

A Project Report on

Emergency Ambulance Booking App

Submitted in partial fulfillment of the requirements for the award
of the degree of

Bachelor of Engineering

in

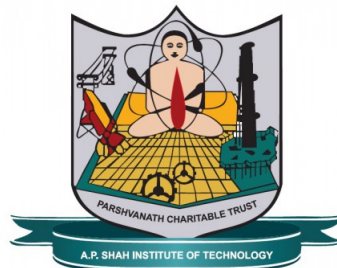
Computer Engineering

by

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Under the Guidance of

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UNIVERSITY OF MUMBAI

Academic Year 2021-2022

Approval Sheet

This Project Report entitled “*Emergency Ambulance Booking App*” Submitted by “*Aaditya Muley*”(18102011), “*Vedant Mhatre*”(18102055), “*Vatsal Mehta*”(18102022) is approved for the partial fulfillment of the requirement for the award of the degree of *Bachelor of Engineering* in *Computer Engineering* from *University of Mumbai*.

Prof. Sachin H Malve
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Head Department of Computer Engineering

Place: A.P. Shah Institute of Technology, Thane
Date: 11 November, 2021

CERTIFICATE

This is to certify that the project entitled “***Emergency Ambulance Booking App***” submitted by “***Aaditya Muley***” (18102011), “***Vedant Mhatre***” (18102055), “***Vat-sal Mehta***” (18102022), for the partial fulfillment of the requirement for award of a degree ***Bachelor of Engineering*** in ***Computer Engineering***, to the University of Mumbai, is a bonafide work carried out during academic year 2021-2022.

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Acknowledgement

We have great pleasure in presenting the report on **Emergency Ambulance Booking App**. We take this opportunity to express our sincere thanks towards our guide **Prof. Sachin H. Malve** Department of Computer Engineering, APSIT thane for providing the technical guidelines and suggestions regarding line of work. We would like to express our gratitude towards his constant encouragement, support and guidance through the development of project.

We thank **Prof. Sachin H. Malve** Head of Department, Computer Engineering, APSIT for his encouragement during progress meeting and providing guidelines to write this report.

We thank **Prof. Amol Kalugade** BE project co-ordinator, Department of Computer Engineering, APSIT for being encouraging throughout the course and for guidance.

We also thank the entire staff of APSIT for their invaluable help rendered during the course of this work. We wish to express our deep gratitude towards all our colleagues of APSIT for their encouragement.

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Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, We have adequately cited and referenced the original sources. We also declare that We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

(Signature)

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Chapter 1

1. Introduction

Mobile-telecommunication and applications have been intertwined in human society and our culture. While a respectable 64.8% of the Indian population is educated, the numbers shy away in front of the 79.8% of the population who own a mobile device and the numbers have only increased exponentially in the post-pandemic years. But the post-pandemic era has also shone a light on the fragile healthcare infrastructure in our country. Our solution aims to buttress this vast infrastructure by taking advantage of the mobile computing power in the hands of the majority of the people.

Our solution is very simple at its core, yet will prove to be very effective. Our proposed android application (taking into consideration the colossal 95.23% android users in India), will serve as a simple interface to book an ambulance in any medical emergency from the nearby hospitals. The World Health Organisation has set the recommended ambulance response time as 8 minutes. But the average time in India is way above the limit at 25 minutes. So our solution offers a much more refined, elegant, and rapid solution to minimise this response time.

The application will allow users to choose the location, specific type of ambulance as needed by the patient (a cardiovascular patient needs a different type of ambulance as compared to an accident patient) and the 3rd party ambulance service provider. The application also pings all the hospitals so as to not waste the patient's time in contacting multiple hospitals to check for vacancies. And most importantly, the app provides a live-tracking feature for the ambulance which is a relief in a highly stressful situation. The app will also feature an emergency button where even unregistered users will be able to call an ambulance to the very nearest hospital in the most dire situations like an accident. The application will track the unregistered user's IP to prevent misuse of this feature. There will be another interface for the 3rd party ambulance service providers to receive ambulance requests, and allocate the proper type of ambulance and a driver. The last interface is for the driver who will have a live updated map with the shortest route planned out to the patient's location and then to the hospital.

This application aims to tackle all the problems faced by the common people when they are trying to obtain an ambulance in high pressure situations. Thus this solution will be the fastest and safest way to get an ambulance for any patient on a ticking clock.

Chapter 2

2. Project Concept

2.1. Abstract

Mobile-telecommunication and applications have been intertwined in human society and our culture. While a respectable 64.8% of the Indian population is educated, the numbers shy away in front of the 79.8% of the population who own a mobile device and the numbers have only increased exponentially in the post-pandemic years. But the post-pandemic era has also shone a light on the fragile healthcare infrastructure in our country. Our solution aims to buttress this vast infrastructure by taking advantage of the mobile computing power in the hands of the majority of the people. Our solution is very simple at its core, yet will prove to be very effective. Our proposed android application (taking into consideration the colossal 95.23% android users in India), will serve as a simple interface to book an ambulance in any medical emergency from the nearby hospitals. This application aims to tackle all the problems faced by the common people when they are trying to obtain an ambulance in high pressure situations. Thus this solution will be the fastest and safest way to get an ambulance for any patient on a ticking clock.

2.2. Objectives

- Buttress the vast healthcare infrastructure by taking advantage of the mobile computing power in the hands of the majority of the people
- Simple interface to book an ambulance in any medical emergency to the nearby hospitals
- The World Health Organisation has set the recommended ambulance response time as 8 minutes. But the average time in India is way above the limit at 25 minutes. So our solution offers a much more refined, elegant, and rapid solution to minimise this response time
- This solution will be the fastest and safest way to get an ambulance for any patient on a ticking clock

2.3. Literature Review

- Healthcare is an information intensive industry. As noted by Cho and Choi (2003), the healthcare industry is facing constant challenges to provide healthcare professionals access to patient information wherever and whenever it is required. They say this access can be achieved through mobile computing [1].
- Several recent studies have discussed the use of Personal Digital Assistants (PDAs) to document healthcare services at the point-of-care [2, 3, 4, 5]

2.4. Problem Definition

- Late arrival of ambulance in emergency situations
- Unreliability of ambulance services
- 3rd party ambulances are not connected with hospitals
- No way to know current location of ambulance and call driver in a highly anxious situation

2.5. Scope

- The Scope of project includes Designing and implementing an effective solution that has emphasis and is more centered on solving user side problem while finding an ambulance in case of a mishap as well as make it less tedious and more accessible for general public
- The solution will comprise of making an mobile app for user side as well as 3rd party ambulance services while making use of the principle of loosely coupled services of Microservice Architecture. The apps would be integrated with each other to build an end to end solution that devises use of best practices from deploying on cloud to using system design

2.6. Technology Stack

- Java 8 (Application Backend)
- XML(Application Frontend)
- Python (Loosely Coupled Services and APIs)
- Google Cloud: Firebase (Authentication, Firestore, Cloud Functions Analytics)
- Mapbox Maps SDK

2.7. Benefits for the society

- 1 in 10 patients die en route to the hospitals in India. According to the National Crime Records Bureau, nearly 24,012 people die each day due to a delay in getting medical assistance
- The World Health Organisation has set the recommended ambulance response time as 8 minutes. But the average time in India is way above the limit at 25 minutes
- So our solution will be the perfect application for the 95% of the Android users in India to help better integration of 3rd party ambulance services, hospitals and patients to mitigate the above mentioned problems

Chapter 3

3. Project Design

3.1. Proposed System

The application will contain 3 parts:

- The user side application
 - Option to select Emergency or schedule ambulance for later
 - Emergency
 - * Auto-fetch current location and select nearest hospital
 - * Ambulance automatically booked
 - Schedule Later
 - * Select location
 - * Select Hospital from the nearby area
 - * Select 3rd party ambulance service provider
 - * Select Ambulance type
- The 3rd-Party Ambulance provider
 - Accept incoming user's ambulance request
 - Assign ambulance driver
 - Update new hospital detail
- The ambulance driver
 - Follow the directions to patient location
 - Follow directions to hospital

3.2. Flow Diagram

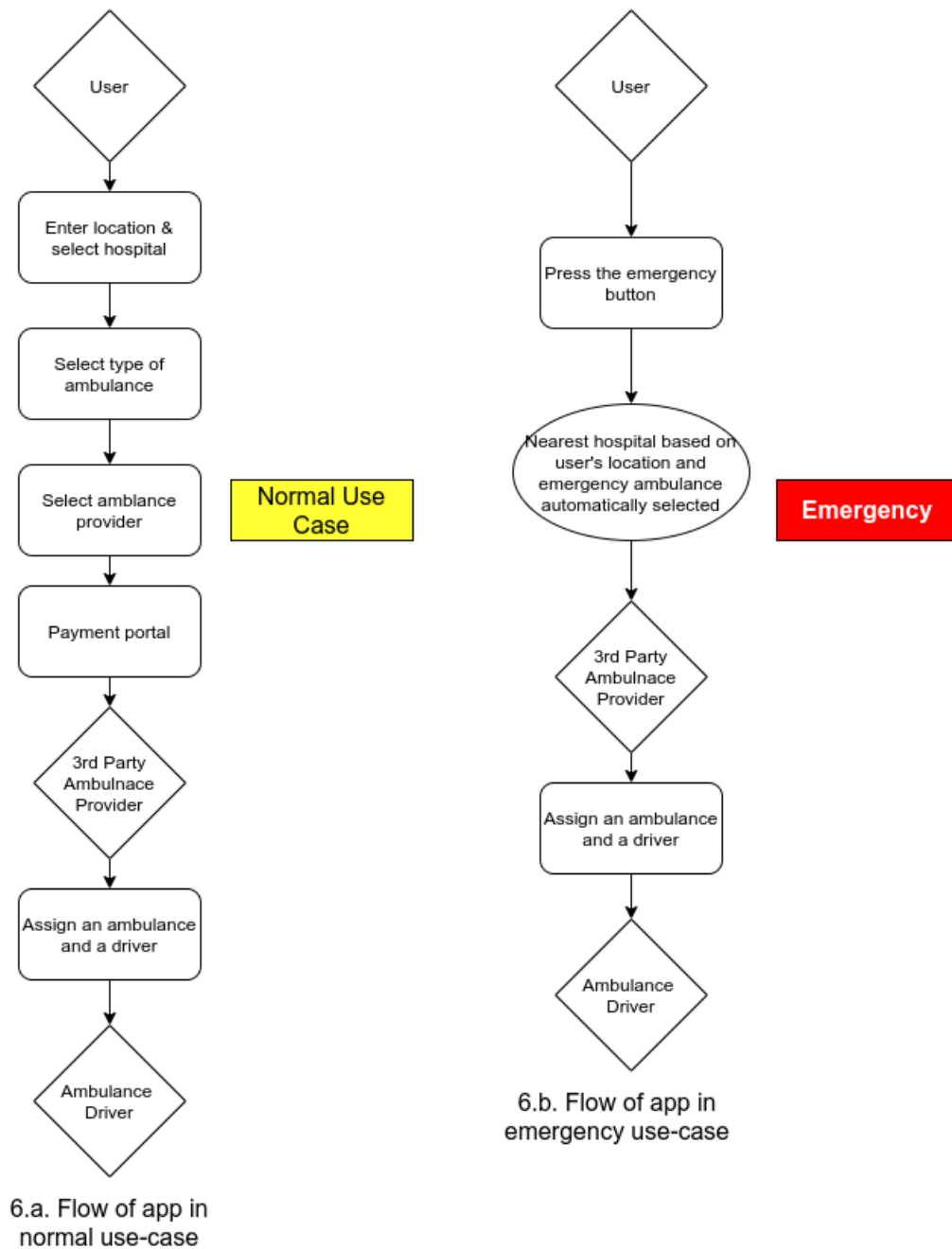


Figure 3.1: Flow Diagram of the Application

3.3. Class Diagram

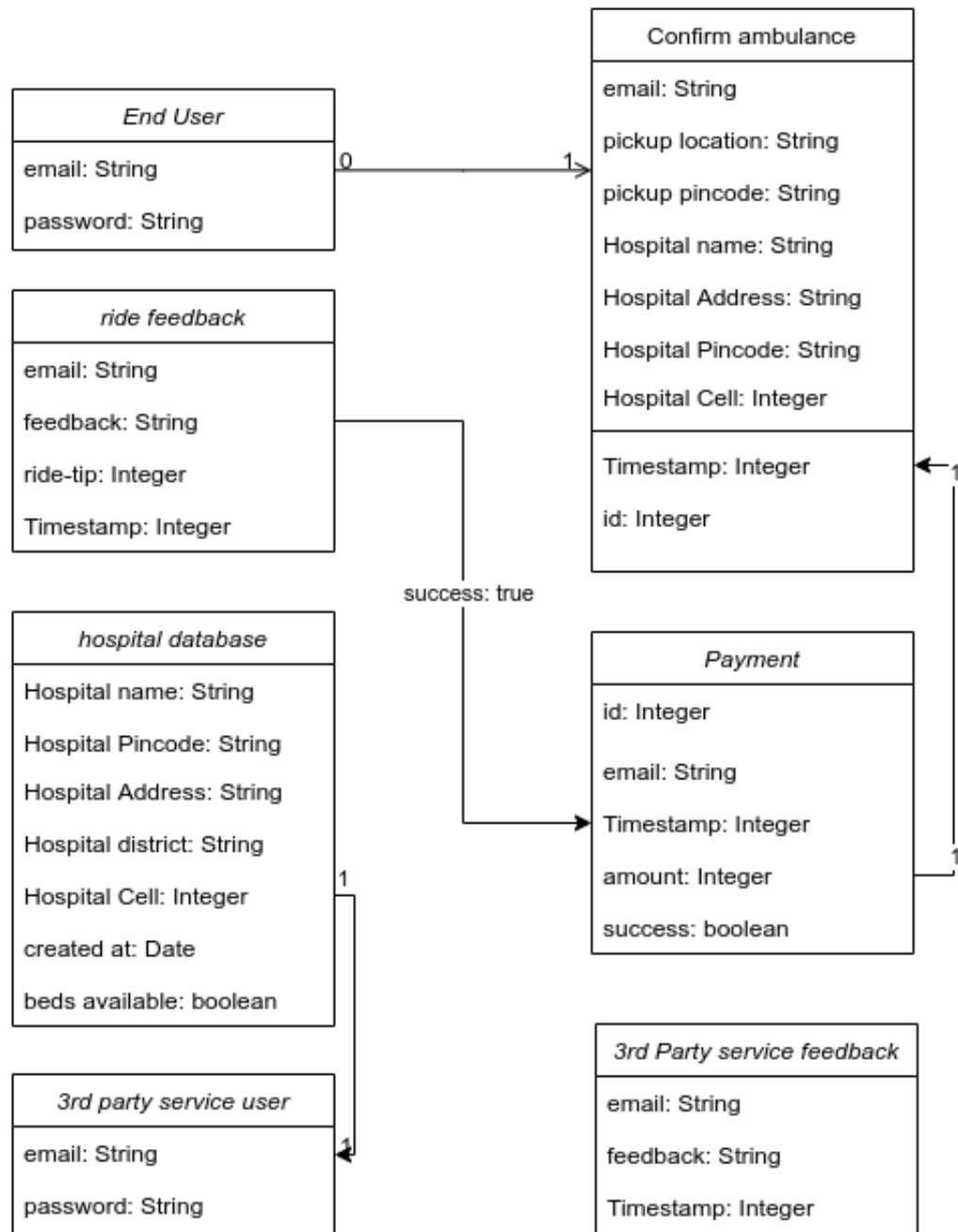


Figure 3.2: Class Diagram of the Application

3.4. Module 1

The first application is the primary application with which the users will interact. A new user will have to start by creating an account. We are linking this with Firebase for backend so there is an option to manually fill in details or to easily sign-up using Google account for ease. This will mainly include the user's email and password since other data is not relevant here. The application will automatically login recurring users.

One the application loads up we fetch the user's current location using the Mapbox Search Service Geocoding API and will display it accordingly on the home screen along with a Streets-View map from Mapbox Android SDK. When the user chooses to schedule an Ambulance for later they are redirected to another page using Java backend services where they can input their pickup and drop location (user's current location will be selected as the pickup location by default but can be changed). Then we use Reverse Geocoding API from Mapbox Search service to get user's Latitude and Longitude and then use a RapidAPI for Indian Pincodes to calculate the pincode of the user. We query this pincode with our NoSQL Realtime database in Firebase to fetch all the hospitals in that pincode area. The user is show this list of hospitals and can choose one. Then user can choose a 3rd party ambulance service affiliated with that hospital operating in the same area and the type of ambulance too. Finally the ambulance booking request is sent to the 3rd Party ambulance service provider on their application. Once this request is confirmed and the driver is assigned (explained in further modules) the user can see an updated map with live-tracking of the ambulance and its driver to the user's location.

3.5. Module 2

Our 2nd application is the 3rd party ambulance service provider's application. Here any new service provider can signup with details about the type of ambulance they provide, the hospitals they are affiliated with, and few other hospital and service provider's contact details. They also specify the number of ambulances in their fleet and number of drivers and accordingly a UID is automatically set to every driver and ambulance which is later used to assign hospital trips to specific drivers.

When a user sends a request to the service provider, they can review the request based on the hospital requested and the type of ambulance requested. They then assign an ambulance and a driver from their fleet for the user.

3.6. Module 3

Our 3rd and final application is the driver's application. This is the simplest application of all. It consists of a Street-View map interface from the Mapbox Android SDK. When the service provider assigns the driver to an user, they automatically get an updated map view with destination as the user's location. They also see the shortest route from source to destination which is calculated using Mapbox Direction API and Mapbox Navigation API. Once the driver reaches user's location the map view once again changes with source as the user's location and destination as the hospital again with the shortest route visible. Throughout the journey the driver's live location is shared with the user.

3.7. References

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Chapter 4

4. Future Plans

4. Planning for the next semester

- We first plan to populate our already vast hospital dataset with more hospital information that we may be able to procure
- We also plan to continue our implementation of the application
- User authentication system will be linked with Firebase for easy sign-in and login using Google account
- Map interface will be updated with Distance Matrix API to calculate shortest distances and ambulance live-tracking using driver's device
- 3rd Party Ambulance service provider's interface will be implemented to accept ambulance requests and assign drivers