**UNIVERSITY NAME**

Secure Mobile App Functional Specification and Report

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**Date YYYY**

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**CI7160 (Mobile Security)**

Contents

[Introduction 2](#_Toc124478750)

[User Password – Security Mitigation method 2](#_Toc124478751)

[Functionality: Bluetooth Wireless Technology 3](#_Toc124478752)

[Usage of Secure Mobile App implemented 4](#_Toc124478753)

[Login steps 4](#_Toc124478754)

[Bluetooth Features on My Application 5](#_Toc124478755)

[Bluetooth Testing 5](#_Toc124478756)

[Challenges during development 6](#_Toc124478757)

[Limitations 7](#_Toc124478758)

[Conclusion 8](#_Toc124478759)

[References 10](#_Toc124478760)

# Introduction

Secure mobile app development is a rapidly growing field of study due to the increasing number of users who rely on mobile devices for their day-to-day activities (Nguyen, 2018). The security of mobile applications is of utmost importance as the data stored and transmitted via these applications can easily be accessed by malicious actors. Therefore, it is essential for developers to be able to design, implement and test secure mobile applications that protect users from potential security threats.

This assignment requires the development of a secure mobile application (“app”) based on the Android platform. The app must include at least one wireless communication functionality and a substantial security feature. Additionally, the app must be designed, implemented and tested to ensure that it is secure and meets the requirements of the user.

The assignment can be completed in either of two ways. The first option is to create a new mobile application from scratch, while the second option is to use code from existing open-source projects and add further functionality to it. The code used in the app must be clearly indicated and properly referenced to avoid plagiarism. In this paper, the app was implemented from scratch. The app was tested to ensure that it meets the security requirements of the user and is secure against potential security threats.

# User Password – Security Mitigation method

Password authentication is one of the most widely used security mitigation methods in mobile app development (Kumar, 2021). It is an effective way of protecting user data from unauthorized access and is an essential part of any mobile app’s security strategy (DeVine, 2017).

Password authentication works by allowing users to enter a password or passcode when logging in to a mobile app. (Safeguard Cyber., 2018) If the correct password is entered, then the user is granted access to the app and its features. If the wrong password is entered, then the user is denied access to the app and its features. Password authentication also prevents unauthorized parties from accessing the app, as it requires a user to provide valid credentials to gain access.

A strong password should be used in order to provide the best security for a mobile app. Passwords should be at least 8 characters long and contain a mix of uppercase, lowercase, numbers, and special characters. It is also important to use different passwords for different apps and services. This helps to ensure that if one account is compromised, the others remain secure (Chang, 2017).

In addition to requiring passwords, mobile app developers should also consider implementing other security measures such as two-factor authentication, biometrics, and encryption. Two-factor authentication requires users to provide two separate pieces of information, such as a password and a code sent to their device, in order to gain access. Biometrics, such as fingerprint scanning or facial recognition, are becoming increasingly popular as a security measure for mobile apps. Encryption is also an important security measure, as it ensures that any data stored on the device is kept secure and can only be accessed with the correct authentication.

To ensure that passwords are as secure as possible, mobile app developers should also consider implementing password strength checks (Hoffman, 2020). This helps to ensure that strong passwords are used and prevents users from using weak passwords that can be easily guessed. Password strength checks can also help to detect if a user’s password has been previously exposed in a data breach (Hoffman, 2020). Mobile app developers should also consider implementing password expiration policies. This helps to ensure that users are regularly updating their passwords and prevents old passwords from being used to gain access to the app. Password authentication is an important security mitigation method in mobile app development. It provides a layer of protection that helps to ensure that user data is kept secure and prevents unauthorized access. Developers should ensure that strong passwords are used and consider implementing other security measures such as two-factor authentication, biometrics, encryption, and password strength checks. Additionally, password expiration policies can also help to ensure that user passwords are regularly updated and kept secure (Munoz, 2020).

# Functionality: Bluetooth Wireless Technology

Bluetooth is a wireless technology that enables two or more devices to communicate with each other (Bluetooth Special Interest Group., 2021). It is a short-range communication protocol that operates in the 2.4 GHz frequency band and is used to send and receive data over short distances (Bluetooth Special Interest Group., 2021). Bluetooth is used in many different types of mobile applications, including audio streaming, file transfer, and remote device control. Bluetooth is used in many mobile applications to enable wireless connectivity between devices (Bluetooth Special Interest Group., 2021). It is particularly useful for connecting headphones and other audio devices to smartphones and tablets. Bluetooth can also be used to wirelessly connect a smartphone to a computer, allowing users to transfer files and data between the two devices. Additionally, Bluetooth can be used to control remote devices such as a drone or a robotic arm.

Bluetooth can also be used to enable communication between mobile devices and sensors. For example, Bluetooth can be used to enable a mobile application to access the data collected by a heart rate monitor or other health device. This data can then be used to provide real-time feedback to the user, or to track and monitor health data over time.

Bluetooth can also be used to enable communication between mobile applications and smart home devices. This allows users to control and monitor their home from their smartphones or tablets. Additionally, Bluetooth can be used to enable communication between mobile applications and Internet of Things (IoT) devices (Bluetooth Special Interest Group., 2021). This allows users to monitor and control their home from their smartphones or tablets, as well as to access and control other connected devices such as thermostats, lights, and security systems.

# Usage of Secure Mobile App implemented

## Login steps

In order to ensure the security of this mobile app, users are required to log in before they can access the app's features. The login process consists of the following steps:

1. On the app's home page, the user will be prompted to enter their username and password.

2. The code written in my application lets the users with correct matching passwords and username to access the app features.

3. Once the user leaves the application, the user must sign in again to have access to my application features.

The login process is designed to protect the user's data validates the user credentials. If the username is same as the one stored in the app and password same as the one stored in the app database then the user logs in. The app ensure that only authorized users can access the app's features.

In order to further secure the user's data, the app was also intended to offer an optional two-factor authentication process. This involves the user setting up a second authentication method, such as using a biometric authentication method such as fingerprint or facial recognition. This additional layer of security ensures that the user's account is even more secure and that unauthorized users cannot gain access to the app's features.

## Bluetooth Features on My Application

The Turn On button is used to enable Bluetooth connectivity on the mobile device. When a user clicks the Turn On button, the Bluetooth radio on the device is enabled, allowing the device to connect to other Bluetooth-enabled devices in its vicinity. When the Turn On button is pressed, a message will appear on the screen informing the user that Bluetooth connectivity has been enabled.

The Turn Off button is used to disable Bluetooth connectivity on the mobile device. When a user clicks the Turn Off button, the Bluetooth radio on the device is disabled, preventing the device from connecting to other Bluetooth-enabled devices in its vicinity. When the Turn Off button is pressed, a message will appear on the screen informing the user that Bluetooth connectivity has been disabled.

The Discoverable button is used to allow the mobile device to be discovered by other Bluetooth-enabled devices. When a user clicks the Discoverable button, the device’s Bluetooth radio is enabled and set to be discovered by other devices in its vicinity. When the Discoverable button is pressed, a message will appear on the screen informing the user that the device is now discoverable.

The Get Paired Device button is used to search for other Bluetooth-enabled devices in the vicinity and to pair the device with them. When a user clicks the Get Paired Device button, the device’s Bluetooth radio is enabled and set to search for other devices in its vicinity. When the Get Paired Device button is pressed, a message will appear on the screen informing the user that the device is now searching for other devices in its vicinity.

## Bluetooth Testing

When the Turn On button is pressed, the following message pops up “My Application wants to turn in Bluetooth”. The user has two options, to click on “Deny” or to click on “Allow” buttons. If the user clicks on “Deny” the process of turning Bluetooth on is aborted and message pops up saying “Bluetooth is off”. If the user clicks on “Allow” the process of turning Bluetooth on is completes and two message pops up; the first one saying “Turning on Bluetooth” followed by a message saying “Bluetooth is on” and thus the Bluetooth radio on the device is enabled and the device is ready to connect to other Bluetooth-enabled devices in its vicinity.

When the Turn Off button is pressed, the following message pops up “Turning off Bluetooth” and thus the Bluetooth radio on the device is disabled and the device is no longer able to connect to other Bluetooth-enabled devices in its vicinity. A message will appear on the screen informing the user that Bluetooth connectivity has been disabled. The message is “Bluetooth is off”

When the Discoverable button is pressed, the following message pops up “My Application wants to turn on Bluetooth and make your phone visible to other devices for 120 seconds”. The user has two options, to click on “Deny” or to click on “Allow” buttons. If the user clicks on “Deny” the process of making your phone Discoverable is aborted and nothing happens. However, If the user clicks on “Allow” the process of making your phone Discoverable completes and two message pops up; the first one saying “Turning on Bluetooth”. Thus, the Bluetooth radio on the device is enabled and set to be discovered by other Bluetooth-enabled devices in its vicinity.

When the Get Paired Device button is pressed, the Bluetooth radio on the device is enabled displays the previously devices that have ever connected to your phone before.

In order to ensure the security of the mobile device, a password should be implemented. The password should be a combination of upper- and lower-case letters, numbers, and special characters. The complexity of the password should be determined by the user, but should be at least 8 characters long. The password should be entered each time the Turn On, Turn Off, Discoverable, or Get Paired Device buttons are pressed. This will ensure that only authorized users are able to access the Bluetooth functions of the device. If an incorrect password is entered, the device should remain in its current state and the user should be notified of the incorrect password entry.

# Challenges during development

Creating a login feature for a mobile app can be a challenging process for developers. There are many technical and security considerations that must be taken into account. In this paper, I’ll discuss some of the potential challenges that developers may face when creating a login feature for a mobile app.

The first challenge is ensuring that user data is kept secure. Mobile devices are inherently vulnerable to malicious attacks and hackers, so developers must take steps to protect user data. This may include implementing strong password policies, encrypting data, and using two-factor authentication.

The second challenge is making the login process as easy and frictionless as possible. Mobile users are used to being able to access their accounts quickly and easily, so developers must ensure that the login process is as quick and intuitive as possible. This may mean implementing features such as fingerprint authentication, facial recognition, or one-click login.

The third challenge is ensuring that the app is accessible to all users. Developers must make sure that the app is compatible with all types of mobile devices and operating systems. They must also ensure that the app is accessible to users with disabilities and provides features such as text-to-speech and magnification tools.

The fourth challenge is making the app secure against brute force attacks. Brute force attacks are a common method used by hackers to gain access to user accounts. To prevent this, developers must implement strong password policies and limit the number of failed login attempts.

Developers must ensure that the app is compliant with any relevant data protection regulations. This may include implementing measures such as the General Data Protection Regulation (GDPR) or the California Consumer Privacy Act (CCPA). Creating a login feature for a mobile app can be a challenging process for developers. However, by taking the necessary steps to ensure user data is kept secure, making the login process as easy and frictionless as possible, ensuring the app is accessible to all users, and ensuring the app is compliant with data protection regulations, developers can create a secure and reliable login feature for mobile apps.

# Limitations

The primary limitation listed above is the time constraint. This is a common issue for many developers, and can be very limiting when it comes to creating a successful application. Without enough time to properly plan, design, and implement a project, developers often struggle to make the most of their efforts.

One of the main issues with time constraints is that it has hindered the ability to set up a database. Without a database, it can be difficult to enable users to register for an application. Without registration, user data is not tracked, making it difficult to tailor the experience to the individual user. Additionally, without data, it can be difficult to properly understand user behavior and preferences, which can be important for marketing and user engagement.

Another issue with time constraints is that it can limit the ability to implement certain features. For example, in the scenario of the app with Bluetooth functionality, the developer may not have had the time necessary to learn how to properly use the technology and to test it. This can lead to the application being released with the feature not working correctly, which can be a major issue for any user.

Finally, time constraints can prevent developers from being able to fully explore the possibilities of an application. In the example of the app for smart lighting, the developer may not have had enough time to explore the full potential of the technology and to create a truly innovative experience for users. This has led to a major impact on the success of an application, as users may not find it to be as useful or innovative as they had hoped.

In general, time constraints can create a number of issues for developers when creating applications. Without enough time to properly plan, design, and implement a project, it can be difficult to create a successful application. Additionally, it can prevent developers from being able to properly set up a database, fully implement features, and explore the full potential of an application.

# Conclusion

In conclusion, secure mobile app development is a rapidly growing field of study due to the increasing number of users who rely on mobile devices for their day-to-day activities. The security of mobile applications is of utmost importance as the data stored and transmitted via these applications can easily be accessed by malicious actors. Therefore, it is essential for developers to be able to design, implement and test secure mobile applications that protect users from potential security threats.

This paper discussed the development of a secure mobile app based on the Android platform. The app was designed to include at least one wireless communication functionality and a substantial security feature. Additionally, the app was implemented and tested to ensure that it is secure and meets the requirements of the user. The app was implemented from scratch and included a login feature with password authentication. The app also included Bluetooth wireless technology, which allowed users to connect to other Bluetooth-enabled devices in their vicinity.

The development of the app was not without its challenges. Developers must take steps to ensure that user data is kept secure, that the login process is as easy and frictionless as possible, that the app is accessible to all users, and that the app is compliant with any relevant data protection regulations. Additionally, time constraints can create a number of issues for developers, such as not having enough time to properly plan, design, and implement a project, or to properly set up a database, fully implement features, and explore the full potential of an application.

Overall, secure mobile app development is an important area of study that requires developers to take the necessary steps to ensure that user data is kept secure and that the app meets the requirements of the user. By taking the necessary steps to ensure user data is kept secure, making the login process as easy and frictionless as possible, ensuring the app is accessible to all users, and ensuring the app is compliant with data protection regulations, developers can create a secure and reliable login feature for mobile apps.

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Appendix: Secure Mobile App Screenshots



















