

# Research Paper on App Lock System for iOS using Fingerprint Sensor

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**Abstract**— In this paper I am giving brief outline about my Application that is used to lock the installed Apps in iPhone for the user privacy. This Application provides dual mode of operation, one mode is for accessing the locked app using a password and other mode is just using Touch-ID recognition. Both the mode operates either or choice method (i.e. The user can open his locked app using his fingerprint or else by entering a password). The main idea of this project is to reduce the time for user to open his locked app on the go by using his fingerprint and the other manual password entering feature is attached additionally. This application works with Touch-Id, it is a fingerprint scanning interface used in iOS. There is no application for locking favourite apps using fingerprint sensor technology in both android and iOS platforms. So, my idea is to develop an application only for iOS on the above basis.

**Key words:** Dual Mode, Touch-ID, Privacy

## I. INTRODUCTION

Touch ID is a fingerprint recognition feature, designed and released by Apple Inc., and is currently available on iPhones since iPhone 5S, as well as iPads since iPad Air 2 and the MacBook Pro. In 2015, Apple introduced the faster second generation Touch ID beginning with the iPhone 6S, and later to the Macbook Pro in 2016.

Touch ID allows users to unlock Apple devices, make purchases in the various Apple digital media stores (the iTunes Store, the App Store, and the iBookstore), and authenticate Apple Pay online or in apps. On announcing the feature, Apple stated that fingerprint information is stored locally in a secure enclave on the Apple A7 and later chips, and is not stored in the cloud, making it very difficult for external access. So we can implement this feature in a application to work as

## II. APP LOCK USING XCODE

For developing the App lock with Touch-Id for iOS ,we need X-code for building this application. The iOS platform developed by Apple is the world's most advanced mobile operating system, continually redefining what people can do with a mobile device. Together, the iOS SDK and Xcode IDE make it easy for developers to create. Technologies shared between iOS and OS X includes the OS X kernel, BSD sockets for networking, and Objective-C and C/C++ compilers for native performance. The iOS platform's bottom layer is the Core OS, which is the foundation of the operating system. It is in charge of memory management, the file system, networking, and other OS tasks, and it interacts directly with the hardware.

Xcode is an integrated development environment containing a suite of software development tools developed by Apple for developing software for macOS, iOS, WatchOS and tvOS.

## III. SWIFT

Swift is a new programming language for iOS, macOS, watchOS, and tvOS apps that builds on the best of C and Objective-C, without the constraints of C compatibility. Swift adopts safe programming patterns and adds modern features to make programming easier, more flexible, and more fun. Swift's clean slate, backed by the mature and much-loved Cocoa and Cocoa Touch frameworks, is an opportunity to reimagine how software development works.

Swift has been years in the making. Apple laid the foundation for Swift by advancing our existing compiler, debugger, and framework infrastructure. We simplified memory management with Automatic Reference Counting (ARC). Our framework stack, built on the solid base of Foundation and Cocoa, has been modernized and standardized throughout. Objective-C itself has evolved to support blocks, collection literals, and modules, enabling framework adoption of modern language technologies without disruption. Thanks to this groundwork, we can now introduce a new language for the future of Apple software development.

Swift feels familiar to Objective-C developers. It adopts the readability of Objective-C's named parameters and the power of Objective-C's dynamic object model. It provides seamless access to existing Cocoa frameworks and mix-and-match interoperability with Objective-C code. Building from this common ground, Swift introduces many new features and unifies the procedural and object-oriented portions of the language.

Swift is friendly to new programmers. It is the first industrial-quality systems programming language that is as expressive and enjoyable as a scripting language. It supports playgrounds, an innovative feature that allows programmers to experiment with Swift code and see the results immediately, without the overhead of building and running an app.

Swift combines the best in modern language thinking with wisdom from the wider Apple engineering culture. The compiler is optimized for performance, and the language is optimized for development, without compromising on either. It's designed to scale from "hello, world" to an entire operating system. All this makes Swift a sound future investment for developers and for Apple.

Swift is a fantastic way to write iOS, macOS, watchOS, and tvOS apps, and will continue to evolve with new features and capabilities. So, I have used "Swift" language to build my application instead of using "Objective-C".

## IV. PROPOSED ALGORITHM

FPC's patented Distinct Area Detection (DAD) algorithm is a feature based algorithm, looking for something that is unique in its surroundings. It locates distinct areas in the

three-dimensional fingerprint image derived from the sensor.

The design of the fingerprint recognition algorithm is crucial to the performance of an embedded system. Not only is the performance with respect to FRR and FAR affected, but the requirements of processor power and memory are strongly dependent upon the type of algorithm. Getting this right can help deliver a low cost system with low power consumption, suited to an embedded environment such as a smart card. FPC's focus in algorithm development is the design of verification and identification algorithms based on the 'Distinct Area Detection' method.

The Distinct Area Detection algorithm works to locate distinct areas in the three-dimensional fingerprint image derived from the capacitive sensor. A 'distinct area' is a part of the image containing characteristic information and includes, but is not limited to, the fingerprint minutiae.

The algorithm consists of two steps: enrolment and verification/identification. In the enrolment procedure a number of distinct areas are extracted from the fingerprint image. The areas together with their geometric relationships form a template unique to each fingerprint. In the verification/identification procedure the template is used as an operator acting on the fresh fingerprint image. If the match is approved, the authentication of the person is completed. One of the benefits using this technology is that to get a match, you will need both the fresh 3D fingerprint image as well as the stored template.

These two algorithms are used along with Touch-Id coding to build my application.

## V. RESULT DISCUSSION

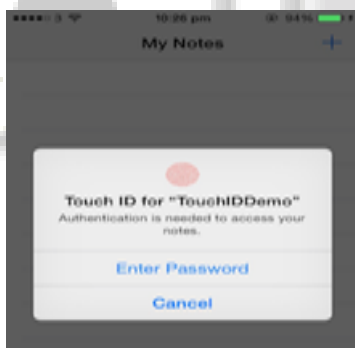


Fig. 1: Screenshot of my Application with Touch-Id

In the above screenshot, we can see the working of my application with Touch-Id feature. I have used to lock the "notes" application in iOS. After that when I have launched the application once again, it prompts with Touch-Id recognition to access the App.

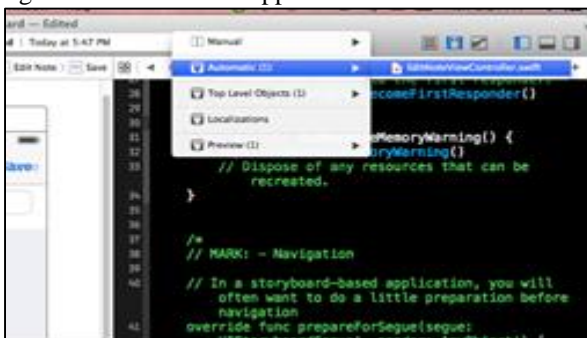


Fig. 2: Screenshot of X-Code IDE

In the above screenshot, we can see the working platform of X-Code with "Swift" language used to build applications.

## VI. CONCLUSION

The present App locks doesn't have fingerprint recognition feature and full security, the hackers can easily bypass the system in android/iOS by force stopping the application. So, Touch-Id based application lock system is developed for iOS in order to overcome those problems and give full privacy for the user for his favourite applications.

## VII. FUTURE SCOPE

In my future work, the size of the application will be developed smaller and very faster efficient to use. The algorithm used in present application also gets modified as the release of any new Mobile Operating System by the apple.

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