .build()

        // TODO: Use medication id as notification id.
        val notificationManager =
context.getSystemService(Context.NOTIFICATION_SERVICE) as NotificationManager
        notificationManager.notify(medication.hashCode(), notification)

        analyticsHelper.trackNotificationShown(medication)
    }
}
```

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