TOURGURU : TOUR GUIDE MOBILE APPLICATION FOR TOURISTS

19-018

Software Requirements Specification

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March 2019

DECLARATION

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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.

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1. Introduction

1.1 Purpose

This document discusses the requirements for the Augmented Reality related parts and social media aspect of the TourGuru system. It gives the overall description of the software system and the solution provided. It also defines requirements for the development of the software system. This document is intended for the users, creators, regulatory bodies and other stakeholders who are involved in developing and deploying the system.

1.2 Scope

This document covers the requirements for the Augmented Reality related parts and social media aspect 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	
MongoDB	
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	
OS	Operating system
WIFI	
RAM	Random Access memory

1.4 Overview

TourGuru is a tour guide assistance system that will help increase the touring experience of the user by helping them with some tasks. The route analysis component of the system will alert the user of nearby tourist locations throughout the journey. It will analyse route by collecting route information from many 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

- Guiding a tourist through a route by intelligent routing.
- Providing the user with a voice narration while they are visiting attractions.
- Answering questions related to the tour which are asked by the user.
- Connecting travellers in proximity to each other.
- Updating location information by crowdsourcing.
- Using AR to enhance user experience.

1.4.3 Users

The main user group of this system are tourists, tour guides, drivers. This includes regular commuters, or people with driving jobs like taxi, bus, truck drivers.

1.5 Organization of SRS

The rest of the document discusses the research component. The chapter 'Overall Descriptions' will describe the overall details of the product which even compares the product to different products, functionalities, consumer characteristics, constraints, assumptions and dependencies. The chapter 'Specific Objectives' illustrates the requirements of the system. It describes both functional & non-functional requirements. It also describes the UI of the system, reliability, system attributes, availability, maintainability and security of the system.

2. Overall Descriptions

The system of the TourGuru is a tour guidance system for tourists that informs the user of the tourist locations throughout the journey. The system comprises of a mobile and web application. The mobile application is based on the android platform and will collect user satisfaction information throughout the journey and post it to the web application after the journey has ended with the user's consent. The web application will be based on the NodeJS platform to support multiple concurrent requests from many users. The web application will store the information obtained from the mobile application in the database. The database will contain the raw data collected from many users. The app will then use this data to connect users nearby according to their interests and privacy preferences. This component will also consist of an AR

feature which would give users a unique experience by showing them ancient monuments in Augmented reality.

2.1 Product Perspective

There are some tour guide assistance systems that has similarities with TourGuru system.

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	✓			✓	
POI alerts	✓	✓	✓		
Waypoint management	✓	✓			✓
Collaborator management	✓	✓			
Distance slider for radius adjusting (proximity alert and activation)	✓	✓			
Identification location(using AR, historical places, ruins, etc)	✓				✓
Question and answer.	✓				

Table 3 - Product similarities

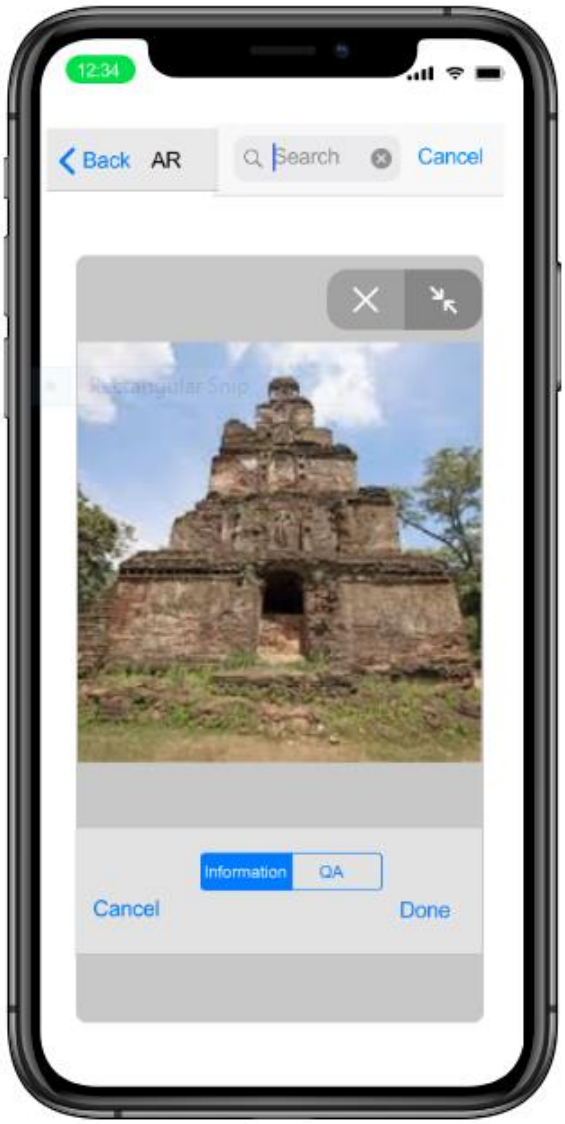
2.1.1 System interfaces

Flutter framework for building the app
Authentications services – Google login
GPS coordination
SQL lite
NodeJS backend for function invocation.
Google cloud platform for cloud services.

- ARcore to enhance user experience by building AR models.
- Cloud server for deployment of backend.

MongoDB for storage of AR models.

2.1.2 User interfaces



2.1.3 Hardware interfaces

- Android device
- GPS functionality
- Camera module
- Biometric sensors
- Internet communication module

2.1.4 Software interfaces

- MongoDB

2.1.5 Communication interfaces

- Data modem
- GPS sensor

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

This system is provided as a SaaS service, that is the system is managed by the service provider, so the user is not required to additional configurations to do this.

2.2 Product functions

The features of this component are there to enhance the user experience. If the user desires to find other users who share similar interests the near proximity they will be shown other users on the display, they have the chance to communicate with each other. This depends on the users preferences regarding their privacy.
The AR feature is meant to immerse the user in the tour experience. It will give the chance for users to see 3D recreations of certain monuments or ruins right before them. The scale of the models will be adjustable.

2.2.1 High Level Architecture Diagram

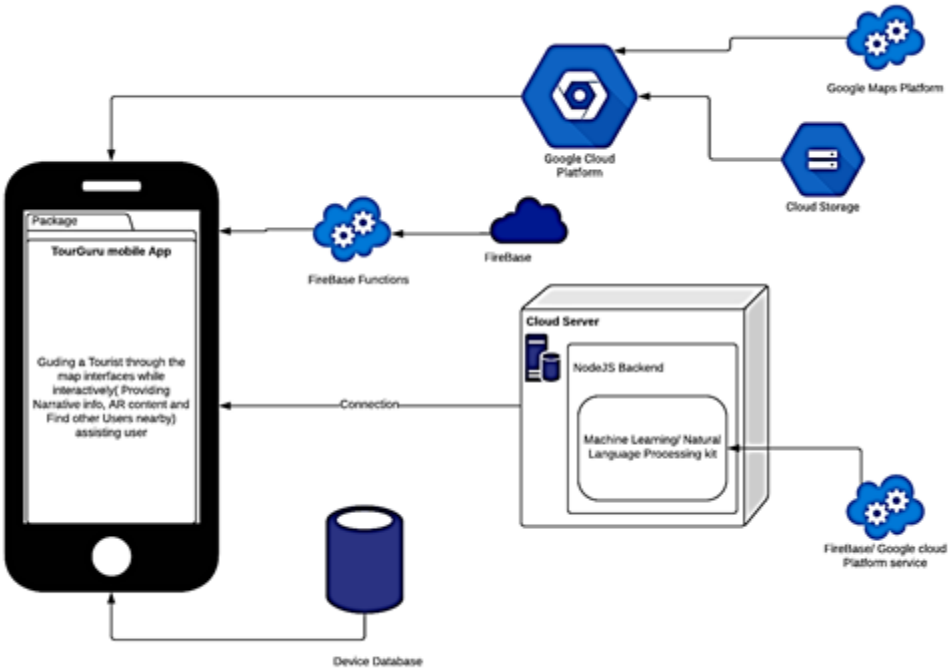


Figure 1 - System Architecture

2.2.2 Use Case Diagram

The requirements for the component are described using a use case diagram followed by the use cases themselves.

Figure 2- Use case diagram

2.2.3 Use Cases

Table 4 -Use case scenario 01

Use case ID	UCP_01	
Use case name	Connect with other users	

Goal in context	User is shown other people with similar interests.	
Pre-condition	The application started and internet and GPS connectivity are available. Location tracking is enabled.	
Post-condition	None	
Primary actor	User	
Secondary actor	None	
Main flow	**Step**	**Action**
	1	User requests to see other users nearby.
	2	User is shown other people who are using the app.

Table 5 -User case scenario 02

Use case ID	UCP_02	
Use case name	View 3d model of a monument .	
Goal in context	User can see an AR model of a monument.	
Pre-condition	The application already started, and internet and GPS connectivity are available. Camera permissions should be given.	
Post-condition	None	
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.

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

It is assumed that,

- the android smartphone can consistently update GPS information within a considerable distance and with accuracy and these coordinates are accurate between different journeys.
- integration with the google maps application is possible for navigation purposes.
- the application can refresh itself with changing GPS coordinates with low latency.
- The device can handle the AR feature.

2.6 Apportioning of requirements

As this document specifies major requirements in this 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 are referred 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. If 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. '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

There would be an easy access button for users to ask the app to find other users with similar interests. It will show these individuals on the map interface. And there would also be an option to communicate with them. Therefore, there will be a chat interface as well. It has a settings interface where you can adjust your privacy and location sharing settings.

3.1.2 Hardware interfaces

The application can be used on a GPS enabled android device with a camera. It will be used to collect location information from the user and to provide location-based alerts. The device can contain biometric sensors for the ease of authentication. It should also be capable of internet connectivity, for communication with the server.

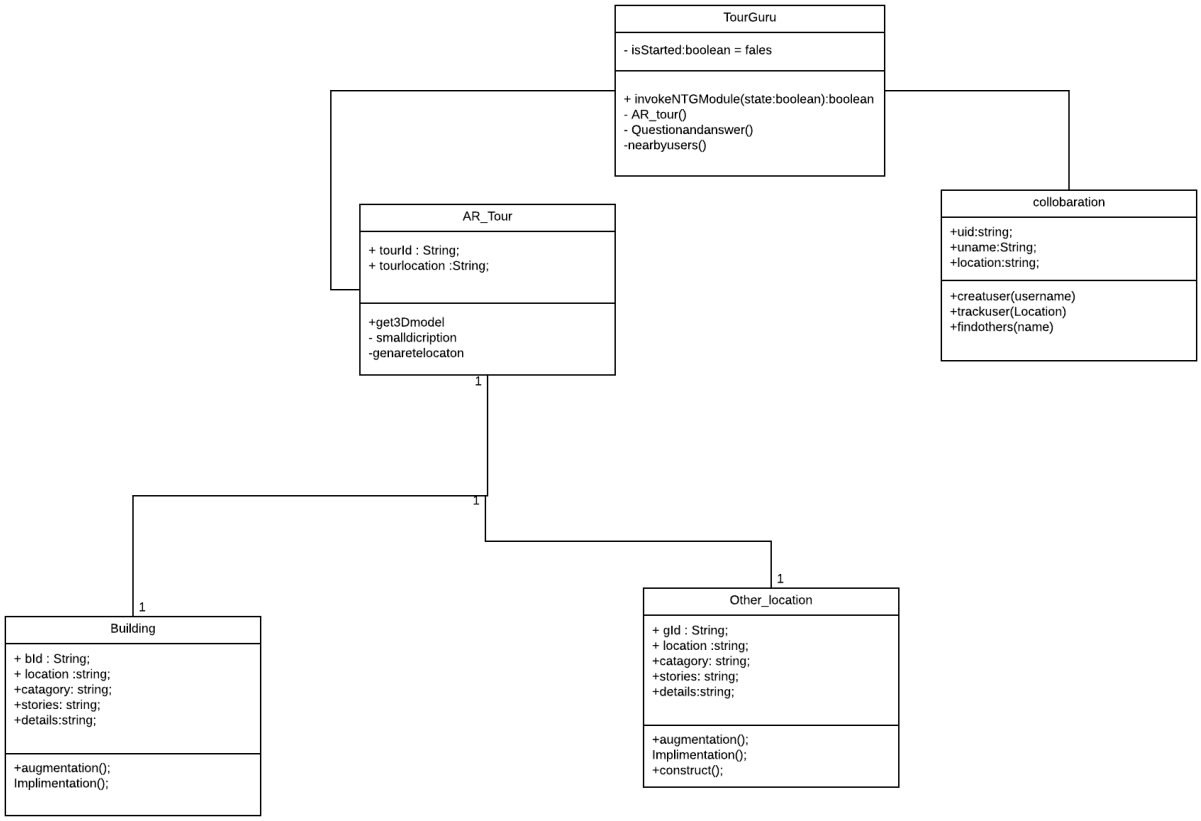
3.1.3 Software interfaces

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

3.1.4 Communication interfaces

The GPS sensor in the mobile phone will provide location information to the application through OS interfaces and the data modem in the mobile phone will help communication with the API since WIFI access cannot be expected while travelling.

3.2 Classes/Objects



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.

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 components would be taken into account while designing a single component.

3.5 Software system attributes

3.5.1 Reliability

This component needs to function smoothly. Since there is a social media aspect to this component a crash would cause inconvenience. Everything from collecting user data, proximity detection of users, chat function to the AR model display should perform well without any crashes.

3.5.2 Availability

The app needs to work whenever the user wants it to work. There can't be instances where the app wont function properly during operation. For example, the 3D models should be available 24/7, there can't be server issues slowing down or halting the activities of the app.

3.5.3 Security

System will be implemented with authentication process and permissions in privacy. Authentication will be needed for authenticating the functions for location information updating and requires for permissions on tracking user location, access to device components and services. Authentication may require a single login and authenticating with device passcode or fingerprint.

3.5.4 Maintainability

Maintainability requires the most effort if the system is not correctly designed. It can be expressed as the success rate for the system to function after fixing an issue within a short period of time. Issues that can be taken for maintenance are introducing new feature, bug-fix and design changes. If design changes done it is taken heavy toll on the resources. So, the system is designed accordingly to adapt maintenance process and least chance for change in system's infrastructure. With this process, after a maintenance it is less likely to affect any performance issues and additional charges.

4. Supporting information

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