

DOCUMENT READING SYSTEM FOR BLIND PEOPLE
("READING EYE")

19-20-J 17

Software Requirements Specification

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DECLARATION

I declare that this is my own work and this system requirement specification does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

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Signature of the supervisor

.....

Date

.....

Signature of the co-supervisor

.....

Date

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1 Introduction

1.1 Purpose

Reading eye system is developing for visually impaired people to enhance their reading ability without braille. We are developing this system as a mobile application. we use cloud to handle functions that requiring more process power. Mobile app need internet access to communicate with cloud. while data transferring from mobile to cloud the requirement of encryption system might rise because the cloud need to confirm the authenticity, integrity and confidentiality of the data. The mobile application use camera to capture the image of the document and send to the cloud. before sending the image must be light weighted for efficient data transfer. The purpose of this document is to detail the functional, non-functional requirements, dependencies and all the relevant specifics of the encryption component and lightweight algorithm component.

1.2 Scope

This document contains the full description of the encryption component and lightweight algorithm component which will secure the backend communication with the cloud and give efficiency in transferring data. Furthermore, the document illustrates all the technologies, tools and applied concepts for implementation of the algorithms.

1.3 Definitions, Acronyms, and Abbreviations

Term	Definition
DES	An encryption algorithm
AES	An encryption algorithm
Diffie-Hellman	Algorithm to share secret key

1.4 Overview

1.4.1 Task of the system

When implementing mobile applications, we must consider about the mobile which the app being installed. Many of mobile phones which are in medium price range are not efficient enough to handle full functional mobile app. Therefore, when implementing the *reading-eye* system we must consider about the efficiency of the mobile phone as well. Running efficiently and securely in any mobile phone must be a key feature of the app. Therefore implementing an encryption algorithm efficient enough to run in any mobile environment and implementing lightweight algorithm to reduce the size of the image to transfer to the cloud are research components of this document.

1.4.2 Main Goal of the system

The main goal of this research is to assist visually impaired people to read printed reading materials and help them to improve their reading ability as normally sighted people.

1.4.3 Specific goal

Implementing an encryption algorithm enforce the security of the system. Implementing algorithm to lightweight the images before sending to the cloud make the system efficient in transferring data.

1.4.4 Users

The user segmentation for the proposed mobile application would be mainly based on three categories as psychographic, geographic and demographic. When considering psychographic segmentation, it is mainly considered about the visually impaired people who have partial or complete blindness. The initial target market based on geographic segmentation would be Sri Lanka. The financial statuses of the users are considered under demographic user segmentation. This product mainly focuses on providing a cross-platform mobile application that would help the user to improve their reading ability in a friendly manner.

2 Overall Descriptions

2.1 Product Perspective

Currently there are many reading applications for visually impaired individuals in the market. Many of them are lacking very critical functionalities. As for example many of them only can read texts

ex: *Amazon Kindle, BARD Mobile, CaptiVoice, KNFB Reader.*

They cannot identify and read images, charts, equations and tables. Some of them having functionalities embedded into the application which make low performance of the mobile.

Some of them having external servers to handle critical functionalities

ex: *Schmoozer.*

They don't apply any functionalities to secure the communication between client and the server and lightweight the image in order to get efficiency in transferring data.

Product	Amazon Kindle	BARD Mobile	CaptiVoice	KNFB Reader	Schmoozer	Reading Eye (Proposed System)
Text Identification and Reading	✓	✓	✓	✓	✓	✓
Charts Identification and Reading	✗	✗	✗	✗	✗	✓
Voice Input (As Command)	✗	✗	✗	✗	✗	✓
Voice output	✓	✗	✓	✓	✓	✓
Cloud Storage	✗	✗	✗	✗	✓	✓
Client-server communication data security	✗	✗	✗	✗	✗	✓
Images' size reduction for efficient communication	✗	✗	✗	✗	✗	✓

Figure 1

There are many security threats to mobile applications in modern-day. Especially when a mobile app communication with the server some threat actors can perform man-in-the-middle attack to intercept the communication and alter original data or perform dos attack to make server temporally unavailable. These attacks will directly be affecting application's reputation.

Therefore, implementing an encryption algorithm and implementing lightweight algorithm to reduce the size is very vital research components in this *reading-eye* system and it will make huge impact on the application's reputation.

2.1.1 System Interfaces

After capturing the image it will be light weighted and encrypted. After that it will send to the cloud to further processing. In the cloud, the encrypted image will be decrypted.

2.1.2 User Interfaces

These research components are for the mobile application's background processes and for the backend. There for there are no need of user interfaces.

2.1.3 Hardware Interfaces

The *reading-eye* is design as a mobile application. Therefore, only mobile phone to run this application is sufficient. There are no need for the special hardware.

2.1.4 Software Interfaces

The Android mobile phones must have Android 5.0 or higher version for deployment and Apple mobile phones must have IOS 9.0 or higher version

2.1.5 Communication Interfaces

Need internet access to app to communicate with the cloud.

2.1.6 Memory Constraints

Above mentioned algorithms are embedded into the application. All the data are stored in the cloud. The app does not store any data. The mobile phone must has at least minimum of 1GB ram.

2.1.7 Operations

- Reading eye is developing with the capability to run on both android and Ios. Customers can purchase it from android play-store or ios app-store.
- The app need internet access. Therefore, before opening the app first must enable the mobile data or connect to a WIFI.
- The app needs mobile phone's camera for capturing images.

2.1.8 Site Adaptation Requirements

The app use design for the visually impaired people only. When opening the app for the first time the app will play an audio file about how to use it.

2.2 Product Functions

The reading eye application has more functions than any other applications which design for visually impaired individuals. When user choose option to read books the app will turn on the camera. User must press the button to take the picture. If the picture is aligned and well-focused the phone will vibrate after the picture taken. Then app will lightweight the image and encrypt it. Then send to the cloud.

2.2.1 High Level Diagram of the component

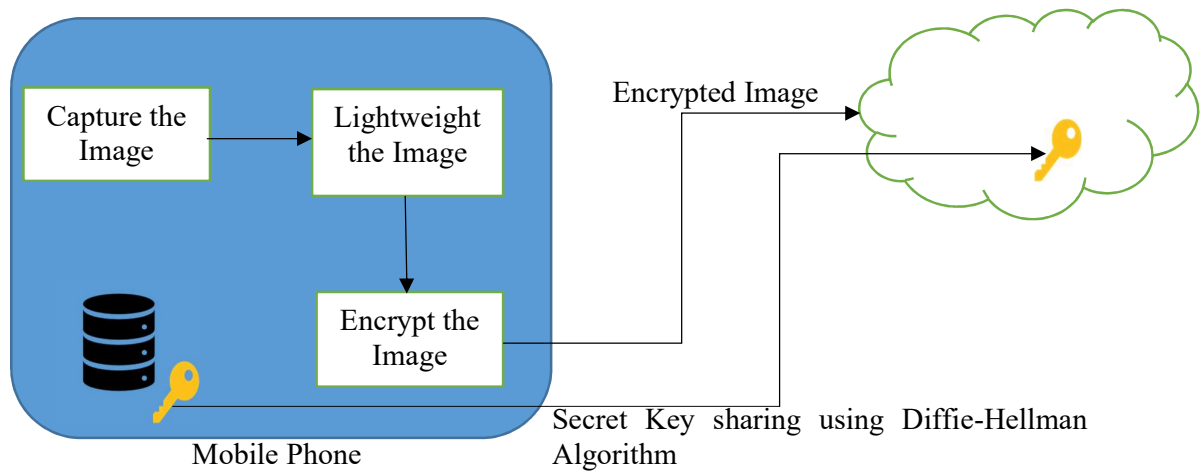


Figure 2

The encryption algorithm is design based on AES and 3DES encryption algorithms. This hybrid encryption algorithm ^[1] is designs to fulfill vital requirements of mobile application such as efficiency and security in transferring the data. The secret key storage is embedded into the application. The key will send to the cloud using Diffie-Hellman algorithm because it is the most secure way to transfer the key.

2.3 User Characteristics

These research components are relevant to backend processes. Therefore, no user interaction required.

2.4 Constraints

Since above mentioned research components are about implementing algorithms, there are no constraints needed.

2.5 Apportioning of Requirements

The proposed product is an outcome of a research project, Therefore, the path to reach the objectives might change. The main components and their results mentioned in this document will not change in future. Nevertheless, the technologies and the methodologies mentioned to

achieve those results might change in order to make them more efficient , reliable ,accurate and secure.

3. Specific requirements

3.1 External interface requirements

There are no need of External interfaces for this research components.

3.2 Classes/Objects

There are no Classes or Objects for this research components

3.3 Performance requirements

Mobile phones require at least 1GB of RAM and processor must be a Dual-core 1.2 GHz. The phone must have at least 8MP primary camera with flasher and vibrating options when camera takes photos.

3.4 Design constraints

The research is based on creating mobile application for the android and IOS. This application cannot run on windows phones and very old phones.

3.5 Software system attributes

3.5.1 Reliability

The Mobile application is designing for get better accuracy than any other related mobile applications. Implementing proper security mechanism will give user much more satisfaction. If the application is secure, then users can depend on it.

3.5.2 Availability

Implementing proper encryption mechanism will prevent certain security threats that damage the availability of the application. Dos attacks and man-in-the middle attacks are very common attacks. The cloud can authenticate the encrypted data,therefoe chanse to get DOS attacks and man-in-the middle attacks are very low.

3.5.3 Security

Implementing an encryption algorithm will enforce the security mechanism of the system.when establishing the connection to the cloud the data cannot be intecepted by third parties. Therat actors cannot alter data or d any damage to them because the data will be encrypted before sending to the coud.

3.5.4 Maintainability

If the application has any bugs that can stall encryption process then there will be update and upgrade mechanism enabled to provide quick and reliable support.

3.6 Other requirements

There are no other requirements

4 Supporting information

4.1 References

[1] : “ Security Enhancement of Digital Motion Image Transmission Using Hybrid AES-DES Algorithm” by M.B. Vishnu, S.K. Tiong, Member IEEE, M. Zaini, Member IEEE, S.P. Koh

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[3]: “A 3DES ASIC Implementation with Feedback Path in the CBC Mode” by Tianshu Fu, Shuguo Li

[4]: “AES Design Improvements Towards Information Security Considering Scan Attack” by Liting Yu, Dongrong Zhang, Liang Wu, Shuguo Xie, Donglin Su, Xiaoxiao Wang

