MANIPAL
ACADEMY of HIGHER EDUCATION
(Deemed to be University under Section 3 of the UGC Act, 1956)

ICT 3168 - MAD Lab Project Report
B.Tech, CCE Semester - 6

moneypal – UPI Client for Payments and More

Submitted by:
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Acknowledgements

At the very outset, I would like to give the first honours to the Almighty who gave me the wisdom and knowledge to complete this project. We also express our gratitude to **Mrs. Nisha Shetty** and **Mrs. Vibha,** Faculty Advisor and Project Guide for providing us with adequate facilities, ways and means by which we were able to complete this project.

Abstract

The app mainly focuses on making online money transfer easier by using the direct mode of peer-to-peer bank transfers interface developed by the Government of India known as Unified Payments Interface (also known as UPI). The app will feature a home screen with all the contacts of the users that also use “moneypal”. The user can pay money, request money, and also chat with them privately and securely. The user will be able to connect multiple bank accounts to their profile and will also be able to select the profile of a contact and send a desired amount of money to them.*

Users can generate and also scan a QR code for their profile to facilitate easy transfers within the app. The app will be secured using an encrypted pin which the user will be asked for before the home screen of the app is shown at every launch of the app. The user can also pay for recharging mobile services and other similar services and will also be able to quickly make payments to business accounts. Bank balance and transaction history will also be shown to the user on a dedicated screen to track expenses.

*Important Note: All actions involving money transfer will be simulated and will not involve real bank accounts or real money.

Introduction

The app is named “moneypal”; composed of the words “money” and “pal” meaning “friend”. As the name suggests, our app primarily aims to simplify the tedious and cumbersome process of making gross financial transactions. Usually, a transaction of any scale either requires cash, in the form of coins and notes or requires cheques for large amounts. Cash is tedious to handle and cheques require the recipient to go to a bank to get the amount. The app will make this process of transferring money extremely easy by digitizing the authentication, verification, and processing aspects of a digital transfer.

Language Description

The app is written in Dart v2 using the Flutter App Development Framework. We used Flutter framework (based on Dart) as we both were comfortable with the language and have past experience for the same. We chose flutter as it is one of the most in-demand languages in the technical world.

Features of Flutter

Flutter framework offers the following features to developers –

- Modern and reactive framework.
- Uses Dart programming language and it is very easy to learn.
- Fast development.
- Beautiful and fluid user interfaces.
- Huge widget catalog.
- Runs same UI for multiple platforms.
- High performance application.

Advantages of Flutter

Flutter comes with beautiful and customizable widgets for high performance and outstanding mobile application. It fulfills all the custom needs and requirements. Besides these, Flutter offers many more advantages as mentioned below –

- Dart has a large repository of software packages which lets you to extend the capabilities of your application.
- Developers need to write just a single code base for both applications (both Android and iOS platforms). **Flutter** may to be extended to other platform as well in the future. • Flutter needs lesser testing. Because of its single code base, it is sufficient if we write automated tests once for both the platforms.
- Flutter's simplicity makes it a good candidate for fast development. Its customization capability and extendibility makes it even more powerful.
- With Flutter, developers has full control over the widgets and its layout.
- Flutter offers great developer tools, with amazing hot reload.

Database-Backend Description

We used Google Firebase for authentication and database. Firebase Authentication integrates with the Firebase Realtime Database to allows us to control data access on a per-user basis using conditions. Once a user authenticates, the *auth* variable in your Realtime Database Security Rules rules will be populated with the user's information. This information includes their unique identifier (*uid*) as well as linked account data. If we implement a custom auth provider, we can add your own fields to the user's auth payload.

Project Description

Problem Statement

These are a few problems that our project app attempts to address:

- How will the app handle user and their sessions?
- How is money transferred and what is used to do facilitate a secure transaction?
- How is using an app easier than traditional methods?
- What more features does the app provide over the traditional methods?
- What is the scope of digital transfer and this app?

Objective

The primary objective of our project is to simplify payments. It will also feature nearby vendors so that the users can find nearby shops and seller quickly and also pay seamlessly. The app also features a QR code scanning and processing feature that will make connecting easy for the users to directly pay without any tedious and lengthy set of steps. Users can also request for money from others so that the exact amounts can be paid.

Proposed Methodology

For authentication and verification of users, the app has a custom API for OTP verification based on Firebase. The API will generate a unique, one-time-use 6 digit number that will act as the passkey whenever the user requests to log into the app.

As seen in the activity diagram below, if the user isn't already registered, the app will redirect them to a screen where they can fill in their details and signup for our service. Details of the users will be communicated using a custom API and will be stored within a database hosted on Firebase.

After signing into the app, the user will be taken to the home screen of the app where they'll be able to see their recent contacts and also, based on their location, nearby shops, and sellers. Location requests have two types– Fine and Coarse. The app will only request for Coarse User Location so which will help it determine nearby shops. Fine User Location will not be asked for preserving the privacy of the user.

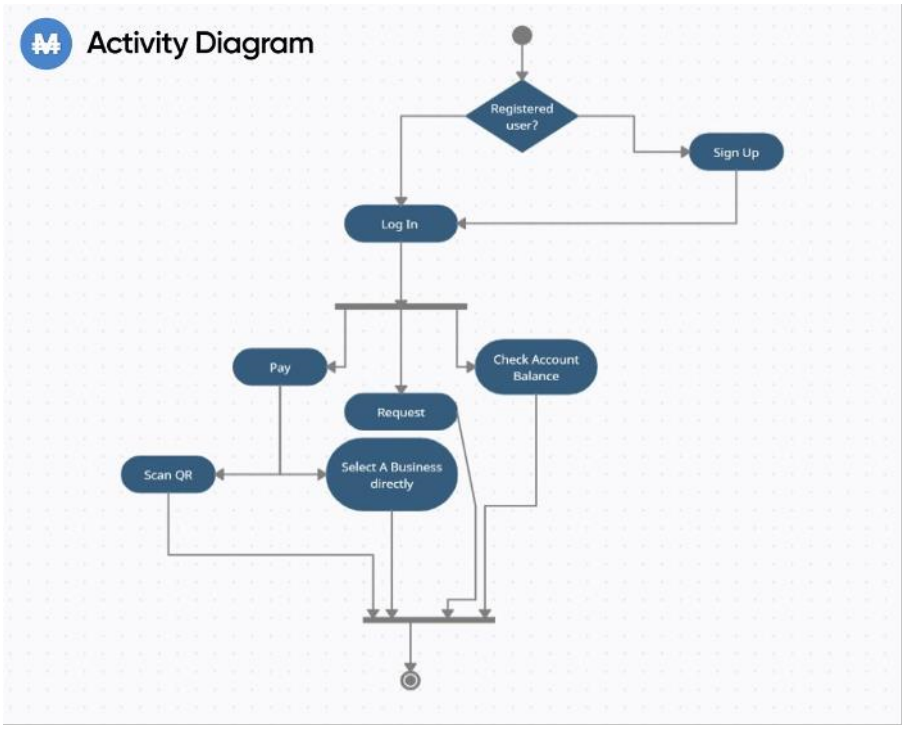
Once the user clicks on any of the profiles, a screen with two options will be shown:

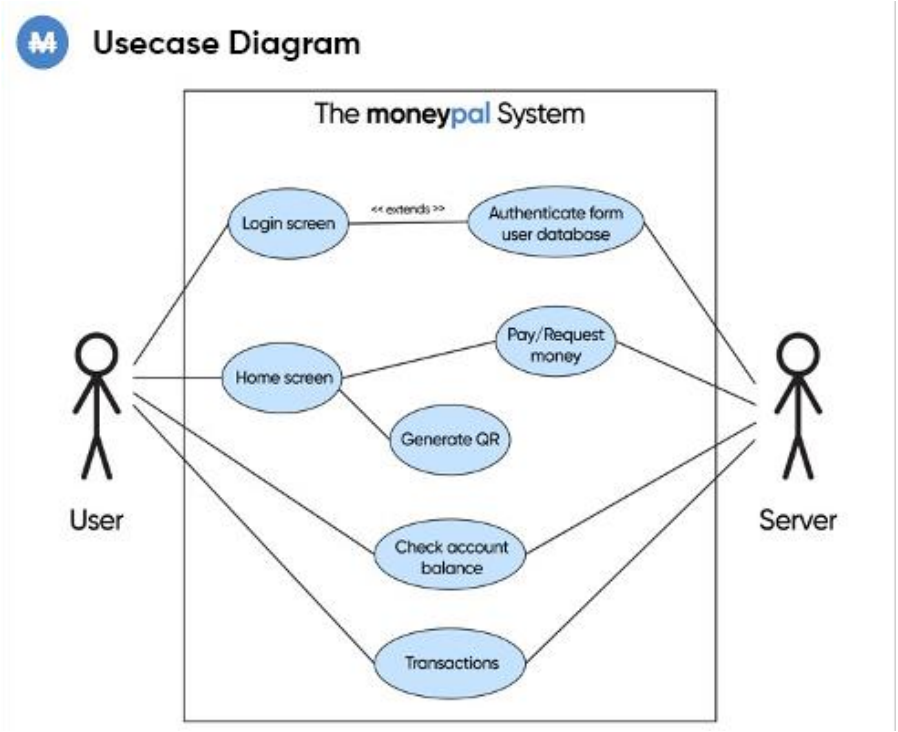
- Pay money to the user
- Request money from the user

For paying money the user will be asked for their UPI PIN set for their selected bank account. Therefore, the user can send and receive money with a couple of clicks.
As seen in the usecase diagram, the user will also have an option to use their camera for scanning a custom generated QR code. QR codes will be generated using a custom algorithm that will encode the identifiable data of the user. This QR can then be scanned to directly enable the person scanning the code to directly send/request money to/from the person to whom the code belongs respectively.

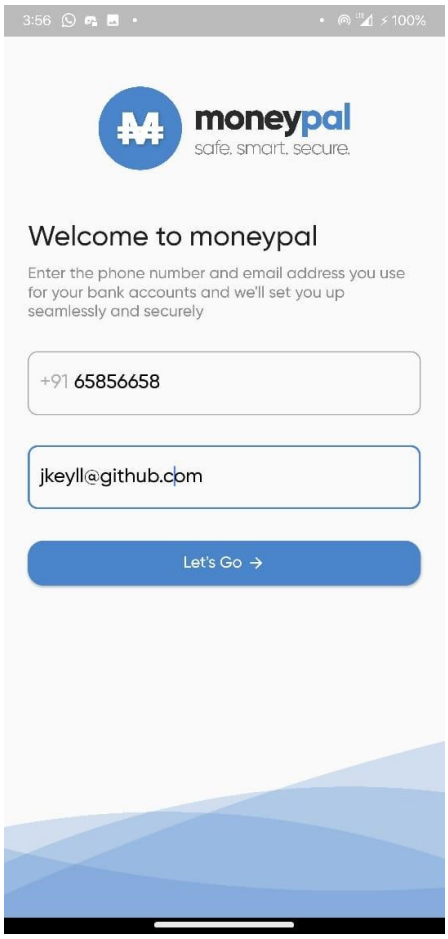
The transactions can have two states– *success* or *failure*. There is no other states such as *processing* or *pending* to avoid retrying payments and preventing financial losses due to ambiguity. Once the payment is complete, the user will be shown a screen with appropriate message and reason in case the transaction fails to complete.

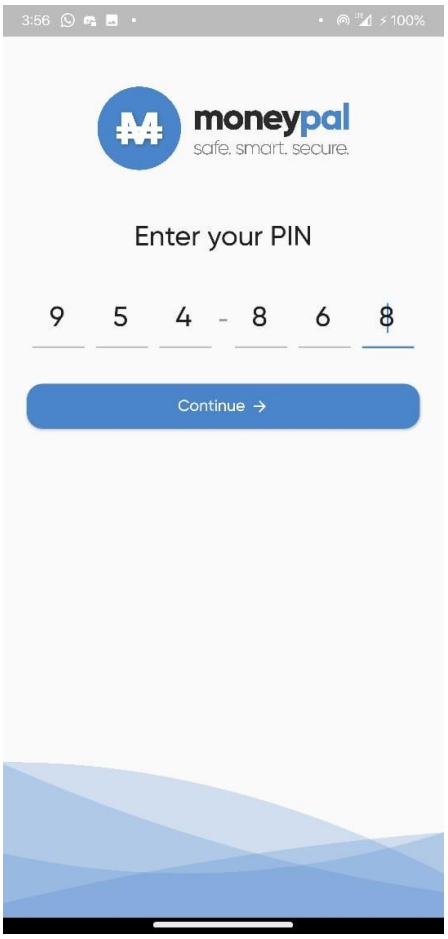
Design


Activity Diagram
Registered user?
Sign Up
Log In
Pay
Check Account Balance
Request
Scan QR
Select A Business directly

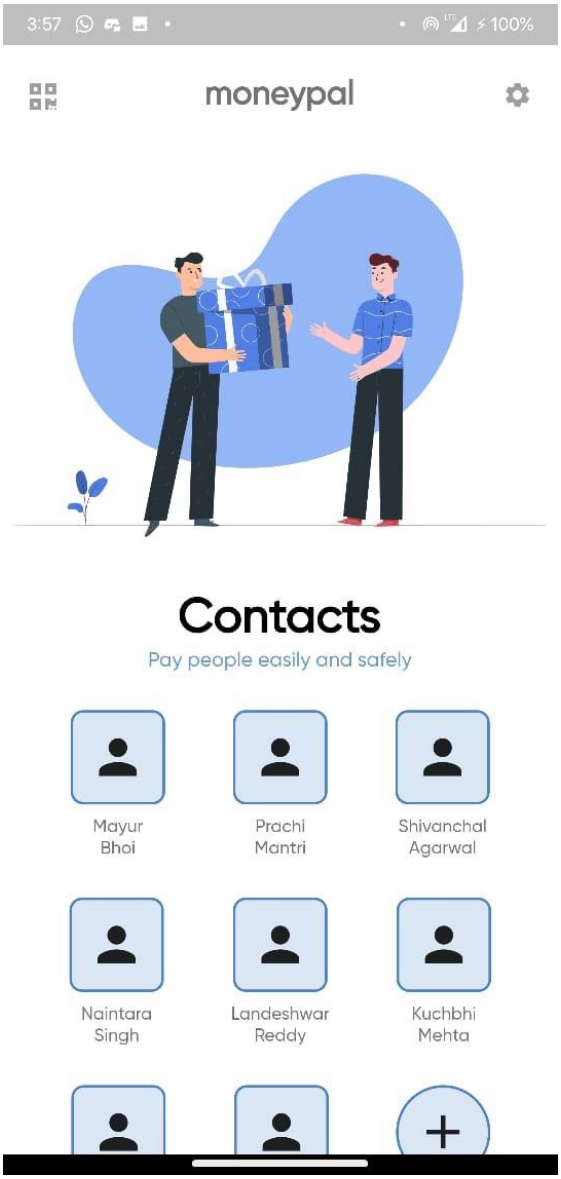

Usecase Diagram
The moneypal System
Login screen
<< extends >>
Authenticate form user database
Pay/Request money
Home screen
Generate QR
Check account balance
Transactions
User
Server

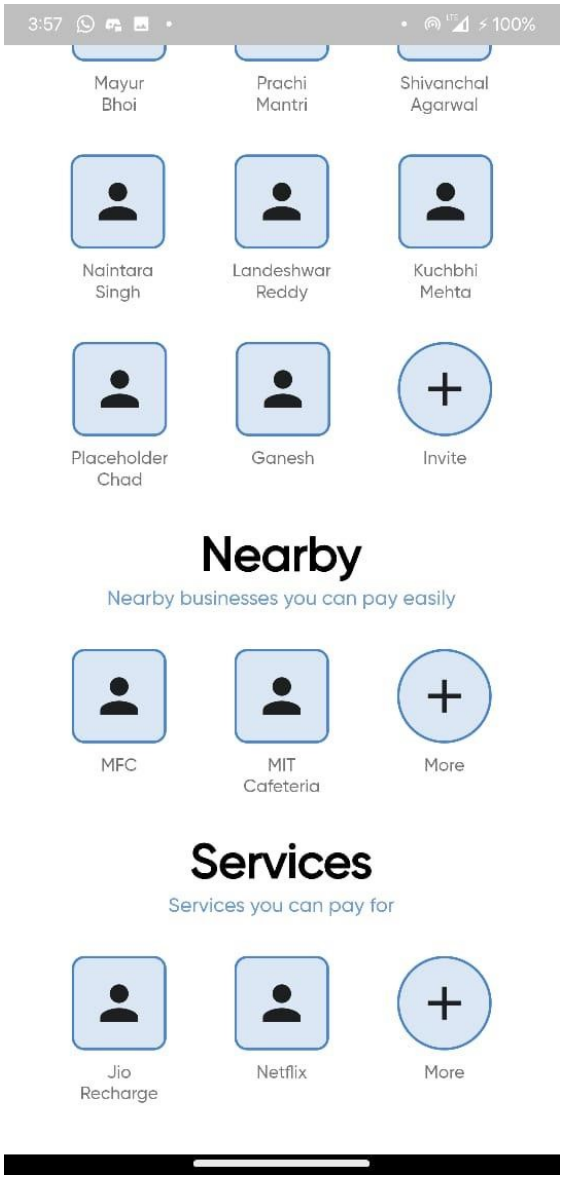
User Interface and Experience



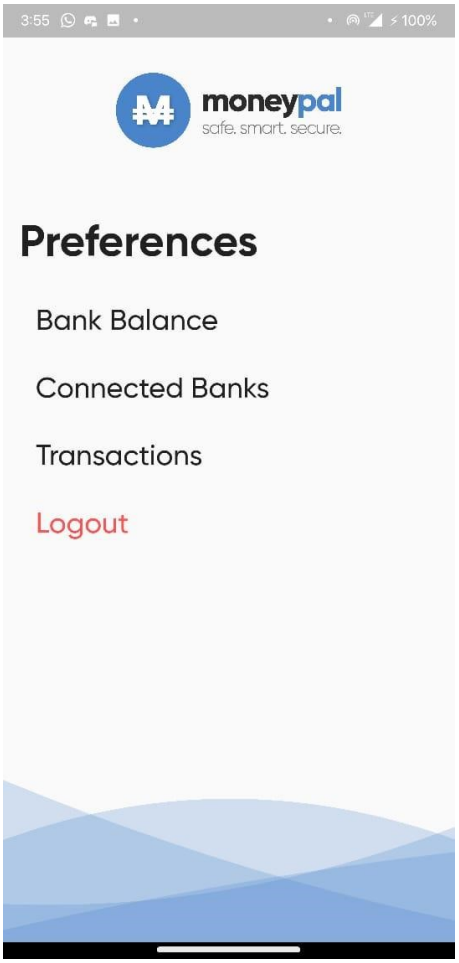


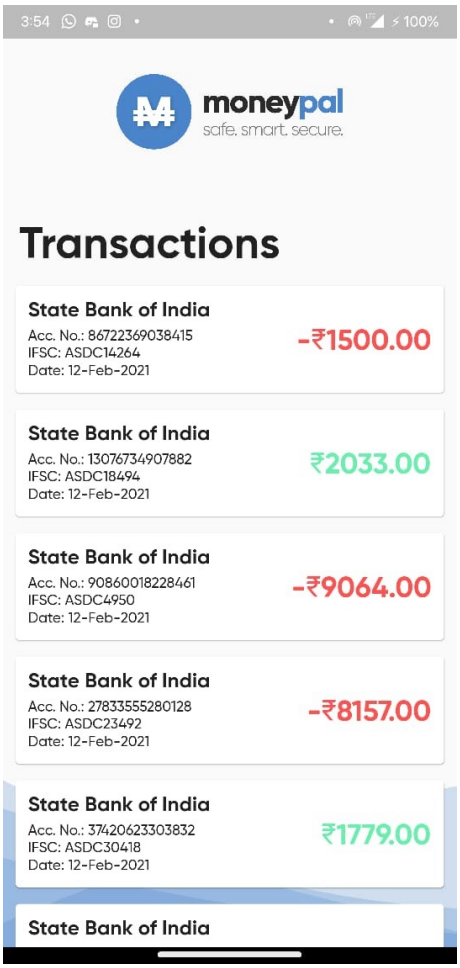
- This is the login screen and it asks the user to enter the mobile number and email for registration.
- After entering the user is prompted to another activity where he needs to enter OTP he received on the mobile number.
- The UI is user friendly and directs the user for the next steps.

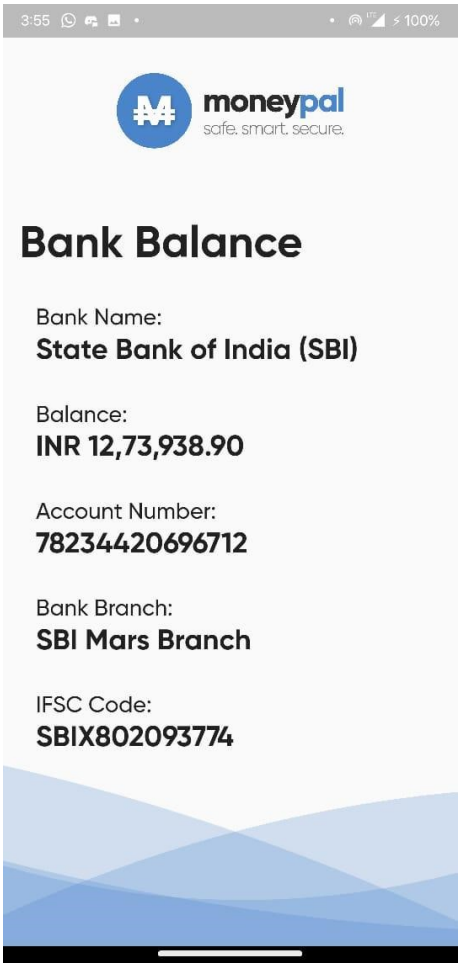




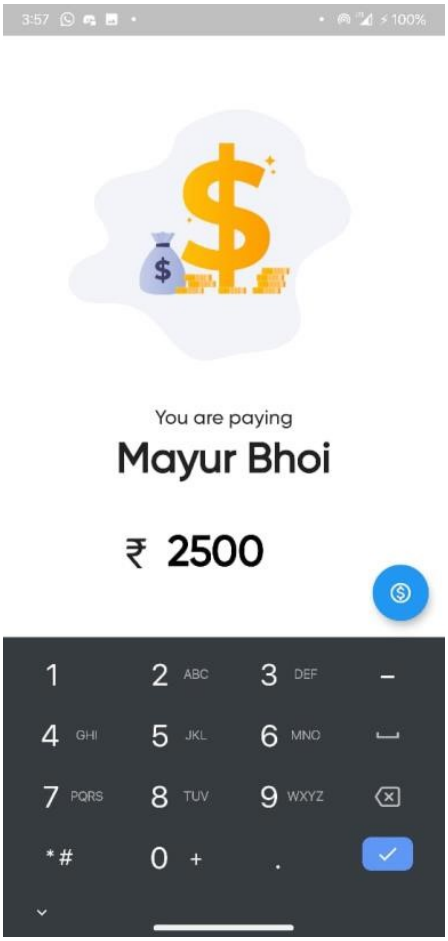
- This is the home page after the user registers and signs in successfully.
- It consists of lists of the users contact, nearby stores and restaurants, and services like recharge, Netflix etc.
- The user can edit the lists as per his choice.

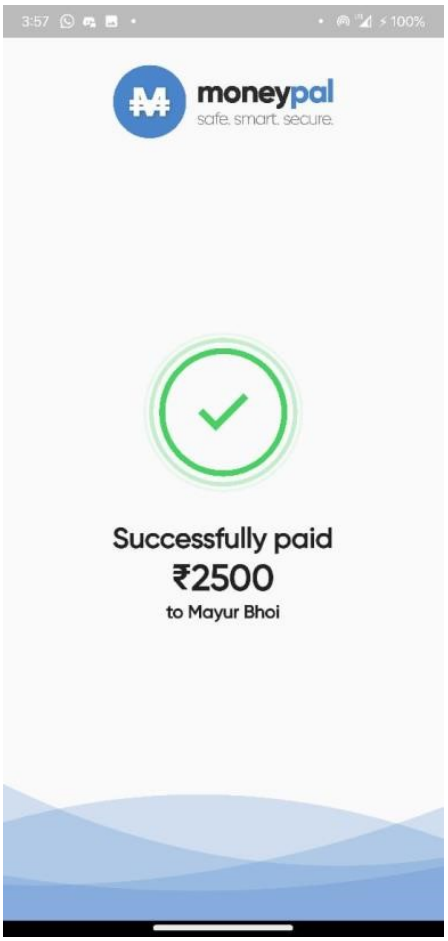


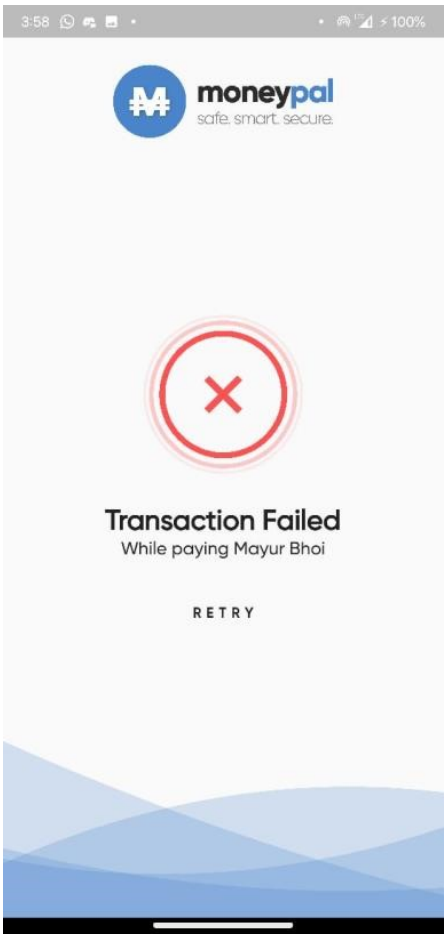




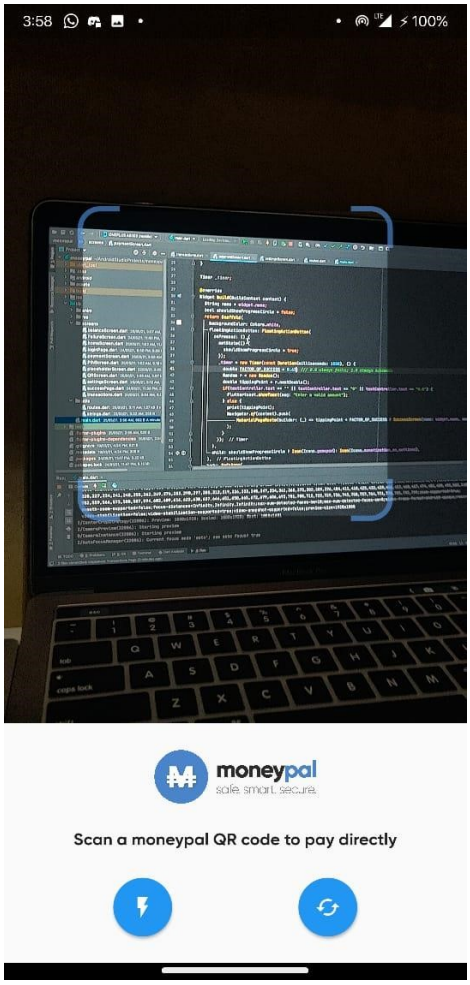
- The preferences are there for the user in which he can the records from the database.
- Details like the transactions and bank details are extracted from the Database and shown here.
- Transactions are tracked using APIs and shows the date and time when the user wants to see a particular transaction.
- On clicking Logout, the user is logged out of the system and has to login again using the mobile number and email to use the facilities.

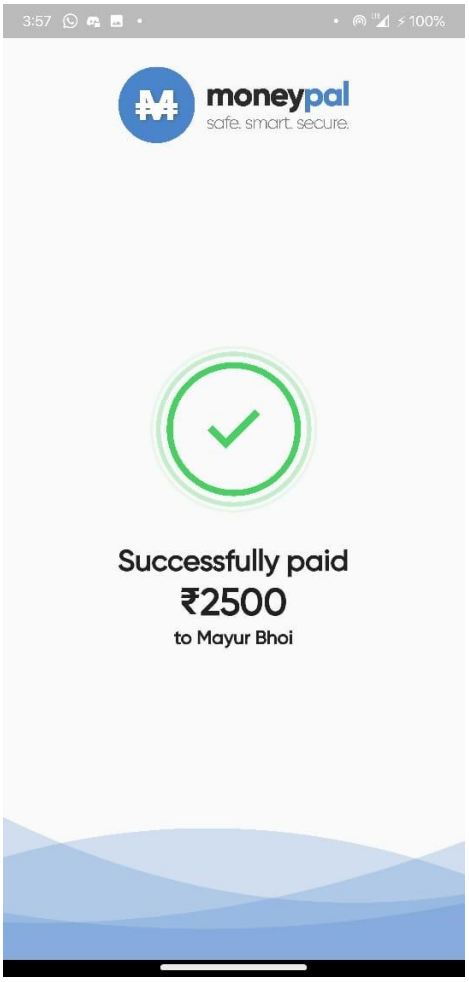






- We can pay our friends directly by entering the account. If we have balance more than the current transaction money, only then the user can send money to another user.
- When the money is sent, it takes the user to another activity to tell that the payment is completed successfully or else the page will show transaction failed if that's the case.
- If the transaction failed, the user is given an option to retry the payment and he will directed to the page rather than the home page where he again needs to find the person to pay.
- It is very easy to use as the payments are done quickly.





- This is the main attraction of our App which is the QR code.
- The App will give each user its own QR code and the user can directly scan a QR and pay directly without going and finding the person in the lists.
- The QR uses camera and the user needs to give the app permission for it and then the screen opens the camera where we need to scan a QR.
- This page has option to retake an image if the user wants.
- Each QR is unique so that distinguishes each user.

Results

- Our app is the perfect app for people living in Manipal and the features are working fine and the whole app is user friendly as it directs the user to the point where he wants to go.
- We created a video demo for our app and the link is followed: https://youtu.be/ECTVLfO3FZ4
- It is a short video showing every page and its working and making payments.

Conclusion

The purpose of this project was to simplify payments for people residing in Manipal. There are many options like GPay and Paytm and they work nicely but this can be simplified further. People living manipal are mainly students and require regular use of such applications. If a student regularly purchases from a local store of Manipal, he needs to go to the common list where all his recent payments are there and find the local store and then make payment. An alternative of this can be that the local store is already present on the top where all local stores of manipal are listed. He can directly click over there and pay. There an option if the user wants to edit that list by keeping stores of his choice. This is save a lot of time of the student where theres rush inside the stores and helps make payments faster.

Team & Individual Responsibilities

Reg. No.	Name	Roll Number	Batch
180953292	Mayur Bhoi	56	B5
180953248	Shivanchal Agarwal	46	B5

Mayur Bhoi

- Development of custom API for OTP and user data serving. Firebase compatibility and interface for the database and app.
- Design of the user interface and user experience of the app using Figma .
- Implementation of the QR code generation algorithm and screens for scanning and generating the QR codes.
- Implementation of OTP verification screens and Login/Signup screens.

Shivanchal Agarwal

- Implementation of the splashscreen and home screen.
- Implementation of the profile page that displays data fetched from servers using the custom API.
- Implementation of the paid/failed screens that appear after the transaction.
- Implementation of the GPS based nearby shop searching functionality. The app is written in Dart v2 using the Flutter App Development Framework.

Future Work

- The App is specially made for people living in Manipal as the data of some local stores and restaurants is already fed and people can add more stores as per their convenience.

- So if we want to expand the same from Manipal to any other city or place we can do that from the servers side and feed in the local places from there.

- This may require a large team and different teams for different cities but they all have 80% functionality common which is to send and receive money from specific people in their list.

References:

[1] Documentation related to Flutter: https://flutter.dev/docs

[2] Widget catalogue: https://flutter.dev/docs/development/ui/widgets

[3] Icons: https://fontawesome.com/icons

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moneypal