TOURGURU : TOUR GUIDE MOBILE APPLICATION FOR TOURISTS

19-018

Software Requirements Specification

M.P.D.S.M. Kumara IT16117488

Supervisor:

Ms. Asanthika Imbulpitiya

Co-Supervisor:

Mr. Nuwan Kodagoda

B.Sc. (Hons) Degree in Information Technology

Sri Lanka Institute of Information Technology

Sri Lanka

March 2019

TOURGURU : TOUR GUIDE MOBILE APPLICATION FOR TOURISTS

19-018

Software Requirements Specification

B.Sc. (Hons) Degree in Information Technology

Sri Lanka Institute of Information Technology

Sri Lanka

March 2019

DECLARATION

We declare that this is our own work and this SRS 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.

Name	Student ID	Signature
M.P.D.S.M. Kumara	IT16117488	

The supervisor/s should certify the proposal report with the following declaration.

The above candidate is carrying out research for the undergraduate Dissertation under my supervision.

Signature of the Supervisor: Date

…..   ....…...

Signature of the Co-Supervisor: Date

…..   ....…...

Table of Contents

Contents

List of figures

List of tables

1 INTRODUCTION

1.1 Purpose

This document composed for to give an understanding of the scope, functional and non-functional requirements, a product perspective, constraints and dependencies relates to UsingAR to identify a location, monument, ruins and other attractions and question given by the user for this location, answer will be generate(chat bot) component on the TourGuru mobile app. Also, constraints, assumptions, software system attributes and its design will be covered in this document. The whole document is intended primarily for customers of the application, but will be interest to Software Engineers, QA Engineers, testers and all the parties who are interested in implementing this product. Intended audiences for this SRS are members of research group, project supervisor (Ms. Asanthika Imbulpitiya), project co-supervisor (Mr. Nuwan Kodagoda) and all the parties and individuals interested in this product with good computer literacy.

1.2 Scope

This document covers the requirements for the Augmented Reality related parts and Question and Answer part of the TourGuru system that includes the mobile application and the web application associated with it. It will discuss the features and technologies of each application which will act as the reference to the developers and stakeholders in selecting the best design.

1.3 Definitions, Acronyms, and Abbreviations

Table 1 – Definitions

Term	Definition
TourGuru	Name of the system
Roadtrippers, Toureazy, Tour Buddy, සිංහලංකා AR	Systems that has similar components
NoSQL	Not only SQL (Structured Query Language)
MongoDB	An open-source document database and leading NoSQL database.
NodeJS	JavaScript framework for creating web applications

Table 2 - Acronym / Abbreviations

Term	Definition
SRS	Software requirements specification
AR	Augmented reality
API	Application programming interface
GPS	Global Positioning System
OS	Operating system
WIFI	Wireless Fidelity
Q&A	Question and Answer
RAM	Random Access memory
NLP	Natural language processing
NLTK	Natural language tool kit

1.4 Overview

TourGuru is a tour guide assistance system that help in increasing the touring experience of the users. It is capable of displaying a 3D model and a small description of a location which is identified by directing the device or tis camera and processing by the device. Further it automatically generates answers for the questions asked by the users.

1.4.1 Main Goals.

Main objective of the TourGuru mobile application is to help travellers navigate through places of interest without much hassle. It needs to be a simple but very exciting and interactive application. It focuses mainly on being a virtual tour guide by narrating details about the places and answering any questions the user might get during their travels.

1.4.2 Specific Goals.
- Identify the location using AR.

  displaying a 3D model and a small description of a location which is identified by directing the device or tis camera and processing by the device
- Answering questions related to the tour which are asked by the user.

1.4.3 Users

System's commonly intended for travellers, that included into criterion that is English understandable and have general capability to use mobile devices. But as presently every person travelling may part in this criterion. As a specially intended user, foreign traveller may be stated as the main user. Traveller may be a driver or a walking person traveling to a destination who gains the advantages of the system.

1.5 Organization of SRS

In the very beginning, this SRS document unfolds the introduction part which consists of purpose of documentation, intended audiences, scope and the overview of the software. System users, goals and reading suggestion are sub parts of the overview.

then it enter to the overall description part which is followed by products perspective, product function, User Characteristics, Constraints, Assumptions and Dependencies that are related to this system. Further, the product perspective part is descriptive under system interfaces, hardware interfaces, software interfaces and communication interfaces.

After that the specific requirements is discussed in which non functional requirements as availability, reliability and maintainability of the proposed system are included. Requirement concern with each of these user interface, hardware interface, software interface, Communication interface will be discussed in external interface requirement section.

The SRS document ends up with the supporting information like additional diagram and appendices.

2. OVERALL DESCRIPTIONS.

TourGuru is a tour guidance system which is built mainly targeting the tourists and in addition drivers, local travellers and guides. Tourists can succeed their journeys by installing this app in there smart mobile phones because they will feel like they are having a guide with them. If we mention about this app in brief, when the user directs the phone camera towards a historical place, a 3D picture of that place and a description will be appeared in the user interface[2]. If the user wants to know further details, he/she can go to the Q&A that will be appeared in the navigation bar. There, when the user asked his/her question, the system will provide a relevant answer[3]. The most important feature of TourGuru is that it is capable of understanding the questions asked by the user and providing answers for them. For the common questions that are frequently asked by the users, answers are stored in the database. The process of answering the uncommon questions consists of catching the natural language of the user and separating its important phrases and querying them to get the relevant answers from the online databases or sites like Wikipedia and Google.

Table 3-Product Perspective.

| Features	TourGuru	Roadtrippers	Toureazy	Tour Buddy	සිංහලංකා AR
Intelligent Trip routing (automatic route creation)	✓	✓			
Trip editor (Add or update custom places)	✓	✓			
Categorize locations (monuments places, restaurant etc)	✓	✓			
Map Filters	✓	✓			✓
Shared user activity	✓	✓		✓	
Traffic management	✓			✓	
Narrations or alerts on point of interest	✓		✓		
Waypoint management	✓	✓			✓
Collaborator management	✓	✓			
Distance slider for radius adjusting (proximity alert and activation)	✓	✓			
Identification location(using AR, historical places, ruins, etc)	✓				✓
Question and answer.	✓				

2.1.1 System interfaces.

- Flutter Framework for building the cross-platform mobile application
- Google Cloud Platform for cloud services.(ARcore to enhance user experience by building AR models)
- SQLite database for mobile app's internal database.
- NodeJS backend for function invocation.
- Cloud Speech-to-Text - Google Cloud.

2.1.2 User interfaces.
Figure 1-user interface
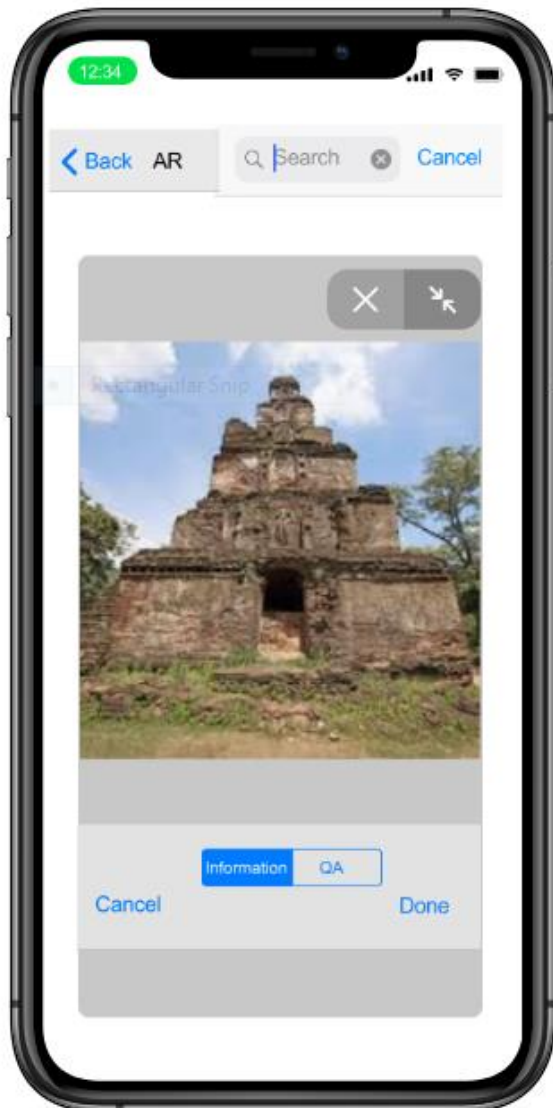
2.1.3 Hardware interfaces.
- Phone's microphone
- Phone's camera
- Biometric sensors
- Internet communication module

2.1.4 Software interfaces.

- Unity 3D.
- 3D Maya- for 3D modelling.
- NLTK
- Cloud Speech-to-Text - Google Cloud.

2.1.5 Communication interfaces.

- Wi-Fi module
- Internet

2.1.6 Memory constraints.

The application will use about 200MB of internal/external storage on the mobile phone and around 512MB of RAM would be necessary.

2.1.7 Site adaption requirements.

Considering application usage from foreign users, the UI exists in English language. For the full access and full experiences all permissions should be provided. When the application should minimalize interactions with the user it needed to choose alerting type or any needed configuration as user intentions. Capability for toggling on-off the component within the app is given for user for further assistance and consistency.

2.2 Product functions.

Features on this product focusses to deliver AR based information to produce detailed and attractive information to involve user with this product to guide in a more accurate strategy. This product requires no configuration easy to use with any traveller, who is interested AR experience. While this involves users which have question on travelling, They need a solution to answer their question immediately. To provide users this kind of solution implementing interface provide a Q&A components.
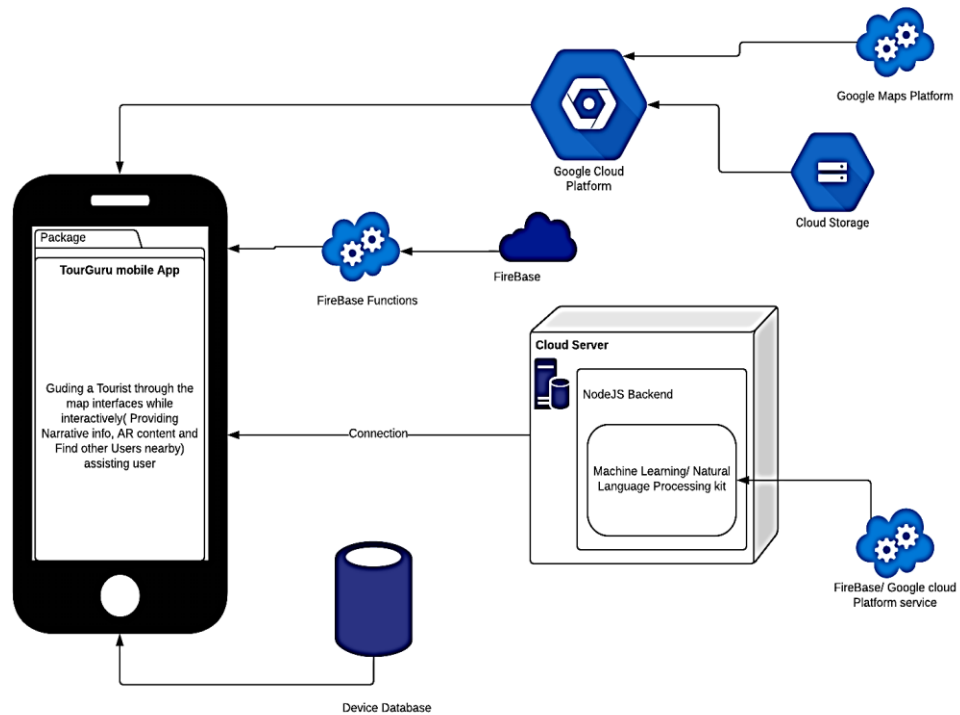
2.2.1 High Level Architecture Diagram.

Figure 2-System Architecture
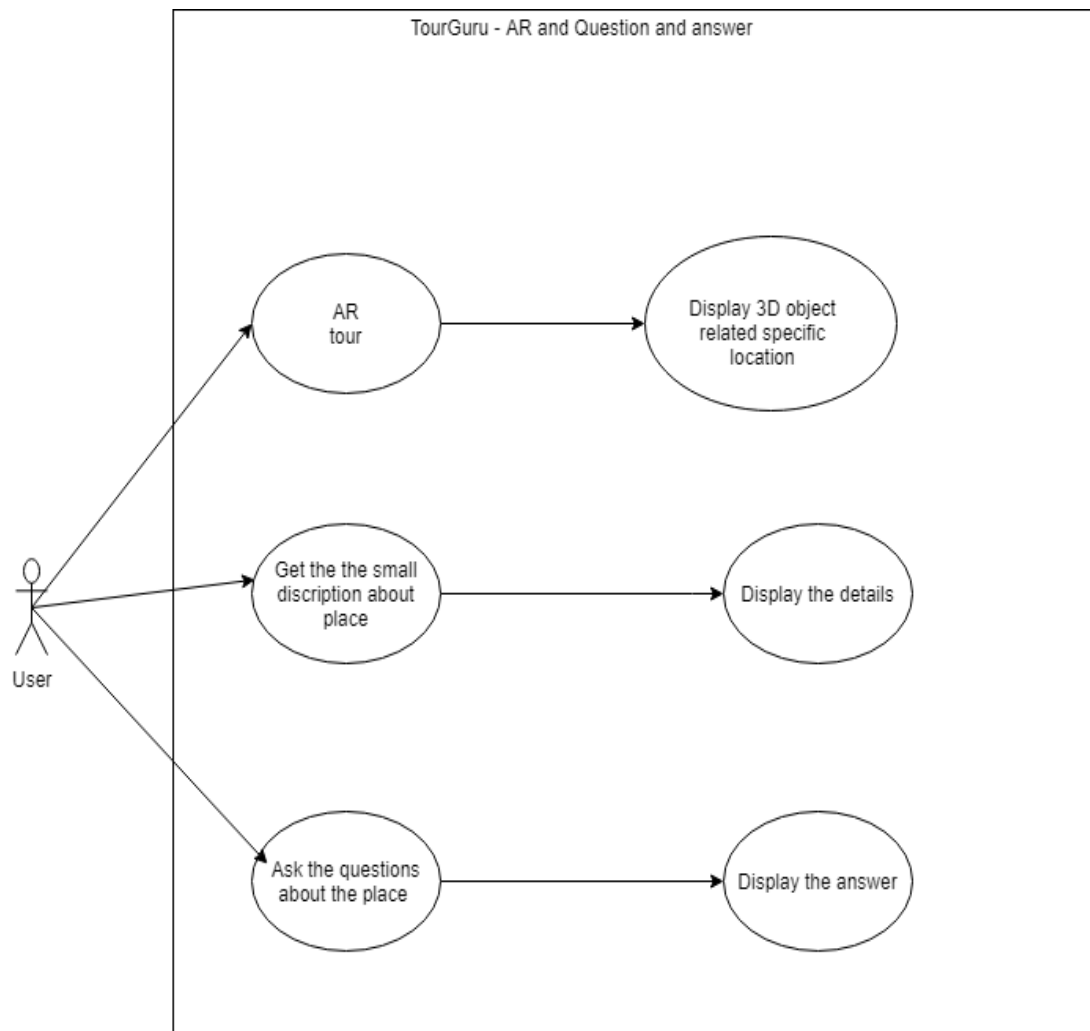
2.2.2 Use Case Diagram.

Figure 3- use case diagram

2.2.3 Use Cases.

Table 4-use cases1

Use case ID	UC_01	
Use case name	AR Tour	
Goal in context	View 3d model of a monument .	
Pre-condition	User can see an AR model of a monument.	
Post-condition	The application already started, and internet and GPS connectivity are available. Camera permissions should be given.	
Primary actor	User	
Secondary actor	None	
Main flow	Step	Action
	1	User access AR feature.
	2	Application displays the AR model on the camera interface.

Table 5-use cases2

Use case ID	UC_02	
Use case name	Getting the description	
Goal in context	Display detailed annotation about the object.	
Pre-condition	AR 3D model is activated.	
Post-condition	None	
Primary actor	User	
Secondary actor	None	
Main flow	Step	Action
	1	User directs the camera to the object.
	2	User receives alerts in screen.

Table 6-use cases3

Use case ID	UC_03	
Use case name	Ask the question about the place.	
Goal in context	Display the answers.	
Pre-condition	AR 3D model is activated.	
Post-condition	None	
Primary actor	User	
Secondary actor	None	
Main flow	Step	Action
	1	User ask the question about the more information.
	2	Display the answer.

2.3 User characteristics.

The users of this system would be regular commuters with a smartphone. This would include people with a wide range of computer skills. However, we presume that the user would be familiar with the usage of an android smartphone.

2.4 Constraints.

The development of the mobile application requires that google play services are correctly installed in the devices. A GPS mock location service must be used to emulate the navigation when developing the application. The development requires Android Studio. The minimum requirements to run android studio could be found online.

The application will constantly collect data from users. However, posting this information constantly to the API ,and other AR related features will consume data and will also exhaust the battery. This information can instead be collected for a journey and sent. In that case, the file size could be large and should be compressed to use less data.

2.5 Assumptions and dependencies.

The TourGuru is an application built to use in android smart phones and the user interface is appeared in English language. Therefore all the users are assumed to be convenient in using smartphones and managing English language. Since the phone camera is to be directed to the particular location, it is assumed that quality cameras are consisted in phones. Further in order to have a better service without any interruption, the internet connection is assumed to be always there without any problem and the bandwidth of the internet connection is assumed not be affected to the data transformation.

2.6 Apportioning of requirements.

As this document specifies major requirements in this NTG module, the target objective won't change as the module completes. But methodologies or technologies mentioned in this document as the need of the better feasible product with compatibility with them.

The requirements described in sections 1 and 2 of this document are referred to as primary specifications; those in section 3 are referred to as requirements (or functional) specifications. The two levels of requirements are intended to be consistent. Inconsistencies are to be logged as defects. In the event that a requirement is stated within both primary and functional specifications, the application will be built from functional specification since it is more detailed.

'Essential requirements' (referred to in section 3) are to be implemented for this version of NTG module. 'Desirable requirements' are to be implemented in this release if possible but are not committed to by the developers. It is anticipated that they will be part of future release. 'Optional requirements' will be implemented at the discretion of developers

3. SPECIFIC REQUIREMENTS
3.1 External interface requirements.
3.1.1 User interfaces.

If the user has a question about a certain place of interest, they can click the Q&A icon to prompt the text to speech UI. Then they can ask a question which will be processed by the app. If the app can find an answer it will then display it on the screen. Then there will be an option to share the question and the answer with other people.

The user can click the view AR model button if they are near a ruin. It will automatically show a view AR model button if its available. The interface will then change from map interface to a camera view. Then once you point the camera at a ruin it will show a recreation of the ruin. There will be adjusters to resize the model.

3.1.2 Hardware interfaces.
Microphone

In order to enter the user inputs as the question(voice) this component needs an inbuilt microphone in the phone which is working properly as expected.

Camera

The AR model needs to be placed in a real life surface which is viewed through the camera. The camera is required to get this view.

3.1.3 Software interfaces.

The system will use a NoSQL database such as MongoDB as the database to store information collected from users.

3.1.4 Communication interfaces.

Internet as communication interface to connect with cloud platform/ server.

GPS module for acquiring location-based information
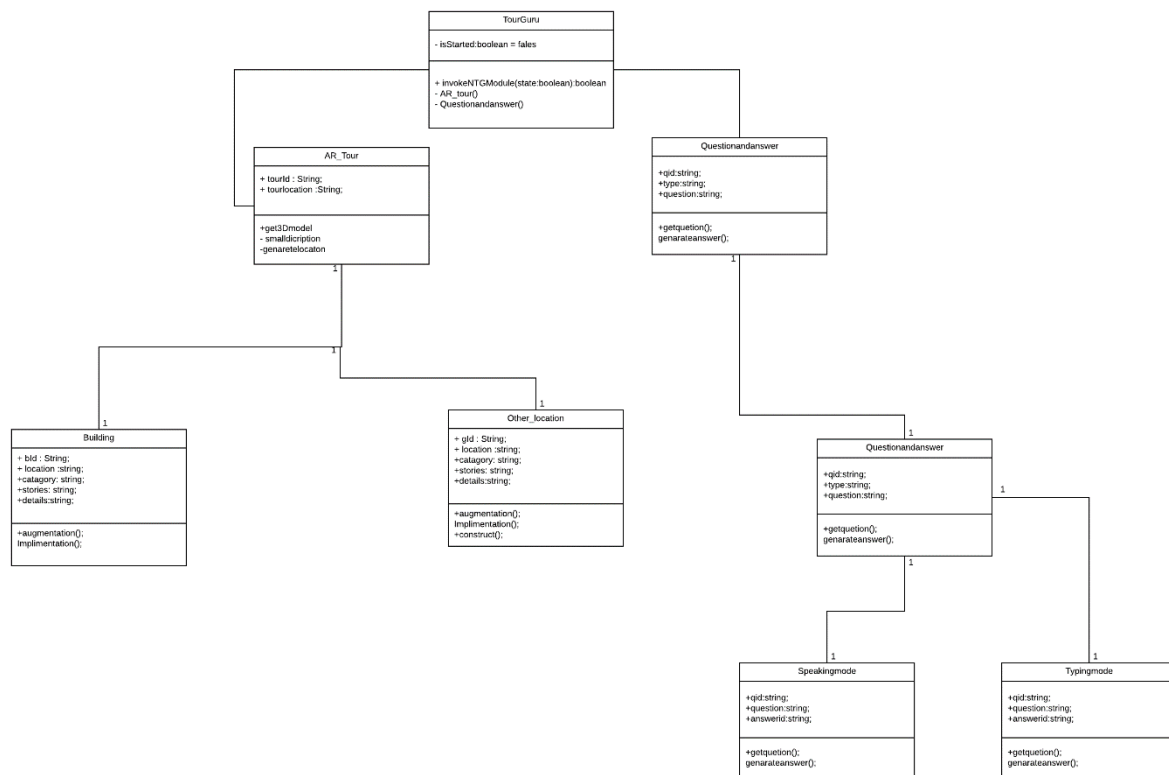
3.2 Classes/Objects.

Figure 4- class diagram

3.3 Performance requirements

- The app should run on any of the devices specified.
- The app should be reliable and should not crash.
- It should run smoothly with prolonged usage.
- It should be very responsive. And respond times should be short.
- The AR models should load fast.
- The AR models shouldn't glitch out.
- The 'search nearby users' function should work with minimum latency.
- Sending of messages and receiving messages should be a fast and seamless process.
- To improve efficiency in Q&A the metric used to evaluate is quantity of information(In size of MB).

3.4 Design constraints.

- Commercial Constraints

We lack the time and financial demands required to find the best materials and have a super advanced design.

- Functional requirements

Certain functionalities might dominate the final design.

- Non-Functional Requirements

The app must be stable and fast, which means there will be some sacrifices in the designing end of things.

- Style

A suitable style or a theme will be selected and the design would be done according to that.

- Usability

The usability of the user interface would promote simplicity restraining certain design suggestions.

- Integration

This component will not be the only feature. It is part of a bigger system made by multiple individuals, so compatibility with those component would be taken into account while designing a single component.

3.5 Software system attributes

3.5.1 Reliability.

The system will give out speed suggestions only when a considerable amount of user data is collected and a reliable prediction could be made. In order to find the most stable and reliable speed prediction, a threshold need to be set.

3.5.2 Availability.

The hosting provider AWS promises a 99% availability for the application. Since the maintenance of the application would be required during the initial stages of the application, the system will have availability of 95%.

3.5.3 Security.

To ensure the privacy, the location history of users. Should be protected, and to protect sniffing malicious parties, there should be an encryption for the communication between the mobile application and the server. In addition, the local database used by the mobile application should also be secured from malicious access in case of the device is lost.

3.5.4 Maintainability.

The data collected by the system should be frequently archived when it is not in use. Therefore a background service is required which is capable of automatically achieving this data in a backup database. After it has been processed.

3.6 Other requirements.

- Extensibility / scalability
- Portability

4. SUPPORTING INFORMATION.

4.1 References

[1] "NLP vs NLU vs NLG (Know what you are trying to achieve) NLP ...". [Online].

[2] "AUGMENTED REALITY IEEE PAPER 2018". [Online]. Available: https://www.engpaper.com/augmented-reality-2018.htm. [Accessed: 12-Mar.-2019].

[3] "(PDF) A Survey of Augmented Reality". [Online]. Available: https://www.researchgate.net/publication/269464134_A_Survey_of_Augmented_Reality. [Accessed: 12-Mar.-2019].