

Security: Fake Calculator (Hide Data)



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CERTIFICATE

It is certified that the contents and form of thesis entitled **Security: Fake Calculator (Hide Data)** submitted by **Awais Akram** have been found satisfactory for the requirement of the degree.

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Finally, I am thankful to my **parents** who prayed and help me all the way. without their support it wouldn't have been possible for me to accomplish this goal. Also thanks to all my dear friends for made my time beautiful.

DEDICATION

This project is dedicated to my Parents who have never failed to give us financial and moral support, for giving all our needs during the time we developed our system and for teaching us that even the largest task can be accomplished if we take one step at a time.

“I pray that ALLAH (swt) give continuous skill to my hands, clear visions to my mind, kindness and meekness to my heart”.

“I have learned many things from this venture, but most of all, I have come to realize more than ever”.

“Quality is never an accident. It is always the result of high intention, intelligent direction, sincere effort and skillful execution. It is the wise choice of many alternatives”.

ABSTRACT

The title of my project is " Security: Fake Calculator (Hide Data)". Apple Device users can enjoy personalized services provided by a security application that hides photos, videos, notes and contacts. Meanwhile, serious privacy concerns arise due to the lack of privacy preservation mechanisms. Currently, this application looks as a scientific calculator but when entering secret passcode, it turns into private storage application in which user can hide photos, videos, notes and contacts. All files are securely stored in the application and remain completely private and confidential. The basic need of creating this application was privacy issue. Apple Device users wants to hide photos, videos, notes and contacts safely somewhere on their device so that no one can access them without a password. The old "Fake Calculator" application was basic. A calculator with basic arithmetic functions was developed but in this new version of the Fake Calculator it is switched to a scientific calculator in which user can perform advance math functions. AES 128-bit encryption on images, videos, notes and contacts is also applied so that no intruder can access our personal data. Fake Calculator is designed and build for iOS platform.

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CHAPTER 1

Security: Fake Calculator (Hide Data)

1.1 INTRODUCTION

Fake Calculator is a scientific calculator that calculates scientific mathematical functions. Anyone who starts this application thinks of it as a scientific calculator but when entering secret password, it turns into a private storage application in which user can hide photos, notes and contacts. All files are securely stored in the application and remain completely private and confidential. AES 128-bit encryption on images, notes and contacts is also applied so that no intruder can access our personal data.

1.2 OBJECTIVES

The major objective was to give iPhone users an application using which they can hide their data within a Fake Calculator and to apply encryption on every bit of data.

Important objectives of this application:

- i. **Scientific Calculator:** A complete working scientific calculator.
- ii. **Secret Photos:** Import/Capture photos and save them secretly on the device.
- iii. **Secret Contacts:** Import old and create new contacts and save them secretly on the device.
- iv. **Secret Notes:** Creation/Deletion/Modification of notes and save them secretly on the device.
- v. **AES 128-bit Encryption:** AES 128-bit encryption on images, notes and contacts is also applied so that no intruder can access our personal data.

1.3 PROBLEM STATEMENT

The basic need of creating this app was privacy issue. iPhone users want to hide photos, notes and contacts safely somewhere on their device so that no one can access them without a password. AES 128-bit encryption was also needed.

1.4 PROPOSED SOLUTION

The old “Fake Calculator” application was basic. A calculator with basic arithmetic functions was developed but in this new version of the Fake Calculator it is switched to a scientific calculator in which user can perform advance math functions. AES 128-bit encryption on images, notes and contacts is also applied so that no intruder can access our personal data.

1.5 SCOPE OF APPLICATION

- 1) Simple and user friendly
- 2) Easy to use.
- 3) To provide confidentiality, privacy and security to user.
- 4) User can
 - a) Add, delete and modify photos.
 - b) Add, delete and modify notes.
 - c) Add, delete and modify contacts.
 - d) Change secret vault password.
 - e) AES 128-bit encryption.

1.6 ADVANTAGES OF THE PROPOSED SOLUTION

The advantages of the proposed system which are available to the user:

- **Efficiency:** The Proposed system will be efficient and accurate. Encryption on data is applied in 2-3 seconds which is really tough on photos.
- **User Friendly:** The proposed system will be user friendly and easy to use due to its simple, easy and attractive interface. The data will be kept safe throughout the application because of secured local database.
- **Security and Integrity:** This application is more integrate and secure. It is impossible to crack or break our secret vault because of the encryption. Techniques applied in the development are ISO proved. (AES 128-bit: **ISO/IEC 18033-3**)
- **Easy to maintain:** Proposed application will be very easy to maintain and changes can easily be done by a novice user.

1.7 FEATURES

- i. Single and multiple photos (Import, modify, share and delete)
- ii. Notes (Import, modify, share and delete)
- iii. Contacts (Import, modify, share and delete)
- iv. Change password
- v. AES 128-bit Encryption
- vi.

CHAPTER 2

TOOLS AND TECHNOLOGY

2.1 Introduction

In previous chapter objective, problem statement, proposed solution, scope and advantages of proposed solution of Project **Security: Fake Calculator (Hide Data)** has been discussed. In this chapter we discuss about technologies, languages and tools which are helping me in developing of this project.

2.2 Swift Language

Swift is a powerful and intuitive programming language for macOS, iOS, watchOS and tvOS. Writing Swift code is interactive and fun, the syntax is concise yet expressive, and Swift includes modern features developers love. Swift code is safe by design, yet also produces software that runs lightning-fast.

2.3 Core Data (Local Database)

Core Data is an object graph and persistence framework provided by Apple in the macOS and iOS operating systems. It was introduced in Mac OS X 10.4 Tiger and iOS with iPhone SDK 3.0. It allows data organized by the relational entity–attribute model to be serialized into XML, binary, or SQLite stores.

2.4 iOS

iOS is the operating system that runs on iPad, iPhone, and iPod devices. The operating system manages the device hardware and provide the technologies required to implement native apps. The *iOS Software Development Kit(SDK)* contains the tools and interfaces needed to develop, install, run, and test native apps that appear on an iOS device's Home screen. Native apps are built using the iOS system frameworks and swift language or Objective-C language and run directly on iOS.

2.5 Xcode 8.3.3

Xcode is an integrated development (IDE) containing a suite of software development tools developed by apple for developing software for OS X and IOS. The latest stable release is version 8.3.3 and is available via the Mac App Store free of charge for macOS Sierra users. Registered developers can download preview releases and prior versions of the suite through the Apple Developer website. However, Apple recently made a beta version of version 9 beta 2 of the software available to those of the public with Apple Developer accounts.

2.6 CocoaPods

CocoaPods is a library dependency management tool for OS X and iOS applications. With CocoaPods, you can define your dependencies, called pods, and manage their versions easily over time and across development environments. Secondly, CocoaPods makes it easy to discover new third-party libraries. Now, this doesn't mean you should go and build a FrankenApp, where every part is written by somebody else and simply stitched together. It does mean that you can find really good libraries that shorten your development cycle and improve the quality of your software.

2.7 Tools

Tools which are used for the development of the project name **Project Security: Fake Calculator (Hide Data)** are mentioned below:

- i. Xcode (8.3)
- ii. Core Data
- iii. Swift 3

2.8 Operating system

- i. macOS X Sierra 10.12

CHAPTER 3

CONCEPTUAL MODELLING

3.1 Introduction

This Chapter include all graphical work used in development process like conceptual diagram and data flow diagram.

3.2 Conceptual Diagram

This diagram (**Figure 1**) shows that user request the app to perform operations. Like user opens the application, enters the password, insert the data and fetching the data from our local database.

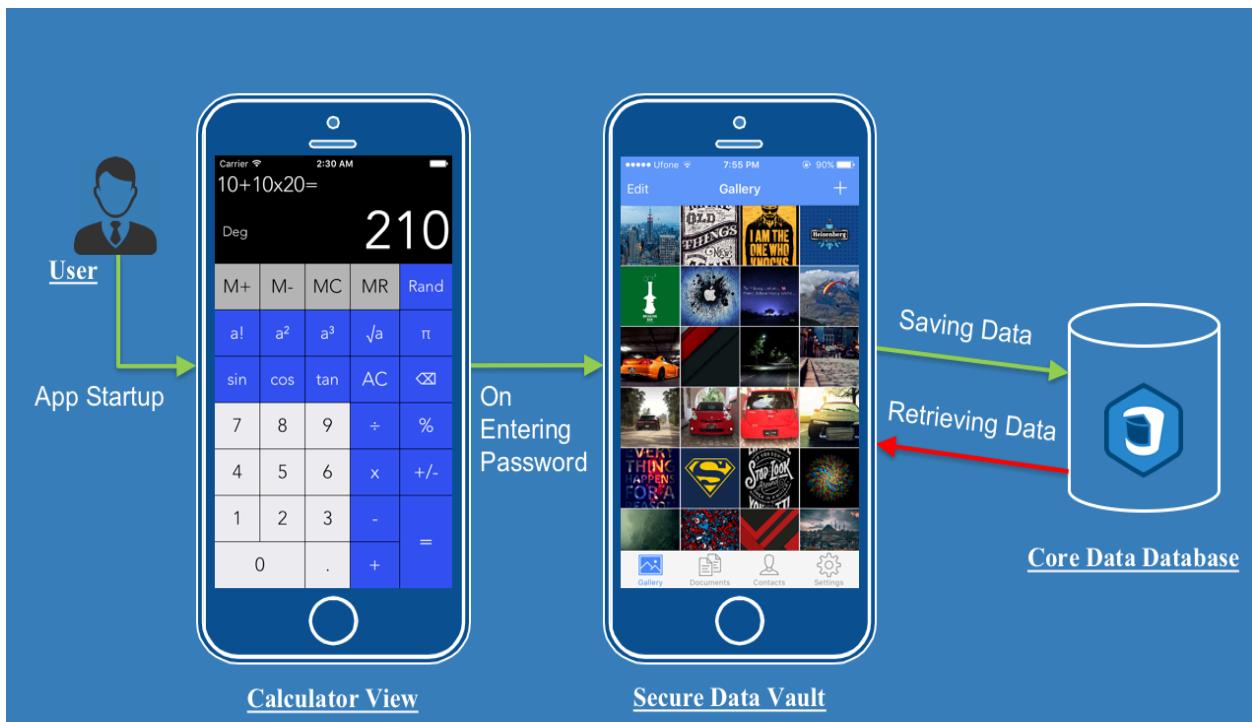


Figure 1: Conceptual Diagram

3.3 Data Flow Diagram

3.3.1 Level 0

Figure 2 shows the basic operation which user can perform and that are opening the vault and request/response from the Core Data. (local database)

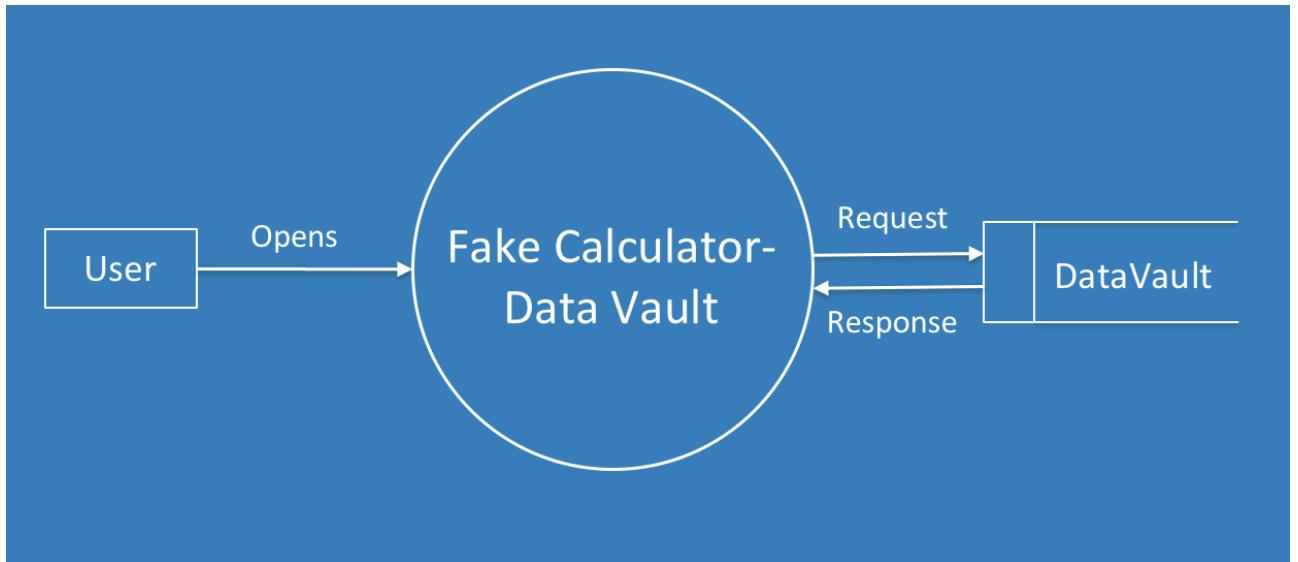


Figure 2: Dataflow Diagram level 0

3.3.2 Level 1

Figure 3 shows detail of above mention operation.

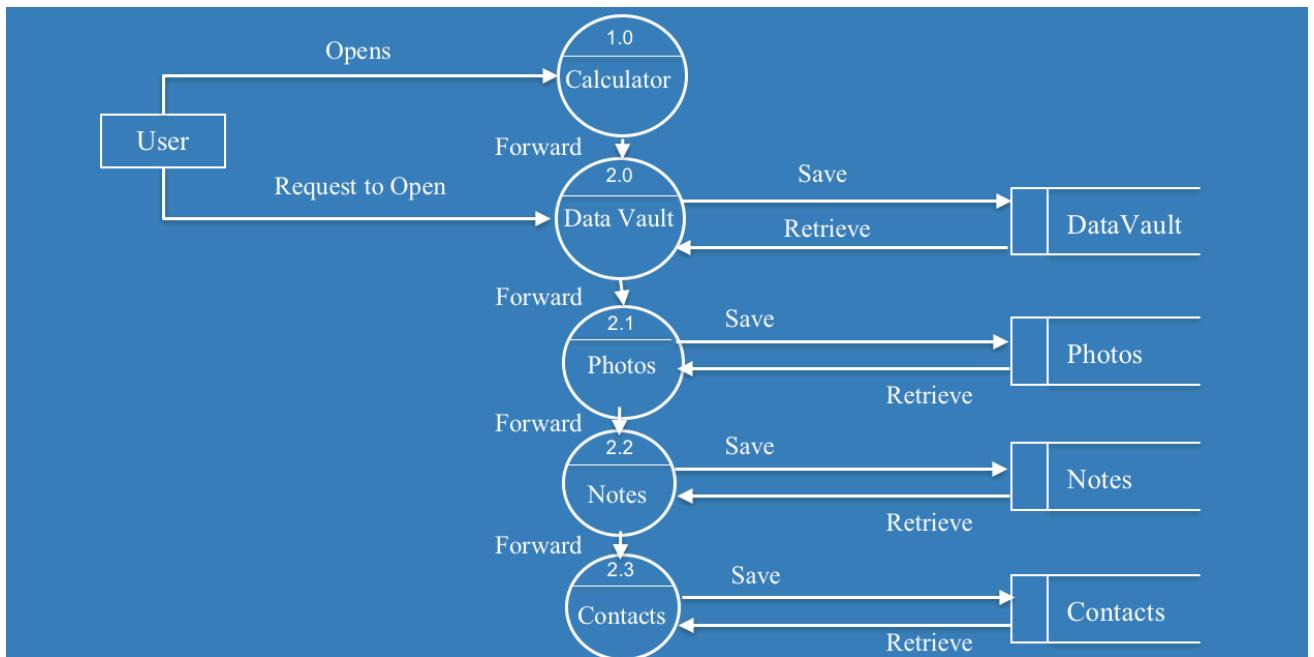


Figure 3: Dataflow Diagram level 1

CHAPTER 4

Application View and User Guide

4.1 Introduction

This chapter includes screenshot of proposed system and explain how to use the application easily. All details which a new user needs are provided in this chapter along with visual representation in the form of screenshots. All the features are explained in detail for user's easiness.

4.2 Loading Screen

Figure 4 shows the launch screen, when app runs this screen show for a while.

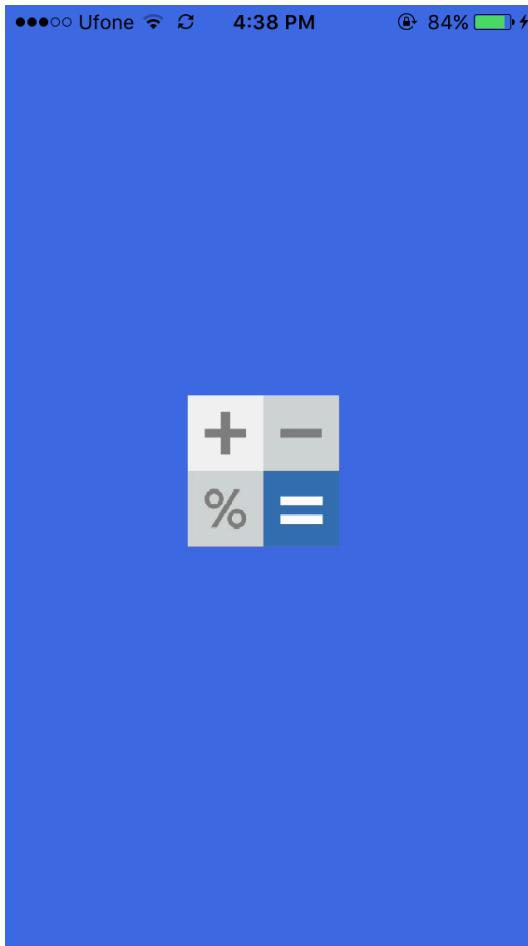


Figure 4: Loading Screen

4.3 Calculator View

Figure 5 shows a scientific calculator which deals with the complex math functions. **Figure 6** shows a password asking screen. That password is then saved in device memory for vault access.



Figure 5: A scientific calculator

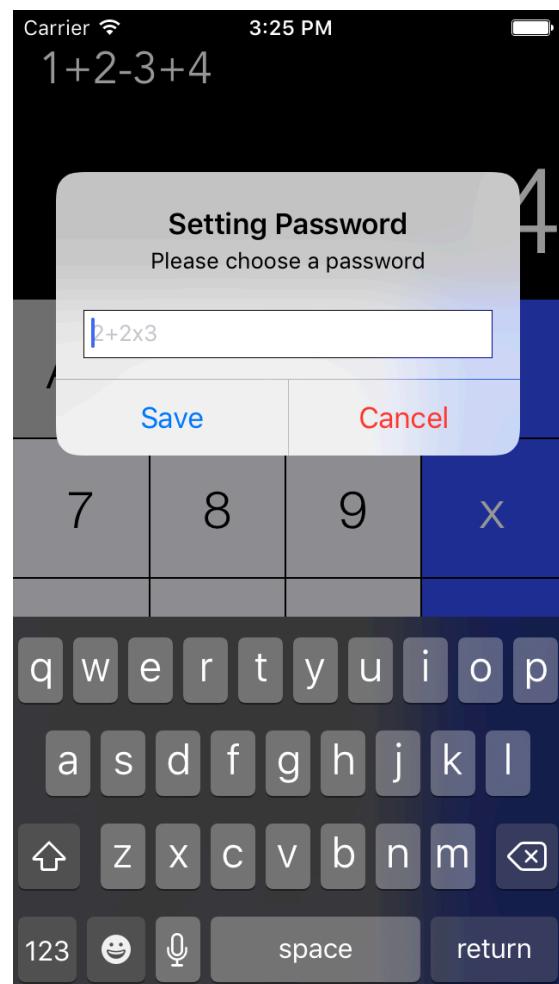


Figure 6: A Password taking screen

4.4 Hidden Gallery

After entering the successful password that could be any equation or a sequence our app will enter into vault mode where a gallery is shown. (**Figure 7**)

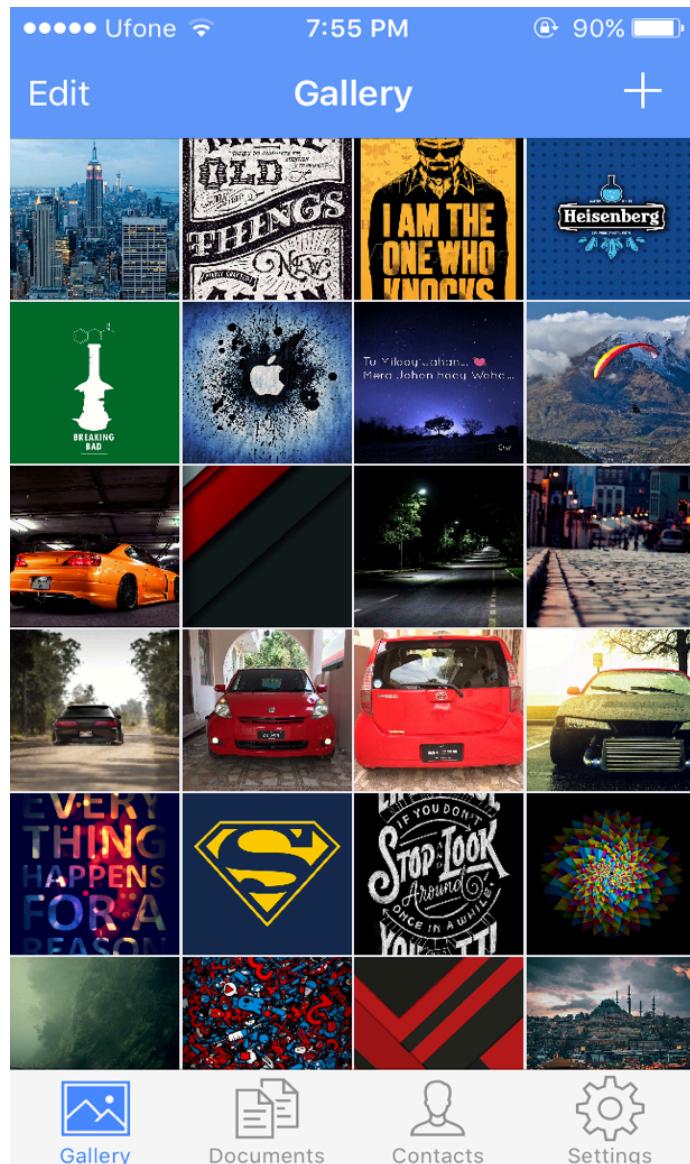


Figure 7: Hidden Vault Gallery

4.4.1 Importing images:

User can also import multiple pictures from his camera roll or can directly capture an image from his device camera by tapping + icon on top right corner. (**Figure 8-11**)

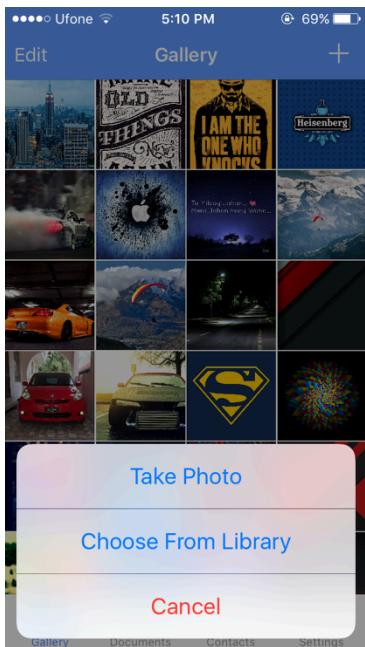


Figure 8: Importing images options

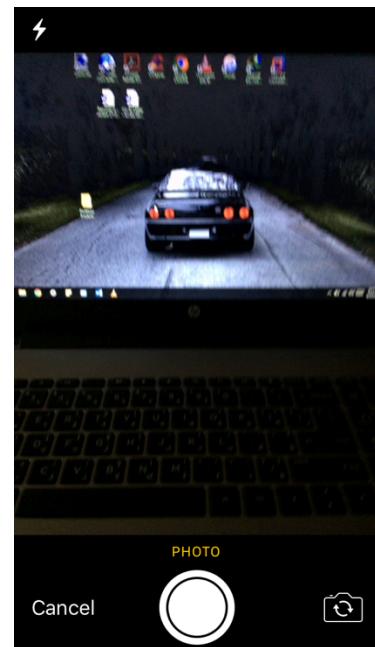


Figure 9: Camera

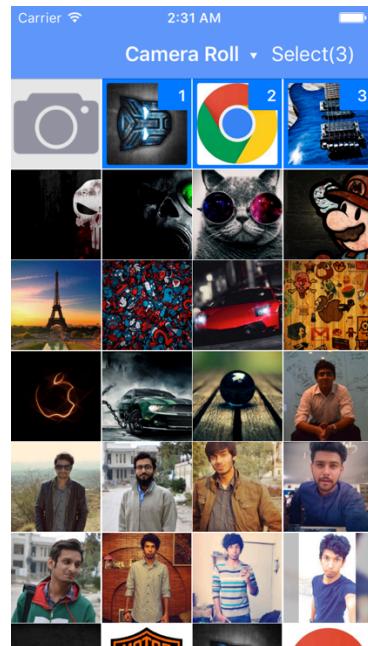
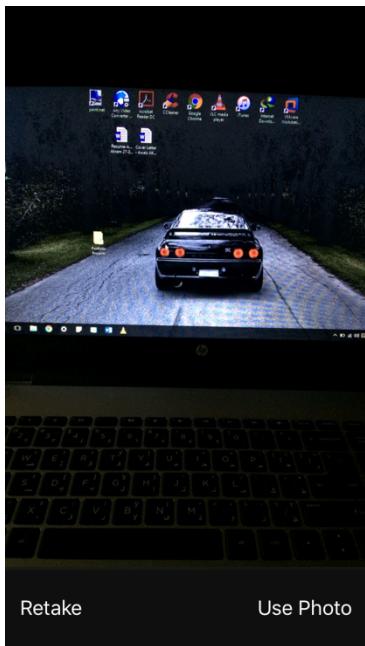


Figure 10: Saving image from Camera images

4.4.2 Deleting images:

User can also delete multiple pictures from his hidden vault by tapping “Edit” button on top left corner. And then tapping the image he wishes to delete. (**Figure 12-13**)



Figure 12: Deleting Images

Figure 11: Image Picker for Multiple

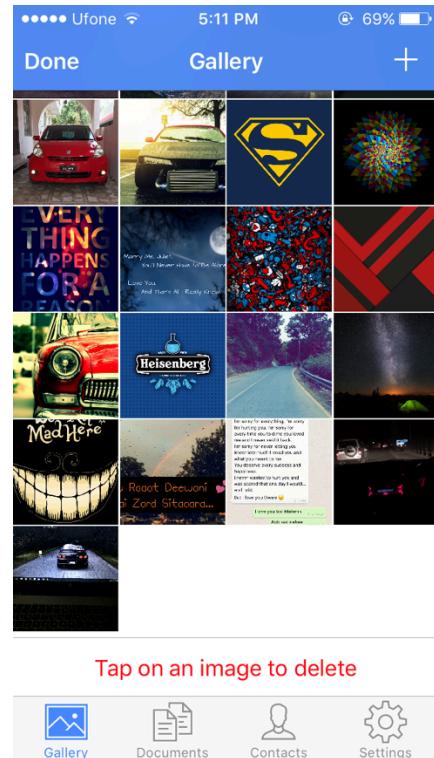


Figure 13: Reloading Hidden Vault Gallery

4.4.3 Sharing image:

User can also share an image from his hidden vault by tapping “Share” button. (**Fig 14-16**)

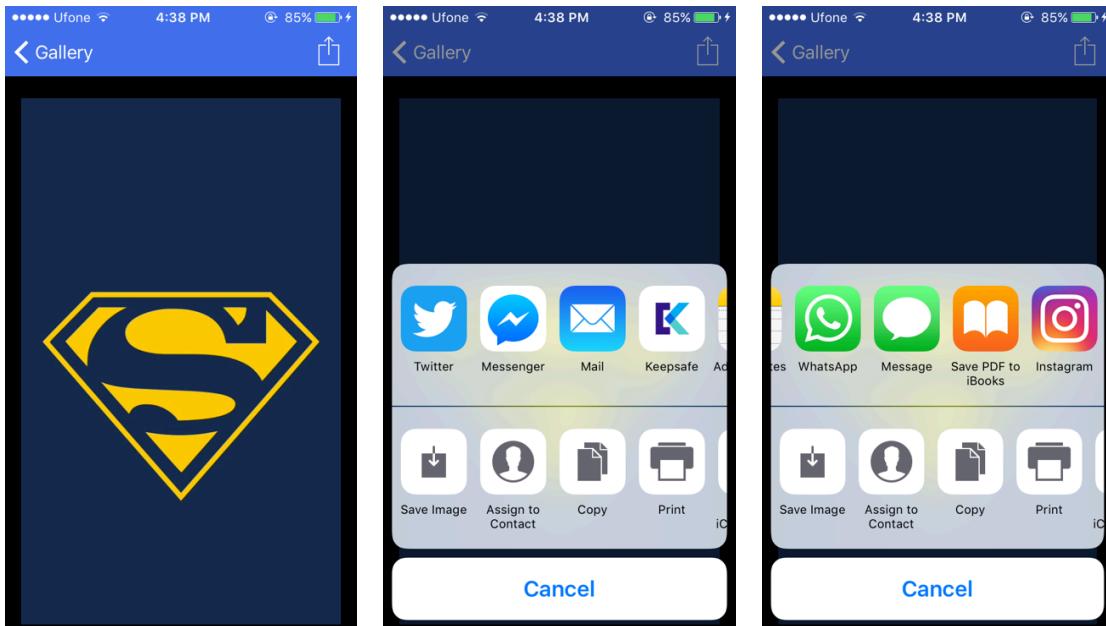


Figure 14: Detailed Image Figure 15: Sharing Options (i) Figure 16: Sharing Options (ii)

4.4.3 Zooming image:

User can also Zoom in/out an image from his hidden vault by pinch gesture. (**Fig 17-19**)

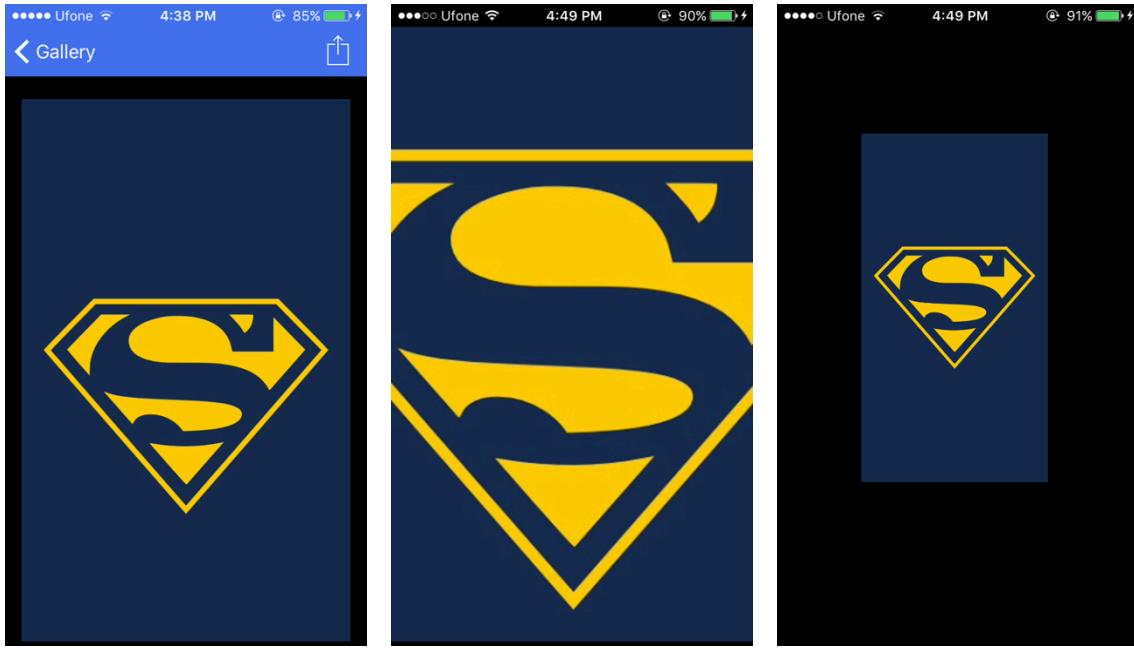


Figure 17: Detailed Image Figure 18: Image Zoomed In Figure 19: Image Zoomed Out

4.5 Hidden Notes

From the tab bar in our app we can move to the next functionality of our application which is secret or hidden notes. User can save his/her important sticky notes here and can modify and delete them too whenever he wants to. (**Figure 20**)

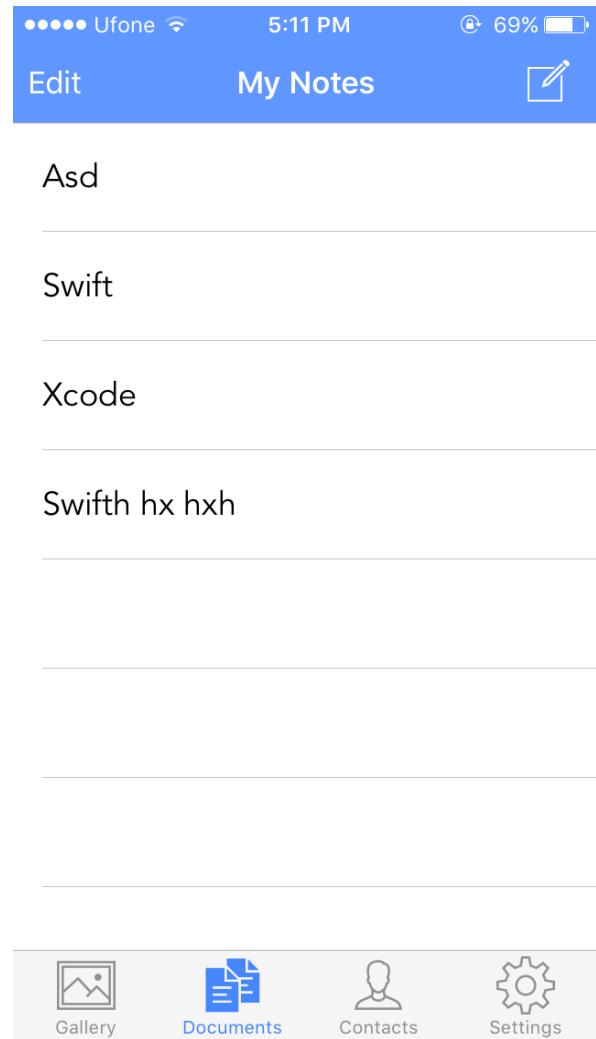


Figure 20: Notes

4.5.1 Create Notes

User can create notes by tapping the “Create” button on top right corner. After writing whatever he can save by pressing the save button and then our note will be saved to our local database (DataVault) and it will show in the table view. (**Figure 21-23**)

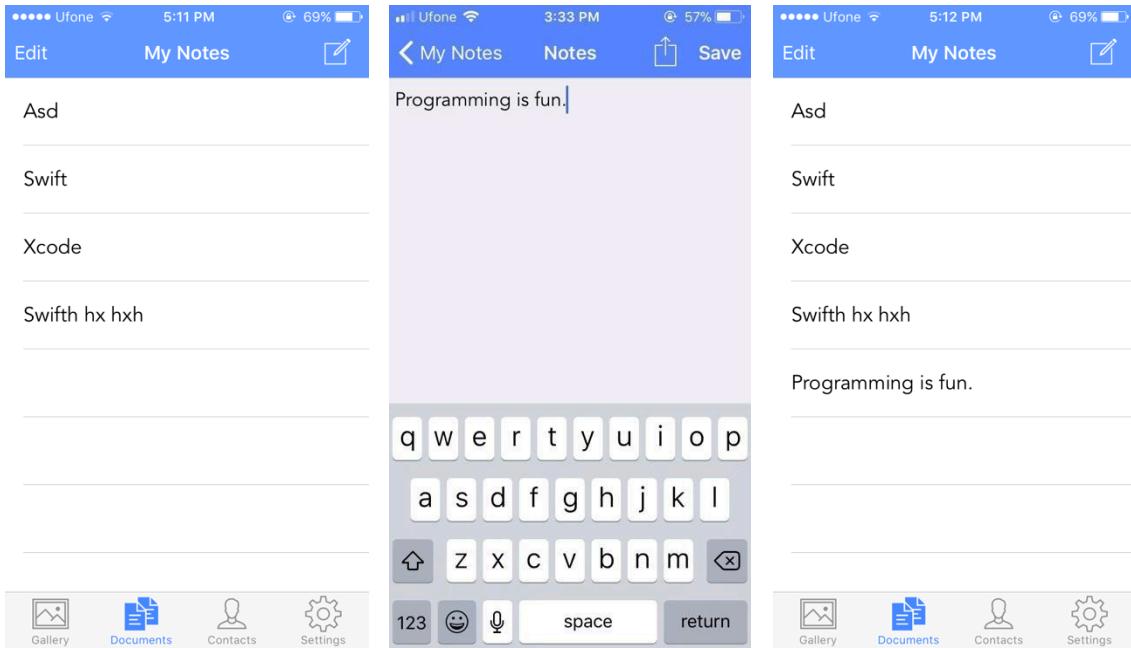


Figure 21: Creating Note

Figure 22: Writing Note

Figure 23: Note Saved

4.5.2 Delete Notes

User can delete the note by swiping the specific note to left and then pressing delete.

Deleting can also be done by tapping “Edit” button on top left corner. (**Figure 24-25**)

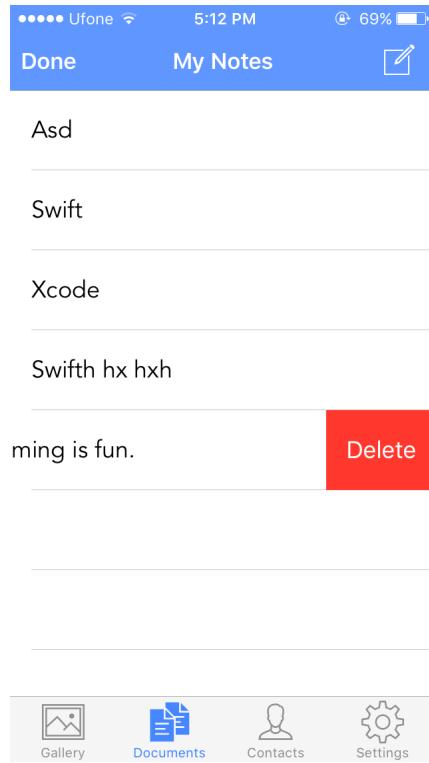


Figure 24: Swiping Note (Left)

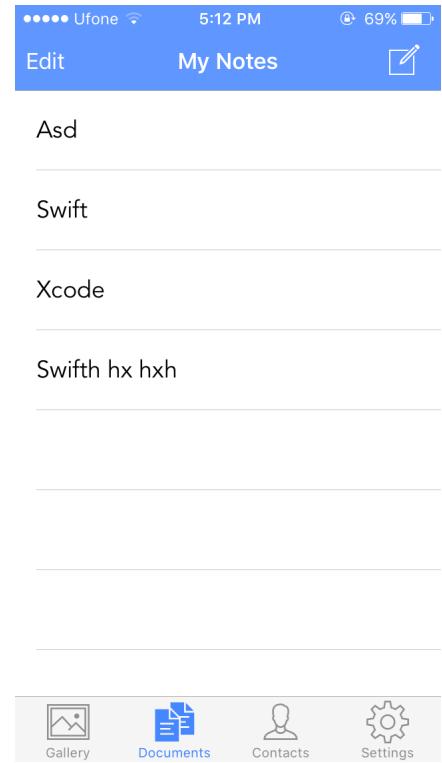


Figure 25: After Deleting

4.5.2 Share Notes

User can share the note by opening the specific note and then pressing second left button from top right side. An activity view will appear asking with multiple sharing options. (**Figure 26-28**)

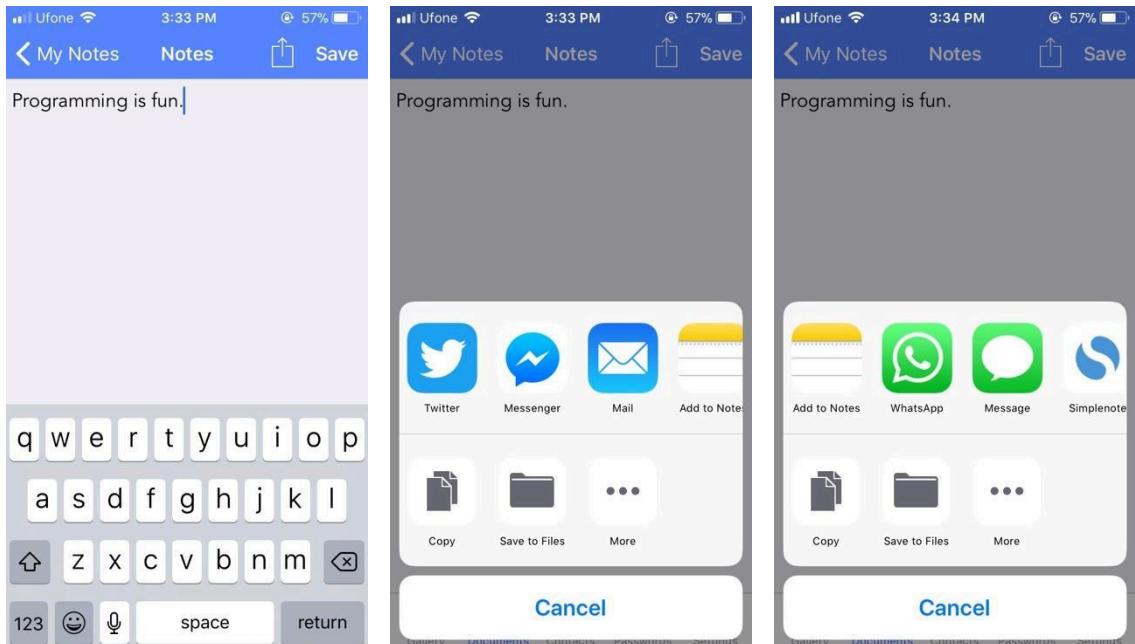


Figure 26: Open Note Figure 27: Sharing Options (i) Figure 28: Sharing Options (ii)

4.6 Hidden Contacts

From the tab bar in our app we can move to the third functionality of our application which is secret or hidden contacts. User can import old and create new contacts manually and can also call, message and email them. Modification and deletion can also be formed on every single contact. (**Figure 29**)



Figure 29: Hidden Contacts

4.6.1: Creating/Importing Contacts

User can import contacts from address book or contact book. He can also create new contacts manually within the app. Single and multiple contacts along with their first name, last name, organization, phone number, email and their date of birth are imported from the address book and save to our local database after encryption. (**Figure 30-32**)



Figure 30: Importing options

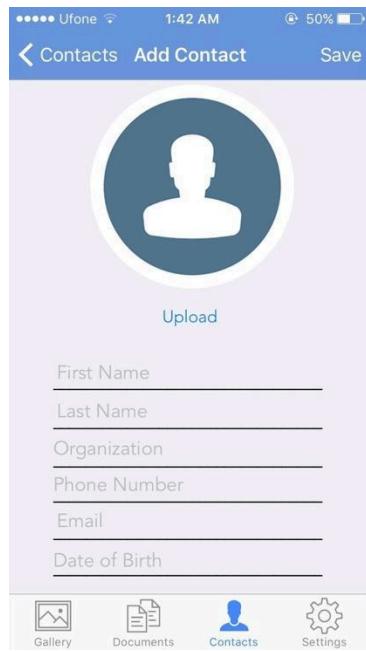


Figure 31: Manual Contact

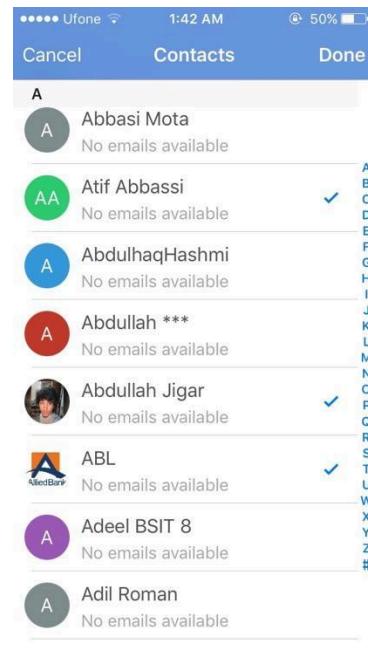


Figure 32: Import Contacts

4.6.2: Delete Contacts

Figure 33 is showing that user can delete contacts by swiping the specific note to left and then pressing delete. Deleting can also be done by tapping “Edit” button on top left corner.

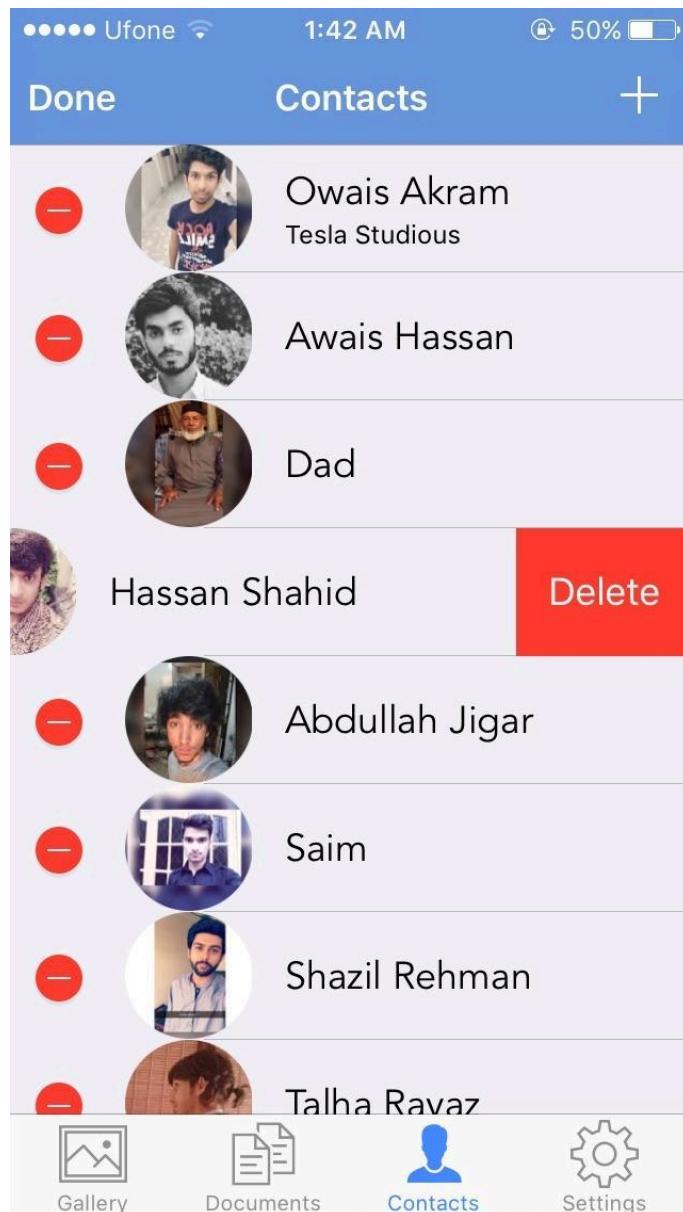


Figure 33: Contacts Deletion

4.7: Encryption (AES 128-bit)

In **Figure 34** an encryption process can be seen. A photo is encrypting in text (string bytes) and then going to save in local database.

In **Figure 35** a decryption process can be seen. A photo is converting back from text to image and then showing in our app.

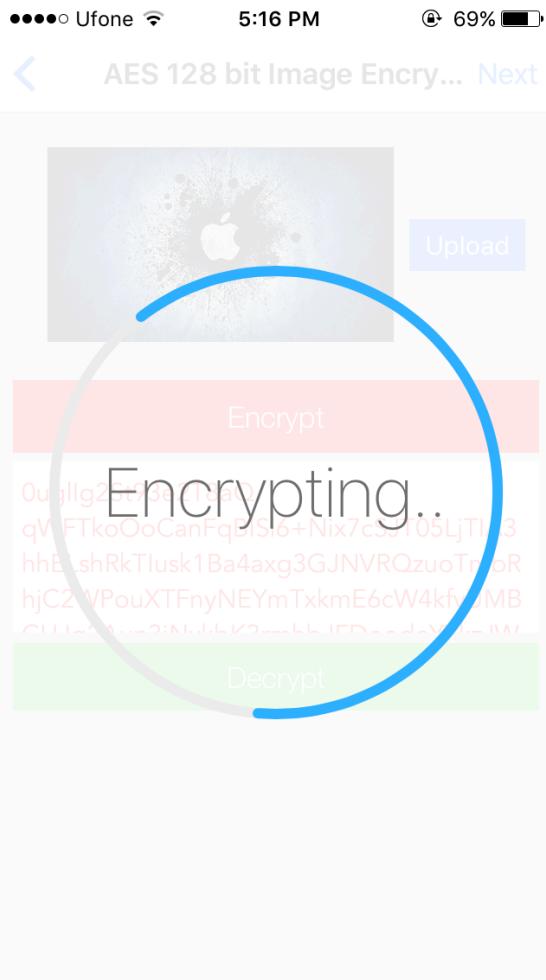


Figure 34: Encrypting Data (image)

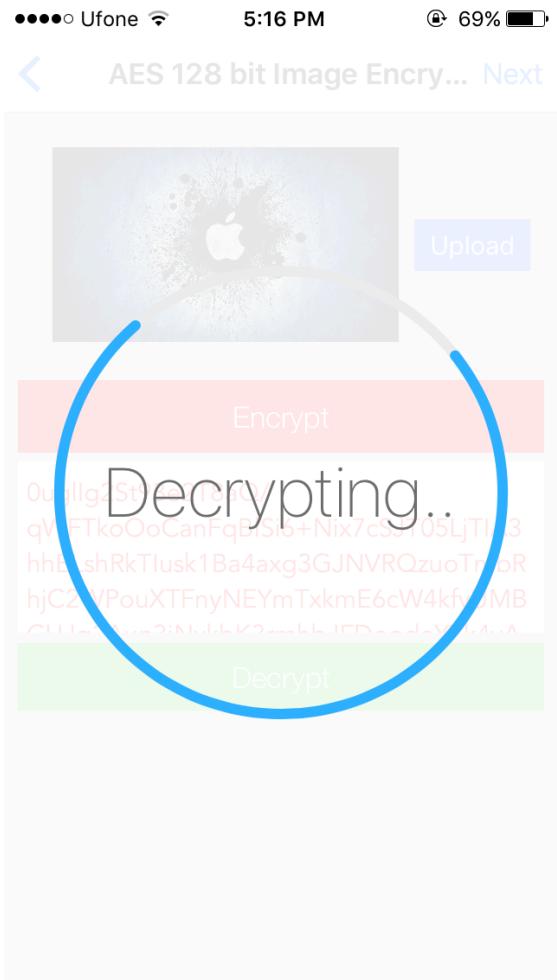


Figure 35: Decrypting Data (image)

4.8: Change Password

Figure 36 is showing that user can change password anytime by going to the settings tab and clicking on “Change Password” button. Password validation is also performed on the textboxes.

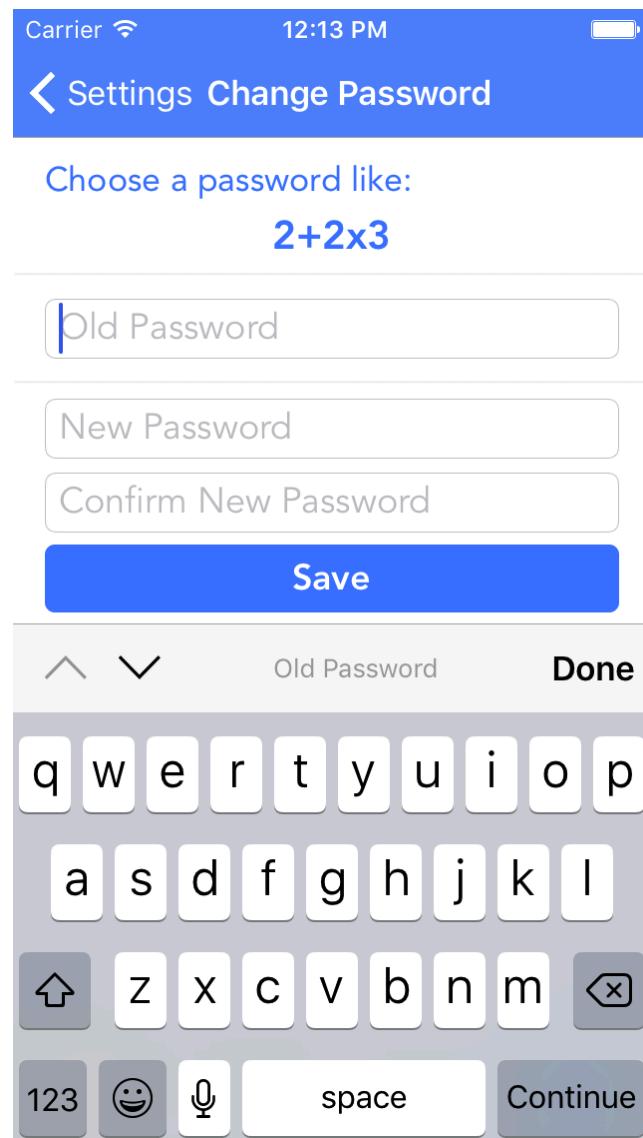


Figure 36: Changing password screen

4.8: About this App

Figure 37 is showing about this app section where the information about the developer of this project **Security: Fake Calculator (Data Vault)** has been provided.



Figure 37: About this app screen

CONCLUSIONS

The Application **Security: Fake Calculator (Hide Data)** is very useful for users who want complete privacy and security on their data. This project is best solution for saving your photos, notes and contacts with a powerful AES 128-bit Encryption applied on every bit of data before saving it on the device storage. Your data is always categorized, secure and remains in an order. It saves a lot time of the searching. Users can access this application everywhere with the iPhone.

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<https://github.com/zhangao0086/DKImagePickerController>

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<https://github.com/iPraba/EPContactsPicker>

5) AES Encryption

RNCryptor: <https://github.com/RNCryptor/RNCryptor>

CryptoSwift: <https://github.com/krzyzanowskim/CryptoSwift>