

Android Application for BMI Calculation with Gender Specific Health Suggestions and Health Awareness

by

Examination Roll: 233141

A Project Report submitted to the
Institute of Information Technology
in partial fulfillment of the requirements for the degree of
Professional Masters in Information Technology

Supervisor: Professor Shamim Al Mamun, PhD



Institute of Information Technology
Jahangirnagar University
Savar, Dhaka-1342

October 2025

DECLARATION

I hereby certify that this project, or any portion of it, has not been submitted to any other university for the grant of a degree. This is my own project.

Roll: 233141

CERTIFICATE

The project titled “Android Application for BMI Calculation with Gender Specific Health Suggestions and Health Awareness” submitted by S. M. Tarek Aziz, ID: 233141, Session: Fall 2023-2024, has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Professional Masters in Information Technology on the 11th of October 2025.

Professor Shamim Al Mamun, PhD
Supervisor

BOARD OF EXAMINERS

Dr. M. Shamim Kaiser
Professor, IIT, JU

Coordinator
PMIT Coordination Committee

Dr. Risala Tasin Khan
Professor, IIT, JU

Member, PMIT Coordination Committee
& Director, IIT

Dr. Jesmin Akhter
Professor, IIT, JU

Member
PMIT Coordination Committee

K M Akkas Ali
Professor, IIT, JU

Member
PMIT Coordination Committee

Dr. Rashed Mazumder
Associate Professor, IIT, JU

Member
PMIT Coordination Committee

ACKNOWLEDGEMENTS

We feel pleased to have the opportunity of expressing our heartfelt thanks and gratitude to those who all rendered their cooperation in making this report.

This project is performed under the supervision of Professor Shamim Al Mamun, PhD Institute of Information Technology (IIT), Jahangirnagar University, Savar, Dhaka. During the work, he has supplied us a number of books, journals, and materials related to the present investigation. Without his help, kind support and generous time spans he has given, we could not perform the project work successfully in due time. First and foremost, we wish to acknowledge our profound and sincere gratitude to him for his guidance, valuable suggestions, encouragement and cordial cooperation.

We express our utmost gratitude to Dr. Risala Tasin Khan, Director, IIT, Jahangirnagar University, Savar, Dhaka, for her valuable advice that have encouraged us to complete the work within the time frame. Moreover, we would also like to thank the other faculty members of IIT who have helped us directly or indirectly by providing their valuable support in completing this work.

We express our gratitude to all other sources from where we have found help. We are indebted to those who have helped us directly or indirectly in completing this work.

Last but not least, we would like to thank all the staff of IIT, Jahangirnagar University and our friends who have helped us by giving their encouragement and cooperation throughout the work.

ABSTRACT

Body Mass Index (BMI) is an important exponent used to assess and measure a person's nutritional and health status, which is important to know and understand for human life. Several existing Android-based health applications can calculate BMI and provide basic health tips. Most of these systems lack gender-specific health guidance, personalized suggestions, and a user-friendly interface that ensures both accuracy and engagement. This project focuses on developing an Android application that efficiently calculates BMI and provides gender-specific health recommendations based on BMI categories like underweight, healthy, overweight, and obese. It uses Firebase Authentication to ensure secure user login and registration. The main interface contains six interactive modules like BMI calculation, app rating, and four health awareness topics like About BMI, Healthy Lifestyle, Physical Activity, and Healthy Diet. The system takes user input like name, age, gender, height, weight and computes BMI, categorizes the results separately for males and females, and then generates personalized health suggestions. The system offers personalized health recommendations to help users maintain or improve their health based on the results.

A user survey conducted among 21 participants showed an 88% satisfaction rate, which is 18% higher than similar existing BMI applications. The simple UI design and gender-based recommendations were very well-liked by users. This demonstrates the improved usability and effectiveness of the proposed system. The full project and source code are publicly available on GitHub: <https://github.com/smtarekaziz/Android-Application-for-BMI-Calculation>

Keywords: Android Application, BMI, Health Awareness, Gender-Specific Suggestions, Healthy Lifestyle, Health Guidance.

LIST OF ABBREVIATIONS

BMI	Body mass index
UI	User Interface
UX	User Experience
iOS	iPhone Operating System
WHO	World Health Organization
CDC	Centers for Disease Control and Prevention
API	Application Programming Interface
OS	Operating System
IOT	Internet of Things
KPI	Key Performance Indicator
SDK	Software Development Kit
GUI	Graphical User Interface
INT	Internet
JU	Jahangirnagar University
IIT	Institute of Information Technology

LIST OF FIGURES

Figure

2.1	Android Platforms in Mobile App Development[1].	6
2.2	iOS Platforms in Mobile App Development[1].	6
2.3	UI/UX home page design of this project.(Source: Created by Author)	7
2.4	Agile and Waterfall Methodologies[2].	8
3.1	App Development Process[3].	11
3.2	Four Layers in Software Application[3].	12
4.1	Application design and Module development. (Source: Created by Author)	16
4.2	App Architecture Diagram. (Source: Created by Author)	17
4.3	Storing Gmail and Password properly by Firebase. (Source: Created by Author)	17
4.4	Register and Sign in ER Diagram. (Source: Created by Author) . .	19
4.5	application Login and Registration Screens Layout. (Source: Created by Author)	20
4.6	Main UI Layout. (Source: Created by Author)	21
4.7	Health awareness Screen Layouts. (Source: Created by Author) . .	22
4.8	BMI Calculation UI Screen Layout. (Source: Created by Author) .	23
4.9	Result and Health suggestion screen Layout. (Source: Created by Author)	24

5.1	User Feedback Summary. (Source: Created by Author)	30
5.2	Performance Metrics by user. (Source: Created by Author)	31
0.1	Survey for User Testing. (Source: Created by Author)	47
0.2	User Interface Design Layouts. (Source: Created by Author)	48
0.3	User Interface Design Layouts. (Source: Created by Author)	49

LIST OF TABLES

Table

3.1	BMI Classification	13
4.1	User Authentication data.	18
5.1	System Testing Results.	29
5.2	Usability Testing Results (Average Ratings out of 5, Sample-21 Users).	32
5.3	Comparison with Similar Apps on google play store.	32
6.1	Summarize of Findings	34

TABLE OF CONTENTS

DECLARATION	ii
CERTIFICATE	iii
ACKNOWLEDGEMENTS	iv
ABSTRACT	v
LIST OF ABBREVIATIONS	vi
LIST OF FIGURES	vii
LIST OF TABLES	ix
CHAPTER	
I. Introduction	1
1.1 Background and Motivation	1
1.2 Problem Statement	1
1.3 Research Objectives	2
1.3.1 Proposed Solution	2
1.3.2 Advantages	3
1.4 Scope of the Research	3
1.5 Structure of the Report	4
II. Literature Review	5
2.1 Overview of Mobile App Development	5
2.2 Frameworks and Platforms in App Development	5
2.2.1 Android Platforms	5
2.2.2 iOS Platforms	6
2.3 Key Technologies Used in Mobile Apps	7
2.4 User Experience and Interface Design Principles	7
2.5 App Development Methodologies	8
2.6 Challenges in Mobile App Development	8

2.7	Previous Studies and Related Work	9
2.8	Summary	9
III.	Research Methodology	10
3.1	Research Approach	10
3.2	App Development Process	10
3.3	Tools and Technologies Used	11
3.4	Design and Architecture of the App	12
3.5	Data Collection and Analysis	13
3.6	Evaluation Metrics	14
3.7	Limitations of the Research	14
IV.	System Design and Development	15
4.1	Requirements Analysis	15
4.2	System Architecture and Design	16
4.3	Database Design	17
4.3.1	User Authentication	18
4.3.2	Data Flow	18
4.4	User Interface (UI) Design	19
4.4.1	Login and Registration Screens Layout	20
4.4.2	Main UI Layout(Home Screen)	20
4.4.3	Health awareness Screen	22
4.4.4	BMI Calculation Page Screen	22
4.4.5	Result and Health suggestion Screen	23
4.5	App Features and Functionalities	24
4.5.1	User Authentication (Register & Sign in)	24
4.5.2	Health Awareness Modules with button	25
4.5.3	Gender Specific Health Suggestions	25
4.5.4	Result Screen	26
4.6	Implementation Challenges and Solutions	26
4.7	Testing and Debugging Strategies	27
4.7.1	Unit Testing	27
4.7.2	Integration Testing	27
4.7.3	User Interface (UI) Testing	28
4.7.4	Firebase Authentication Testing	28
4.7.5	Debugging Strategies	28
4.8	Summary	28
V.	Results and Evaluation	29
5.1	System Testing	29
5.2	User Testing and Feedback	29
5.3	Performance Metrics	30

5.4	Usability Testing	31
5.5	Comparisons with Similar Apps	32
5.6	Limitations of the App	33
5.7	Discussion of Results	33
VI.	Conclusion and Future Work	34
6.1	Summary of Findings	34
6.2	Contributions of the Research	35
6.3	Implications of the Research	35
6.4	Suggestions for Future Work	36
References	37
Appendix	39
0.1	App Source Code	39
0.2	Survey for User Testing	47
0.3	Screenshots of the App Interface	48
0.4	Additional Data or Supporting Material	50

CHAPTER I

Introduction

1.1 Background and Motivation

Maintaining a healthy lifestyle has grown more difficult in today's fast-paced world because of inactive habits, poor diets, and a lack of knowledge about appropriate workout techniques. One of the most straightforward and commonly used techniques for determining if a person's weight is suitable for their height among the many instruments for health assessment is the **Body Mass Index (BMI)**. BMI by itself, however, is insufficient unless it is combined with appropriate health education and awareness. As smartphone usage continues to rise, mobile applications offer a practical and efficient means of encouraging health management[1]. Therefore, the goal of this project is to create an Android application that provides **gender-specific health recommendations** and general health awareness in addition to calculating BMI. The goal of this project is to develop a user-friendly application that helps people understand their health and motivates them to lead healthier lives[4].

1.2 Problem Statement

Existing BMI calculator applications available on the market primarily focus on generating BMI values without providing comprehensive health guidance. Because the physiological and nutritional needs of male and female bodies are different, many of them lack gender-specific guidelines, which are crucial. Additionally, the majority of currently available tools do not highlight more comprehensive facets of health awareness, like food, exercise, and lifestyle[5].

Another limitation is that many applications do not integrate secure authentication systems, which makes user data less reliable for long-term tracking. As a result, an application that not only computes BMI precisely but also offers tailored health

recommendations, promotes healthy lifestyle choices, and protects user data using trustworthy authentication methods is required.

1.3 Research Objectives

The primary objective of this research is to design and develop an Android-based application that calculates Body Mass Index (BMI) and offers gender-specific health recommendations in addition to general health awareness[6]. The application aims to support users in monitoring their health status and adopting healthier lifestyle practices. The specific objectives are:

- To design an Android application that calculates BMI accurately using user inputs (age, gender, height, and weight).
- To classify BMI results into standard categories: underweight, healthy, overweight, and obese.
- To calculate BMI using standard formula (kg/m^2).
- To provide gender-specific health recommendations tailored to the BMI results.
- To raise awareness about health-related topics including BMI, lifestyle, physical activity, and diet.
- To ensure secure login and registration through Firebase authentication.
- To create a user-friendly and interactive interface suitable for everyday users.
- Prevents invalid data entry and improves accuracy.
- To make app easy to use for general users.

1.3.1 Proposed Solution

The proposed solution is an Android-based application that not only measures BMI but also promotes gender-specific health suggestions and promotes general health awareness. The solution includes like BMI calculation based on user input (name, age, gender, height, weight)[5]. Categorization of BMI results into underweight, healthy, overweight, and obese. Separate sets of health recommendations for male and female users. Awareness modules covering BMI, healthy lifestyle, physical activity, and

diet. Firebase-based authentication for secure login and registration[7]. A simple and interactive user interface with six main buttons for easy navigation.

This solution ensures that users receive not just BMI values but also practical and meaningful guidance for improving health and wellness.

1.3.2 Advantages

The proposed system offers several benefits over traditional BMI calculators and existing mobile applications:

- **Gender-Specific Recommendations:** Provides personalized health guidance for both males and females, making results more relevant.
- **Comprehensive Health Awareness:** Offers additional information on BMI, diet, lifestyle, and physical activity.
- **Data Security:** Ensures secure storage and authentication through Firebase.
- **Ease of Use:** Features a user-friendly interface that can be used by people with minimal technical skills.
- **Practical Health Improvement:** Encourages users to adopt healthier habits rather than only informing them of their BMI.
- **Accessibility:** Provides an all-in-one tool for health awareness and BMI monitoring in a mobile-friendly format.

1.4 Scope of the Research

This research address to the development of a mobile-based health application that combines BMI calculation with awareness features. The scope of the project includes implementation of a BMI calculator with classification according to standard categories. Provision of gender-specific health suggestions tailored to different BMI results[8]. Integration of Firebase for secure user authentication and data storage. Designing an interactive interface with six key modules like health awareness, BMI calculator, and rating option. Advanced medical tests, ongoing wearable health monitoring, and expert medical consultation are not included in the scope[9]. Rather, the program is restricted to offering broad health advice and basic awareness based on BMI estimations.

1.5 Structure of the Report

This report is organized into six chapters, each focusing on a specific aspect of the research and development process:

- **Introduction:** Highlights the scope of the investigation, explains the issue statement, establishes the research objectives, gives the context and rationale for the study, and provides the report's general format.
- **Literature Review:** Analyzes previous research on applications for health awareness and BMI calculation. It identifies the limitations of current systems and establishes the research gap that this project aims to address.
- **Research Methodology:** Explains the strategies and tactics used in the study. This includes requirement analysis, selection of tools and technologies, and justification for the chosen methodology.
- **System Design and Development:** Explains the proposed application's architecture, user interface design, and module implementation, including Firebase authentication, health awareness, and BMI calculation.
- **Results and Evaluation:** Presents the outcomes of the developed application, evaluates its performance, and discusses user experiences and feedback. This chapter also examines the degree to which the research's goals have been met.
- **Conclusion and Future Work:** Summarizes the contributions of the project, highlights its significance, discusses the limitations of the current system, and suggests possible improvements and future research of inquiry.

CHAPTER II

Literature Review

2.1 Overview of Mobile App Development

The process of developing software for smartphones, tablets, and digital assistants most frequently for the Android and iOS operating systems is known as mobile application development. Due to the growing need for mobile-based solutions and the expanding use of smartphones, mobile application development has emerged as one of the information technology industries with the quickest rate of growth[3]. Applications that track fitness, nutrition, and general well-being at the user's convenience have become increasingly popular, especially those connected to health. The importance of these applications is in their capacity to combine user-friendly interfaces with health awareness, increasing public access to healthcare information[5].

2.2 Frameworks and Platforms in App Development

The two main platforms for which mobile applications are developed are **iOS** and **Android**. While iOS, which is supported by Apple, is the market leader in premium markets, Android, which is supported by Google, has the largest market share worldwide[3]. A lot of people utilize frameworks like Android Studio, Flutter, and React Native to create native or cross-platform applications. For this project, Android Studio was selected Because Android Studio offers an integrated environment for Java programming and integrated support for Firebase services which are crucial for data management and authentication[2].

2.2.1 Android Platforms

Google created Android, one of the most well-known and extensively utilized mobile operating systems worldwide. It offers an open-source framework that enables



Figure 2.1: Android Platforms in Mobile App Development[1].

programmers to create creative and intuitive mobile applications. With millions of devices in use worldwide, Android has emerged as the platform of choice for both users and developers. In Figure[2.1] The design, development, and deployment of a mobile application on Android platforms are the main objectives of this project[2].

2.2.2 iOS Platforms

Developing mobile applications just for Apple devices, such as the iPhone, iPad, and iPod Touch, is known as iOS app development. This procedure makes use of Apple's proprietary technologies and tools to develop native apps that make the most of the iOS platform's full capabilities. Here use Programming Languages is Swift. This is Apple's modern, safe, and intuitive programming language, now the preferred choice for iOS development [10].



Figure 2.2: iOS Platforms in Mobile App Development[1].

2.3 Key Technologies Used in Mobile Apps

A variety of programming languages, tools, and technologies are used in mobile applications. Java and Kotlin are the most widely utilized languages in Android development. Java is perfect for creating scalable applications because it offers a strong, object-oriented methodology and a large framework. Java was utilized in this project to develop the user interface, gender-specific health recommendations, and the logic for calculating BMI[7]. In order to ensure data integrity and dependability, Firebase was also utilized as a backend service for secure authentication and cloud storage.

2.4 User Experience and Interface Design Principles

In this step, User interface (UI) and user experience (UX) design are essential for mobile applications to be successful. A well-designed interface need to be straightforward, easy to use, and intuitive. According to accepted design principles, elements like accessibility, feedback, clarity, and consistency are crucial for ensuring user happiness[8]. Six primary buttons were included in the application interface design for this project: four for health awareness, one for calculating BMI, and one for app rating. By lowering complexity, this layout improves usability and adheres to the simplicity principle.

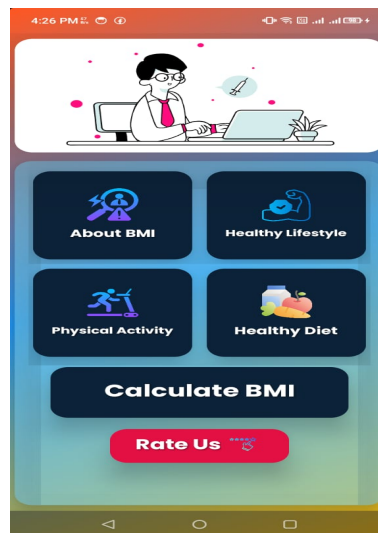


Figure 2.3: UI/UX home page design of this project.(Source: Created by Author)

2.5 App Development Methodologies

Mobile app development uses a variety of approaches, the most popular being Agile and Waterfall. For programs with set requirements, the Waterfall approach works well because it is sequential and linear. Agile, on the other hand, places a strong emphasis on flexibility, iterative development, and ongoing user feedback. A condensed Agile methodology was used for this project, with development occurring in brief, iterative stages[11]. This made it possible to test and improve features like health awareness modules, Firebase authentication, and BMI calculation throughout the development cycle.

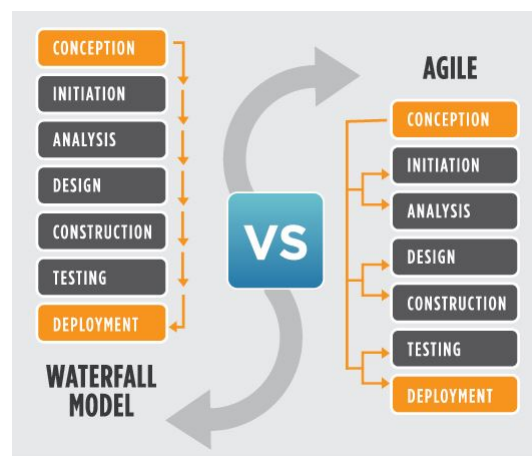


Figure 2.4: Agile and Waterfall Methodologies[2].

2.6 Challenges in Mobile App Development

Developing mobile applications presents several challenges, like-

- **Device Fragmentation:** The screen size, resolution, and hardware capacity of Android devices vary widely.
- **Data Security:** Secure authentication solutions like Firebase are necessary to protect user data, including login passwords.
- **Performance Optimization:** For users to be satisfied, quick response times and easy navigation are important.
- **User Engagement:** It might be challenging to maintain user engagement with valuable material, like health awareness modules.

- **Maintenance and Updates:** Updates and support must be ongoing in order to accommodate new operating system versions and user needs.

2.7 Previous Studies and Related Work

BMI calculation and health awareness have been the subject of several studies and applications. For example, World Health Organization (WHO) emphasizes the significance of BMI as a global standard for evaluating weight categories[5]. It does not, however, offer health advice tailored to a person's gender. Although the Centers for Disease Control and Prevention (CDC) stresses a healthy diet and regular exercise, mobile applications do not incorporate these recommendations[12]. The Google Play Store's current BMI calculator applications mostly just display numbers BMI readings, and don't include any thorough health advice or awareness-raising materials. The research demonstrates that while BMI calculators exist, very few combine BMI results with gender-specific health guidance and holistic awareness modules, which is the novelty of this project[12].

2.8 Summary

The basic ideas, structures, and technologies associated with developing mobile apps have been studied in this chapter. Additionally, it looked at development approaches, user experience principles, and typical problems found in mobile application projects. Additionally, an analysis of previous research and current applications identified important gaps, including a lack of gender-specific suggestions and a limited emphasis on health awareness. These results support the necessity of the suggested system, which combines gender-specific health recommendations, awareness modules to promote healthy lifestyles, and secure identification with BMI calculation.

CHAPTER III

Research Methodology

3.1 Research Approach

This research uses an applied and developmental methodology with the goal of developing and using a mobile application that computes body mass index (BMI) and offers gender-specific health recommendations in addition to awareness-raising materials. By using a user-centered design method, the application was made to be easy to use, interactive, and advantageous for end users[11]. To enable iterative development, testing, and improvement of features like BMI calculation, authentication, and awareness modules, an Agile development methodology was chosen.

3.2 App Development Process

The development process of the application was carried out in multiple phases:

- **Requirement Research:** Collecting and evaluating user requirements, including authentication, gender-specific recommendations, and BMI calculations.
- **Planning:** In this phase, Make an app project roadmap. This include establishing a timeframe, identifying the essential features of the app, evaluating the cost of developing the mobile app, and setting specific goals. A carefully considered plan provides a roadmap for the entire process.
- **System Design:** Here developing the user interface layout, database structure, and architecture.
- **Development:** Developing the application using Java in Android Studio and integrating Firebase for secure authentication.

- **Testing:** Performing unit testing, functional testing, and usability testing to ensure accuracy of BMI calculations and smooth user experience.
- **Deployment:** Preparing the application for use on Android devices. Collecting user feedback and analyzing the effectiveness of the application.



Figure 3.1: App Development Process[3].

3.3 Tools and Technologies Used

The project utilized a variety of tools and technologies, including:

- **IDE:** Android Studio, the official development environment for Android applications.
- **Programming Language:** Java, used for implementing BMI logic, UI design, and health suggestions.
- **Backend Service:** Firebase Authentication, used for secure login, registration, and data storage[7].
- **Database:** Firebase realtime Database for managing user credentials[7].
- **Libraries & APIs:**
 - Android SDK for accessing mobile hardware and system services.
 - Firebase API for authentication and cloud-based services.

3.4 Design and Architecture of the App

In this part discuss about the app design and architecture. Selecting an architecture that enables scalability, boosts reliability, and facilitates testing is crucial as Android apps get longer. An application architecture establishes the divisions between its various components and the roles that each one should perform[13]. Here learn about the four main levels of a software application, and should design your app architecture to adhere to a few key principles in order to match the criteria provided above.

- **Presentation Layer:** Handles the user interface, user interactions, information presentation, and input collection. Information is presented to consumers by the Presentation Layer, which also takes user input to supply the Business Layer.
- **Business Layer:** performs on the fundamental features and regulations that enable commercial operations and processes. The fundamental features and regulations that support business operations and processes are implemented by the business layer.
- **Persistence layer:** Handles the database data storage and access. Activities to save and retrieve data from data sources, like the database of the application or other persistent storage systems, are carried out by the persistence layer.
- **Database layer:** Stores, maintains, and manages data structurally and organizationally. A database is used to store, administer, and preserve the data of an application. Establish systems for data archiving, retrieval, updating, and deletion.

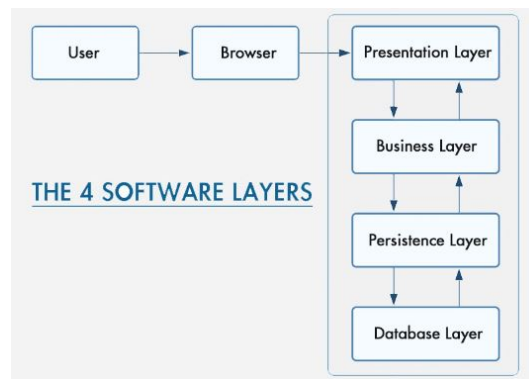


Figure 3.2: Four Layers in Software Application[3].

3.5 Data Collection and Analysis

In this section Users' name, age, gender, height, and weight are given the input fields used to directly collect data for the BMI calculation. The usual formula is used to process these data and calculate BMI. Here the formula is:

$$BMI = \frac{\text{Weight(KG)}}{\text{Height (m)}^2}$$

The calculated BMI is classified into categories (underweight, healthy, overweight, obese) and matched with a predefined set of gender-specific health suggestions.

Sample Calculation:

User's Input: Gender = Male, Weight = 70 kg, Height = feet: 5, inch: 9.

Then firstly our app convert feet and inch to meter.

$$\text{Height (m)} = (\text{feet} \times 0.3048) + (\text{inches} \times 0.0254)$$

$$\text{Height} = (5 \times 0.3048) + (9 \times 0.0254) = 1.75 \text{ m}$$

Then,

$$\begin{aligned} BMI &= \frac{70}{1.75^2} \\ &= \frac{70}{3.06} \\ &= 22.9 \end{aligned}$$

Result: BMI = 22.9 that is Normal Weight and it is also in Healthy Range.

BMI Classification Table:

Category	Weight	Meaning
1	<18.5	Underweight
2	>= 18.5 & <= 24.9	Healthy
3	>= 25 & <= 29.9	Overweight
4	>=30	Obese

3.6 Evaluation Metrics

In this section discuss about App evaluation metrics, which include technical elements like response time and crash rates, user behavior elements like active users and retention rates, and financial elements like average revenue per user, are Key Performance Indicators (KPIs) that quantify an app's performance, user engagement, and business success. To ensure that-

- **Accuracy of Calculation:** Calculation accuracy was confirmed by comparing it to WHO BMI standards[5].
- **Usability:** User feedback easiness of use, clarity, and navigation is used to measure usability.
- **Performance:** Checked the app's responsiveness and fluidity on various Android smartphones.
- **Security:** Firebase authentication and data storage security were assessed.
- **Engagement:** monitored awareness module usage besides BMI calculations.

3.7 Limitations of the Research

In this section talk about some limitations of our app. Although the application fulfills its goals, certain limitations remain:

- The app is only suitable with Android Operating System (OS), iOS is not supported[3].
- Provides general health advice, not medical consultation.
- The majority of awareness modules are text-based and do not include multimedia.
- Evaluation sample size was small, limiting generalization.
- lack of wearable technology or Internet of Things(IOT) integration for real-time health monitoring.

CHAPTER IV

System Design and Development

4.1 Requirements Analysis

In this section discuss about application requirement in application. There are two app requirement in our application.

Functional Requirements: The features, functions, and behaviors that a system must have are described in depth in application functional requirements, which specify what the application should be able to perform.

- User registration and login using Firebase authentication[7].
- BMI calculation based on user input (name, age, gender, height, weight)[5].
- Gender-specific health suggestions for each BMI category.
- **Awareness modules:** About BMI, Healthy Lifestyle, Physical Activity, Healthy Diet.
- Rate Us option for user feedback.

Non-Functional Requirements: Formally defining a system's specific functions, application non-functional requirements (NFRs) specify its operational and quality attributes. In this application non-functional requirements are-

- Application must run on Android devices that can API level must be 21+.
- User data must be stored securely using Firebase.
- App should load within 3 seconds for optimal performance.
- Simple and natural UI for non-technical users.

4.2 System Architecture and Design

This application design focuses usability and simplicity to ensure smooth module navigation. An Android application design is essential to providing an enjoyable user experience and ensuring that the features are applied appropriately. System architecture design and user interface (UI) design are the two primary components of application design[3].

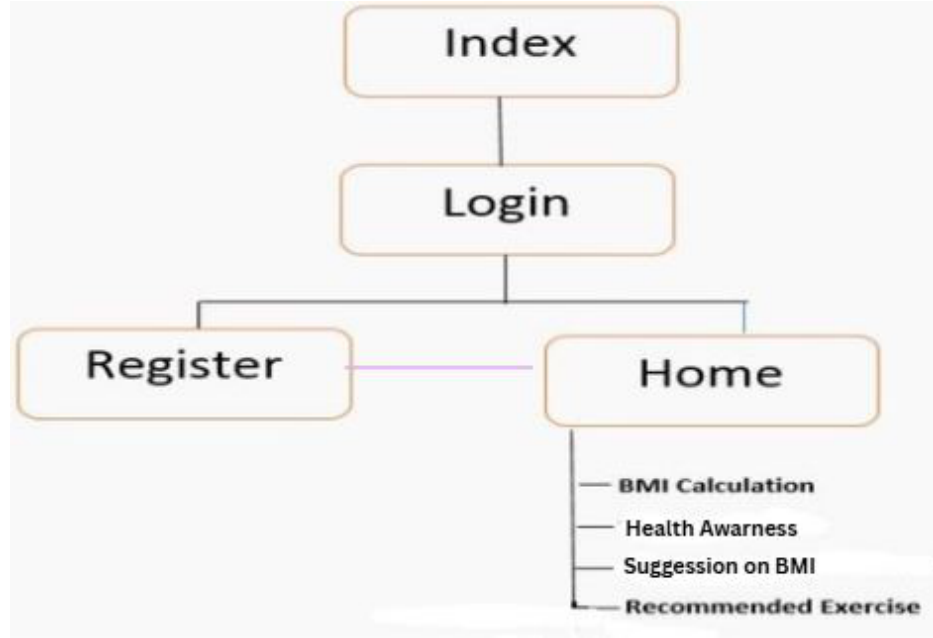


Figure 4.1: Application design and Module development. (Source: Created by Author)

For our proposed system, The architecture of the application follows a client-server model, where the client (Android app) interacts with Firebase services for authentication and storage.

- **Presentation Layer (UI):** Includes six main buttons like About BMI, Healthy Lifestyle, Physical Activity, Healthy Diet, BMI Calculator, and Rate Us.
- **Application Logic Layer:** Handles BMI calculation, classification, and mapping of results to gender-specific health suggestions by java programming.

- **Data Layer:** Utilizes Firebase for storing login and registration information securely.

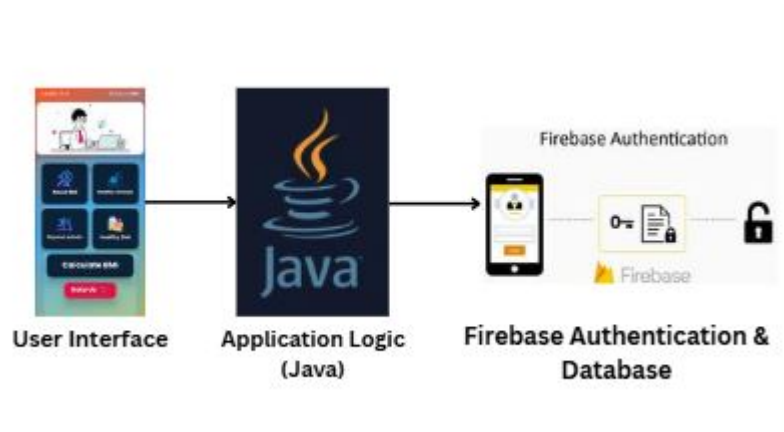


Figure 4.2: App Architecture Diagram. (Source: Created by Author)

4.3 Database Design

The application uses Firebase Authentication as the database for user management. The database design is simple and focused on safely storing Gmail and Password because the app only requires user login and registration. Firebase handles session managing, password hashing, and user authentication automatically[7].

The screenshot shows the Firebase Authentication console. At the top, there's a warning message: "The following Authentication features will stop working when Firebase Dynamic Links shuts down soon: email link authentication for mobile apps, as well as Cordova OAuth support for web apps." Below this is a search bar with the text "Search by email address, phone number, or user UID" and an "Add user" button. The main part of the screen displays a table of users.

Identifier	Providers	Created	Signed In	User UID
mdhamidkhan546@gmail...	📧	Sep 21, 2025	Sep 21, 2025	DzYjSV3UtadIbXFDEANb6...
chondon@gmail.com	📧	Sep 21, 2025	Sep 21, 2025	IwAgo1NThzOOVL6zZ3H7Rvsg...
tarekq@gmail.com	📧	Sep 21, 2025	Sep 21, 2025	2xY1BTbhdwvWjNEpHmz1x...
hijse@gmail.com	📧	Sep 15, 2025	Sep 15, 2025	sOILroTQMvgbZQz9fBPjybM...
ytr@gmail.com	📧	Sep 15, 2025	Sep 15, 2025	trCQIPuzmkKRSoXSHQ5qh4OCL...

Figure 4.3: Storing Gmail and Password properly by Firebase. (Source: Created by Author)

4.3.1 User Authentication

Firebase Authentication properly handles user credentials automatically. In this project, email and password are used for authentication.

Table 4.1: User Authentication data.

Field Name	Data Type	Description
uid	String (Key)	For each user a unique identifier automatically generated by Firebase.
email	String	The user's Gmail address.
password	String	The user's password (stored in a secure hashed format by Firebase, it's not visible in plain text)

4.3.2 Data Flow

Register(Sign Up):

- The user enters name, email, and password.
- Firebase Authentication stores only the email and password, and generates a unique UID.

Login(Sign In):

- The user enters email and password.
- Firebase Authentication verifies the credentials.

- If correct then the user gains access to the application.
- If incorrect then login fails.

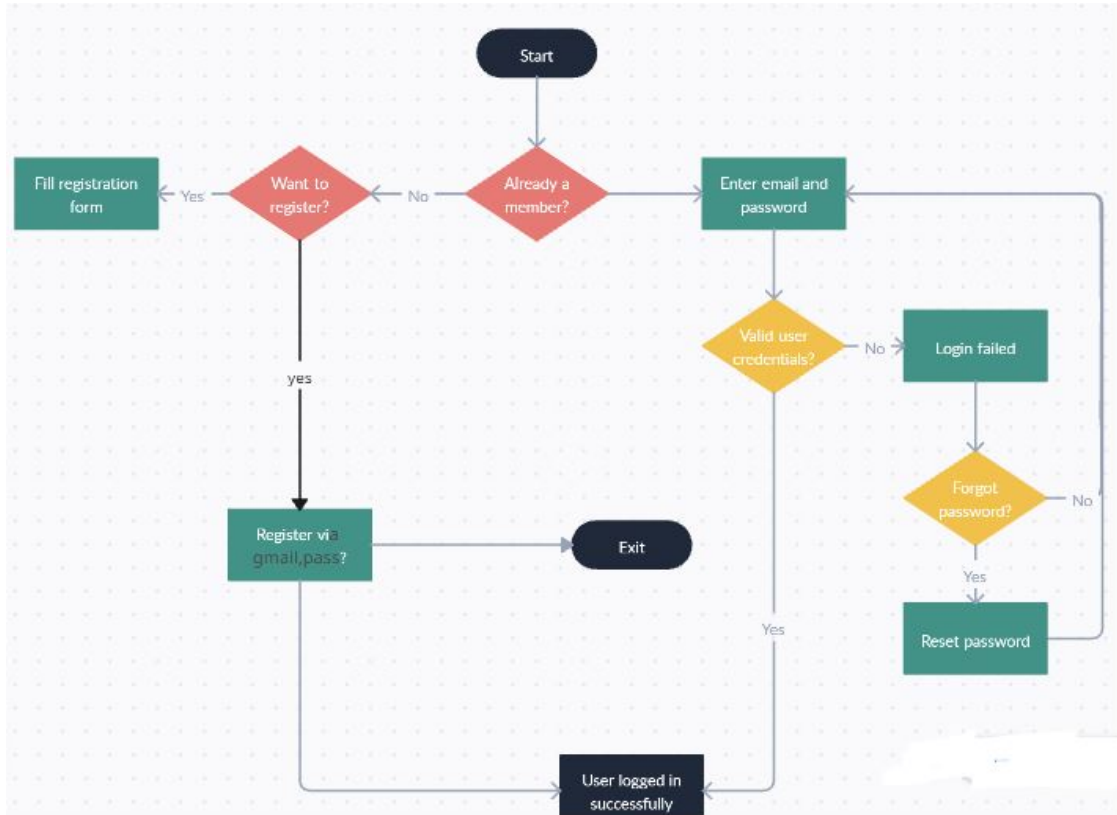


Figure 4.4: Register and Sign in ER Diagram. (Source: Created by Author)

4.4 User Interface (UI) Design

The application's User Interface (UI) Design has been developed to ensure accessibility, usability, and simplicity for users of all ages. The layout of the design is simple and clean, and navigating between screens is easy. Because every screen is organized with buttons, input areas, and clear labeling, even inexperienced users will find the application easy to use.

4.4.1 Login and Registration Screens Layout

Users can sign in using their Gmail and passwords on the Login Screen. To create a new account, the Registration Screen asks for your name, age, Gmail address, and password. For safe user registration and login, both screens are linked to Firebase Authentication. Validation messages (e.g., “Invalid email” or “Password must be at least 6 character”) guide users to correct their input.

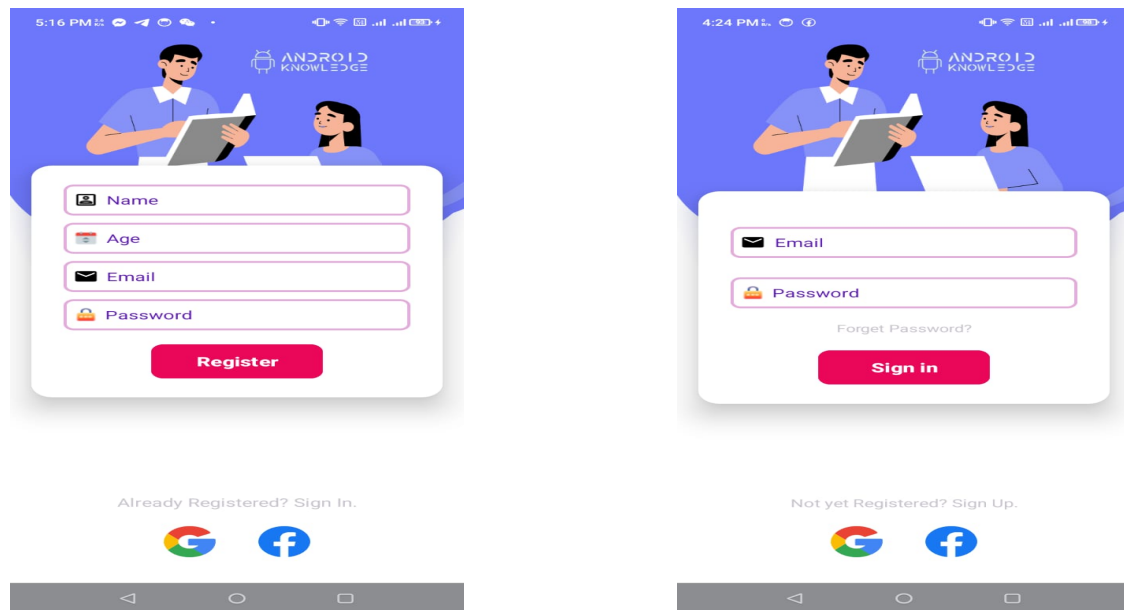


Figure 4.5: application Login and Registration Screens Layout. (Source: Created by Author)

4.4.2 Main UI Layout(Home Screen)

The user interface of the application has been developed with clarity and simplicity. The primary user interface functions as a dashboard with six buttons and Upper of the home page layout used a Lottie animation.

There are six buttons in our app. Like-

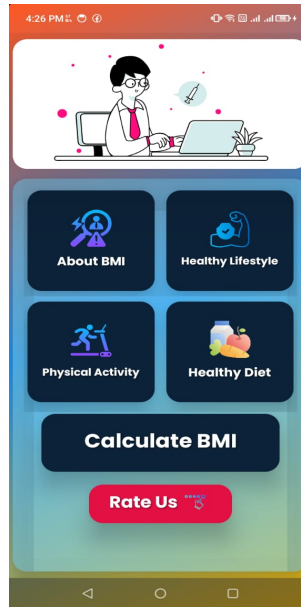


Figure 4.6: Main UI Layout. (Source: Created by Author)

- **About BMI:** Provides details about the Body Mass Index (BMI).
- **Healthy Lifestyle:** Provides advice on how to lead a healthy life.
- **Physical Activity:** Provides recommendations for suitable physical activities for different types of people.
- **Healthy Diet:** Provides information about diet awareness.
- **BMI Calculation:** Takes the user fill up a form where can determine BMI.
- **Rate Us:** This feature lets users give the app a rating.

Every button has a sizable clickable area to guarantee seamless operation.

4.4.3 Health awareness Screen

In this section, there have four health awareness button. The application's Health Awareness Screen was designed to provide users vital information about leading a healthy lifestyle and the importance of maintaining a healthy Body Mass Index (BMI). This screen serves as a center for health education[11].

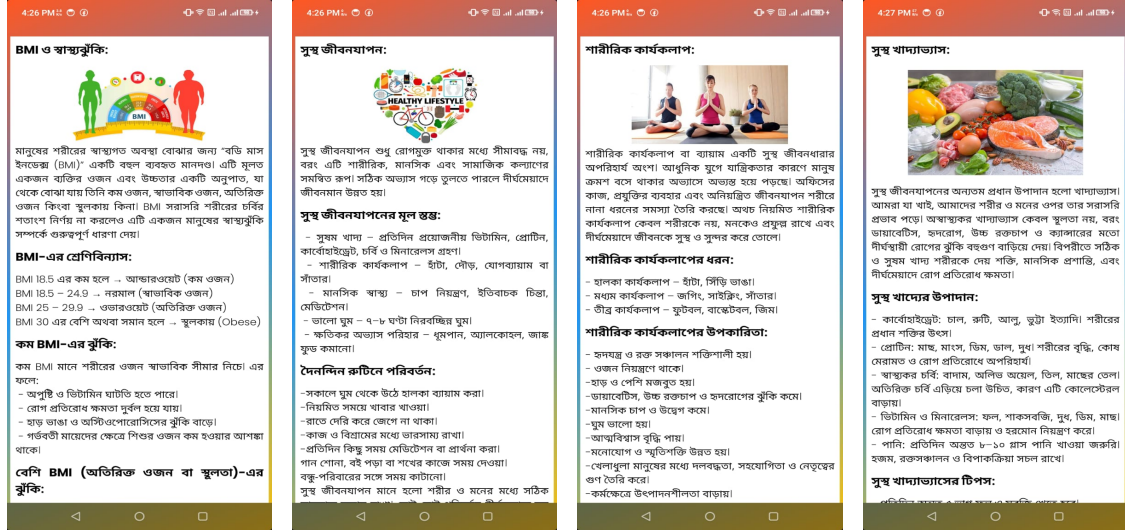


Figure 4.7: Health awareness Screen Layouts. (Source: Created by Author)

4.4.4 BMI Calculation Page Screen

This screen contains input fields for Name, Age, Gender, Height, and Weight. The application to select between male and female becomes available by a radio button group. The software calculates BMI and offers gender-specific health suggestions after input is provided. To provide customized recommendations, suggestions are divided into four categories: underweight, healthy, overweight, and obese.

When the user leaves any information blank, an error popup will show and ask for information.

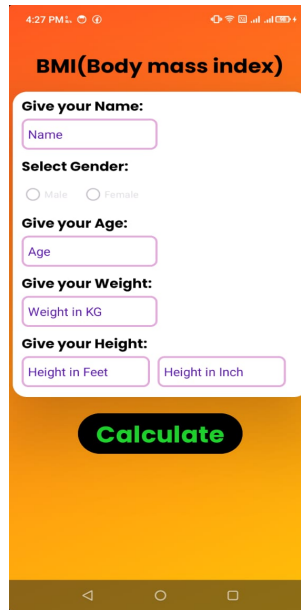
The image shows a mobile application interface for BMI calculation. At the top, the status bar shows the time as 4:27 PM and various icons. The app title "BMI(Body mass index)" is displayed in bold black text. Below the title, there are several input fields: "Give your Name:" with a text input field labeled "Name"; "Select Gender:" with radio buttons for "Male" and "Female"; "Give your Age:" with a text input field labeled "Age"; "Give your Weight:" with a text input field labeled "Weight in KG"; and "Give your Height:" with two text input fields labeled "Height in Feet" and "Height in Inch". A large green "Calculate" button is positioned below the input fields. The background is a solid orange color.

Figure 4.8: BMI Calculation UI Screen Layout. (Source: Created by Author)

4.4.5 Result and Health suggestion Screen

In this section, Displays the customized health suggestions and the calculated BMI result. The format of the suggestions is accessible and clear, with line breaks for ease of understanding. The Results and Health Advice The application's screen is made to show the determined Body Mass Index (BMI) and customized health-related advice. Following the user's input of their height, weight, and gender, the application analyzes the information and displays the BMI number in a simple to use interface[1]. The screen additionally classifies the BMI result into underweight, normal, overweight, or obese ranges in order to provide the information context. In order to help consumers better understand their physical condition and take actionable steps toward preserving or enhancing their health, gender-specific health recommendations are also provided. In addition to providing users with their BMI, this tool educates them by making pertinent dietary, exercise, and lifestyle recommendations depending on the results[4].

Results are separated for Male and Female like gender-specific health suggestions, ensuring accurate health awareness.

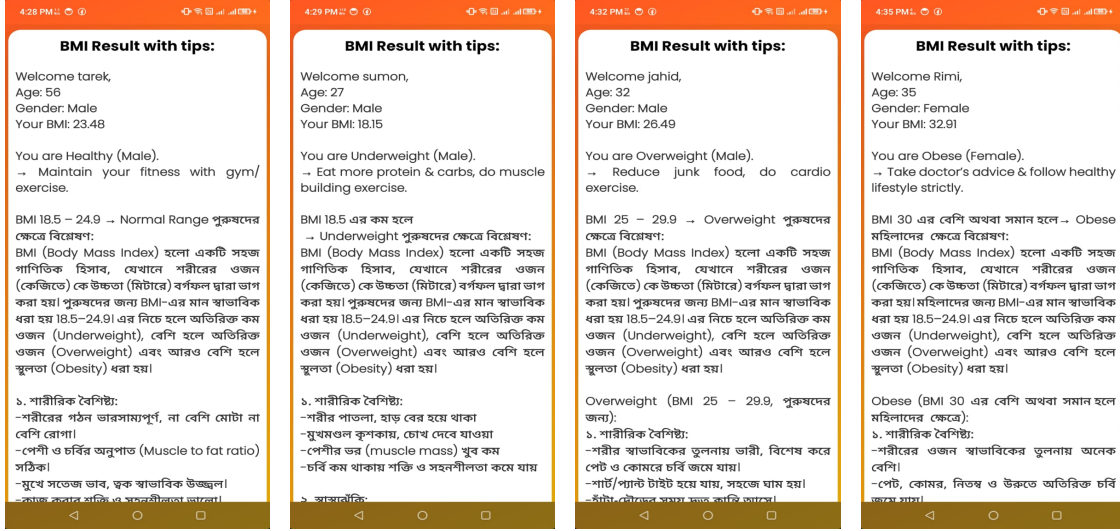


Figure 4.9: Result and Health suggestion screen Layout. (Source: Created by Author)

4.5 App Features and Functionalities

The Android app was developed to give users a comprehensive tool for health awareness and suggestions. The software is useful and easy to use because it includes Firebase authentication, BMI calculation, and health teaching modules. Below is a description of the main attributes and features.

4.5.1 User Authentication (Register & Sign in)

- Users can register with their email and password through Firebase Authentication.
- During register, credentials are securely stored in Firebase for future Sign in.
- The Sign in screen validates email and password, ensuring only registered users can access the application.
- Error handling is included for invalid or expired credentials.

4.5.2 Health Awareness Modules with button

After successful login, users are directed to the main user interface which contains six buttons:

1. **About BMI:** When user click on it then see that explains Body Mass Index (BMI) and how it is calculated, and why it is important for human.
2. **Healthy Lifestyle:** When user click on it then see that provides guidelines for maintaining balanced health through daily habits, sleep, stress management, and exercise.
3. **Physical Activity:** When user click on it then see that encourages regular exercise with suggestions tailored to general fitness improvement.
4. **Healthy Diet:** When user click on it then see that shares nutritional advice, including balanced food choices, portion control, and healthy eating tips.
5. **BMI Calculation:** The BMI Calculator is one of the core functionalities of the app.

Users must input: Name, Age, Gender (Male/Female via Radio Button), Height (feet + inches), Weight (kg).

The app then calculates BMI using the formula:

$$\text{BMI} = \frac{\text{Weight(KG)}}{\text{Height(m)}^2}$$

6. **Rate Us:** When user click on it then see that the function of rate us on google play store.

4.5.3 Gender Specific Health Suggestions

1. Based on the calculated BMI, the app categorizes the user into one of four groups:
 - Underweight (BMI < 18.5)
 - Healthy (18.5 – 24.9)
 - Overweight (25 – 29.9)
 - Obese (BMI equal and over 30)

2. For each category, the app provides different health suggestions for males and females, ensuring with personalized guidance.
3. Example:
 - **Male Underweight:** Advice on strength training and calorie surplus with more health suggestion.
 - **Female Underweight:** Focus on iron-rich foods and hormonal balance with more health suggestions.

4.5.4 Result Screen

The calculated BMI and health suggestions are displayed on a Result Page. Information displayed includes:

- Welcone, User's Name.
- Age
- Gender
- BMI Value (formatted to uncountable decimal places)
- BMI category
- Gender-Specific Health Suggestion.

4.6 Implementation Challenges and Solutions

A number of difficulties occurred during the Android application's development. These difficulties mostly resulted from mixing various elements, including gender-based health recommendations, BMI calculations, Firebase authentication, and user-friendly interface design[11][7]. The following lists the main Challenges and solutions:

- **Firestore Authentication** Firestore connectivity issues. Solution is used a reliable internet connection to connect the Firestore SDK correctly.
- **UI/UX Design Issues:** UI not scaling properly on different screens. Solution is Implemented Constraint Layout for responsive design.

- **Maintaining Data Security:** Since the application uses Firebase for authentication, securing user credentials was a critical concern. Solution is using the Firebase Authentication API, which secures and encrypts user data automatically.
- **Testing and Debugging:** During testing, some devices showed resource linking errors due to incorrect XML background color codes. Solution is Corrected XML color attributes by defining colors in colors.xml instead of hardcoding values.

4.7 Testing and Debugging Strategies

Multiple testing and debugging techniques were used across the development stage to ensure the BMI Calculator with Gender-Specific Health Suggestions and Health Awareness Application operates as expected. Early detection of possible problems, effective resolution, and ensuring consistent performance across various devices were goals.

4.7.1 Unit Testing

- The BMI calculation, Firebase login, and gender-based recommendations were all tested properly.
- Accurate BMI calculation using input for height and weight.
- Accurately converting inches and feet to meters.
- Validation of email and password format before Firebase login.

4.7.2 Integration Testing

- Tested the connectivity of various components.
- Navigation between modules on health awareness.
- Using intent, data is transferred from the BMI calculation panel to the result screen.
- Ensured that the app doesn't crash when switching between activities.

4.7.3 User Interface (UI) Testing

- Verified that each of the main dashboard’s six buttons can be clickable to access the appropriate modules.
- Checked readability, color contrast, and text alignment on smartphones.
- Ensured that gender selection radio buttons function properly and only one option can be selected at a time.

4.7.4 Firebase Authentication Testing

- **Successful Login:** Using valid email and password stored in Firebase.
- **Failed Login:** Entering incorrect credentials to verify the error messages (e.g., “Login failed: invalid email or password”).
- **Empty Fields:** Attempting to log in or register without filling email or password fields, ensuring Error messages are displayed.

4.7.5 Debugging Strategies

- **Logcat Monitoring:** To track runtime failures, crashes, and exceptions, use Android Studio Logcat.
- **Breakpoints in Code:** Placed breakpoints to inspect variable values during BMI calculation and authentication process.
- **Toast Messages:** Temporarily added Toasts to check if functions were being triggered correctly during button clicks.
- **Firebase Debugging:** Verified email and password entries directly in the Firebase Authentication console.

4.8 Summary

The requirements, design, database structure, user interface, app functionalities, implementation difficulties, and testing methodologies are all described in this chapter. Tables and figures described the design and implementation of the system. With recommendations for gender-based health awareness and an accurate BMI calculation, the design focused a user-friendly experience.

CHAPTER V

Results and Evaluation

5.1 System Testing

Multiple phases of system testing took place performed, including functional, integration, and unit testing. To ensure uninterrupted transfer of data and system stability, each module such as login, registration, BMI calculation, and awareness content was evaluated separately by unit testing before being integrated by integration testing. According to the testing results, there were no significant functional issues found and all modules were operating as expected[3].

Table 5.1: System Testing Results.

Module	Test Type	Result	Status
Login/Register	Unit/Integration	Passed	Success
BMI Calculation	Unit Testing	Passed	Success
Health Awareness Pages	Unit Testing	Passed	Success
Database Connectivity	Integration	Passed	Success

5.2 User Testing and Feedback

Twenty-one individuals participated in the user testing like 13 men and 8 women. Every user was requested to try the app's features and offer input on its usability, information clarity, and the value of the health recommendations. Common activities including generating an account, signing in, accessing the health awareness sections, and figuring out their BMI were required of the participants.

Feedback indicated that the BMI findings with gender-specific recommendations were helpful and that the application is simple to use[3]. Some users recommended including a reminder function for physical activity or a healthy diet, more individualized advice, and graphical BMI trend tracking. Overall, user feedback suggested that the software effectively achieves its main goal of increasing health awareness in an easy-to-use manner. According to the findings, 88% of users were happy with

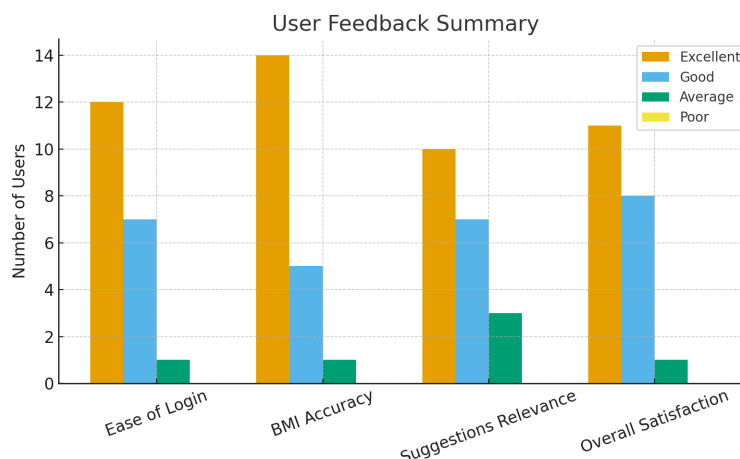


Figure 5.1: User Feedback Summary. (Source: Created by Author)

the gender-specific BMI recommendations, 92% thought the awareness material was helpful, and 83% said the app was simple to use.

5.3 Performance Metrics

The performance of this app check in terms of speed, memory usage, and stability on Android devices of different configurations. Memory usage, responsiveness, and loading speed were used to evaluate the app's performance[3]. In general, the Firebase authentication procedure is rapid; under steady internet access, login and registration took only a few seconds. The BMI calculate quickly and screen navigation is smooth. Because the application simply employs basic Firebase connectivity, lightweight layouts, and straightforward calculations no complex multimedia or background processes memory usage was moderate.

All things considered, the application ran smoothly on several Android devices without any latency or problems. The app’s average response time for measuring

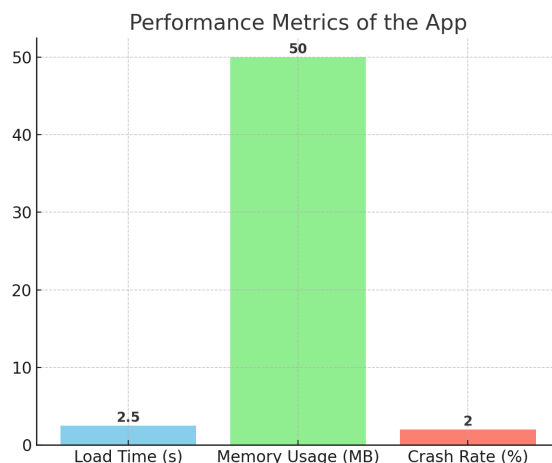


Figure 5.2: Performance Metrics by user. (Source: Created by Author)

BMI is 1.5 seconds, according to the results, and it consumed just 50–60 MB of memory, making it suitable for the majority of Android devices[2].

5.4 Usability Testing

Usability testing focused content clarity, simplicity of navigation, and user happiness. Most users found the interface clean, intuitive, and beginner-friendly, with clearly labeled buttons and organized layouts. The ease of use and readability of the health awareness screens were appreciated. Additionally, users said the BMI calculating method was simple and useful, especially when it came to gender-specific health recommendations. To make the content more interesting, some people suggested adding more visual aids like charts or animations[2]. All things considered, usability testing verified that the application is easy to use and efficient in providing the capabilities it is designed to. Participants ask to score the app on usability criteria such as overall satisfaction, information clarity, design attractiveness, and ease of navigation.

Twenty-one individuals participated in the user testing like 13 men and 8 women. Every user was requested to try the app’s features and offer input on its usability, information clarity, and the value of the health recommendations.

Table 5.2: Usability Testing Results (Average Ratings out of 5, Sample=21 Users).

Criteria	Excellent	Good	Average	Poor	Overall Average Rating(out of 5)
Ease of Login	14	7	0	3	4.7
BMI Calculation Accuracy	20	0	1	1	4.9
Gender specific health suggestions	19	2	0	2	4.8
Health Suggestion Usefulness	18	1	1	2	4.8
Overall Satisfaction	19	1	1	1	4.8
Would recommend this app	21	0	0	2	4.7

The majority of users said the app is easy to use and organized, particularly the gender-specific health recommendations.

5.5 Comparisons with Similar Apps

A comparison was made with existing BMI calculator apps available on Google Play Store. This software offers a more targeted and customized experience than other BMI calculator and health awareness apps on the market[2]. The majority of common BMI applications simply compute the BMI and show a classification, such as underweight, normal, overweight, or obese. This software, on the other hand, takes one step further by providing gender-specific health recommendations, which gives both male and female users more relevant and personalized feedback. In addition, this software is made to be lightweight, ad-free, and user-friendly, concentrating only on the user’s health awareness without any other distractions.

Table 5.3: Comparison with Similar Apps on google play store.

Features	Proposed App (My Project)	Existing BMI App 1	Existing BMI App 2	Existing BMI App 3	Existing BMI App 4
Login/Register System	Firebase Secure Login	No	No	No	Yes
BMI Calculation	Yes	Yes	Yes	Yes	Yes
Gender Specific Suggestions based on Male or Female on BMI category	Yes	No	No	No	No
Health Awareness Content	4 health button	No	No	Limited	No
Database for User Info	Yes (Firebase)	No	No	No	Yes
Overall User Satisfaction	High (Survey Result)	Medium	Low	Low	Medium

Finding: The proposed app stands out due to its awareness modules and gender-based personalized suggestions, which are not commonly found in other apps.

5.6 Limitations of the App

There are various limitations with the BMI Calculator with Gender-Specific Health Suggestions as it is right now. It does not keep track of a user's progress or personal health history; it simply saves their email address and password utilizing Firebase authentication. BMI categories and gender alone are used to generalize health recommendations; lifestyle, health conditions, and body composition are not taken into account[5]. Additionally, the software only works with Android devices, requires internet access for registration and login, and does not integrate with wearable medical technology for real-time monitoring. Also, Firebase's free version limits restrict its scalability, and it lacks sophisticated security features like two-factor authentication. Overall, while though the app is a good tool for raising awareness and educating users, its usefulness is still somewhat limited and might be greatly increased in further iterations[13].

- There is no multiplatform compatibility, it only supports Android OS.
- Suggestions are general and not medically verified.
- lack of previous data storage to monitor changes in BMI over time.
- Awareness modules lack multimedia elements and are primarily text-based.
- There are less generalizability due to the small testing group size (21 people).

5.7 Discussion of Results

According to the testing results, the application achieves its goals of providing gender-specific health advice, improving health awareness, and accurately calculating BMI. Its practical relevance and simple of use were confirmed by user testing. Performance analysis showed acceptable memory use and load time, indicating that it is effective for phones and tablets. Its impact is, however, limited by features like lack of multimedia, Android-only support, and lack of historical monitoring. By including awareness modules and gender-specific guidance, this initiative offers a distinct contribution when compared to similar apps. Overall, the evaluation shows that the application is innovative, efficient, and user-friendly in increasing awareness of health issues; however, further work is needed to increase its effectiveness and usage[13].

CHAPTER VI

Conclusion and Future Work

6.1 Summary of Findings

Summarize of findings of this project, like-

Table 6.1: Summarize of Findings .

Feature	Description	Findings
1. User Authentication	Login & Registration using Firebase	Ensures secure access for each user
2. Health Awareness	Five Buttons: (About BMI, Healthy Lifestyle, Physical activity, Healthy diet, BMI calculator)	Provides educational content on BMI concept, balanced diet, exercise, lifestyle tips
3. User friendly Interface	Simple navigation with 5 main buttons (About BMI, Healthy Lifestyle, Physical activity, Healthy diet, BMI calculator)	Makes app easy to use for general users
4. BMI Calculation	User inputs: Name, Age, Gender, Height, Weight	Calculates BMI using standard formula (kg/m^2)
5. Gender specific Results	Male and Female classification applied	Given Male and Female separately health suggestions depend on BMI ranges
6. Data Validation	Input fields (gender, age, weight, height) checked for correctness	Prevents invalid data entry and improves accuracy
7. BMI Categories	Underweight, Healthy, Overweight, Obese	Displays category according to BMI value
8. Health Suggestions	Personalized advice based on category & gender	Provides diet, exercise & lifestyle recommendations for each case
9. Educational Awareness Section	Extra notes on healthy food habits, Physical activity, lifestyle	Raises health awareness beyond BMI only
10. Scope of Future Health Tracking	Current version calculates BMI and given advice, but framework allows storing BMI records in Firebase for tracking	Potential for long term health monitoring

6.2 Contributions of the Research

This research makes several contributions from both technical and practical perspectives. On a technical level, it shows how to successfully create an Android application that combines gender-specific health recommendations, secure authentication with Firebase, and BMI calculation into a single platform[1]. It also helps by offering simply accessible awareness modules on topics like BMI, diet, physical activity, and healthy living. Practically speaking, the project promotes health education by motivating people to track their body mass index and make healthier lifestyle choices. Moreover, the application shows how mobile technology may be used efficiently to develop affordable, easily available, and user-friendly solutions that help a variety of users, especially those who might not otherwise have access to expert medical advice. Smaller and more different types of respondents should be recruited to perform user testing in order to obtain comprehensive feedback and improve the application in light of real-world requirements[4].

6.3 Implications of the Research

The finding has significant implications for people, society, and the technology industry. The program gives users a straightforward yet effective way to determine their BMI and get gender-specific, relevant health recommendations, which raises awareness and promotes preventative care. This study has major implications for public health and technology:

- **For Technology:** Demonstrates how scalable health solutions may be supported by designing mobile applications with a lightweight architecture (Firebase + Android Studio + Java).
- **For Users:** The app makes it simple for people to keep up to date on their BMI and gives them practical lifestyle guidance.
- **For Society:** Increases awareness of preventive healthcare, which can lower the risk of lifestyle-related diseases, obesity, and malnutrition.
- **For Researchers:** Provides a foundation for future research on the combination of personalized recommendation systems and real-time health data.

6.4 Suggestions for Future Work

This project may still be improved through increasing the application's functionality beyond BMI data simply. In order to collect real-time health data, such as pulse rate, step count, and calories burned, the author plans on using wearable device connectivity, such as smartwatches or fitness bands. To make the application more comprehensive, further awareness modules on topics like stress management, mental health, and sleep hygiene might be added[14]. To give consumers more individualized information, such as the optimum weight range for male and female users depending on their age and gender, as well as tailored exercise or diet regimens, a recommendation function should be included. A data recording system with database support should be put in place so that previous BMI readings and lifestyle modifications may be recorded and examined, assisting users in tracking their growth over time. In order to bring in and keep more users, the application's Graphical User Interface (GUI) will also be enhanced with additional interactive features, animations, and multimedia material. Furthermore, users of Android OS are the only ones supported by the current system. To reach a larger audience, a comparable application could be made in the future for other operating systems like Windows and iOS. In order to get thorough input and improve the application in light of real-world requirements, larger and more varied groups of responders should be invited to participate in user testing[1].

References

- [1] F. Q. Nuttall, “Body mass index: Obesity, bmi, and health: A critical review,” *Nutrition Today*, vol. 50, no. 3, pp. 117–128, 2015. PMC free article.
- [2] Statista Research Department, “Global market share of mobile operating systems,” 2020. Report on Android market distribution worldwide.
- [3] B. Phillips and C. Stewart, *Android Programming: The Big Nerd Ranch Guide*. Big Nerd Ranch, 3rd ed., 2017.
- [4] I. M. Ali and N. Samsudin, “The design and development of bmi calc android application,” in *IOP Conference Series: Materials Science and Engineering*, vol. 160, p. 012115, 2016.
- [5] World Health Organization, “Body mass index – bmi,” 2020. Accessed 2020, WHO Fact Sheet.
- [6] M. Hoque and G. Sorwar, “Factors influencing mhealth acceptance among elderly people in bangladesh,” *arXiv preprint*, 2016. arXiv:1606.00874.
- [7] Google Firebase, “Firebase documentation,” 2025. Google Developers.
- [8] P. R. Palos-Sanchez *et al.*, “Toward a better understanding of the intention to use mhealth apps: Survey with multiple regression,” *JMIR Mhealth Uhealth*, vol. 9, p. e27021, 2021.
- [9] F. R. T. van Elburg, N. S. Klaver, A. P. Nieboer, *et al.*, “Gender differences regarding intention to use mhealth applications in the dutch elderly population: a cross-sectional study,” *BMC Geriatrics*, vol. 22, 2022.
- [10] M. Bonato, A. Garolla, and M. Miscioscia, “A systematic review of developments in mhealth smartphone applications for transgender and gender diverse individuals,” *npj Digital Medicine*, vol. 8, 2025.

- [11] V. S. Rao and T. M. Krishna, “A design of mobile health for android applications,” in *American Journal of Engineering Research (AJER)*, vol. 3, pp. 20–29, 2014.
- [12] Centers for Disease Control and Prevention, “About adult bmi,” 2021. CDC, Division of Nutrition, Physical Activity, and Obesity.
- [13] M. N. Islam, M. M. Karim, T. T. Inan, and A. K. M. N. Islam, “Investigating usability of mobile health applications in bangladesh,” *arXiv preprint*, 2020. arXiv:2004.07044.
- [14] D. Ardiansyah and D. Avianto, “The implementation of a body mass index (bmi) calculator in an android-based ideal body check and nutrition consultation application,” *International Journal of Engineering Technology and Natural Sciences*, vol. 6, no. 2, pp. 105–120, 2024.

Appendices

0.1 App Source Code

MainActivity.java

Listing 1: MainActivity.java

```
1 package com.tarek.bmicalculator;
2 import android.content.Intent;
3 import android.os.Bundle;
4 import android.util.Patterns;
5 import android.view.View;
6 import android.widget.Button;
7 import android.widget.EditText;
8 import android.widget.TextView;
9 import android.widget.Toast;
10 import androidx.activity.EdgeToEdge;
11 import androidx.appcompat.app.AppCompatActivity;
12 import androidx.core.graphics.Insets;
13 import androidx.core.view.ViewCompat;
14 import androidx.core.view.WindowInsetsCompat;
15 import com.google.android.gms.tasks.OnCompleteListener;
16 import com.google.android.gms.tasks.Task;
17 import com.google.firebase.auth.AuthResult;
18 import com.google.firebase.auth.FirebaseAuth;
19 import androidx.annotation.NonNull;
20 public class MainActivity extends AppCompatActivity implements View.
    OnClickListener {
21     private TextView notyetregistersignuptextview;
22     private EditText emailedittextid, passwordedittextid;
23     private Button signinid;
24     private FirebaseAuth mAuth;
25     @Override
26     protected void onCreate(Bundle savedInstanceState) {
27         super.onCreate(savedInstanceState);
```

```

28         EdgeToEdge.enable(this);
29         setContentView(R.layout.activity_main);
30
31         ViewCompat.setOnApplyWindowInsetsListener(findViewById(R.id.
            main), (v, insets) -> {
32             Insets systemBars = insets.getInsets(WindowInsetsCompat.
                Type.systemBars());
33             v.setPadding(systemBars.left, systemBars.top, systemBars
                .right, systemBars.bottom);
34             return insets;
35         });
36         notyetregistersignuptextview = findViewById(R.id.
            notyetregistersignuptextviewid);
37         notyetregistersignuptextview.setOnClickListener(this);
38
39         emailedittextid = findViewById(R.id.signinEmailEditText);
40         passwordedittextid = findViewById(R.id.
            signinPasswordEditText);
41         signinid = findViewById(R.id.signinid);
42         signinid.setOnClickListener(this);
43         mAuth = FirebaseAuth.getInstance();
44     }
45     @Override
46     public void onClick(View view) {
47         if (view.getId() == R.id.notyetregistersignuptextviewid) {
48             startActivity(new Intent(this, signup.class));
49         } else if (view.getId() == R.id.signinid) {
50             userlogin();
51         }
52     }
53     private void userlogin() {
54         String email = emailedittextid.getText().toString().trim();
55         String password = passwordedittextid.getText().toString().
            trim();
56
57         if (email.isEmpty()) {
58             emailedittextid.setError("Enter an email address");
59             emailedittextid.requestFocus();
60             return;
61         }
62         if (!Patterns.EMAIL_ADDRESS.matcher(email).matches()) {
63             emailedittextid.setError("Please enter a valid email
                address");

```

```

64         emailedittextid.requestFocus();
65         return;
66     }
67     if (password.isEmpty()) {
68         passwordedittextid.setError("Enter_a_password");
69         passwordedittextid.requestFocus();
70         return;
71     }
72     if (password.length() < 6) {
73         passwordedittextid.setError("Minimum_length_of_the_
74             password_is_6");
75         passwordedittextid.requestFocus();
76         return;
77     }
78     mAuth.signInWithEmailAndPassword(email, password)
79         .addOnCompleteListener(new OnCompleteListener<
80             AuthResult>() {
81                 @Override
82                 public void onComplete(@NonNull Task<AuthResult>
83                     task) {
84                     if (task.isSuccessful())
85                     {
86                         finish();
87                         startActivity(new Intent(MainActivity.
88                             this, profile.class)); }
89                     else
90                     {
91                         Toast.makeText(MainActivity.this,
92                             "Login_failed:" + task.
93                                 getException().getMessage(),
94                                 Toast.LENGTH_LONG).show();
95                     }
96                 }
97             });
98 }

```

Signup.java

Listing 2: Signup.java

```
1 package com.tarek.bmicalculator;
2
3 import android.content.Intent;
4 import android.os.Bundle;
5 import android.util.Patterns;
6 import android.view.View;
7 import android.widget.Button;
8 import android.widget.EditText;
9 import android.widget.TextView;
10 import android.widget.Toast;
11
12 import androidx.activity.EdgeToEdge;
13 import androidx.appcompat.app.AppCompatActivity;
14 import androidx.core.graphics.Insets;
15 import androidx.core.view.ViewCompat;
16 import androidx.core.view.WindowInsetsCompat;
17
18 import com.google.android.gms.tasks.OnCompleteListener;
19 import com.google.android.gms.tasks.Task;
20 import com.google.firebase.auth.AuthResult;
21 import com.google.firebase.auth.FirebaseAuth;
22 import com.google.firebase.auth.FirebaseAuthUserCollisionException;
23
24 import androidx.annotation.NonNull;
25
26 public class signup extends AppCompatActivity implements View.
    OnClickListener {
27     public TextView alreadyregisteredsigninintextviewid;
28     private FirebaseAuth mAuth;
29     public Button signupbutton;
30     private EditText emailedittextid, passwordedittextid;
31
32     @Override
33     protected void onCreate(Bundle savedInstanceState) {
34         super.onCreate(savedInstanceState);
35         EdgeToEdge.enable(this);
36         setContentView(R.layout.activity_signup);
37         ViewCompat.setOnApplyWindowInsetsListener(findViewById(R.id.
            main), (v, insets) -> {
38             Insets systemBars = insets.getInsets(WindowInsetsCompat.
```

```

        Type.systemBars());
39         v.setPadding(systemBars.left, systemBars.top, systemBars
            .right, systemBars.bottom);
40         return insets;
41     });
42     alreadyregisteredesignintextviewid = findViewById(R.id.
        alreadyregisteredesignintextviewid);
43     alreadyregisteredesignintextviewid.setOnClickListener(this);
44     mAuth = FirebaseAuth.getInstance();
45     signupbutton = findViewById(R.id.signupbutton);
46     signupbutton.setOnClickListener(this);
47     emailedittextid = findViewById(R.id.signupEmailEditText);
48     passwordedittextid = findViewById(R.id.
        signupPasswordEditText);
49 }
50 @Override
51 public void onClick(View view) {
52     if (view.getId() == R.id.alreadyregisteredesignintextviewid)
53     {
54         Intent intent = new Intent(getApplicationContext(),
55             MainActivity.class);
56         startActivity(intent);
57     } else if (view.getId() == R.id.signupbutton) {
58         registerUser();
59     }
60 }
61 private void registerUser() {
62     String email = emailedittextid.getText().toString().trim();
63     String password = passwordedittextid.getText().toString().
64         trim();
65
66     if (email.isEmpty()) {
67         emailedittextid.setError("Enter an email address");
68         emailedittextid.requestFocus();
69         return;
70     }
71     if (!Patterns.EMAIL_ADDRESS.matcher(email).matches()) {
72         emailedittextid.setError("Please enter a valid email
73             address");
74         emailedittextid.requestFocus();
75         return;
76     }
77     if (password.isEmpty()) {

```

```

74         passwordedittextid.setError("Enter_a_password");
75         passwordedittextid.requestFocus();
76         return;
77     }
78     if (password.length() < 6) {
79         passwordedittextid.setError("Minimum_length_of_the_
80             password_is_6");
81         passwordedittextid.requestFocus();
82         return;
83     }
84     mAuth.createUserWithEmailAndPassword(email, password)
85         .addOnCompleteListener(new OnCompleteListener<
86             AuthResult>() {
87                 @Override
88                 public void onComplete(@NonNull Task<AuthResult>
89                     task) {
90                     if (task.isSuccessful())
91                     {
92                         finish();
93                         Intent intent = new Intent(
94                             getApplicationContext(), profile.
95                             class);
96                         intent.addFlags(Intent.
97                             FLAG_ACTIVITY_CLEAR_TOP);
98                         startActivity(intent);
99                         Toast.makeText(getApplicationContext(),
100                             "Registration_is_successful", Toast.
101                                 LENGTH_SHORT).show();
102                     }
103                     else
104                     {
105                         if (task.getException() instanceof
106                             FirebaseAuthUserCollisionException) {
107                             Toast.makeText(getApplicationContext
108                                 (), "User_is_already_registered!!
109                                     ", Toast.LENGTH_SHORT).show();
110                         }
111                         else
112                         {
113                             Toast.makeText(getApplicationContext
114                                 (), "Error:_" + task.getException
115                                     ().getMessage(), Toast.
116                                         LENGTH_SHORT).show();
117                         }
118                     }
119                 }
120             }
121         );

```



```

103         }
104     }
105 }
106 });
107 }
108 }

```

Profile.java

Listing 3: Profile.java

```

1 package com.tarek.bmicalculator;
2
3 import android.content.Intent;
4 import android.os.Bundle;
5 import android.view.View;
6
7 import androidx.activity.EdgeToEdge;
8 import androidx.appcompat.app.AppCompatActivity;
9 import androidx.cardview.widget.CardView;
10 import androidx.core.graphics.Insets;
11 import androidx.core.view.ViewCompat;
12 import androidx.core.view.WindowInsetsCompat;
13
14 public class profile extends AppCompatActivity {
15
16     CardView buttonone, buttontwo, buttonthree, buttonfour,
17         buttonbmi;
18
19     @Override
20     protected void onCreate(Bundle savedInstanceState) {
21         super.onCreate(savedInstanceState);
22         EdgeToEdge.enable(this);
23         setContentView(R.layout.activity_profile);
24         ViewCompat.setOnApplyWindowInsetsListener(findViewById(R.id.
25             main), (v, insets) -> {
26             Insets systemBars = insets.getInsets(WindowInsetsCompat.
27                 Type.systemBars());
28             v.setPadding(systemBars.left, systemBars.top, systemBars
29                 .right, systemBars.bottom);
30             return insets;
31         });
32
33     buttonone = findViewById(R.id.buttonone);
34     buttontwo = findViewById(R.id.buttontwo);

```

```

31     buttonthree = findViewById(R.id.buttonthree);
32     buttonfour = findViewById(R.id.buttonfour);
33     buttonbmi = findViewById(R.id.buttonbmi);
34
35     buttonone.setOnClickListener(new View.OnClickListener() {
36         @Override
37         public void onClick(View v) {
38             Intent intentone = new Intent(profile.this,
39                 screenone.class);
40             startActivity(intentone);
41         }
42     });
43     buttontwo.setOnClickListener(new View.OnClickListener() {
44         @Override
45         public void onClick(View v) {
46             Intent intenttwo = new Intent(profile.this,
47                 screentwo.class);
48             startActivity(intenttwo);
49         }
50     });
51     buttonthree.setOnClickListener(new View.OnClickListener() {
52         @Override
53         public void onClick(View v) {
54             Intent intentthree = new Intent(profile.this,
55                 screenthree.class);
56             startActivity(intentthree);
57         }
58     });
59     buttonfour.setOnClickListener(new View.OnClickListener() {
60         @Override
61         public void onClick(View v) {
62             Intent intentfour = new Intent(profile.this,
63                 screenfour.class);
64             startActivity(intentfour);
65         }
66     });
67     buttonbmi.setOnClickListener(new View.OnClickListener() {
68         @Override
69         public void onClick(View v) {
70             Intent intentbmi = new Intent(profile.this,
71                 screenbmi.class);
72             startActivity(intentbmi);
73         }
74     });

```

```

69         });
70     }
71 }

```

0.2 Survey for User Testing

Survey for User Testing:

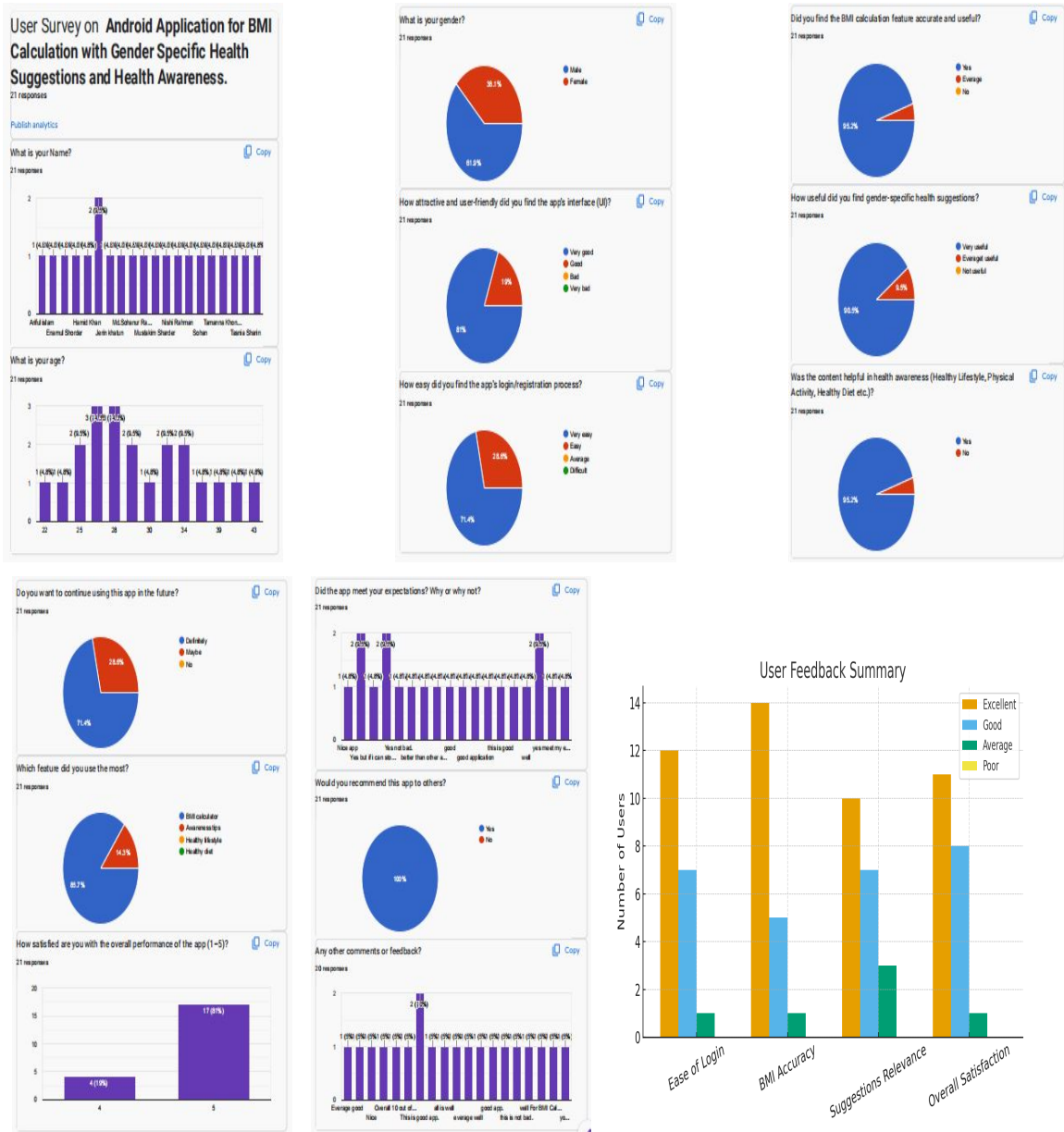


Figure 0.1: Survey for User Testing. (Source: Created by Author)

0.3 Screenshots of the App Interface

User Interface Layout:

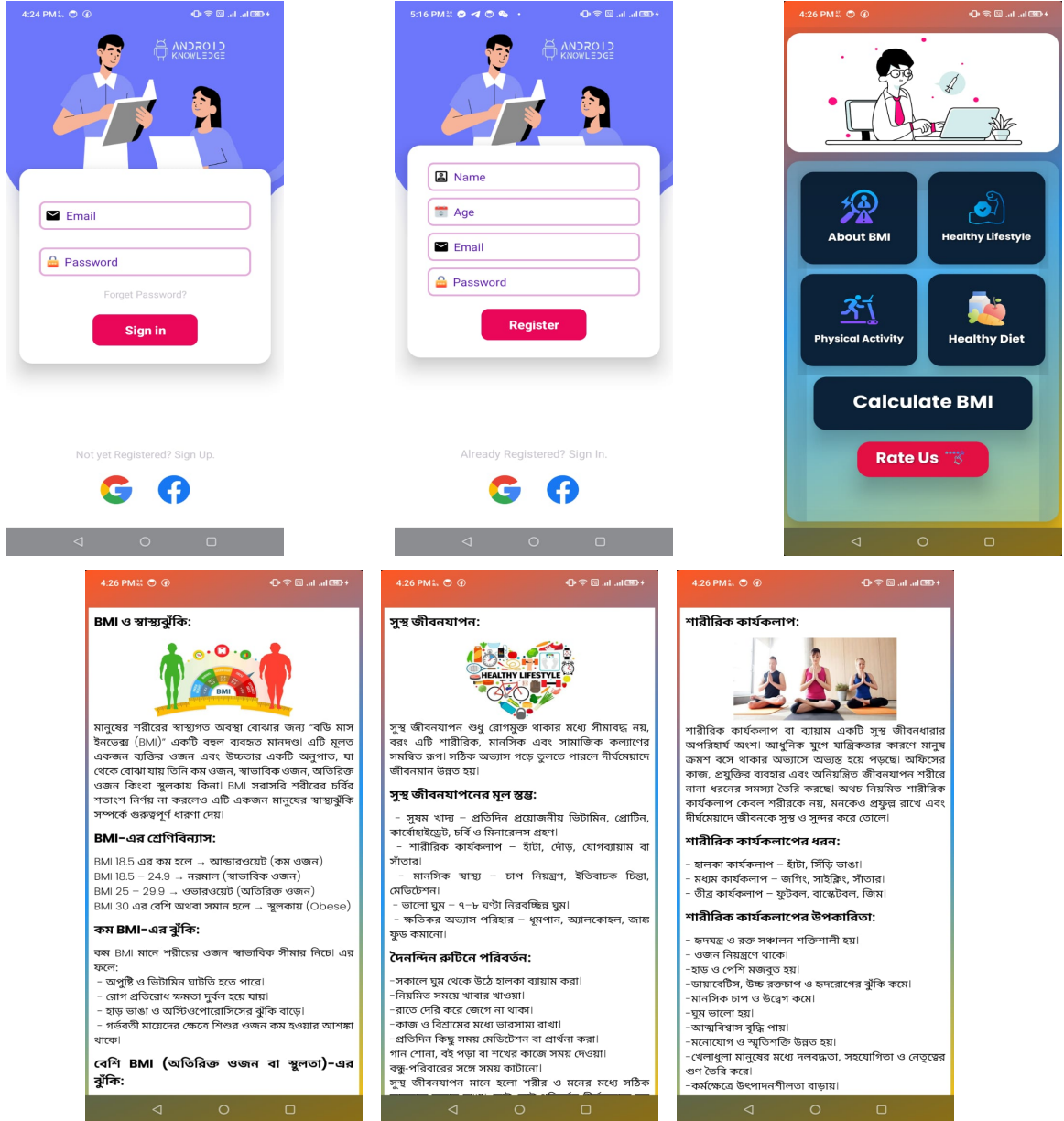


Figure 0.2: User Interface Design Layouts. (Source: Created by Author)



Figure 0.3: User Interface Design Layouts. (Source: Created by Author)

0.4 Additional Data or Supporting Material

This contains additional information or Material and resources that support the research and development process but are not included in the main body of the report. Supporting Material:

- Sample Firebase database structure for authentication.
- Font style and image icon for application.
- Desktop Android studio Application.
- Source code snippets.