

**MAIN PROJECT DESIGN REPORT ON
VISITOR DATA COLLECTION USING QR CODE**

Submitted By

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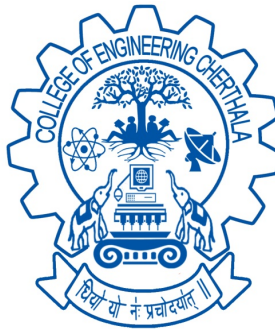
SALU K L (CEC17CS048)

under the esteemed guidance of

Mrs. APARNA A

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JANUARY 2021

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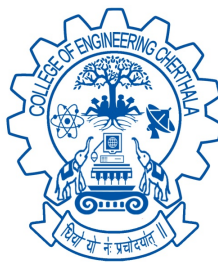
Bachelor of Technology

in

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of

A P J Abdul Kalam Technological University



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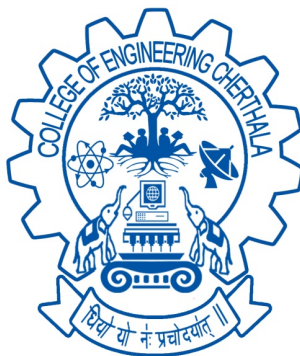
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C E R T I F I C A T E

This is to certify that, the main project design report titled ***VISITOR DATA COLLECTION USING QR CODE*** is bonified record of the **CS451 SEMINAR & PROJECT PRE-LIMINARY** presented by **LAKSHMIPRIYA R** (REG NO: CEC17CS035), Seventh Semester B.Tech. Computer Science Engineering student, under our guidance and supervision, in partial fulfilment of the requirement for the award of the degree **B.Tech in Computer Science & Engineering** of **APJ Abdul Kalam Kerala Technological University**.

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ABSTRACT

This year the world fear epidemic covid 19 has caused tremendous damage to our day-to-day life which thus affected our life practices and styles. As days passed the situation is increasing at an alarming rate and hence its monitoring is becoming difficult. As this is caused due to the contact between the individual's several tiers are created while tracking back the individuals (as direct contact, indirect contact, and so on)

Thus to automate the above situation, we are proposing an application where instead of the manual entering of details at each place, these details are entered into the app, and hence after submission, a QR code is generated. Now while visiting a public place what we need to do is to just scan our QR code onto the admin version scanner which will be provided to the public places. Here during the scanning, the QR code will be decoded and stored in the cloud database. This will be an efficient process as data collection and retrieval are very practical and applicable. Moreover, the practice of queues and manual works can be avoided. If any of the entered applicants become positive, the other users can be alerted through notification with the help of the data stored in the cloud and it is applicable vice versa.

Considering the other situations, since the details are stored online by database cloud, data loss due to firebreak, carelessness, malpractices, and so on can be prevented, and also it can be referred at any time easily including the future references. This thus might solve a socially relevant cause and provide a practical solution.

Key: Virtual Queue, QR code generation, QR scanning, Cloud storage.

Contents

1	INTRODUCTION	1
2	PROBLEM STATEMENT AND OBJECTIVES	2
2.1	EXISTING SYSTEM	2
2.2	DISADVANTAGES	3
2.3	PROBLEM STATEMENT	3
3	LITERATURE SURVEY	4
3.1	INTRODUCTION TO QR TECHNOLOGY	4
3.2	AROGYA SETU:CASE STUDY	5
3.3	FIREBASE : CASE STUDY	6
3.4	VIRTUAL QUEUING SYSTEM USING CLOUD COMPUTING	8
3.5	COMPARISON TABLE	9
4	PROPOSED SYSTEM	10
4.1	TYPE OF USERS	11
4.2	STEPS OF IMPLEMENTATION	11
4.3	FEATURES OF SYSTEM	13
4.4	ADVANTAGES	14
5	SOFTWARE REQUIREMENT SPECIFICATION	15
5.1	PRODUCT PERSPECTIVE	15
5.2	USER CLASSES AND CHARACTERISTICS	15
5.3	OPERATING ENVIRONMENT	16

5.4	FUNCTIONAL REQUIREMENTS	16
5.4.1	SOFTWARE INTERFACE	16
5.4.2	HARDWARE INTERFACE	17
5.5	NON-FUNCTIONAL REQUIREMENTS	17
5.5.1	PERFORMANCE REQUIREMENTS	17
5.5.2	SECURITY REQUIREMENTS	17
5.5.3	SOFTWARE QUALITY ATTRIBUTES	17
5.5.4	BUSINESS RULES	18
6	SYSTEM DESIGN	19
6.1	MODULES	19
6.2	ALGORITHM	22
6.2.1	LOGIN MODULE	22
6.2.2	USER MODULE	23
6.2.3	ADMIN MODULE	24
6.3	FLOW CHART	25
6.4	USE CASE DIAGRAM	27
6.5	SEQUENCE DIAGRAM	29
6.6	DATA FLOW DIAGRAM	31
6.6.1	Level-0 DFD	31
6.6.2	Level-1 DFD	32
6.6.3	Level-2 DFD	34
6.7	USER INTERFACE DESIGN	36
7	CONCLUSION	39
	REFERENCES	41

List of Figures

6.1	MODULES	20
6.2	FLOWCHART	26
6.3	USECASE DIAGRAM OF PROPOSED SYSTEM	28
6.4	SEQUENCE DIAGRAM OF PROPOSED SYSTEM	30
6.5	LEVEL-0 DFD	32
6.6	LEVEL-1 DFD	33
6.7	LEVEL-2 DFD	35
6.8	LOGIN PAGE	36
6.9	ADMIN PAGE	37
6.10	USER PAGE	38

List of Tables

3.1	Comparison Table	9
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Chapter 1

INTRODUCTION

Even though the restrictions in covid lockdown days are loosening, still the details are being collected when we are visiting public places including malls, hospitals, banks, and so on. Since this is the first time we are facing such an epidemic, it thus leads to trying out various practices and hence modifying them. But the collection of personal information in public is still conducted manually by the individuals. Earlier since there were lockdowns and the restrictions were tighter the practice of collecting information was managed, but now the situation has changed restrictions are getting loosened and cases are increasing day by day, such a practice is not practical as time is valuable for everyone. Standing in a queue to fill out the details is time-consuming and hence the rush might create damage in other perspectives like maintaining social distance in a crowd etc. As we all know covid positive cases are increasing at a tremendous rate and hence retrieving the information from the earlier manual works is also improper and inefficient which might thus lead to late contacting the individuals who in turn become a carrier without his/her knowledge just because of the delay in contacting by the authorities.

We require a system which thus reduces the time consumption, improves the efficiency, manages our busy schedule by alerting through notifications, etc rather than the manual works done during the existing system.

Chapter 2

PROBLEM STATEMENT AND OBJECTIVES

2.1 EXISTING SYSTEM

VISITOR COLLECTION

Since covid pandemic is a new unfamiliar situation which arose a year ago and affected our daily life and taken away several lives. Its solution to solve the crisis is also slowly developed rather than the textbook solution. Hence dealing with this pandemic and controlling the situation is also something similar to trial and error which started from strict lockdown to loosening restriction, strict monitoring to home isolations, etc.

Taking consideration, as the time goes even though the restrictions have loosened to a large extent, still when it comes to the public situation while visiting a public place we need to enter our data for further contact if necessary. So when individuals visit a public place they fill out their details including name, address, phone number, etc which might be required and used by the officials when backtracking is done, since it covid is considered as contact disease.

When an affected individual has reported the authorities and officials will backtrack the locations where the affected individual's visits and will notify the others within the time frame and location to be quarantined. Further, these details are also stored manually and will only be practical in small situations. Considering that the pandemic state has risen to a large number, this manual collection, retrieval, and storing is a cumbersome process and have several disadvantages, as the details collected may not be fully collected, others may not be notified as required and hence due to lack of awareness and quarantine the spreading might increase to another extent.

2.2 DISADVANTAGES

The Disadvantages of the existing system are:

- Manual work is tiresome for individuals and officials
- Time consuming when considering standing in queues and filling details manually.
- Might affect the health, as cannot guarantee that it will not affect and cause health issues to the public.
- Not practical in case of the general situation, only applicable only in small situations.
- Cannot guarantee the details are completely collected.
- Backtracking of the individuals is not entirely efficient.
- Lack of awareness as the situation arose as affected individuals might not be notified as required.
- Since data are collection is manual, its safety might not be guaranteed.
- Retrieval, managing, storing is not effective.

2.3 PROBLEM STATEMENT

- In the existing system, Data-Collection of visitors at public places is done manually.
- Moreover, the storage of these manually collected data can be a issue in the future.
- Other disadvantages can be waiting in queues, avoiding Social-Distancing norms etc.
- Digitalizing the entry of data can accomodate these issues.

Chapter 3

LITERATURE SURVEY

3.1 INTRODUCTION TO QR TECHNOLOGY

A QR code is a type of matrix bar code or two-dimensional code that can store data information and is designed to be read by smartphones. QR stands for “Quick Response” indicating that the code contents should be decoded very quickly at high speed. The code consists of black modules arranged in a square pattern on a white background. The information encoded may be text, a URL, or other data. The QR code was designed to allow its contents to be decoded at high speed. The popularity of QR codes is growing rapidly all around the world. Nowadays, mobile phones with a built-in camera are widely used to recognize the QR Codes

QR code provides high data storage capacity, fast scanning, omni-directional readability, and many other advantages including, error-correction (so that damaged code can also be read successfully) and different types of versions. Different varieties of QR code symbols like logo QR code, encrypted QR code, QR Code is also available so that user can choose among them according to their need. Now these days, a QR code is applied in different application streams related to marketing, security, academics, etc. and gain popularity at a high pace. The the popularity of QR code grows rapidly with the growth of smartphone users.

The QR code system consists of a QR code encoder and decoder. The encoder is responsible for encoding data and generation of the QR Code, while the decoder decodes the data from the QR code. data are given to the QR code encoder and it generates the required QR code and when we want to access the data of the QR code, QR code is decoded via QR Code decoder (scanner) which retrieves the data of QR code.

RELEVANCE IN THE PROPOSED SYSTEM:

- In this proposed system using Qr code allows us to enter the data without
- Omnidirectional and Fast Scanning: QR code can be read much faster and scanned from any angle within 360 degrees i.e. no need to align the scanner with the code symbol.
- Small Size: QR code takes less space. A QR Code can hold the same amount of data contained in a 1-D barcode in only one-tenth of the space. Huge Data Storage Capacity: QR code has high data storage capacity. A single QR Code symbol can contain up to 7,089 numerals (200 times the amount of the data storage capacity of the traditional 1-D barcode).
- Many Types of Data: The QR Code can handle numerals, alphanumeric characters, Japanese, Chinese or Korean characters and binary data.
- Error correction: Error correction technique used in QR codes enable successful decoding of the code the symbol even if up to 30% of the data is dirty or damaged.
- Direct Marking: The QR Code due to the high degree of readability under low-contrast conditions allows printing of a symbol directly onto a part or product.
- Available for Everyone: Anyone can make their own QR code according to their need, for example, user can create QR code of the URL of its website for advertising purposes.
- Wide Range of Uses: There are lots of potential uses of QR codes. They can be used to extend the user experience in-store, restaurants, websites, and more.

3.2 AROGYA SETU:CASE STUDY

COVID-19 tracking tools or contact-tracing apps are getting developed at a rapid pace by different governments in their respective countries. This study explores one such tool called Aarogya Setu, developed by the Government of India. It is a mobile application developed under the Health Ministry, as a part of the E-Governance initiative, to track and sensitize the

citizens of India in a joint battle against COVID-19 spread. The study aims to understand various useful features of this tool and to present different concepts of data science applied within the application along with its importance in managing the ongoing pandemic. The App uses Bluetooth and GPS technologies to alert a user when they are nearby a COVID-19 infected person. The application uses various Data Science concepts such as Classification, Association Rule Mining, and Clustering to analyze COVID-19 spread in India. The study also shows potential upgrades in the application, which includes the usage of Artificial Intelligence and Computer Vision to detect COVID-19 patients. The study would be useful for mobile technology professionals, data science professionals, medical practitioners, health-related frontline workers, public administrators, and government officials.

RELEVANCE IN THE PROPOSED SYSTEM:

Compared to our proposed system, It also uses features similar to that of Arogya Setu as it is also an application used to assist the health institutions for backtracking of the affected individuals and also allows to replace the manual entry of data in public places using the QR code. Hence, our proposed system also takes the inspirations from this application and also add necessary additional features similar to the situations used, ie; instead of 30-day data storage in the Arogya Setu app, we are allowed to insert and update the data as required, and also it is a one time entry for data to form Qr code.

3.3 FIREBASE : CASE STUDY

The web application has become more and more reliant upon a large amount of database and unorganized data such as videos, images, audio, text, files, and other arbitrary types. It is difficult for Relational Database Management System (RDBMS) to handle the unstructured data. Firebase is a relatively new technology for handling a large amount of unstructured data. It is very fast as compared to RDBMS. This paper focuses on the application of Firebase with Android and aims at familiarizing its concepts, related terminologies, advantages, and limitations. The paper also tries to demonstrate some of the features of Firebase by developing an Android app.

RELEVANCE IN THE PROPOSED SYSTEM:

Firebase is the main database used in our proposed system which allows the storing, retrieval, and managing of the data as necessary ie, the data which is scanned using the QR code is stored in firebase and admin also retrieve the data as required.

- **Real-time Database Helps to Store and Synchronize Data:** The cloud-hosted NoSQL database is offered by Firebase real-time database that helps you store and synchronize data between the clients. This indeed makes it easier for the developers to access the data using any of the devices and helps to develop a collaborative feature.
- **Firebase Offers Facility of Crash Reporting to Fix Bugs Quickly** It has often been seen that a lot of apps suffer due to bug issues, which tends to slow down navigation speed, and users opt-out of it. The result is that the rating of the app also declines.
- **Fast and Secured Web Hosting:** The benefit of Firebase Hosting allows you to set-up a single-page, a mobile landing page, a web page, or a progressive web page with ease. It also helps to deliver the content rapidly anywhere
- **Firebase Authentication:** Nowadays, most of the apps have a log in the facility and the developer aims to simplify and secure it better. Therefore, the support of Firebase Authentication is there to do that task with an easy sign-in process.
- **Firebase Allows the Content Storage with Ease:** It has become much easier to store the user-dedicated content that includes texts, images, and videos. You can also develop the final phase of your app from prototype effortlessly using advanced technology.
- **Send Notifications and Messages to Targeted Audiences:** The Firebase Cloud Messaging offers you an opportunity to send notifications and messages to your targeted audiences for free across all devices and platforms with the help of a battery-efficient connection.

3.4 VIRTUAL QUEUING SYSTEM USING CLOUD COMPUTING

In today's busy world, time and efforts had become the most valuable thing for peoples. It is becoming a necessity to get everything in the comfort of home without any wastage of their precious time and efforts. But still, there is one major problem which every people want to avoid but still cannot avoid, Queues are becoming a major real-world problem to be addressed. Though initially in the olden days peoples used to manage to stand in long queues but nowadays peoples are having a very busy schedule and cannot afford either time or efforts for waiting in long queues

Virtual Queuing system automates the manual queues by using cloud computing. The system provides an android based application where a user can create or join a virtual queue. The application provides an effortless and time saving way of managing queues using which organizations can help their customers or clients without making them wait in long queues also users are in turn benefited by queuing at a place without wasting their precious time and efforts. The the application provides various other features such as Sending Notifications to Joined Users, Joining advance Queues, etc.

RELEVANCE IN THE PROPOSED SYSTEM:

Considering our proposed system we took the inspiration from this virtual queue technology as here also comes the idea of elimination of manual queues by the virtual queues, in our proposed system by using a QR code the data is inserted into the cloud in the orderly queue manner which slightly forms the concept of the virtual queue and thereby improving efficiency and reduces time consumption.

3.5 COMPARISON TABLE

Reference	Advantages	Disadvantages
[1] An Introduction to QR Technology	<ul style="list-style-type: none"> - Omnidirectional - Fast Scanning - Small Size - Huge Capacity 	<ul style="list-style-type: none"> - Need of QR code scanner - Security issues - Lack of public awareness
[2] Arogya Setu App: Case Study	<ul style="list-style-type: none"> - Wide range of uses - Tracking of data - Awareness 	<ul style="list-style-type: none"> - Privacy concerns - Changing guidelines
[3] Application of Firebase in Android App Development - A Study	<ul style="list-style-type: none"> - built-in email/password authentication system - easy-to-use hosting services 	<ul style="list-style-type: none"> - app runs on one centralized database - Storage format entirely different to that of SQL.
[4] Virtual Queueing System using Cloud Computing	<ul style="list-style-type: none"> - Reduces wait time - Client Satisfaction - Increase Sales - Decrease Spread of Disease 	<ul style="list-style-type: none"> - Limited Ability - System Errors - Internet Connection - Cost

Table 3.1: Comparison Table

Chapter 4

PROPOSED SYSTEM

The proposed system consists of an Android application made using Google Flutter. An Android application where a user can enter his data into the application, generate QR Code based on data given, and also share the data using QR Code. The application has an Admin Login and a User login. Admin has a QR-Code scanner and the user has a QR-Code generator.

A user can log in to the application and enter his/her data like Name, Address, Phone Number etc. The user can use the feature of local data storage so, only one-time entry of details is needed. Whenever the user visits a public place, this application is used to generate a QR Code based on the given data. At the time of the visit, the user uses the application to generate the QR Code and shows the QR Code to the Officer in the public place.

The Officer at the public place has an Admin version of the same application that has a QR Code reader in it. Admin users can scan the QR Code from the user, thereby get the data from the visitor and can upload them to the online database. Thus the details are saved to the location where the Admin wants and can be easily accessed at the time of need. One of the use-cases of data thus collected can be that if any of the visitors have been reported positive, the notification could be sent to all visitors who were there at the same time.

4.1 TYPE OF USERS

I. Normal User or Visitor

The basic users of this system are the Visitors, given a basic idea of the product and how it works. The users would be directed on how to login into the system and enter the details. The details are directly maintained by the database. The users can make changes to the entered data conveniently in the future if needed.

II. An officer at the public place or Administrator

The Administrator of this system being the Officers at these public places would be given a basic idea of the product and how it works. The user interface of the project is easy to understand by the users of the system.

The Administrator would be directed on how to login into the system and scan the QR-Code. Also, it should be directed on how to upload the collected data to the online database and how it can be used. It should also be directed on how to use the feature of Local Notifications and also to manage the database and the maintenance required at regular times.

4.2 STEPS OF IMPLEMENTATION

Main operations that come into this application are:

- Fill-In personal Data
- Generation of QR-Code
- Scanning of QR-Code
- Future uses of collected data

I. Fill-In personal Data

This is the first step in this application. The User or the Visitor is required to log in to this application to enter his/her details like Name, Address, Phone Number, Email, etc. into this application. After entering, the user is provided with an option to store the entered data in his mobile-phone itself.

II. Local-Storage

This feature requires functionality and it enables the user to enter the details only once. Thus the user doesn't have to enter the details when he visits the public places again and again.

III. Generation of QR-Code

This is the second step in the use of this application. Now, the details provided by a user is present within his/her smartphone itself. When visiting a public place like Hospital, Mall, etc. this application is to be used again. The user logs into the application and selects an option present within the application itself, to generate QR-code.

When this option is performed, the application generates a QR-Code based on the personal details given by the user. This QR-Code dynamically generated is shown at the public place, where the officer who takes the visitor data also would be using this application.

IV. Scanning of QR-Code

The person or Officer in charge of collecting visitor data at these public places would be using an Administrator version of this application itself. He logs in to the application as an Administrator. Upon the login, there's an option to scan the QR-Code.

The officer scans the QR-Code displayed to him by a visitor, thus the visitor data is transferred from the visitor to the Officer. This process requires less time, doesn't create large queues. So, the Social-Distancing norms could be preserved.

After this scanning process, the visitor data is present with the Officer. The officer can upload it to the Online-Database. The advantage of using an Online Database lies in that it's easy to manage and also the security it provides. The data uploaded can only be visible to the Administrator. So no issue of loss of data is present.

V. Future uses of collected data

With this data collected and stored in the database, it could be used for many uses. One of the most important ones lies in the ability to provide Local-Notifications. In case if any of the visitors turn COVID positive, the secondary and tertiary contacts could be easily identified.

By referring to the visitors who were present at the same time when the COVID infected person was there, they could be alerted. This application provides its main advantage in this scope. No need to search for the data, all the data is present within the Online Database itself. Also, this application provides an option to send out Local notifications to the selected visitors, so that they could be informed of this issue.

Being a mobile-application, the scope of introducing new futures in the application is very high. New ideas could be implemented in the application without any problem.

4.3 FEATURES OF SYSTEM

Standing in a queue to fill out the details is time-consuming and hence the rush might create damage in other perspectives like maintaining social distance in a crowd etc. As we all know COVID positive cases are increasing at a tremendous rate and hence retrieving the information from the earlier manual works is also improper and inefficient which might thus lead to late contacting the individuals who in turn become a carrier without his/her knowledge just because of the delay in contacting by the authorities.

Thus to automate the above situation, we are proposing an application where instead of the manual entering of details at each place, these details are entered into the app, and hence after submission, a QR code is generated.

This project has the following features:

1. Reduce Manual queues

With this application, the problem of Manual-queues can be reduced. Thus, Social-Distancing norms can be followed.

2. Fill-in details only once

This application has local-storage, so it has the function to store the details entered by the user in their mobile-phones themselves. So the details are needed to be filled in only once. No

need to fill in the details again and again.

3. Efficient storage of collected Data

Since the details are stored online by database cloud, data loss due to firebreak, carelessness, malpractices, and so on can be prevented, and also it can be referred at any time easily including the future references.

4. Local Notifications

In case any of the entered visitors become Positive, the other users can be alerted through a local notification with the help of the data stored in the cloud.

5. Scope for Future Development

Being a mobile-application, the scope of introducing new features in the application is very high. New ideas could be implemented in the application without any problem.

4.4 ADVANTAGES

The advantages of the proposed system are:

- Efficient means of Data-Collection with one time entry:-Considering that rather than the manual entry an intake of data is done using QR code it provides an efficient retrieval, storing, and management of data for officials as well as users, one-time data entry also supports this efficiency.
- Visitor-Data is saved to an online database like Google Firebase. No problem of security: As mentioned in the literature survey papers firebase allows real-time synchronization of data and has secure web hosting and authentication comparatively. Even its easiness in storage and access adds as its plus points.
- No violations of Health-measures occur: This process is time-efficient as rather time standing in the queue can be used for other works and QR code data intake is much faster
- Local notifications can be provided to the visitors easily: As a feature of firebase, by using it, the admin can control sending the notifications to users as required and under the conditions, which reduces the disadvantage of the existing system.

Chapter 5

SOFTWARE REQUIREMENT SPECIFICATION

5.1 PRODUCT PERSPECTIVE

Through this application, we are proposing an application where instead of the manual entering of details at each place, these details are entered into the app and hence after submission, a QR code is generated. Now while visiting a public place what we need to do is to just scan our QR code onto the admin version scanner which will be provided to the public places.

5.2 USER CLASSES AND CHARACTERISTICS

This application has basically 2 types of users.

- **Visitor or Ordinary person visiting the public place**
- **Officer at the public place**

The Visitor first uses this application to fill in their details like their Name, Address, Phone Number, E-mail etc. And saves this option in their device itself.

The Officer-in-Charge of visitor data collection at different public places like banks, Hospitals, Malls uses the Admin-version of this application itself. This version of the application has access to a QR-Code Scanner. With this scanner, they can scan the QR-Codes shown by the visitors. The Officer can then upload this collected data to their database and also fetch the data from the database whenever needed. Hence, this Officer is also acting as the Administrator of the application.

5.3 OPERATING ENVIRONMENT

The proposed system consists of a Mobile Application. It can be used in any Operating Environment - Android, iOS etc.. The mobile application uses two databases- MySQL, a relational database for local-storage of collected user details. And Google Firebase, a non-relational database for storing the visitor details in the cloud.

5.4 FUNCTIONAL REQUIREMENTS

5.4.1 SOFTWARE INTERFACE

This Mobile-Application is built using Flutter, a framework created by Google. This framework can be used for creating Mobile-Applications that support both Android and iOS environments. This application can be used on both platforms from a single-codebase itself.

- Front-End – Flutter Framework
- Back-End – Firebase
- Languages Used – Dart
- Database – Firestore, SQL-Lite
 - For local data-storage – SQL-Lite database.
 - For local notifications – Google-FireStore.

Features of Dart:

- Open source
- Platform independent
- Object Oriented
- Extensive libraries
- Browser supported
- Async programming

5.4.2 HARDWARE INTERFACE

The mobile application requires the following hardware requirements:

- Mobile Phone with RAM 2 GB or higher
- Android version 7.0 or higher
- Atleast 50 MB of storage space
- Stable Internet connection

5.5 NON-FUNCTIONAL REQUIREMENTS

5.5.1 PERFORMANCE REQUIREMENTS

This project helps to collect the Visitor-Data visiting a public place and use this data in the future for various purposes.

5.5.2 SECURITY REQUIREMENTS

No one without registered users can enter into the application. One particular user of a section only can perform his/her particular actions. Only the administrator of the application can access the data stored in the database. Seperate logins for the normal User and the Admin is provided.

Also the data collected is stored in the Online database ie, Firebase. So no fear of any loss of data, or any other problems can happen.

5.5.3 SOFTWARE QUALITY ATTRIBUTES

In the development phase also testing and conferences of users is been continued. So that the quality of the software is been maintained and all the requirements are been fulfilled.

- Correctness of data
- Maintainability

- Adaptability
- Usability

5.5.4 BUSINESS RULES

This project helps to collect the Visitor-Data visiting a public place and use this data in the future for various purposes. It avoid the problem of long queues at public places and also makes a way to store the Visitor details in a more efficient and secure manner.

Chapter 6

SYSTEM DESIGN

6.1 MODULES

Modular design, or modularity in design, is a design principle that subdivides a system into smaller parts called modules, which can be independently created, modified, replaced, or exchanged with other modules or between different systems.

In our project there are mainly 7 modules. They are:

1. Login Module
2. User Module
3. Local Storage Module
4. QR Generation Module
5. Admin Module
6. QR Scanner Module
7. Cloud Storage Module

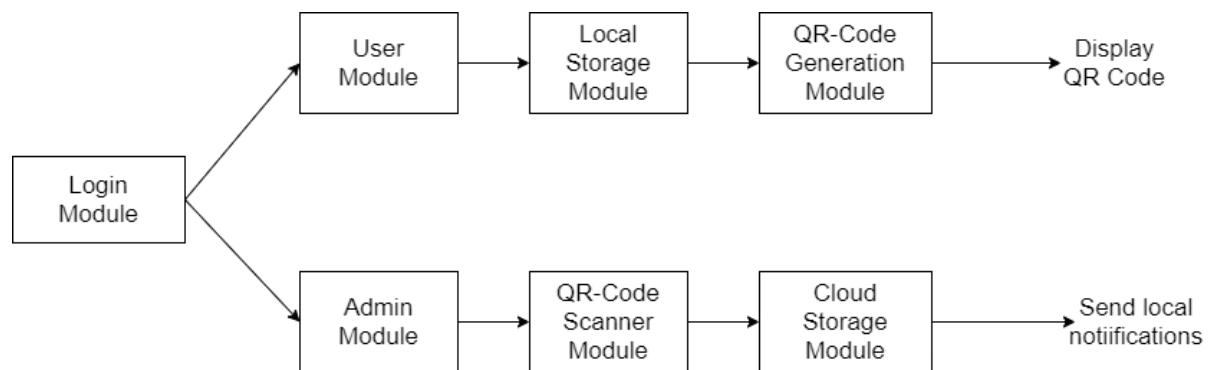


Fig. 6.1: MODULES

1. Login Module

- Input : User credentials
- Output : Provides privilege and redirection

This is the first User Interface module in our system. And also the basic module in the system. The authentication of registered users and registration of new users are done in this module. Based on the credentials provided in this module, our entire system will be classified into two major modules :

- (a) User Module
- (b) Admin Module

2. User Module

- Input : User Details
- Output : User Data

This is the module where common people or public users can enter their personal information into the application. Users can also have the privilege to edit/update the entered details in this module.

3. Local Storage Module

- Input : User Data
- Output : Locally stored user data

The entered data will be saved locally in this module. That is, the the data entered by the user will be saved on their own mobile phones. The database is the major component in this module. We are using SQLite for the local storage.

4. QR Generation Module

- Input : Locally stored user data
- Output : QR Code

This is the module in which locally stored data would be converted to QR code. A QR-Code generator is the key component of this module. The encoding of the user data, Generation of random QR code and displaying of the QR code are the major processes in this module.

5. Admin Module

- Input : QR Code
- Output : User Data

This is the module where admin users ie.Shop owners or Security in a government office or hospital etc. at various public places. In this module,there is an interface to scan QR code. Admin can access the user data by scanning the QR code and then they can manage or view the data in this module.

6. QR Scanner Module

- Input : QR Code
- Output : Scanned User Data

This is the module which detects and scans the QR code shown by the user. The decoding of QR Code happen in this module. Data from user module transferred to admin module through this module.

7. Cloud Storage Module

- Input : User Data
- Output : Notification

In this module, the admin can upload the decoded user data to a cloud based online DB. The uploading, Storing and managing the data is happening in this module. The Google FireStore is the database used here and Firebase is the backend. Using this backend, there is also an option to send the notifications to the users using the cloud messaging technology.

6.2 ALGORITHM

6.2.1 LOGIN MODULE

1. Input : Inserting the credentials.
2. Output : Redirecting to the required.

Step 1 : Start

Step 2 : Register to the application,if its a new entry.

Step 3 : After registration,login to the application using the credentials provided.

Step 4 : Check if the credentials entered are valid or not,after authorization check

Step 5 : If the credentials match to the admin login,redirect the page to admin home page.

Step 6 : If the credentials match to the user login,redirect the page to the user home page

Step 7 : If the credentials entered are invalid and authorization fails, display error message.

Step 8 : Stop.

6.2.2 USER MODULE

1. Input : Entry of details.
2. Output : Generating the QR code.

Step 1 : Start

Step 2 : Register into the application by giving a username and password. With the registered username and password, login to the application. If already registered, just login to the application.

Step 3 : Now from the options screen, select the action user wishes to do.

- Step 3.1 : If the user wants to enter his/her personal details, click on Enter details button. The user would now be directed to the respective screen. Now enter the personal details like Name, Address, Phone etc. After entering details click on Save button to locally store the inputted details.
- Step 3.2 : the user wants to update the already entered details, click on Update details button. The user would now be directed to the respective screen. Now enter the details the user wants to update and click Update button. The details would get updated now.
- Step 3.3 : If the user wants to generate a QR code from the already entered details, click on Generate QR code button. The user would now be directed to the respective screen. Now a QR Code would be generated based on the already entered details.
- Step 3.4 : If the user wants to log out, click LOG OUT button.

Step 4: Stop

6.2.3 ADMIN MODULE

1. Input : Scanning the QR code.
2. Output : Sending the notifications.

Step 1 : Start

Step 2 : Register into the application by giving a username and password. With the registered username and password, login to the application. If already registered, just login to the application.

Step 3 : Now from the options screen, select the action admin wishes to do.

- Step 3.1 : If the admin wants to scan a QR code click on Scan QR Code button. The admin would now be directed to the respective screen. The Qr code scanner would be opened now and Admin can scan a QR Code.
- Step 3.2 : If the admin wants to upload the scanned details click on Upload Scanned Details button. The admin would now be directed to the respective screen. Now click on Upload button to upload all the scanned details to the online database.
- Step 3.3 : If the admin wants to manage the scanned details, click on Manage Details button. The user would now be directed to the respective screen. Within this screen, the admin can view all the previously uploaded details.
- Step 3.4 : If the admin wants to log out from the application, click on LOG OUT button. The admin would now be logged out of the application.

Step 4: Stop

6.3 FLOW CHART

A flowchart is a type of diagram that represents a workflow or process. A flowchart can also be defined as a diagrammatic representation of an algorithm, a step-by-step approach to solving a task.

The flowchart of our system explains the complete working of our system. After registration, the application checks the authentication details and decides if it is a valid or invalid user if invalid goes back to the login page else check if it is the public user or an admin, according to the conditions and credentials the login page will be redirected to the next module.

If the person is provided with the user privilege, then they are provided with the following functionalities: To enter the details in the application, and all those details are stored in the local storage. Whenever the user visits any public places, the QR code is generated. Whereas on the admin side, they can scan this QR code generated by the user and these received data can be uploaded into the online database. The admin also has the privilege to manage these data and can also send notifications to the users as required under the necessary conditions. After completing the tasks, the user and admin can logout from their profile.

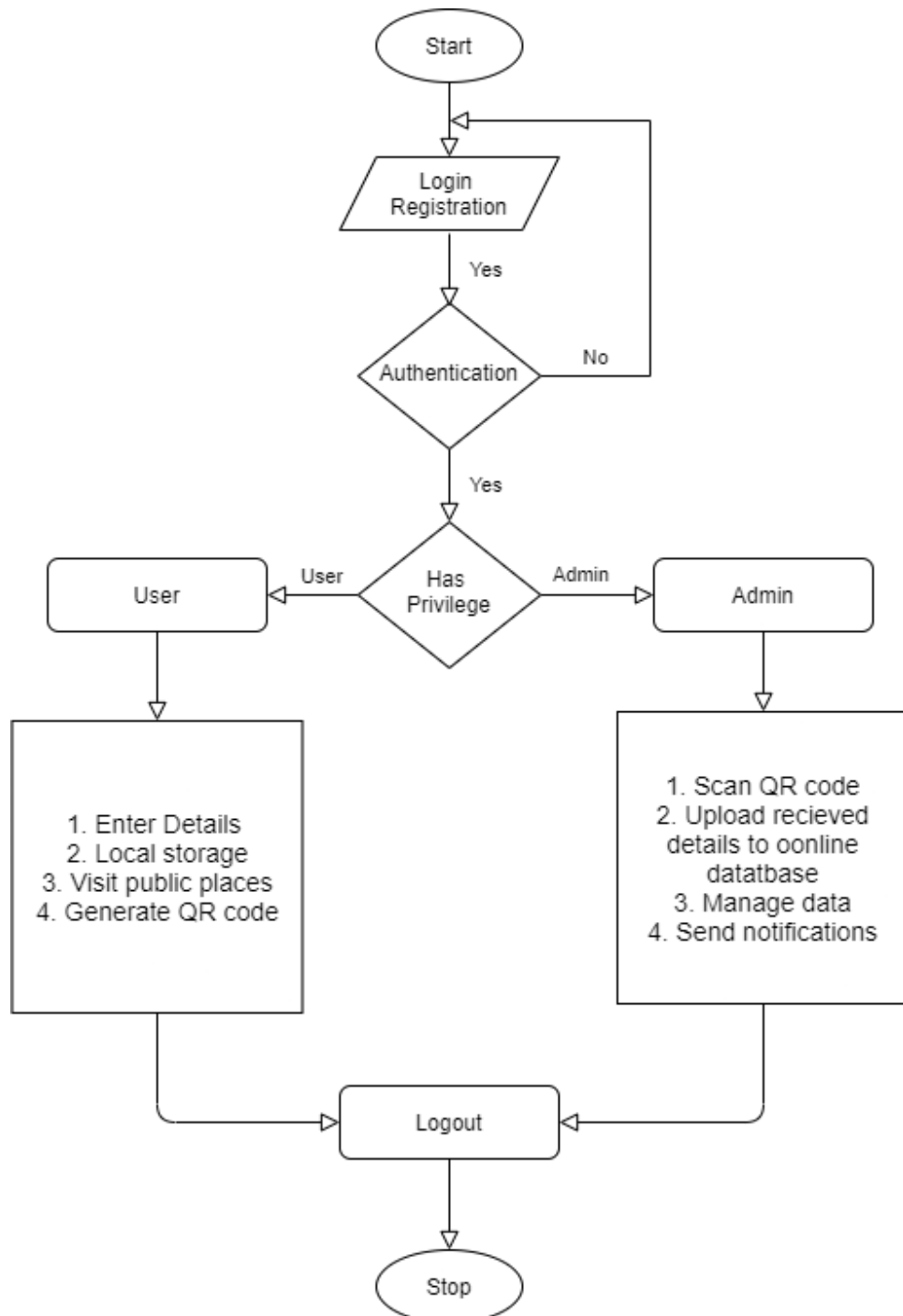


Fig. 6.2: FLOWCHART

6.4 USE CASE DIAGRAM

A use case diagram at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. A use case diagram can identify the different types of users of a system and the different use cases and will often be accompanied by other types of diagrams as well.

The use case diagram of our system comprises of two actors: User and Admin. Both the actors can first register and then can log in to the application. Then the user can enter their details after login. Whenever the user visits a public place they will be able to generate the Qr code based on the entered and saved data, which is scanned to the scanner.

Considering the actor which is the admin, they are responsible for managing the scanned data using the scanner, as these data will be stored in the cloud. Under necessary conditions, the admin can check the data, retrieve the data, and send the notifications to the users to inform the details.

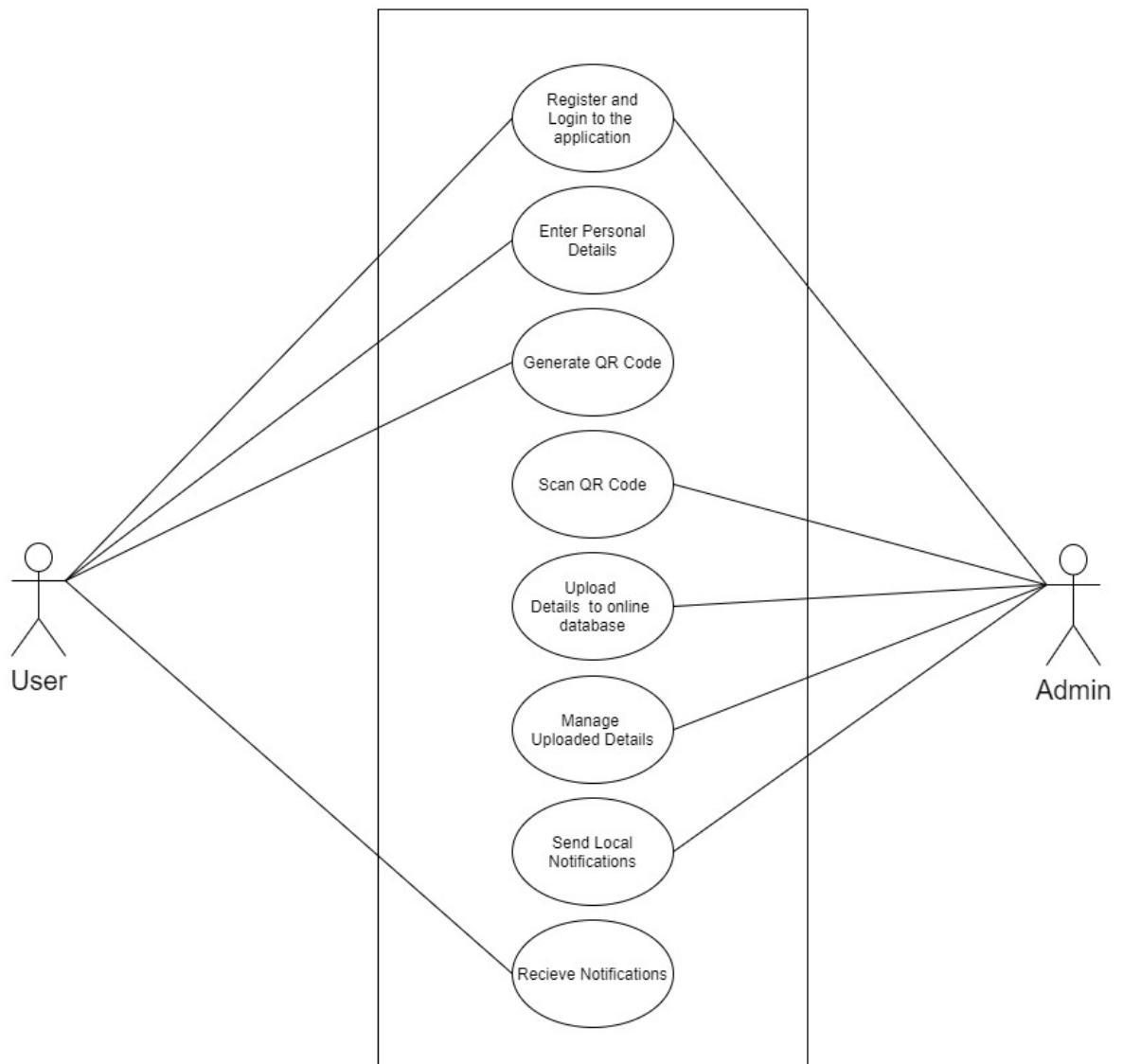


Fig. 6.3: USECASE DIAGRAM OF PROPOSED SYSTEM

6.5 SEQUENCE DIAGRAM

A sequence diagram shows object interactions arranged in time sequence. It depicts the objects involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario. Sequence diagrams are typically associated with use case realizations in the Logical View of the system under development. Sequence diagrams are sometimes called event diagrams or event scenarios.

In the sequence diagram of our system, there are six objects: User, Local Storage, QR Code Generator, QR Code Scanner, Admin, and Cloud.

At first, the user enters the details onto the local storage. On the local storage itself, the user can display the data by itself which is referred to as a reflexive message. The user can also update/modify the details entered and in return, a return message is passed by the local storage to the user.

Whenever a user visits any place, a QR code has to be generated which is done in the next object, QR Code Generator. After the generation of this QR code, it has to be scanned which is done by the next object, QR Code Scanner. After scanning, the data are available which has to be stored somewhere. For that, the cloud is used. In the cloud, all the data are stored which can be accessed and managed by the admin. Admin also can directly send notifications to the user.

The following is the sequence diagram of our proposed system:

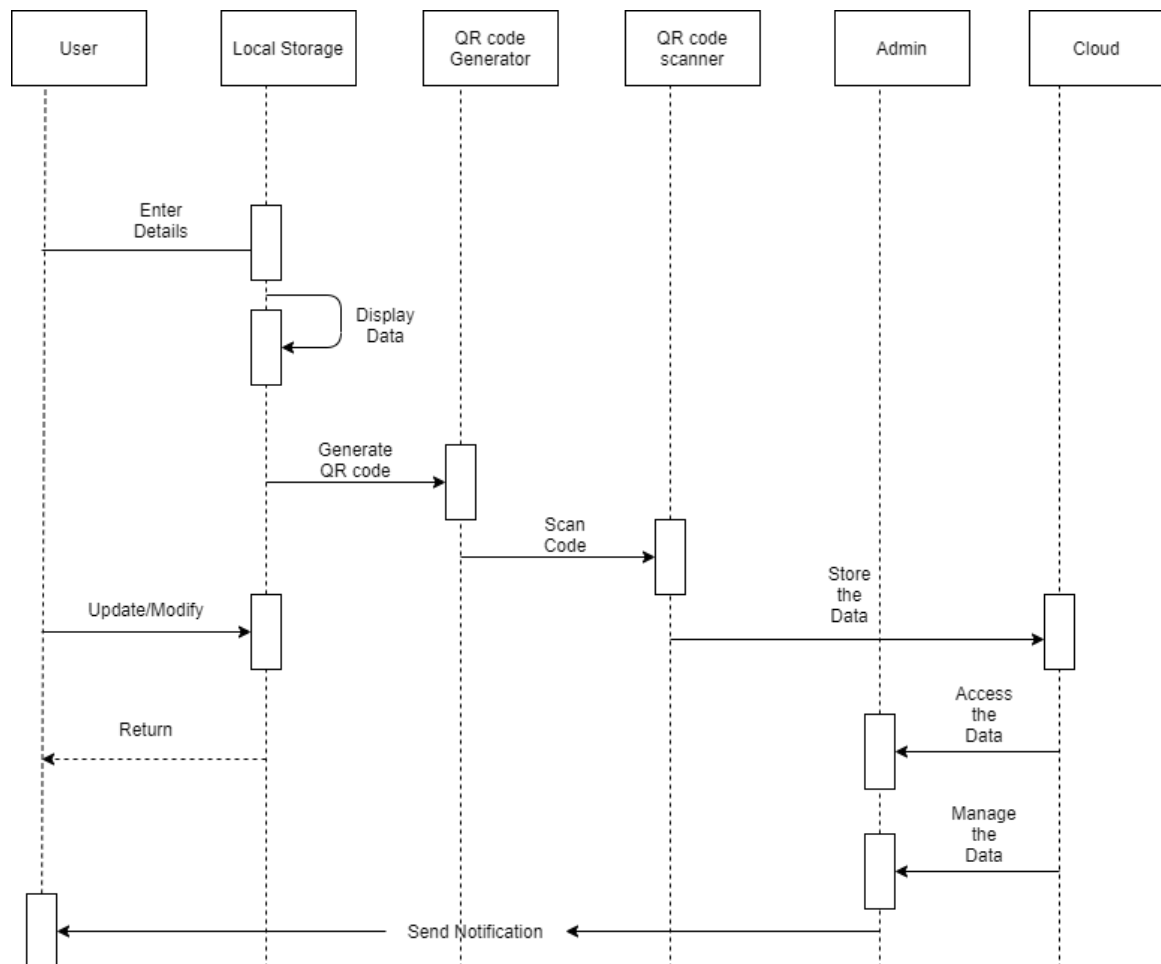


Fig. 6.4: SEQUENCE DIAGRAM OF PROPOSED SYSTEM

6.6 DATA FLOW DIAGRAM

DFD is the abbreviation for Data Flow Diagram. The flow of data of a system or a process is represented by DFD. It also gives insight into the inputs and outputs of each entity and the process itself. DFD does not have control flow and no loops or decision rules are present. Specific operations depending on the type of data can be explained by a flowchart. Data Flow Diagram can be represented in several ways. The DFD belongs to structured-analysis modeling tools. Data Flow diagrams are very popular because they help us to visualize the major steps and data involved in software-system processes.

Levels of DFD

DFD uses hierarchy to maintain transparency thus multilevel DFD's can be created. Levels of DFD are as follows:

- Level-0 DFD
- Level-1 DFD
- Level-2 DFD

In our proposed system we have 3 levels of Data flow Diagrams. These dataflow diagrams are used to represent the actual data flow in our proposed system.

6.6.1 Level-0 DFD

The Level-0 dataflow diagram explains the basic entities/ external users, the main process and the main storage used in our system. There are two entities here: 1.User and 2.Admin. There is only one main process, mobile app(0). We are using Cloud Storage as a major database. Users can enter their details into the mobile app. The mobile app will display the QR Code that corresponds to that entered data. Admin can scan that QR code and access those data. After that, the admin can upload these data to the cloud storage via a mobile app. The cloud storage module will send the alert notification to the user as the output of our system.

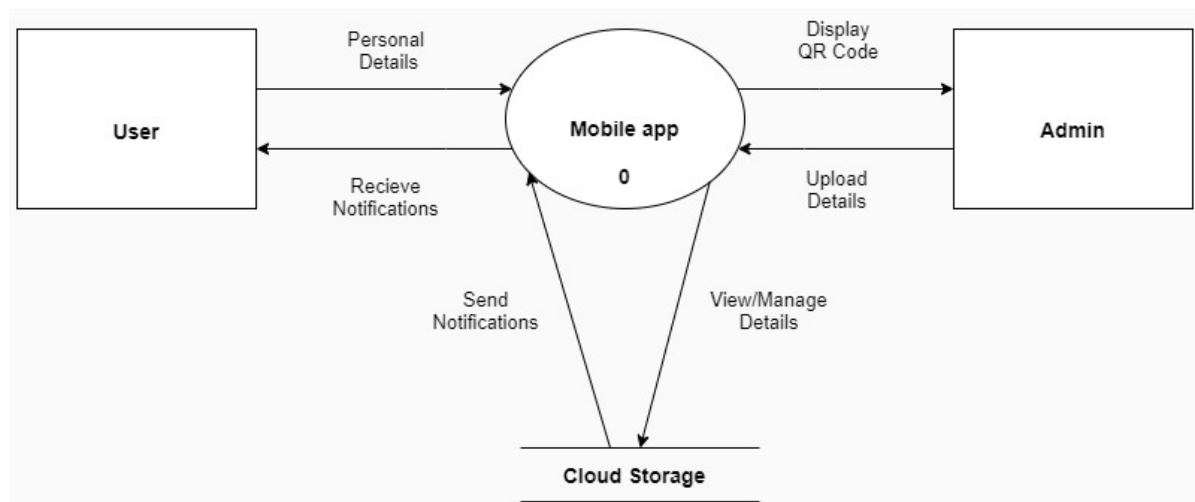


Fig. 6.5: LEVEL-0 DFD

6.6.2 Level-1 DFD

The Level-1 dataflow diagram will more focus on the different processes in our proposed system. First, we have a User Data Entry process(0.1) where users can enter their details. The entered data will be saved in Local Storage(SQLLite). The details updation process(0.2) allows users to edit/update their entered details. Those updated details also will be saved in Local Storage. From the user process, the data will be flow to the QR Generation process(0.3). The QR generation process will generate the QR code and it will be displayed while visiting a public place. The QR Scanning process(0.4) will scan the displayed QR code and through this admin access the user data. Admin can manage this scanned data. Then the admin will upload this user data to cloud storage(Google Firestore) by performing the View/Update Process(0.5). In this process, the admin can upload, view, or edit the data. There is also an option to send the notification to the user using the features of our backend: Google Firebase.

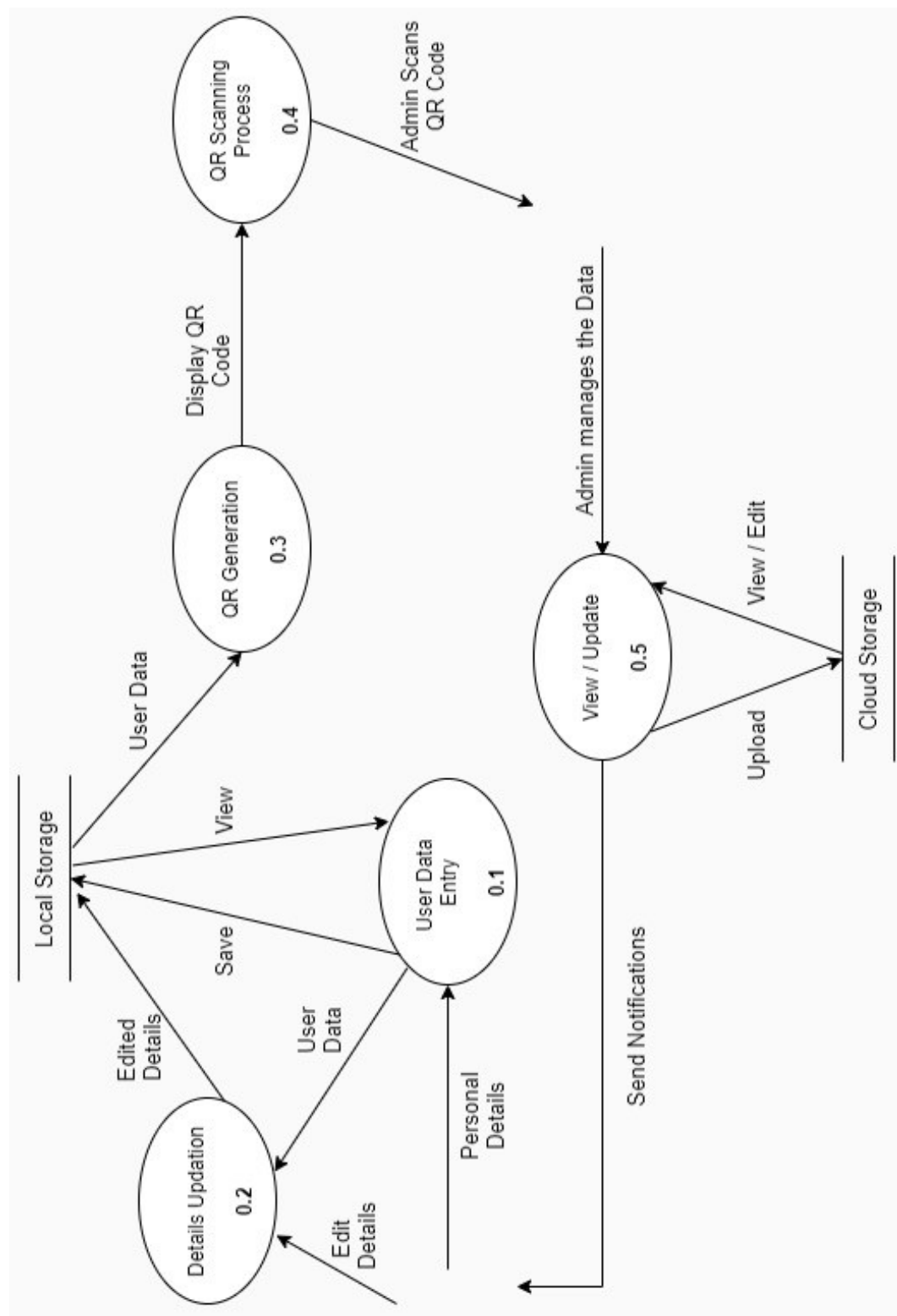


Fig. 6.6: LEVEL-1 DFD

6.6.3 Level-2 DFD

The Level-2 dataflow diagram is a more detailed one about our system which explains the different sub-processes of each process in level-1 DFD. The user/admin will open the Application. Then they will undergo the Login/Register process(0.1.1). The new users can register in our application whereas the registered users or admins can log in using their credentials. Based on the credentials, the user and admin are distinguished. The user can Enter User Details(0.1.2) as well as Update Details(0.2) to the Local Storage. After that, the encoding of user data(0.3.1) will happen. This encoded data will be converted to QR code in the Random QR Code Creation(0.3.2) process. Then this QR code will be displayed and Scan QR Code(0.4.1) process will be done. Then this scanned QR code will be decoded in the Decoding Scanned QR code(0.4.2) process. The decoded data will be uploaded to cloud storage in the Uploading the Data(0.5.1) process. Admin can View Data(0.5.2). Admin must upload the positive cases(0.5.4) information. Using the data of positive cases which is uploaded by the admin, Select the users with the same timestamp of positive cases(0.5.3) and send the notification alert to those selected users using the Cloud Messaging feature of Google Firebase.

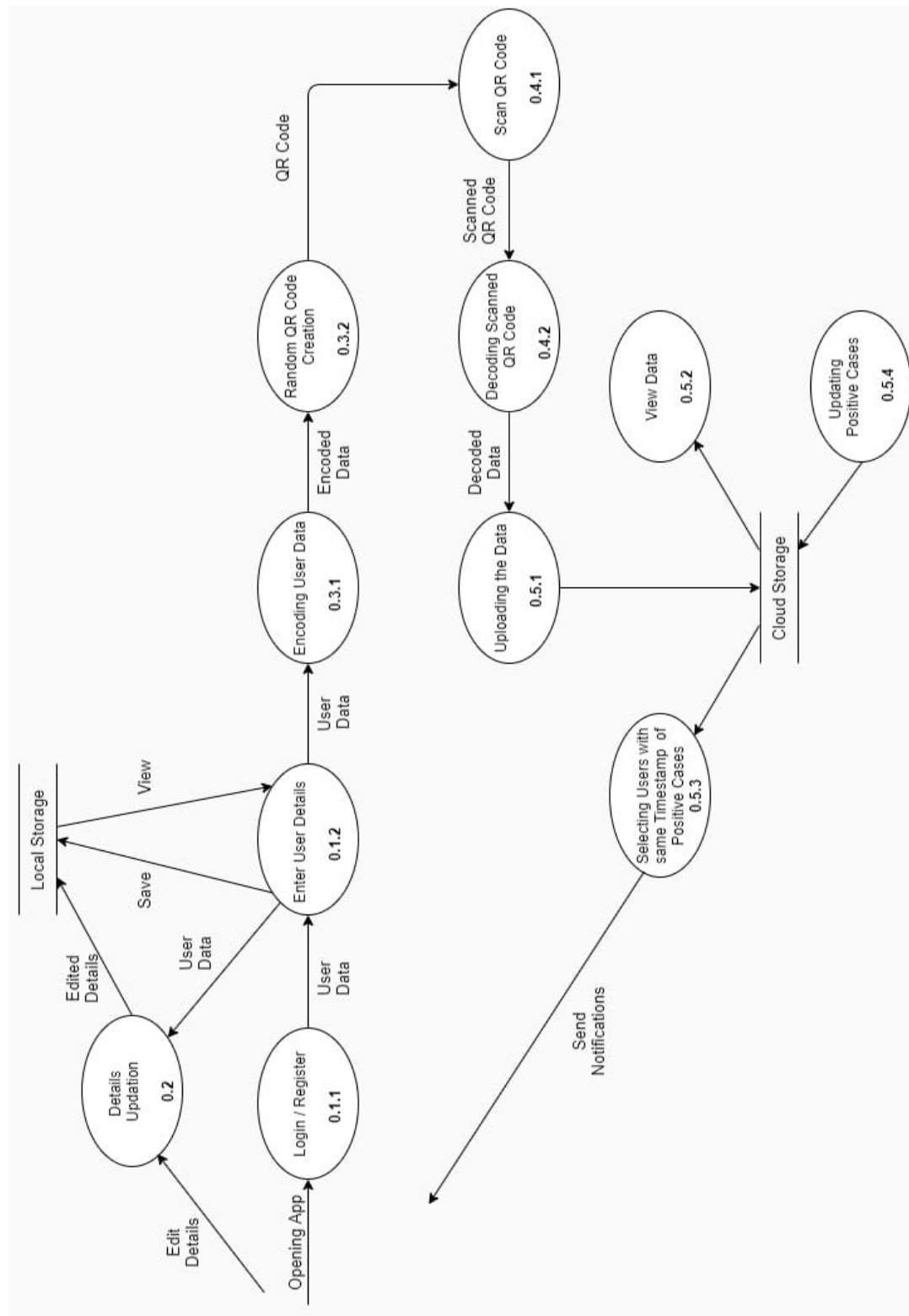


Fig. 6.7: LEVEL-2 DFD

6.7 USER INTERFACE DESIGN

Provides the basic GUI interface prototype for our proposed system which shows the basic functions when the user or admin is using the application

Below shows the GUI interface for login page, then after redirecting it, the user or admin page will be displayed, whose GUI is provided as follows along with its basic functions that can be performed.

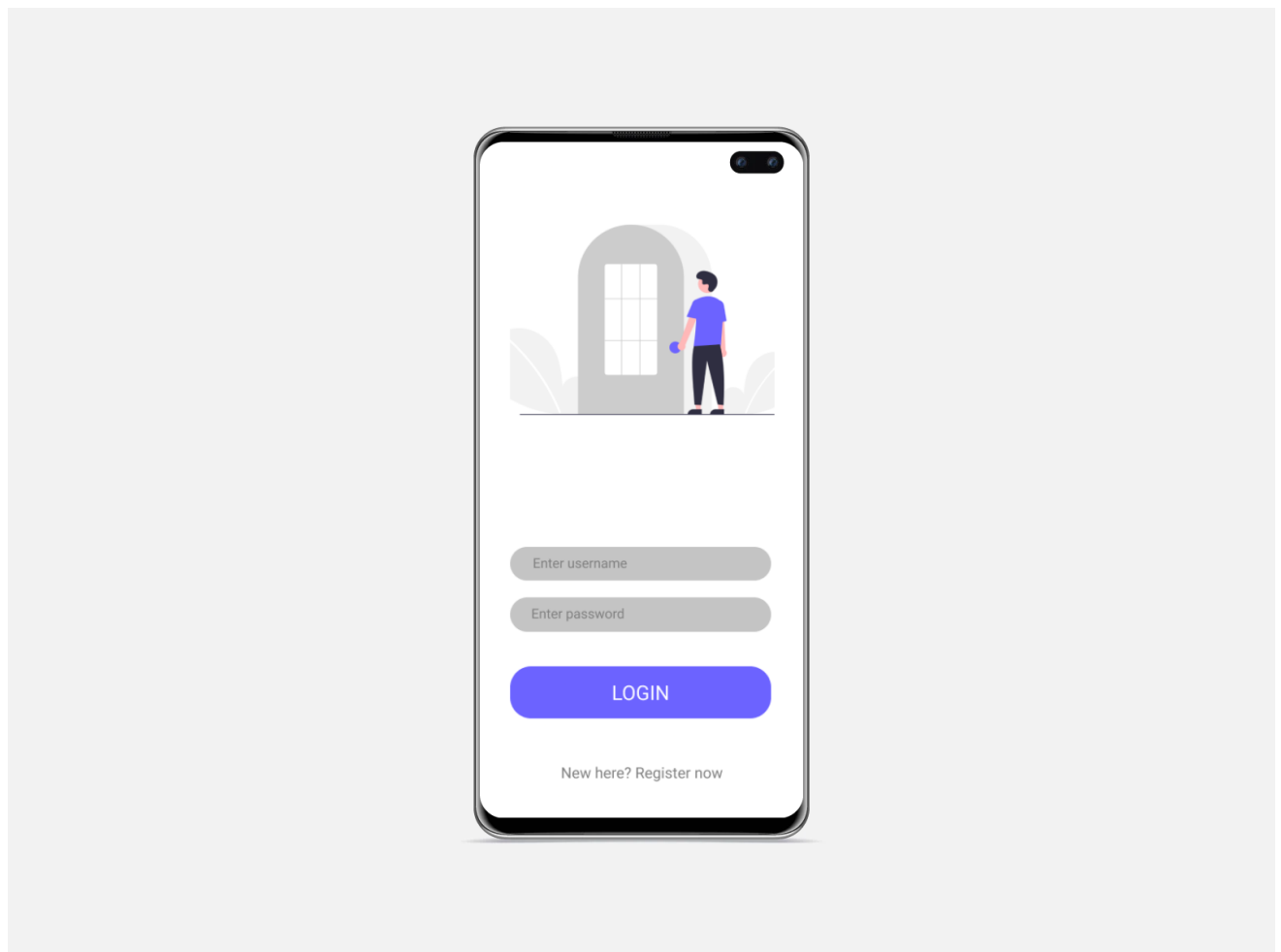


Fig. 6.8: LOGIN PAGE

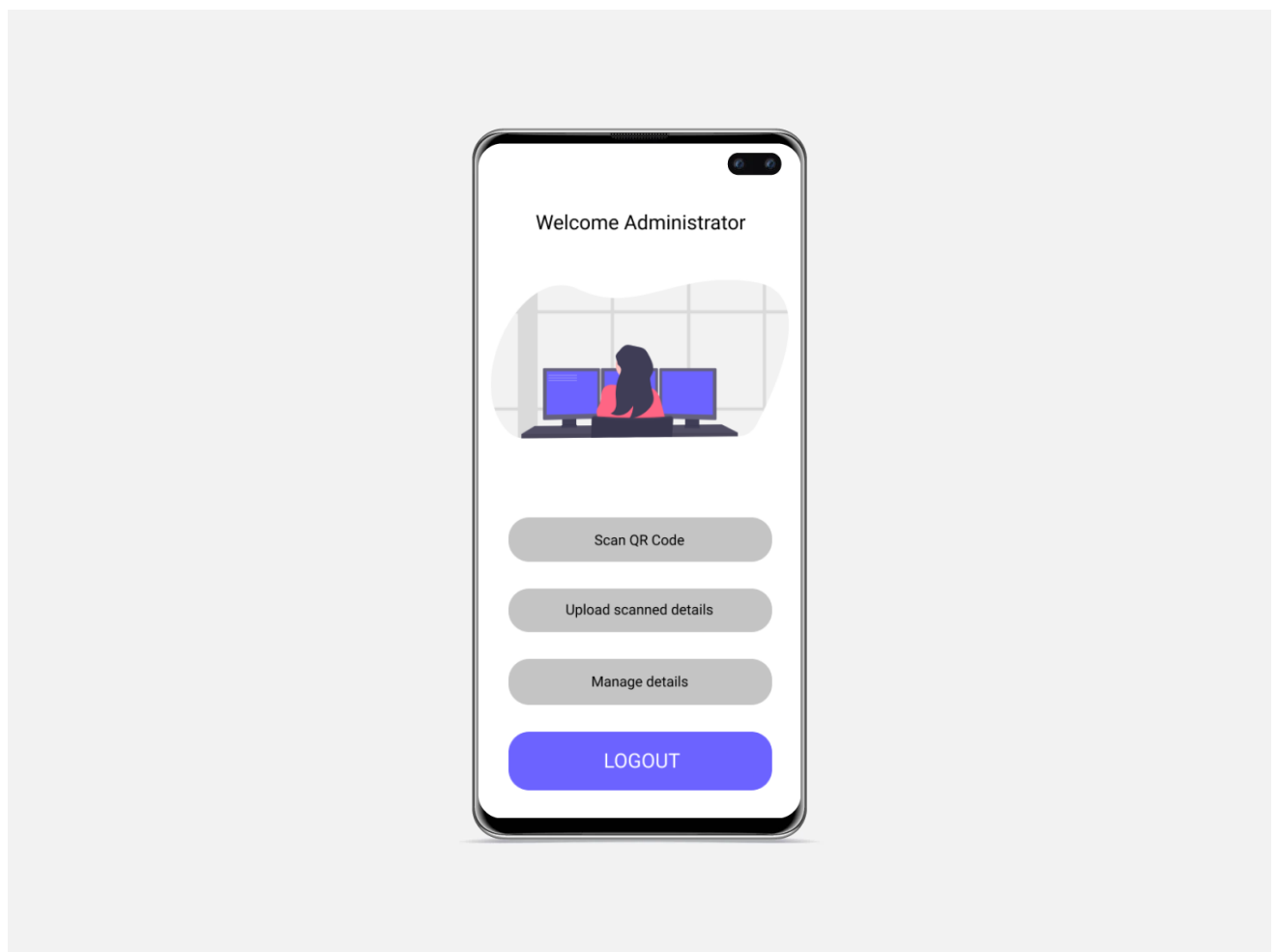


Fig. 6.9: ADMIN PAGE

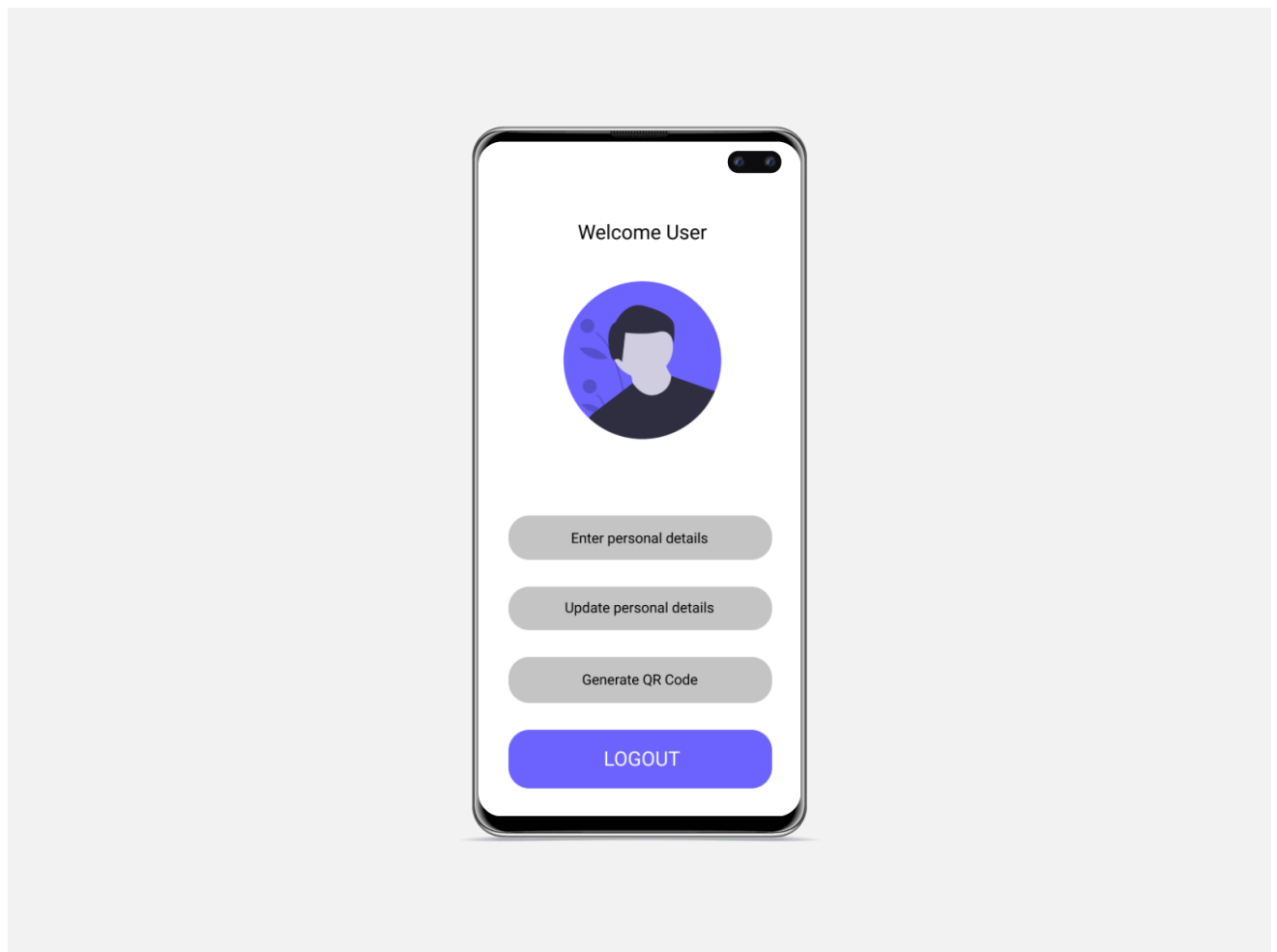


Fig. 6.10: USER PAGE

Chapter 7

CONCLUSION

Visitor Data Collection using QR Code provides several advantages compared to the existing solution. Covid-19 pandemic is a newly arisen situation and hence its solution, practices and controlling methods are different from the text book practices and involves much trial and error method.

Similarly this automated application can also evolve as required and add several features along with the basic prototype. Currently, it is based on the fact of monitoring and assisting the health organizations for the covid pandemic situation, but considering its functionalities it might still be used for other situations that involve data intake, storing, retrieval, notifying, and backtracking the individuals.

When considering the practice of manual intake of data which is a tiresome task, our automated solution itself provides better enhancement functions be in terms of inserting, searching, or retrieval under conditions. Being an application under firebase and necessary control of authorities it also solves several disadvantages of other applications including security, privacy concerns, authentication, and even notification sending.

Being an application as time goes more functionalities can be added as necessary to adapt to the required situations and taking considerations of the limitations of the current system.

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