Software Requirements Specification

for

Enhancing Textbooks using Augmented Reality

Version 1.0
13 January 2021

Team : Meera E Thimothy,
Muhammed Raneesh C M,
Naveen P R

Mentor: Shaiju Paul
Assistant Professor
Dept. of CSE

Jyothi Engineering College

Table of Contents

Revision History

Name	Date	Reason For Changes	Version

1. Introduction

1.1 Purpose

The purpose of the project is to design an AR Textbook application for school students. It covers Performance consideration, User Interface, Hardware and software requirements and use cases.

1.2 Project Scope

The AR Textbook application will help the school students to understand their textbook easily with the help of augmented reality. The app will detect the 2D images in the textbook and augment the images with 3D objects, video, etc. This will help them to understand the concepts in the textbook very easily.

The main goal of the project is to encourage self-study among students. The textbooks are good sources of knowledge. But understanding them is very difficult for normal students. So our aim is to provide good resources while reading the textbook.

1.3 Definitions, Acronyms, and Abbreviations

- 2D : 2 Dimensional
- 3D : 3 Dimensional
- AR: Augmented Reality
- App : Application
- RAT : Rational
- DEP : Dependencies
- FR : Functional Requirements

2. Overall Description

2.1 Product Perspective

The students are facing a lot of problems during the pandemic. Learning becomes difficult due to the lack of contact classes from schools. Even Though the textbooks are good resources for learning, understanding them without a mentor is very difficult for normal students. To overcome this we introduce the AR textbook app, which helps the students understand the concepts of the textbook very easily without a mentor and also to improve self study capability of students.

2.2 Product Features

The major feature of the application is detecting 2D images from textbook and augmenting contents like 3D models, videos, audios etc. on top of it. Besides that, we also provide study materials like pdf notes, video lectures etc. inside the App.

2.3 User Classes and Characteristics

Students are the main users of our app since the app will help them to understand the concept in the textbook very easily. Beside students the teachers can also use the app to recommend the lessons for students to easily understand what they taught in the class and also provide proper feedback to the app developers.

2.4 Operating Environment

The app can be used by anyone if he/she has an android phone that runs in android version greater than or equal to 7.0 and also ARCore is supported hardware. The devices that support ARCore can be found in the link below.

https://developers.google.com/ar/discover/supported-devices

2.5 Assumptions and Dependencies

- Assume the phone is **Android** 7.0 or later (some devices will need at least **Android** 8.0 in order for ARCore to work)
- Assume that the phone has a good working camera
- Assume user provide permission for the app to use the camera

3. Specific Requirements

This section contains more detailed information regarding the needed functionalities of our application, including interfaces, internal functions, and testing requirements.

3.1 External interface Requirements

3.1.1 User Interfaces

A first time user should see a log-in page when he/she opens the app. The user could be able to register for the app. After login he/she will be directed to the main home page or dashboard. From here the user can go for either AR based study or looking for other study materials like pdf notes, Video lectures, etc. These facilities should be easily accessible from the home screens.

3.1.2 Software Interfaces

The mobile app needs to communicate with various databases that contain the study materials like videos, pdf notes etc. Since users are only viewing the content the communication only contains reading operations.

3.2 Functional Requirements

3.2.1 User Class 1 - The user

3.2.1.1 Functional requirement 1.1

ID : FR1
Title : Download mobile application
DESC : The user should be able to download the application from a trusted store for free.
RAT : In order for a user to download the application
DEP : None

3.2.1.2 Functional requirement 1.2

ID : FR2
Title : Download and notify user for a new release
DESC : The user should be able to update the application either directly from the app or from a trusted store. The user should be notified of this.
RAT : In order for a user to download the new update/release of the application
DEP : FR1

3.2.1.3 Functional requirement 1.3

ID : FR3
Title : User login
DESC : The user should be able to login to the application. If he/she is not registered there should be an option to that.
RAT : In order for a user to login to the application
DEP : FR1

3.2.1.4 Functional requirement 1.4

ID : FR4
Title : Home screen
DESC : The user should be directed to the home screen or the dashboard of the application immediately after login for the ease of accessing the features of the application.
RAT : In order to help users find the resources.
DEP : FR3

3.2.1.5 Functional requirement 1.5

ID : FR 5
Title : Help options
DESC : The user should be directed how to use the application. For that there should be good manuals or proper documentation that can be accessed from the home screen.
RAT : In order to identify the various options available in the application
DEP : FR3

3.2.1.6 Functional requirement 1.6

ID : FR6
Title : Custom Languages
DESC : Allows the user to change to language of his choice.
RAT : In order to help the user who didn't know english
DEP : None

3.2.2 AR Functionality

3.2.2.1 Functional requirement 2.1

ID : FR7
Title : Camera Permissions
DESC : Ask user to access the camera
RAT : Needed for AR functionality
DEP : None

3.2.2.2 Functional requirement 2.2

ID : FR8
Title : Recognize markers
DESC : For identifying the markers in the textbook
RAT : Needed for AR functionality
DEP : FR8

3.2.2.3 Functional requirement 2.3

ID : FR9
Title : Placing content on the markers
DESC : The content corresponding to the markers should be placed on top of the marker
RAT : To provide AR experience to the user
DEP : FR7, FR 8

3.2.3 Non AR Content Accessing

3.2.3.1 *Functional requirement 3.1*

ID : FR10
Title : Accessing the non AR contents like notes, class videos etc.

DESC : The user should be able to access the study materials easily and efficiently from the home screen of the app.
RAT : In order to access study materials
DEP : None

4. Other Nonfunctional Requirements

4.1 Performance Requirements

The performance of the application should be very good. There should not be any delays when switching between different pages. The Camera opening, Marker detection should not take too much time.

4.2 Safety Requirements

When comparing to other AR types like Markerless AR and Location-based AR, the marker based AR is more safe since the user did not want to move around.

4.3 Security Requirements

The details of the user like name, class, etc. should be collected with the proper permission of the user. There will be an option for students to skip all information except their class.

4.4 Software Quality Attributes

4.4.1 Adaptability

The application can be run on any android device that is listed in ARCore official website. The features other than AR can be accessed by normal devices also.

4.4.2 Reliability

The app would not crash while using it except the error caused by external reasons like OS error.

4.4.3 Availability

The app should be available in the app store to download. The downloading and installation procedures should be smooth.