

Ahmedabad
University

CSE519 - Human Computer Interaction
Final Project Report

Section 1

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Group 20: **Bug Smashers**

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Chapter 1: Introduction

Motivation

As of now the government has already provided the website for booking a slot for a driving test, to apply for a renewal of driving licence, to pay the e-challan, to download and view the registered certificate, etc. but the users are not familiar with the design of the websites, so users have to apply through various agents or sometimes they have to go to RTO office for registration. So to make the world digitise we have created a 'DigiWheels' website to provide a user friendly, simple and can do all of the mentioned tasks from one website.

Overview of Project

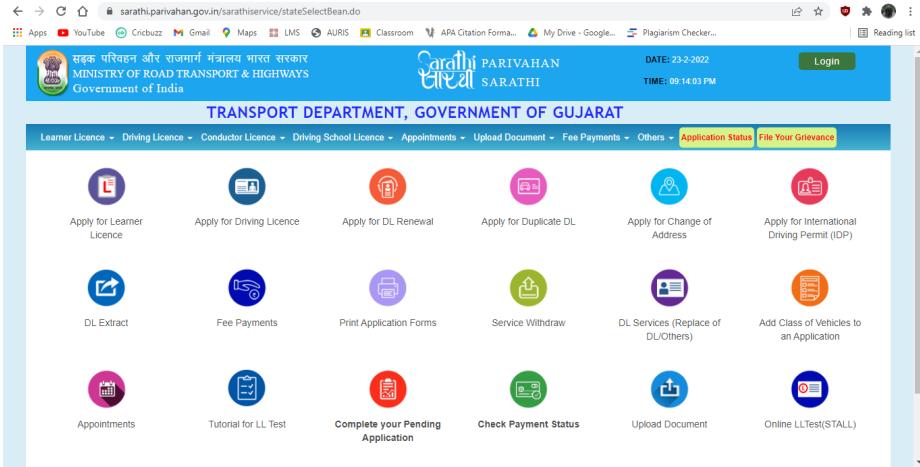
The goal of this website/application is to provide users with effortless access to the transport information along with the application for licence and other transport-related documents. A user should be able to

- apply for a new learner/permanent licence
- Renew his/her driving licence
- Save and view his/her driving licence in digital form
- View details of vehicles registered to his/her name
- View, dispute and pay traffic violation fines with his/her payment method of choice i.e. credit cards, UPI, wallets, net banking, etc.
- Apply for a special vehicle permit
- See if he/she is compliant with various traffic regulations such as a compulsory FastTag, valid PUC certificate and take necessary actions in case he is not
- And much more

Market Survey

1. Parivahan Sewa Website

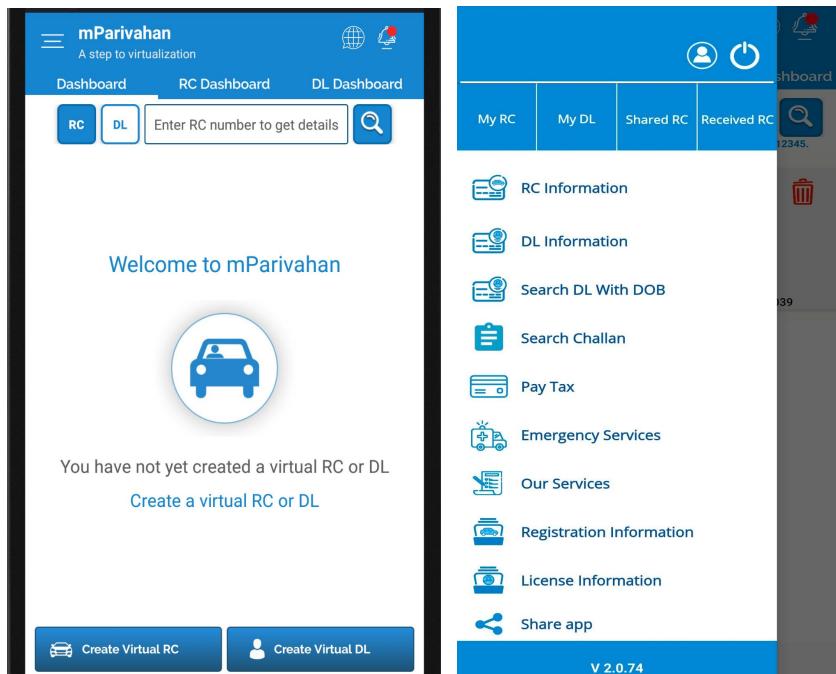
- <https://parivahan.gov.in/parivahan/>



- The website provides almost all the services required but the interaction styles are very basic and so many options in one place without any tutorials often confuses users. They take help from external sources to know the sequence of operations to be performed.
- There is inconsistency in the representation of data like data formats are different on various pages. It doesn't prevent users from making mistakes and going backwards is troublesome. There is a high payment failure rate too.
- After shifting all applications to fully online mode the process has become faster but the complexity is high for general people. Thus, reliance on technically sound fellows and agents has sprung. This can easily be solved by making a simple and interactive UI.

2. M-Parivahan Mobile Application

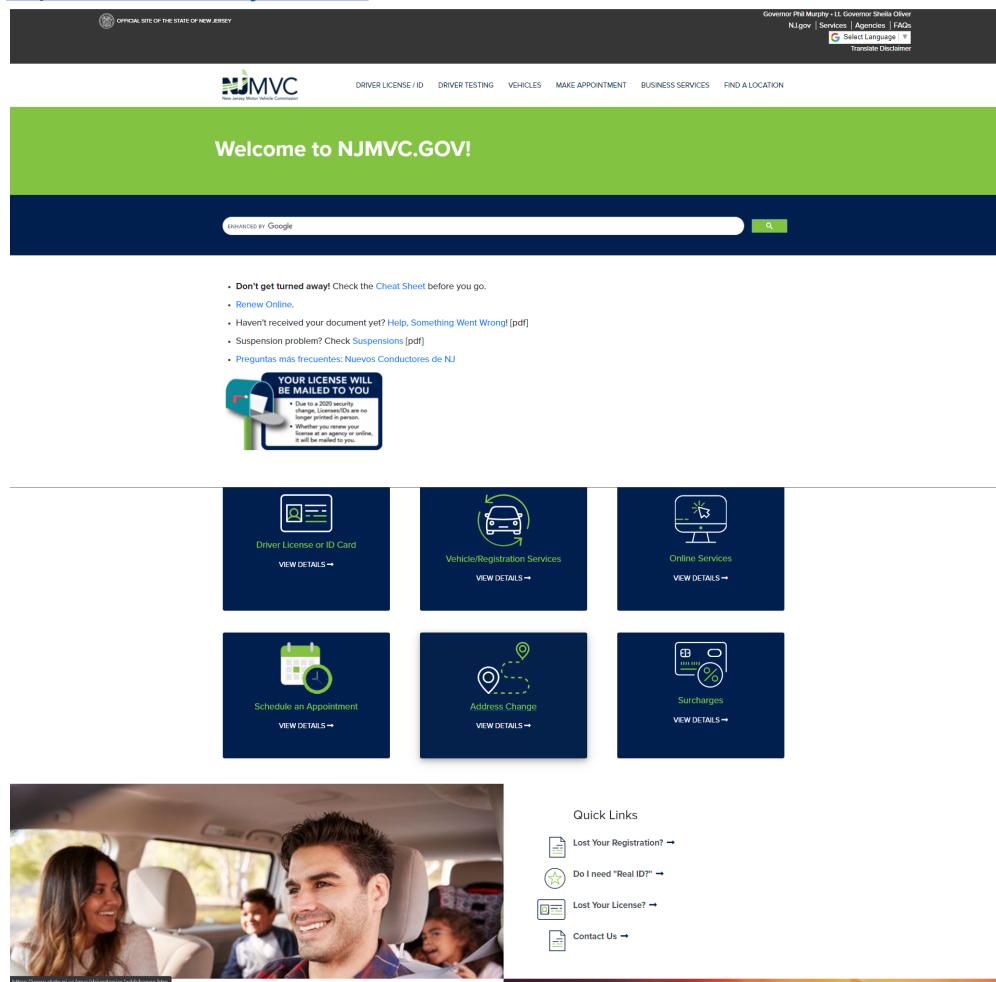
- https://play.google.com/store/apps/details?id=com.nic.mparivahan&hl=en_IN&gl=US



- After logging in M-Parivahan with the mobile number and aadhar card details, the user can save the documents related to transportation like driving licence, RC book, learner licence, etc. along with this user can pay the vehicle tax and also pay the e-challan.
- If the user doesn't know the English language, the app has also provided different language options like Hindi, Gujarati, Tamil, and Telugu. Users can also share/her RC book with family members so that they can access it.
- There is also an option for downloading the licence and RC books, so if the user has downloaded the documents he can access these in offline mode as well.
- M-Parivahan has also provided the option for searching nearby PUC centres as well as RTO centres for the driving test centres from the registered home address.

3. New Jersey Motor Vehicle Commission Website

- <https://www.state.nj.us/mvc/>



- The site provides various services related to motor vehicles i.e. licence related information, vehicle-related information, number plates, appointment booking, etc.
- The website is offered in multiple languages via google translate integration along with a prominent search bar that uses google enhanced search to derive its results
- Different sub-services are categorised into different boxes laid out in a grid that adapts to all kinds of devices such as desktops, mobiles, tablets, etc.
- Most of the subpages detail the process of getting to the desired destination but none of the work can be done online. For example, a person can't apply for vehicle registration or a driving licence online. He/She must visit the DMV. This is extremely inconvenient for simple tasks such as making payments or filling out forms.

Chapter 2: Details of Tools

Brief Description of facilities available

- Students can communicate and work together way faster with real-time collaboration using Figma
- If a person doesn't have prior knowledge about how to do coding then he can make a website or a mobile application
- Because of easiness and flexibility in making the website or mobile application students can gain consistency across the project and also save time.
- Perform repetitive tasks with the help of plugins and even create them for public or organisational use.

Comparison table with other tools

Feature	Figma	Adobe XD	Sketch
Collaboration	Real-time collaboration	Real-time collaboration on projects synced to the cloud	Real-time collaboration for MacOS Sketch subscribers
Platform	Cloud-based with desktop apps for Mac and Windows	Desktop app in sync with Adobe Creative Cloud	Exclusive MacOS
Vector Manipulation	Vector networks, allowing multiple lines to connect a single point.	The sequence of Connected Points - Nodes	Sequence of Connected Points - Nodes
Plugins	Own library of plugins in the developing stage	Both native and 3rd party plugins but fewer options	Huge amount of 3rd party plugins for almost any functionality

Chapter 3: Project Planning and Preparation

Part 1

Paper-Pen Design

Screen 1: Slot Availability

SLOT AVAILABILITY						
Select State : <input checked="" type="checkbox"/> Gujarat						
Select RTO : <input checked="" type="checkbox"/> Ahmedabad						
Number of available slots for each day :						
<	April 2022					>
S	M	T	W	T	F	S
					1 2 0 0	
3	4	5	6	7	8 9 5 0	
10	11	12	13	14	15 16 16 17 15 18 8 2	
17	18	19	20	21	22 23 26 22 24 28 8 5	
24	25	26	27	28	29 30 30 33 28 32 12 7	

Holiday on Sundays

 Booked

 Filling Fast

 Available

Screen 2: Application Status

APPLICATION STATUS

Enter Application Number : 123456

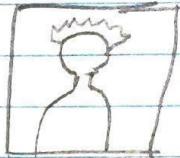
Enter Date of Birth : 09-02-2001 Calendar

Submit

Name: Moksh Doshi

RTO : Ahmedabad

License: a-J011234567



Services Requested :

1. - - -

2. - - -

Steps Completed :

1. - - -

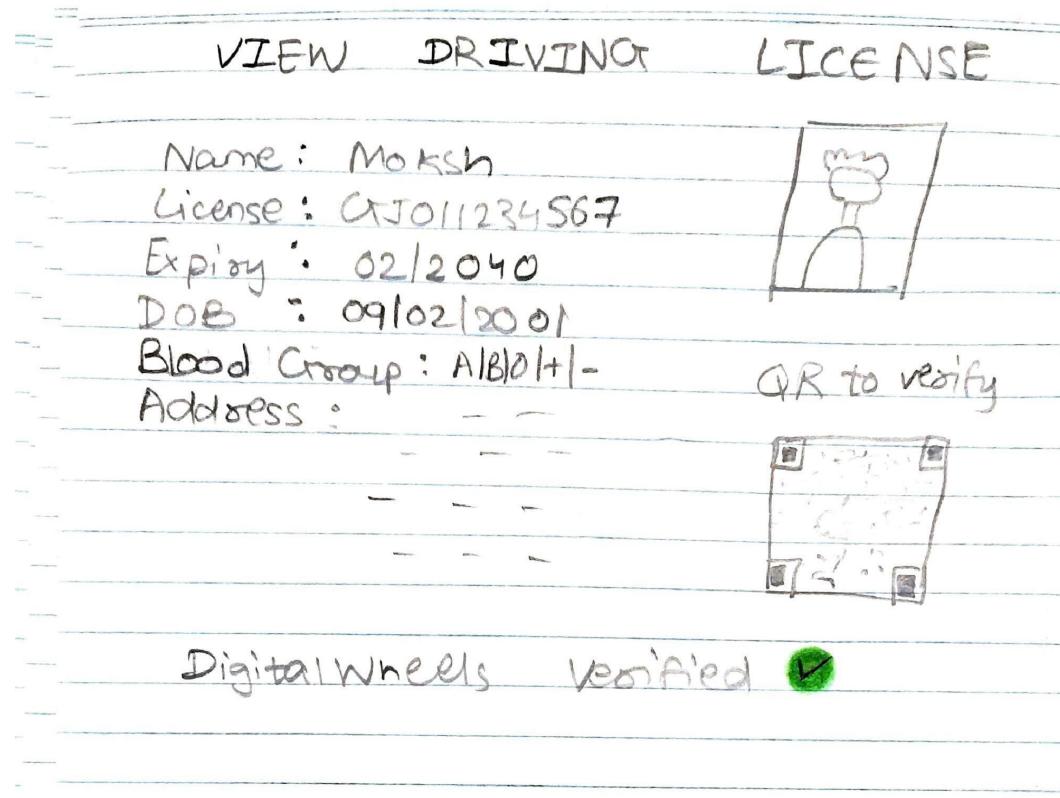
2. - - -

Current Status : - - -

Steps Remaining :

1. - - -

Screen 3: View Driving Licence



Persona

Name: Parth

Quote: To run business effectively, I need to maintain client relations.

Bio: Parth is a newly turned adult and has just joined his father's auto parts business in XYZ city. He is keen on taking new responsibilities and keeps on touring throughout the state he lives in to meet his clients' needs. He enjoys a good social life with his friends and family and often meets them post office hours.

Behaviour:

- Likes to work hard for office purposes
- Needs to drive for long distances regularly and is fond of it

Goals:

- Business growth and betterment of brand name
- Manage government documents for his family

Pain Points: He knows about new applications and trends because of social media. However, not being from a technological background, things get difficult for him when operating them becomes too technical.

Personality: Extrovert, Intuitive, Feeler and Perceiver

Brands: MRF, Instagram, DigiLocker

Scenario Description

The user wants to book an appointment for the RTO exam. He wants to see all the possible dates on which he can book along with his preferred time. He does not know the possible places he can go. Nor does he know whether he is allowed at this stage or not. He may want to see it for more than 1 month as there could be other family members or friends for whom the step can become valid later. He may just visit to check now and book later after gaining further clarity.

Use Case Description

A use case for the above-described scenario would be

1. The user selects the applied state.
2. User selects the preferred Regional Transport Office (RTO) inside the selected state.
3. Colour coded availability of the current month is shown.
4. User selects an available date and time slot.
5. User enters application number
6. The user is asked to confirm the request
7. Appointment acknowledgement is provided

Alternative Cases:

3.1 User switches month using arrows at top

4.1 User selects a fully booked slot

4.2 Error message is displayed

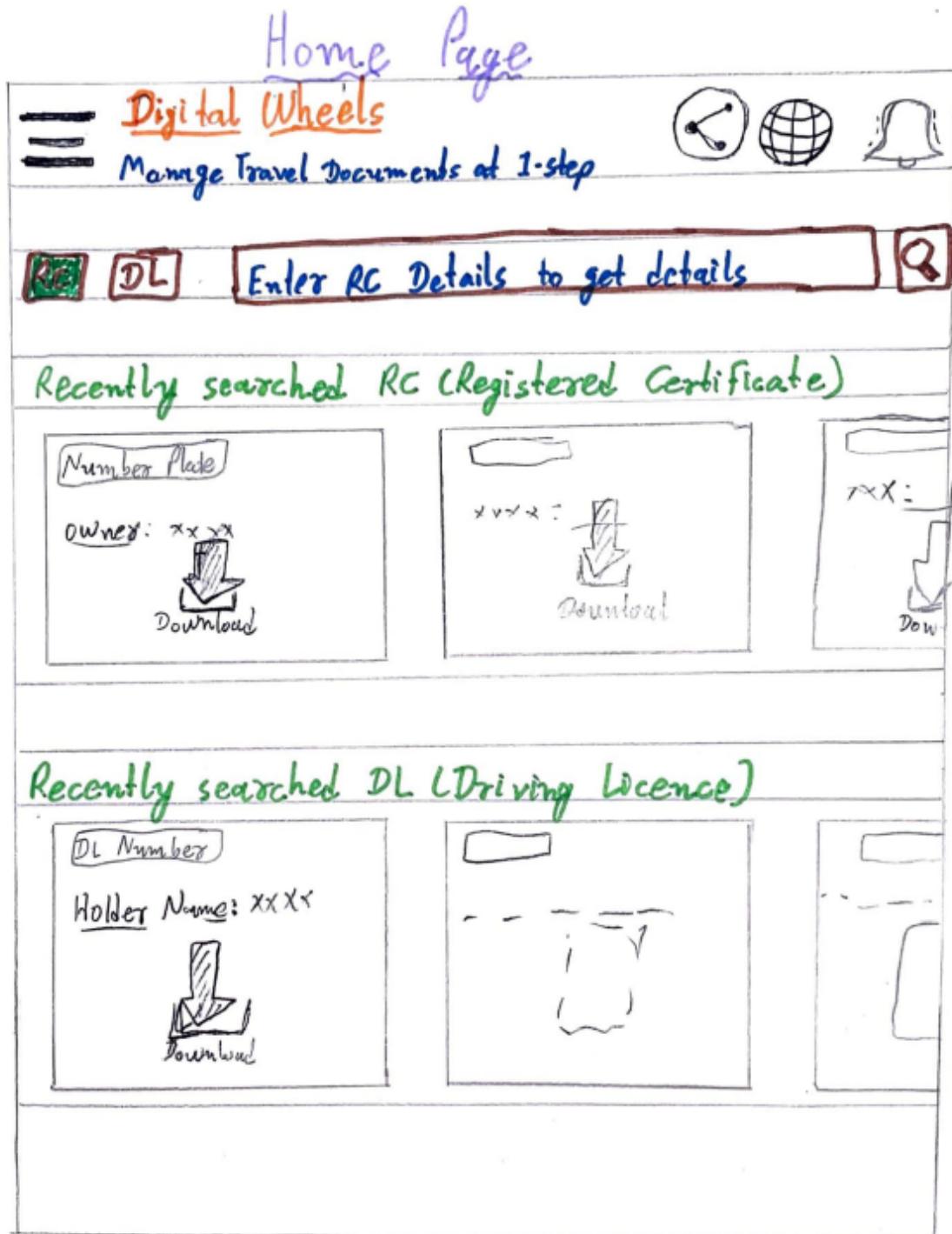
5.1 User is early for request or enters invalid application number

5.2 Redirection to home page

Part 2

Pen-Paper Design

Screen-1: Home page of website



Screen-2: RC Book detailed page

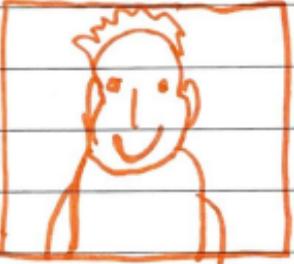
RC Book

GJ01ME 0638


Status as on
March 03, 2020
06:32 PM

Owner Details

Name : Jatin Sapru
Son/Daughter/Wife of : Natu Patel



Chassis No: M64JC ZQ 32590J2

Engine No: JC66327018

Vehicle Maker Company : Honda Cars India
Model Name: Activa 199cc

Issue date: Sep 07, 2012 Expiry date: Mar, 2020

Fuel Type: Petrol Colour: Black

Registration Center: Ahmedabad

Screen-3: E-challan payment

E-challan payment

Enter the vehicle no. plate (GJ01XX1234)

GJ01EF0378
Challan details

Unpaid Challans +

No Records Found! :)

Paid Challans Receipts -

Sr No.	Challan Date	Notice Number	Amount	Status	Print
①	23/09/18	123456	500	Paid	<input type="button" value="Print"/>
	→ Red light violation				
②	30/10/18	910112	1000	Paid	<input type="button" value="Print"/>
	→ Red light violation				
③	03/03/20	135799	100	Paid	<input type="button" value="Print"/>
	→ Helmet violation				

Persona

Name: Vedant

Quote: Want to manage all the family documents like Aadhar card, pan card, driving licence in single app

Bio: Vedant is the only son in his 3-person family. His father and mother are old aged people so they do not know how to manage and save documents on the phone or in the app so Vedant wants to help them by saving all the documents of his own, his father's as well as his mother's documents like Aadhar card, pan card, driving licence, RC book so that he can share it with his parents for the easiness in case the documents needed. He is 27 years old and works in an IT company. He basically has a computer engineering background.

Behaviour:

- He enjoys spending time with his family and after that with his close friends.
- He loves to play cricket on weekends early in the morning with his friends.
- He is a passionate coder who does his job with full enthusiasm and gives his 100% of the effort during office hours to any type of work.

Goals:

- To manage the government authorised documents for his parents
- Wants to make his own new private firm in the IT sector after 5-10 years

Pain Points: He loves to spend time with his family and friends and wants to go out with them but he is not earning enough so he can go out. Because of this even he cannot throw a party at home because of a lower salary.

Personality: Introvert by birth, Intuition because of engineering background, perceptive and thinker.

Brands: Shakti IT firm, Google Drive, Digi locker, M-Parivahan

Scenario Description

The challan receipt for the 2-wheeler has come home for his father's red-light violation while going to a shop to buy the groceries for the home as his mother doesn't know how to drive 2-wheeler or 4-wheeler. His father does not know how to pay the challan so he asks his son to pay for it. He does not earn too much money from his job because he is doing a job in a small Shakti IT firm. So, for the challan payment he wants to pay it online but he just wants to check if there are any other challans remaining or not so that he can save the money from his salary next month and can pay the amount for the e-challan.

Use Case Description

Use case for the described above scenario is mentioned below:

1. User go to the e-challan website
2. User enters the vehicle number plate in the full format (i.e GJ01MExxxx)
3. If the entered number plate is valid then the 'correct number plate entered' message will pop up and user will be directed to another page
4. In this page the challans which are pending to pay will be shown
5. User clicks on Pay now option
6. User enters the mobile number and a message for the payment will be sent
7. After successful payment message of "successful payment" will be prompted
8. Receipt will be sent to user mobile number and will be visible on the website as well

Alternative Cases:

- 2.1.1 If the entered number plate is wrong then message of "Wrong number plate entered" will be prompted
- 2.1.2 User will be redirected to the web page number 2 again

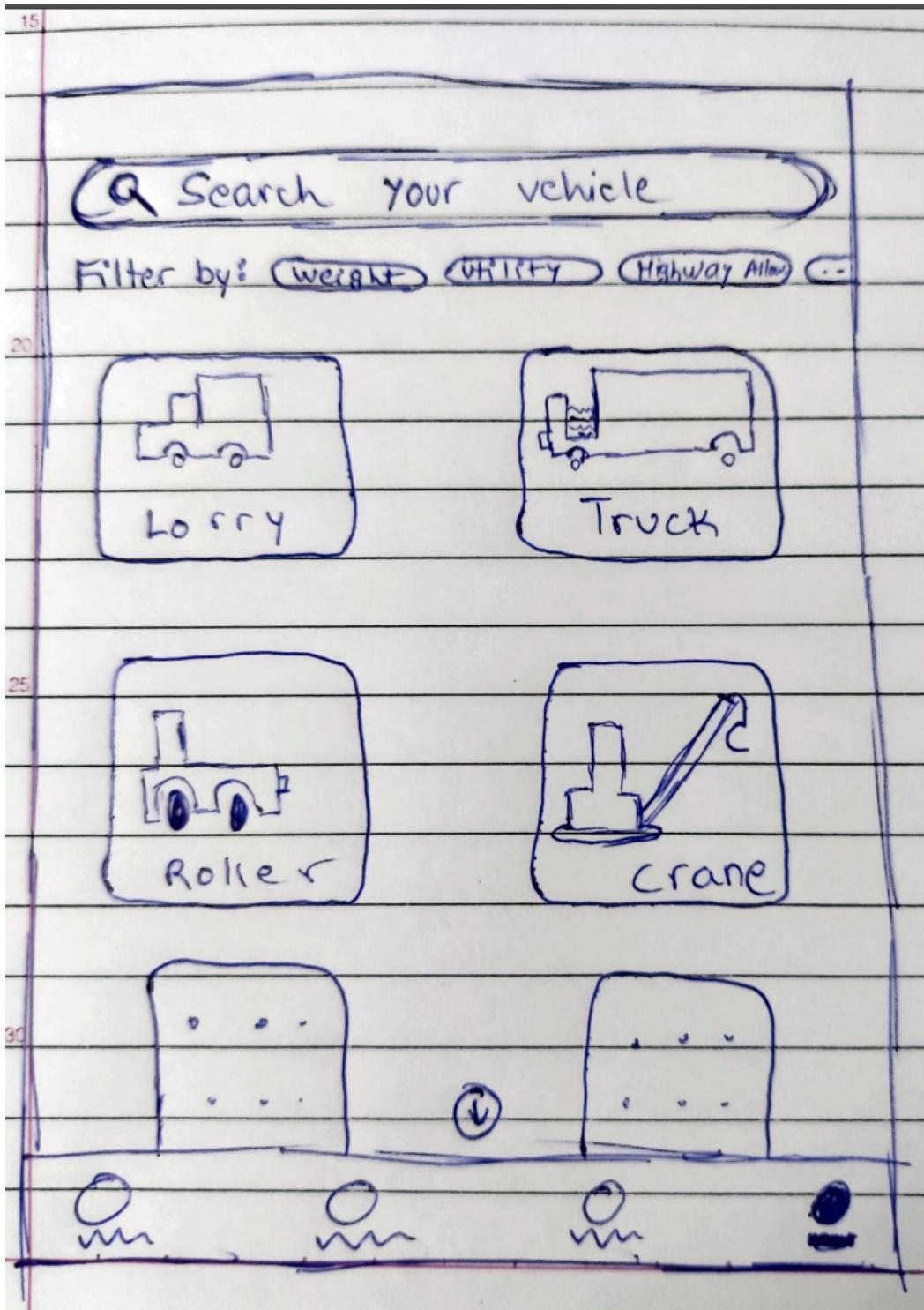
4.1 If no challans are remaining for the entered number plate, then message of "No pending challans" will be displayed

- 7.1.1 If payment failure occurs error message will be displayed
- 7.1.2 User will be redirected to the payment page again
- 7.2 in case of successful payment receipt will be sent to registered mobile number

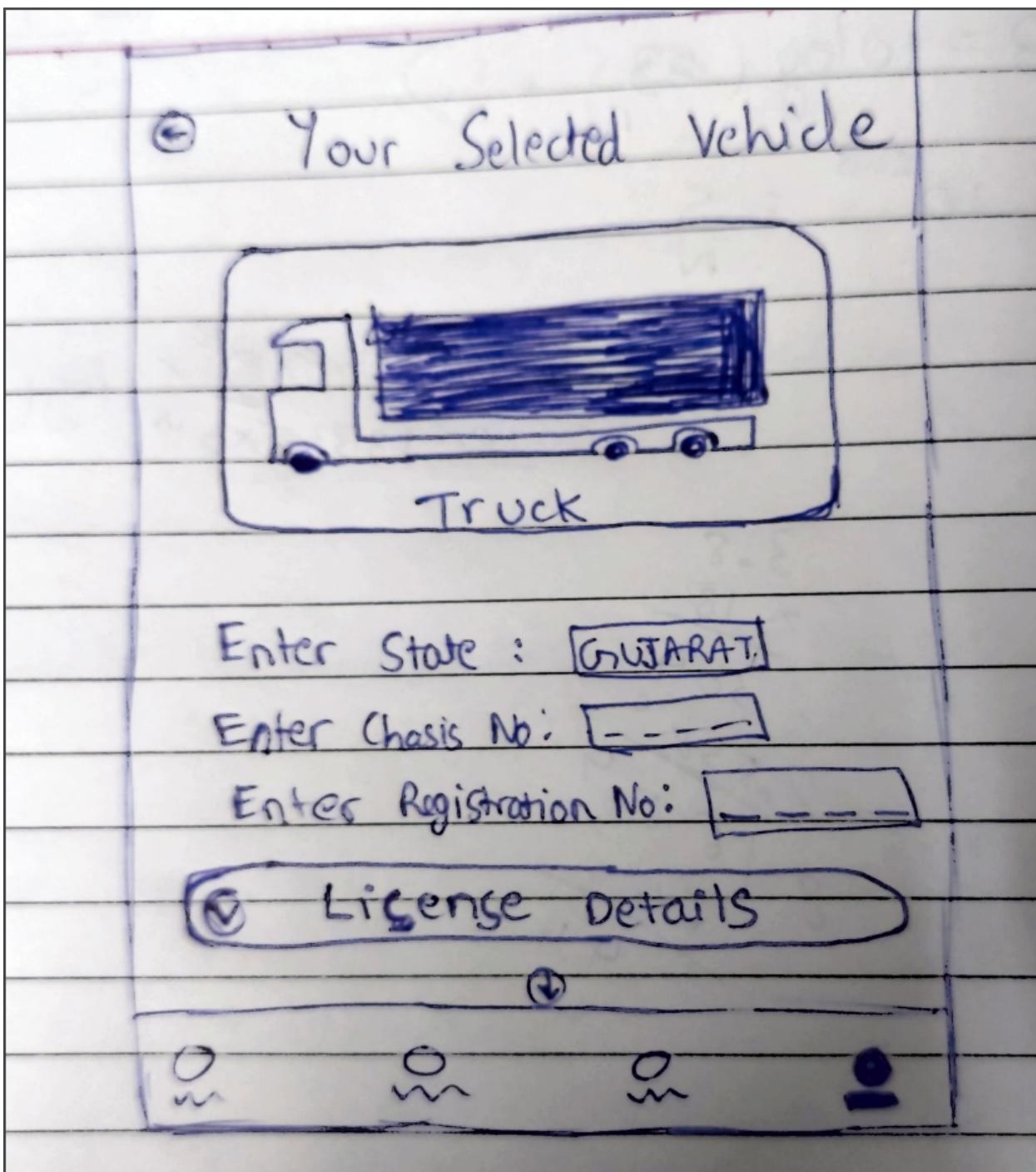
Part 3

Pen-Paper Design

Screen 1: Search>Select Special Vehicle



Screen 2: Enter Details



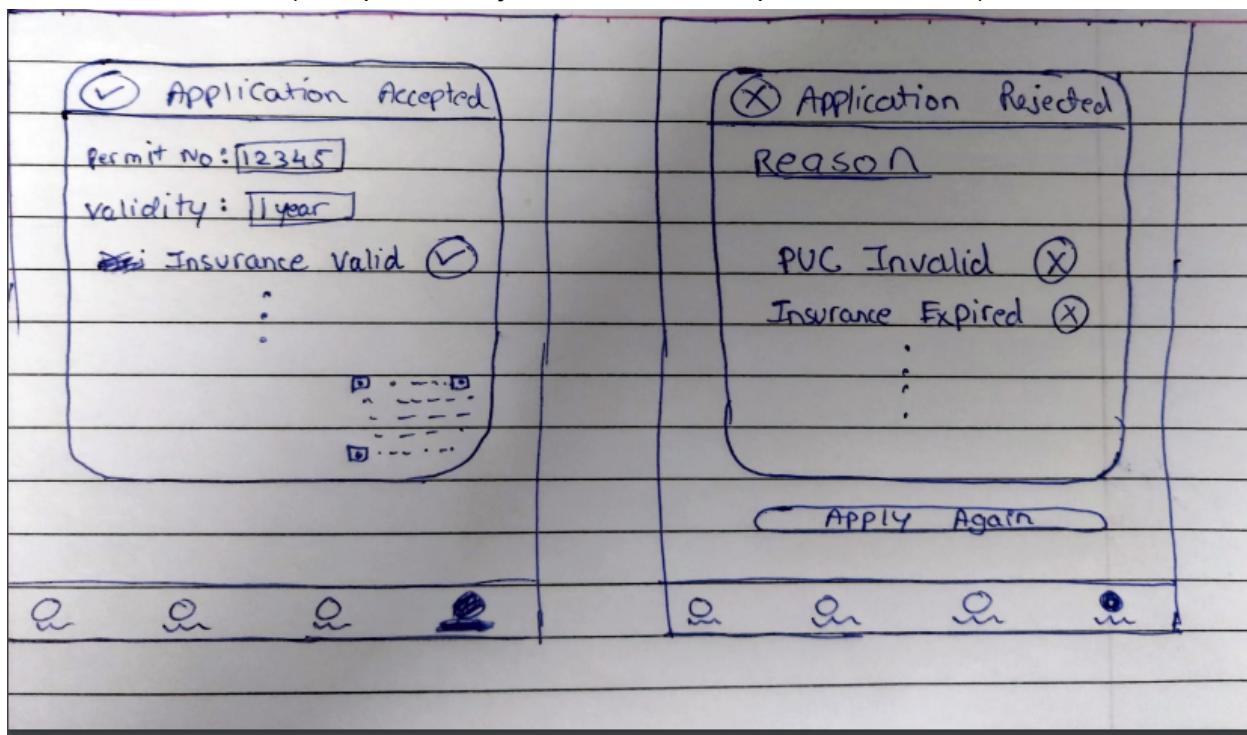
Screen 3: Enter Details (continued - scrolled down)

The image shows a hand-drawn wireframe of a mobile application screen. The screen is divided into five horizontal sections, each containing a circular icon with a symbol and text. The first four sections are grouped together by a large rounded rectangle.

- License Details**: Contains a checkmark icon and the text "License Details".
- Registration Details**: Contains a checkmark icon and the text "Registration Details".
- Insurance Details**: Contains a question mark icon and the text "Insurance Details". Below this section, there is a form field labeled "Policy Num: -----".
- PUC Details**: Contains a crossed-out checkmark icon and the text "PUC Details".
- Application Status**: Contains a question mark icon and the text "Application Status".

At the bottom of the screen, there are four small icons: a person, a gear, a magnifying glass, and a plus sign.

Screen 4: Final result (Accepted or Rejected Screen with qr code or reason)



Persona

Name: Hritik

Quote: Work smart not hard. Efficiency always trumps over brute force

Bio: Hritik is an entrepreneur who has just started a company of his own. He is extremely busy in day-to-day management of the newly setup business. Staff is limited so Hritik has to multitask in order to grow his business. It is difficult for Hritik to allot a moment for menial tasks, let alone his social life. However, this is improving as investors have provided seed funding which has enabled Hritik to offload some of his responsibilities to new hires.

Behaviour:

- Very loyal to close friends and family
- Likes to solve difficult jigsaw puzzles and Rubik's cubes'

Goals:

- Manage tasks more efficiently such as paperwork, appointments, etc
- Make a long-lasting global impact through charitable efforts

Pain Points: Hritik gets very frustrated when something requires more than a couple of steps to do. He prefers to do things in the most efficient manner i.e., in his way. Things such as delay in issuance of government documents related to transport makes him think that the system doesn't cater to people like him.

Personality: Extrovert (can be ambivert sometimes), Sensing (only acknowledges hard and fast facts), Thinking and Judging.

Brands: Zerodha, Apple, BHIM UPI

Scenario Description

A user wants to apply for a special vehicle permit. He has a vehicle type in mind with various properties such as its dimensions, weight and load capacity. He is not sure whether that specific vehicle is allowed on state/national highways & expressways or not. He would also like to check the compliance of his vehicle with the government-mandated rules such as compulsory PUC certificate, special licence plate, whether Fast Tag is required or not and many more rules.

Use Case Description

A use case for the above-described scenario would be

1. User selects his/her desired vehicle
2. User selects the state in which that specific vehicle is registered
3. The user enters the details of his/her vehicle such as chassis number, registration number, etc
4. User can now see which criteria are fulfilled and which criteria should be fulfilled
5. User uploads the required documents
6. After successful submission, acknowledgement receipt is displayed
7. After confirmation final result is displayed

Alternative Cases:

- 1.1 User can select his/her vehicle via search or other filter options
- 1.2 Closest option to the user's criteria can be suggested in case nothing is found

- 4.1 Criteria which are fulfilled are displayed beside a green checkmark
- 4.2 Criteria which is not fulfilled is displayed beside a red cross
- 4.3 Directly redirect to the page where said criteria can be fulfilled

7.1 If the application is accepted then success message with relevant permit in digit form is displayed

7.2 If the application is denied then failure message with steps to rectify the application is displayed

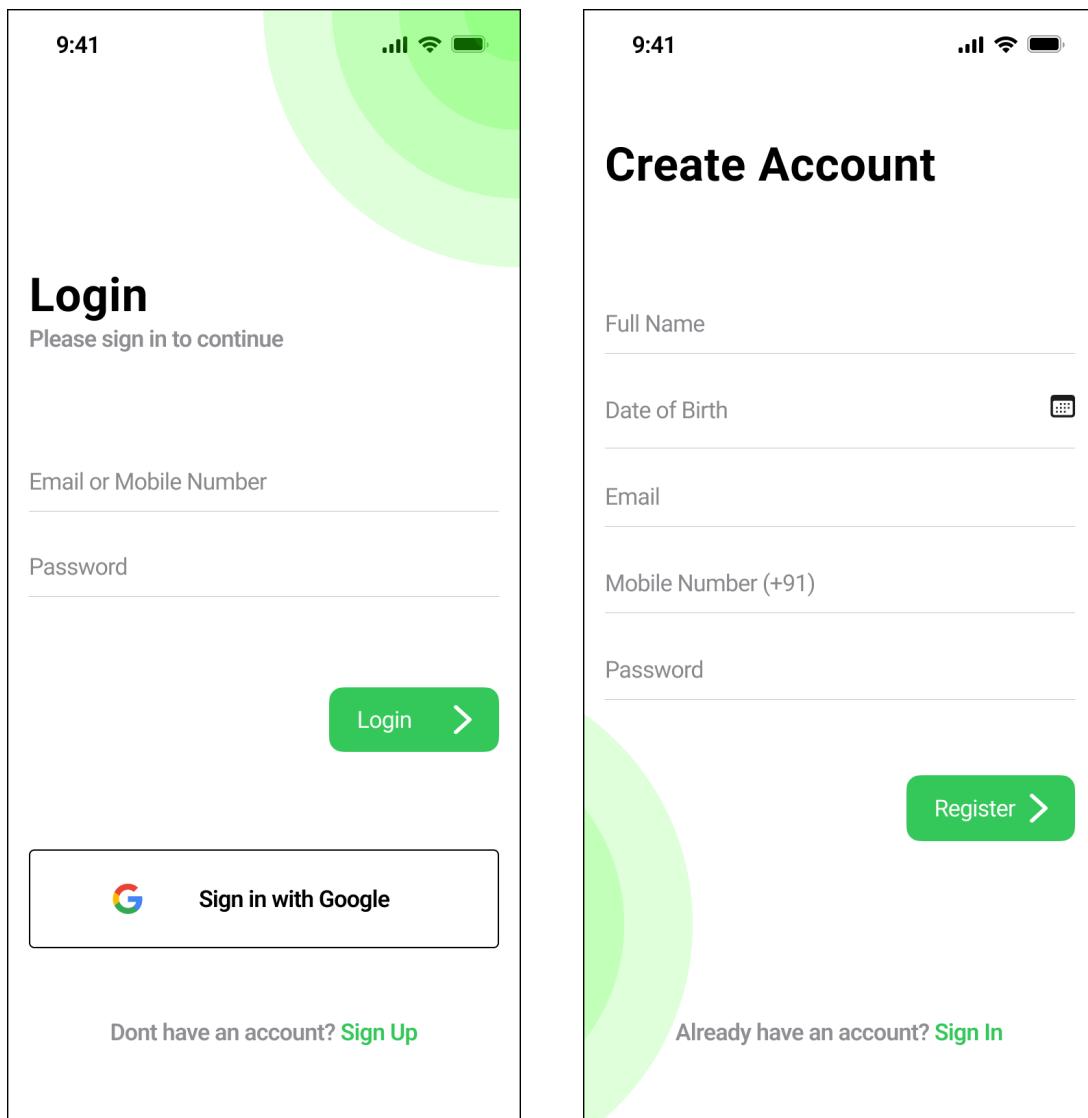
Chapter 4: Project Features

1. Login/Registration

Functionality

It will allow new users to create an account in the “DigiWheels” mobile app by providing basic details like Full Name, Date Of Birth, Email , Mobile Number and Password. Registered users can directly login through Email/Mobile Number and password or through the Gmail account which was used at the time of registration.

Photos of the implementation



Universal Usability

- **Diverse Cognitive and Perceptual Abilities:** If the user has already registered for the “DigiWheels” application then the next time user will be able to Log In through a mobile number/Gmail id. It will help users to save time and it will reduce their mental load of the user. If not, then the user may need to register once (to create an account) then the application remembers the details so the user may not need to log in every time he/she opens the application

Design Principles

- **Consistency**
 - Similar fields are provided to enter similar data
 - Buttons and their design are kept rectangular in shape with curved edges and placed at end of form on the right end side
 - Relevant hyperlinks are placed at bottom along with a sense of what they lead to.
 - The green colour is used to signify themes or any primary or secondary action elements.

Interaction Style

Form Fill in by filling 3 text boxes of Full Name, Email and Password and a numeric input for Mobile Number.

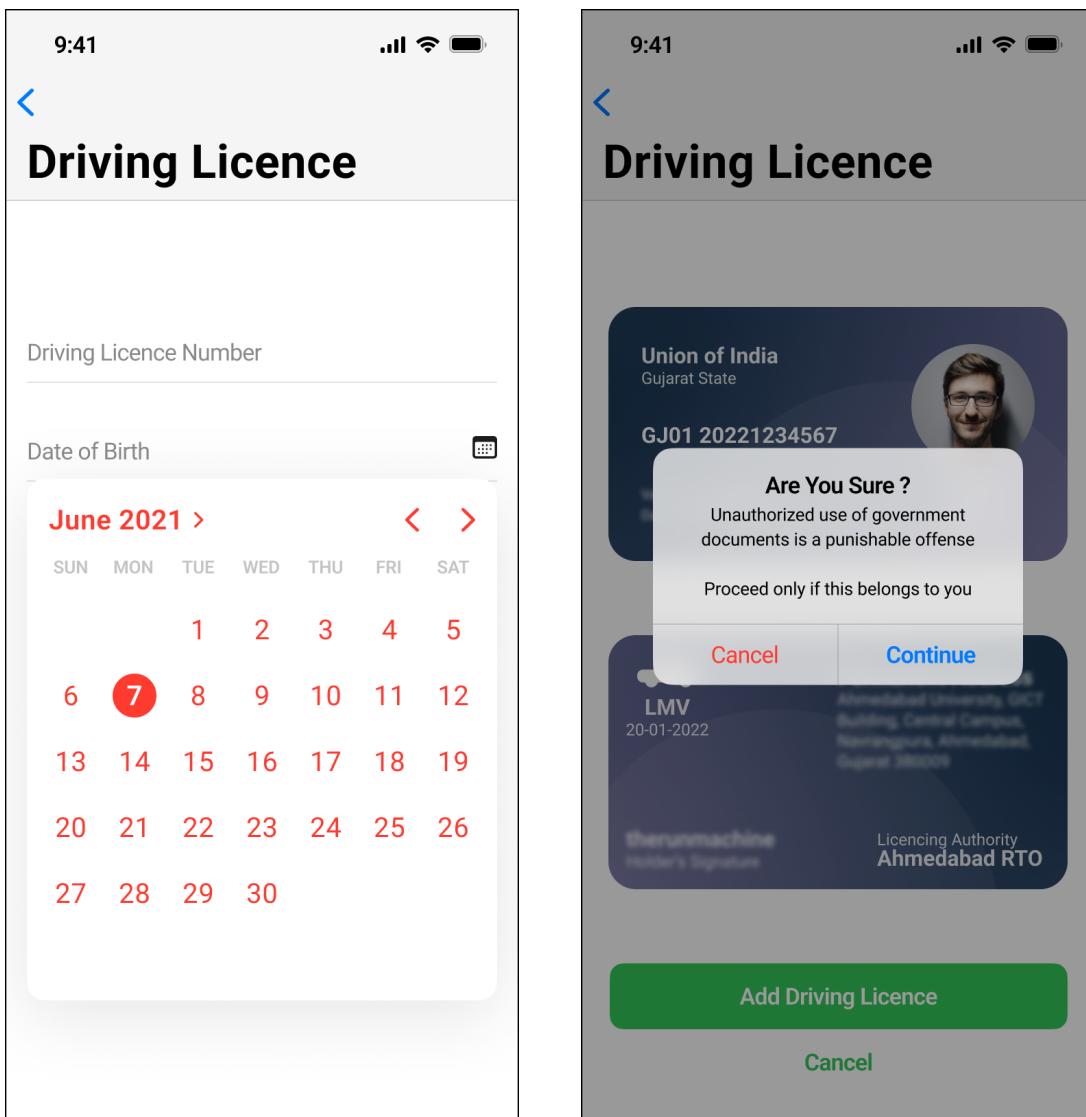
Menu Selection for selecting the date of birth from a calendar table.

2. Add Driving Licence

Functionality

Users can search for their driving licence by entering vital details like licence number and date of birth. If matching is found, one can view the driving licence on the application page in masked form. After confirming that it belongs to him/her, one can permanently link it to their account.

Photos of the implementation:



Universal Usability

- **Diverse Cognitive and Perceptual Abilities:** We have provided the option to select the date of birth from the calendar so that there won't be an issue with the date format. Here we are providing the information in the English language which is widely used all over the world and also it will help in better language communication.

Design Principles

Prevent Errors - Even after obtaining correct details and displaying the masked document, it confirms once again from the user if he owns and wishes to add it to his account to prevent him from using someone else's data by mistake.

Interaction Style

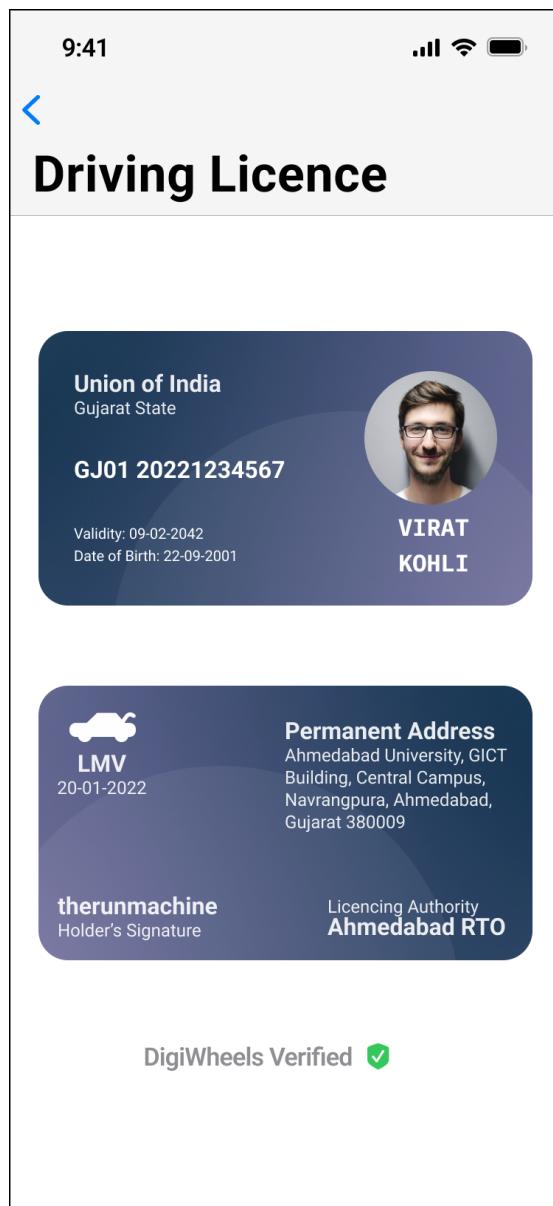
- **Form Fill in** by filling a textbox for an alphanumeric Driving Licence Number.
- **Menu Selection** for selecting the date of birth from a calendar table.

3. View Driving Licence

Functionality

After creating a virtual licence by using the “Add Driving Licence”, the user can view the digital version of his licence anytime in the presence of internet connectivity. This will present data from a government authorised database and will free the user from carrying the physical copy of his licence. A DigiWheels verified licence can be shown for verification purposes and will hold equal value according to the IT Act 2000.

Photos of the implementation



Universal Usability

- **Cultural and International Diversity:** The licence details are provided in the numeric data, in the date format as well as in the symbolic representation so that anyone can recognise the driver's identity and its validity by looking at the driving licence.
- **Diverse Cognitive and Perceptual Abilities:** It will free the user from carrying the physical copy of his licence. It will solve the problem of carrying it in the wallet.

Design Principles

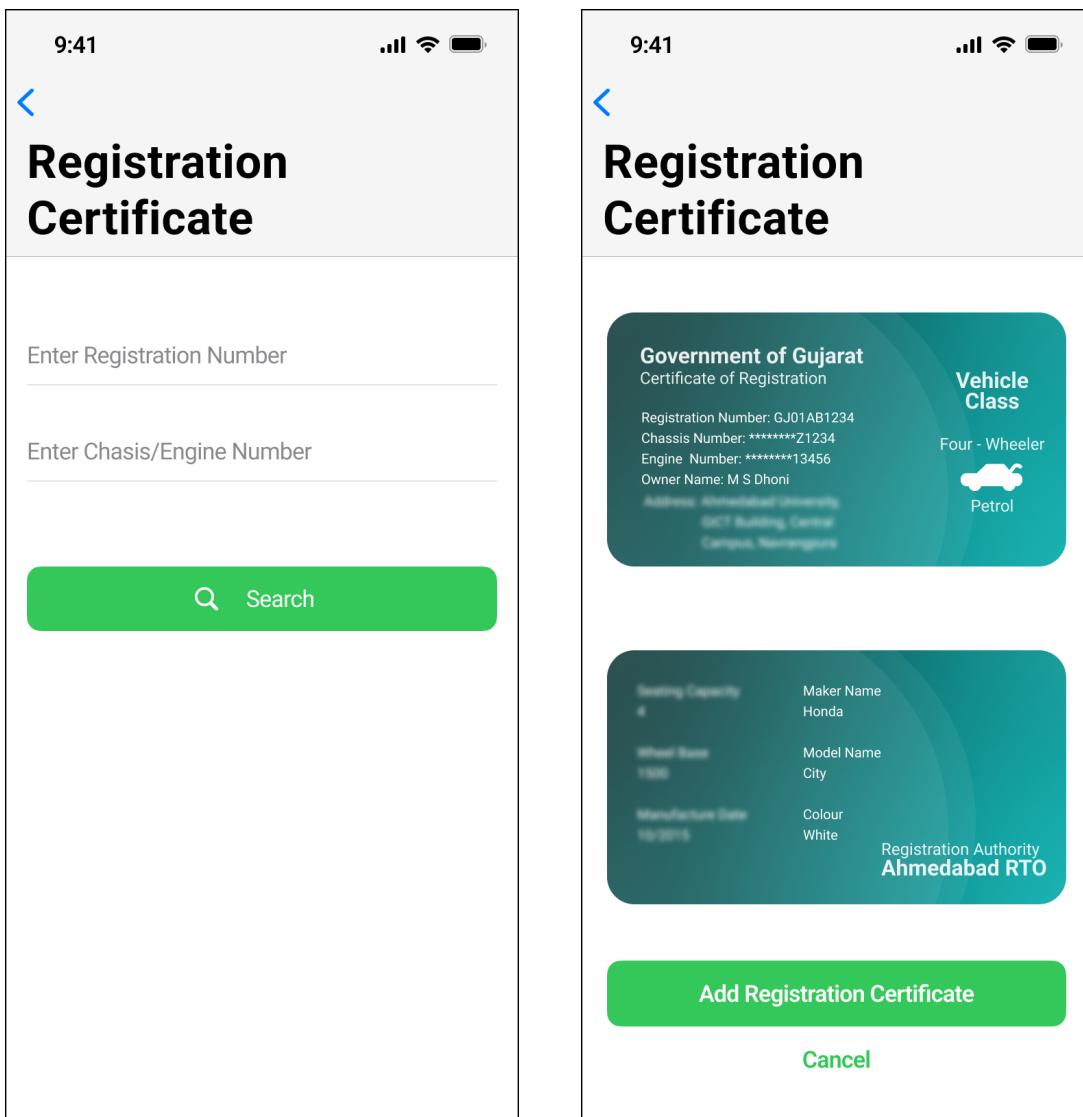
Reduce Short Term Memory Load - Once the licence is added by filling required details, the user just visits his virtual dashboard and fetches his document without the need of remembering any information.

4. Add RC book

Functionality

User can search his registered book of the vehicle by entering vital details like vehicle registered number plate and Chassis number/Engine number. If matching records are found, one can view the RC book on the application page in masked form. After confirming that it belongs to him/her, one can permanently link it to their account.

Photos of the implementation



Universal Usability

- **Diverse Cognitive and Perceptual Abilities:** The application uses various typographies to indicate the hierarchy. This way even a user who is not well versed in technology or people who have some perceptual disabilities can easily get accustomed to the minimalist and spacy yet informative interface without any significant mental load.

Design Principles

Prevent Errors - Even after obtaining correct details and displaying the masked document, it confirms once again from the user if he owns and wishes to add it in his account to prevent him from using someone else's data by mistake.

Interaction Style

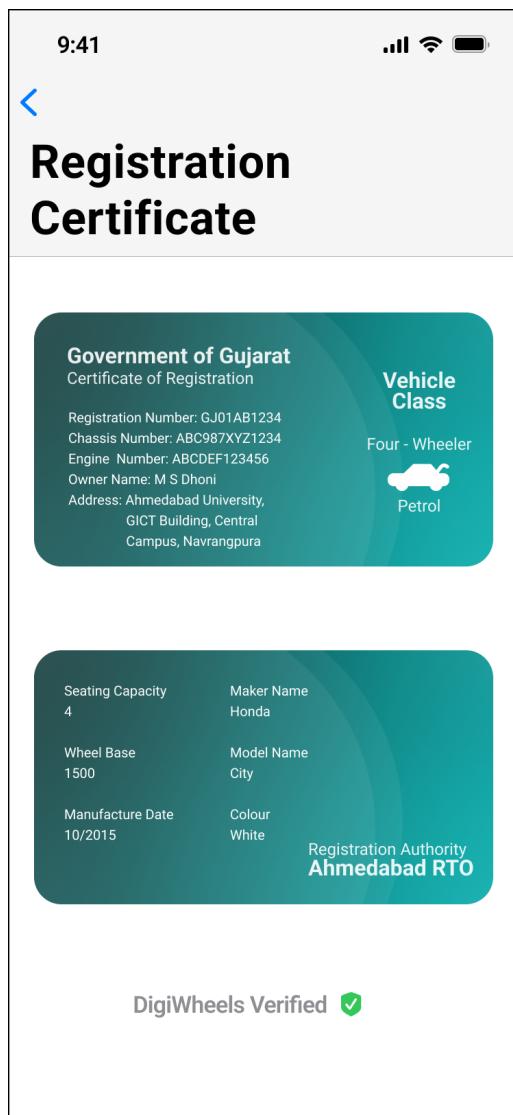
Form Fill-in by filling 2 textboxes for alphanumeric Vehicle Registration Number and either of Chassis or Engine Number.

5. View RC book

Functionality

After creating a virtual RC book by using “Add RC Book”, a user can view the digital copy of his registration certificate anytime in the presence of internet connectivity. It will be authorised from a government database and eventually help users be free from carrying the physical copy of the Registered Certificate of their vehicle. A DigiWheels verified RC will be a valid document for verification purposes.

Photos of the implementation



Universal Usability

- **Cultural and International Diversity:** The RC book details are provided in the numeric data, in the date format as well as in the symbolic representation so that anyone can recognise the driver's identity by looking at the driving licence.
- **Diverse Cognitive and Perceptual Abilities:** It will free the user from carrying the physical copy of his RC book. It will solve the problem of carrying it in the wallet.

Design Principles

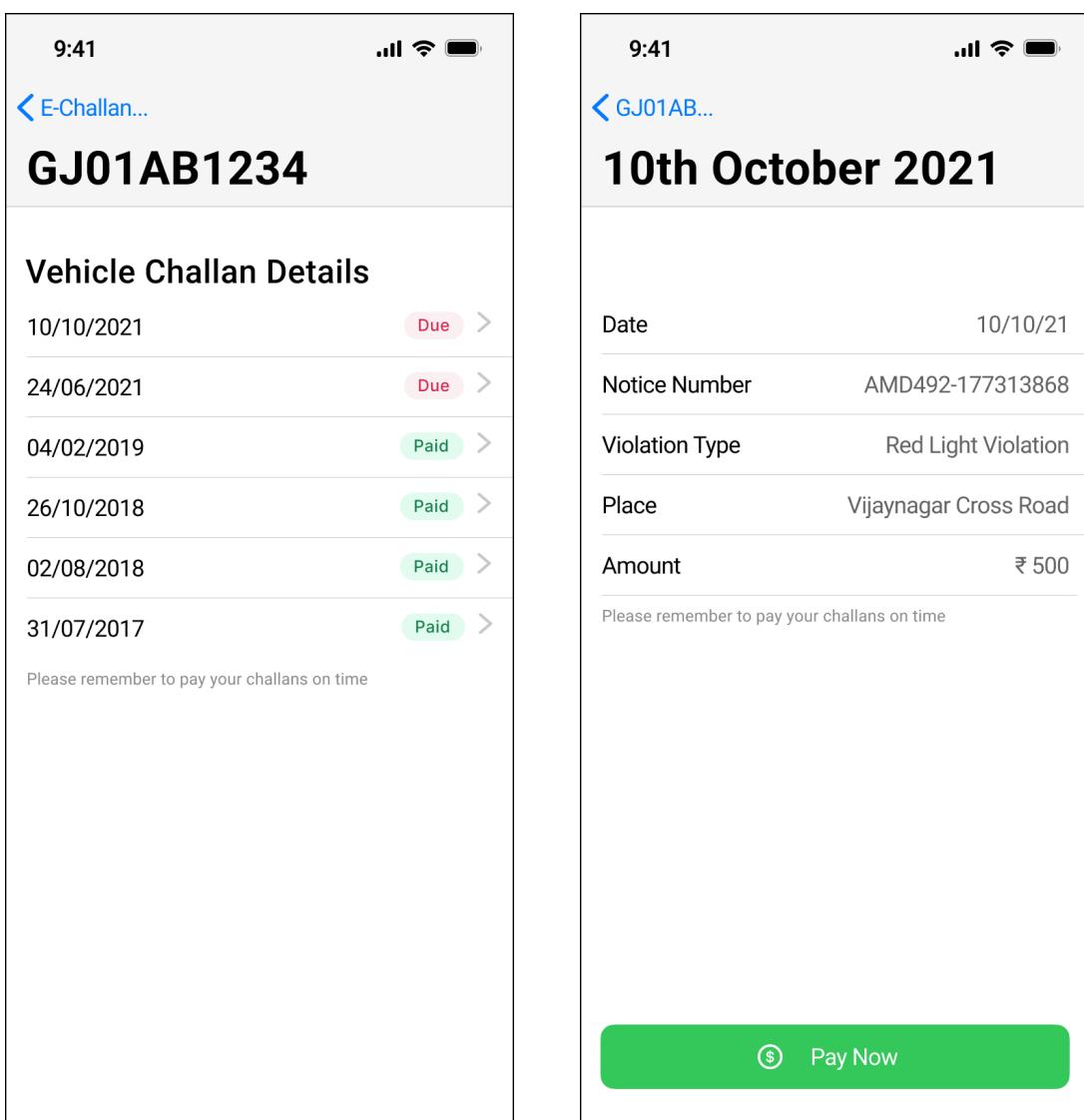
Reduce Short Term Memory Load - Once the registration certificate is added by filling required details, the user just visits his virtual dashboard and fetches his document without the need of remembering any information.

6. E-challan Payment

Functionality

Users can view and pay the e-challan of the vehicle after entering the details like the registration number of the vehicle and the vehicle's registered state. Here the data will be fetched from the traffic department. After entering the useful information of the vehicle used will be displayed the paid as well as unpaid e-challans. Users can select any number of unpaid challans and pay them together or users can pay the e-challans individually as well.

Photos of the implementation



Universal Usability

- **Cultural and International Diversity:** Here the date format and currency format is provided for the better understanding of the E-challan and easiness of the user. Provided the option of the “Pay Now” button in a very attractive light green colour so that user attention directly goes to that button.

Design Principles

- **Offer Informative Feedback:** The application offers informative feedback. If a user clicks an item in a list of challans, then the app moves on to the next i.e. detail view and vice versa on touching the back button. Secondly, the chip indicates the status of challan payment i.e. paid or due. Red colour gives an altering feedback i.e. user should pay those due fines in the list at their earliest. Green colour gives feedback that challans have been successfully paid and no more action is required.
- **Easy Reversal of Actions:** Application provides easy reversal of actions. If a user decides to pay a fine, but on the details screen he wants to go back and not pay the fine, the application has a back button which directs him back to the list view. This way a user has peace of mind that accidental actions can be undone.

Interaction Style

Form Fill-in by filling a textbox for the alphanumeric Vehicle Registration Number.

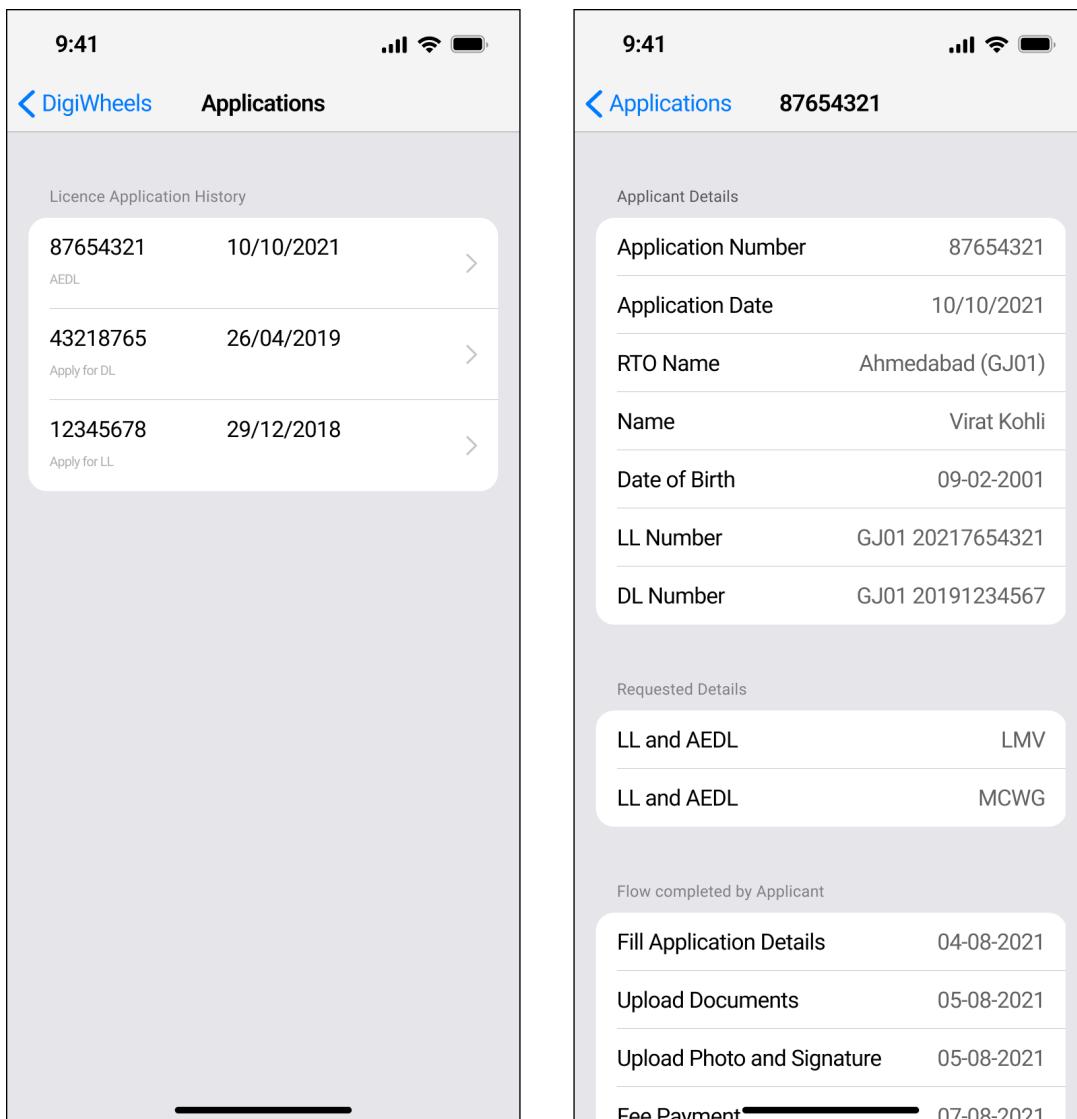
Menu Selection for selecting a specific challan from a list of challans

7. Track Application

Functionality

This option will allow users to track the application status from filling out the application form to till the dispatch date and time for the driving licence. To access this option, users will only need to enter the application number. I.e. If any user has uploaded all the documents and all other required information is filled then the next time when he logs into the application he will be redirected to the payment option and then he will be asked to book the slot for the driving test. So, in short, the user can continue doing his procedure where he left the previous time using this track application option.

Photos of the implementation



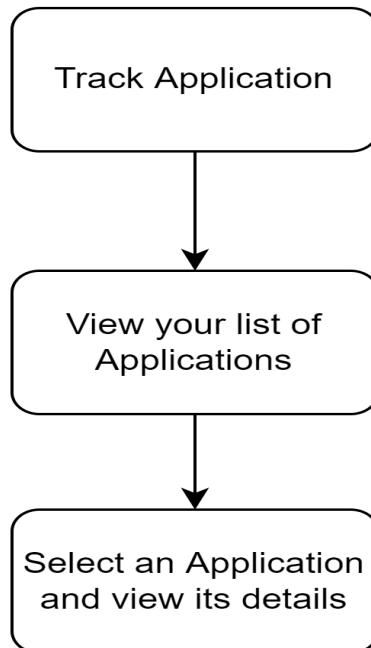
Universal Usability

- **Diverse Cognitive and Perceptual Abilities:** If the user has already filled some part of the application in the “DigiWheels” application then the next time when user Login into the application user can see his past filled details and can continue filling the details where he left last time. It will help users to save time and it will reduce the mental load of the user to not fill every single detail every time.

Design Principles

- **Consistency**
 - All the information is provided in a similar type of rectangle boxes with the same font style and font size for better consistency
 - Similar types of data like application details, requested details, flow completed by the user are kept in rectangular shape with curved edges and heading of that field are also provided in the light grey colour in same font size
- **Reduce Short Term Memory Load**
 - User can continue to fill the application where he left out filling last time so that it will make it easier for a user to not fill every detail every single time and will help to reduce the memory load of filling the application details.

Hierarchical Task Analysis

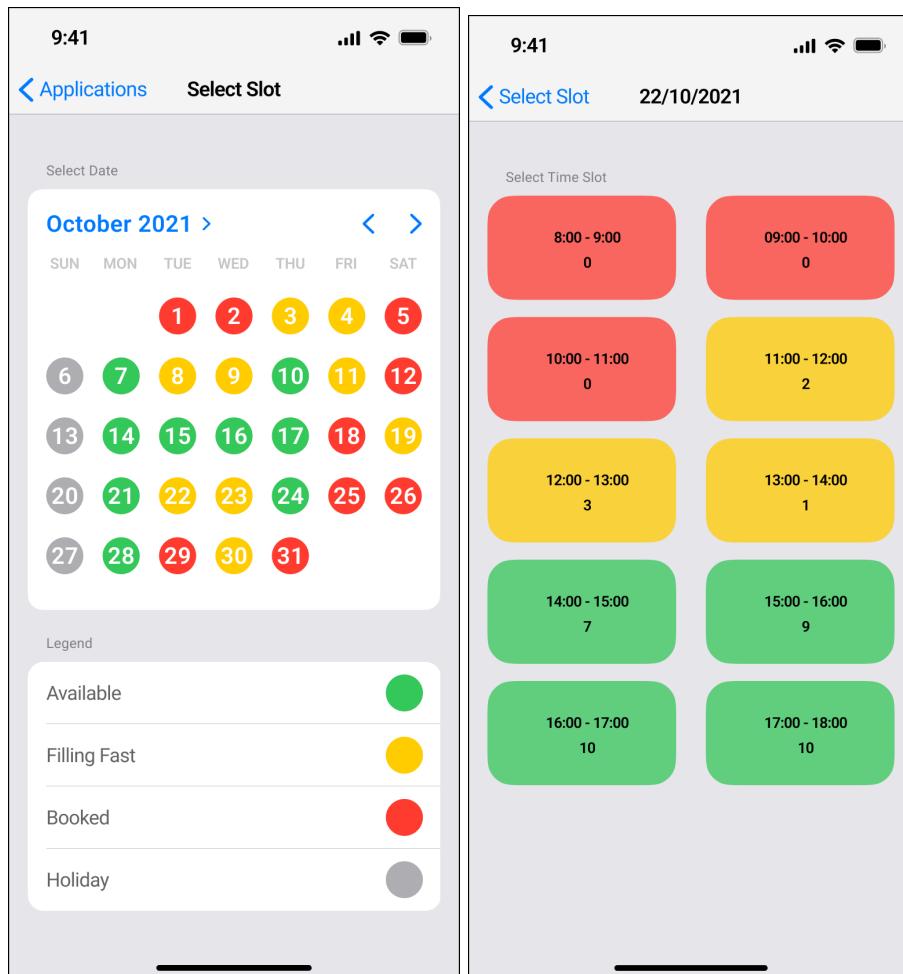


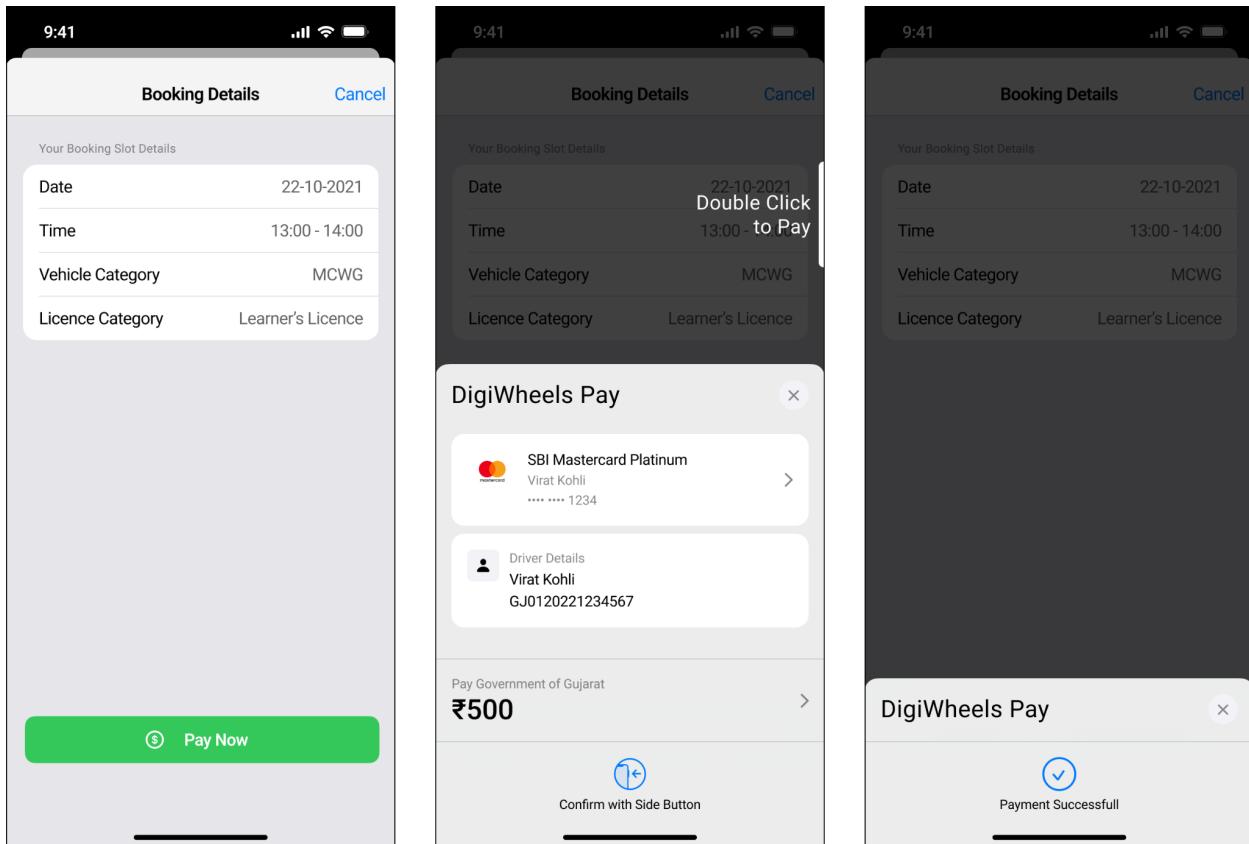
8. Book slot for driving test

Functionality

Users can book the slot for a 2-wheeler, 3-wheeler, or 4-wheeler driving test. Before choosing the slot booking option users will be required to fill in the details like name, age, gender, date of birth, etc. and also required to upload the government authorised documents like aadhar card or pan card or passport details. After that, in the book slot option, different dates will be displayed in different colours. The dates on which RTO have holidays those dates will be displayed in yellow colour, while if there is no slot available for a particular day that will be displayed in red colour and other remaining dates will be displayed in green colour from which user can choose a date and then he will be displayed the available slots for that chosen date. After filling in the given details, the user can book the slot for the driving test.

Photos of the implementation





Universal Usability

- **Diverse Cognitive and Perceptual Abilities:** Different types of colour coding are given on each date so that the user easily and speedily makes the decision by differentiating between different dates.
- **Cultural and International Diversity:** Here different colour options are provided for a better understanding of the slot booking page so that users can easily differentiate the dates between available slot dates, booked dates, holidays and the fast filling dates of the slot booking.

Design Principles

Permit Easy Reversal of Actions - If the user by mistake clicks on the pay now option then also he can click on the cancel option to cancel the transaction for payment. So, it will provide the option of easy reversal to cancel the payment.

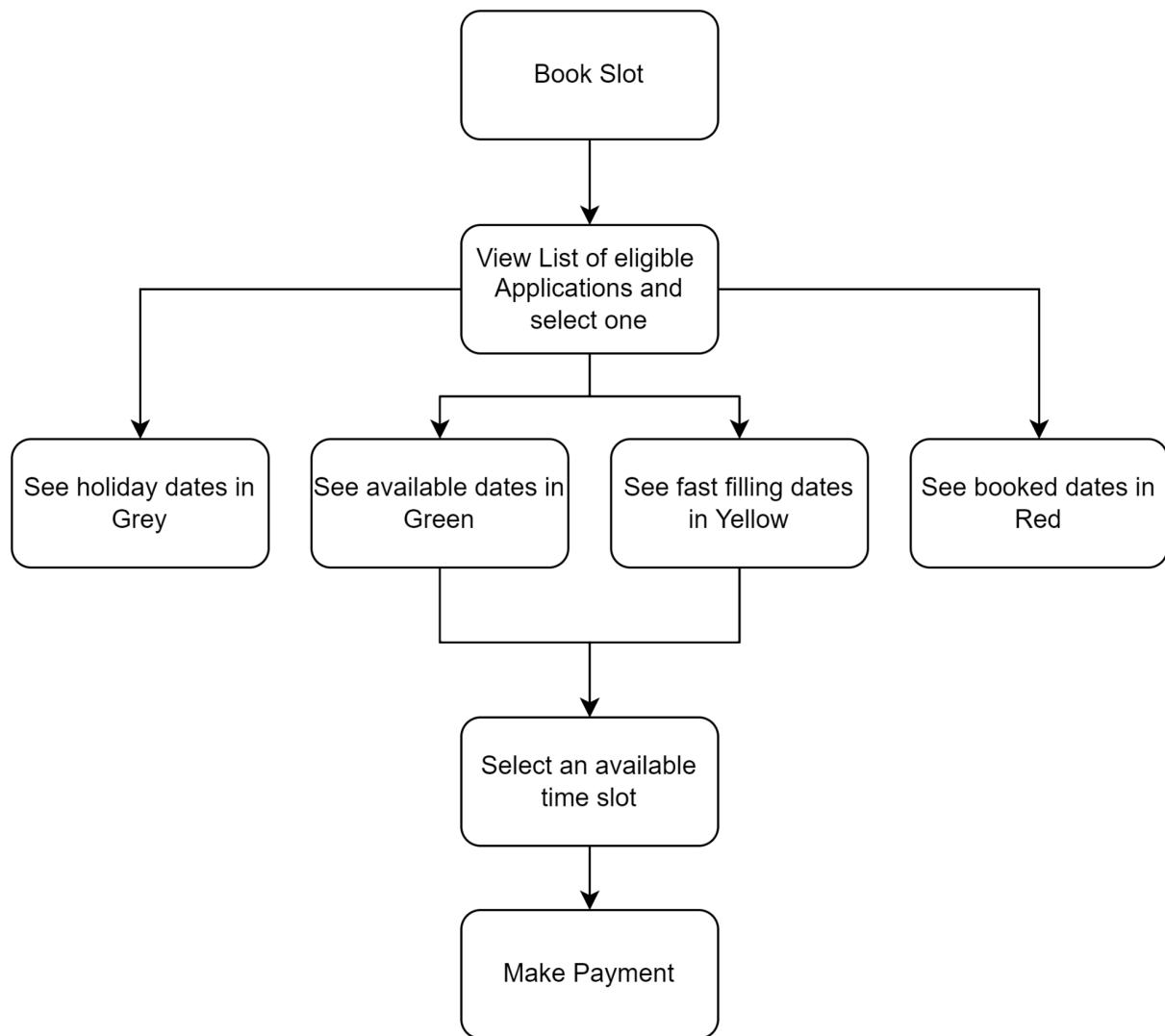
Visibility: All dates are clearly displayed in different colours and the pay now option is well placed and placed in the centre of the bottom in green colour for better visibility.

Prevent Errors: Different colour combinations are provided for showing different types of slot availability so that it will help in preventing the errors.

Interaction Style

- **Direct Manipulation:** all dates are clearly displayed in different colours for better visibility and for making it easier for the user.
- **Menu Selection** for selecting the date for the slot booking and also for selecting a payment method.

Hierarchical Task Analysis

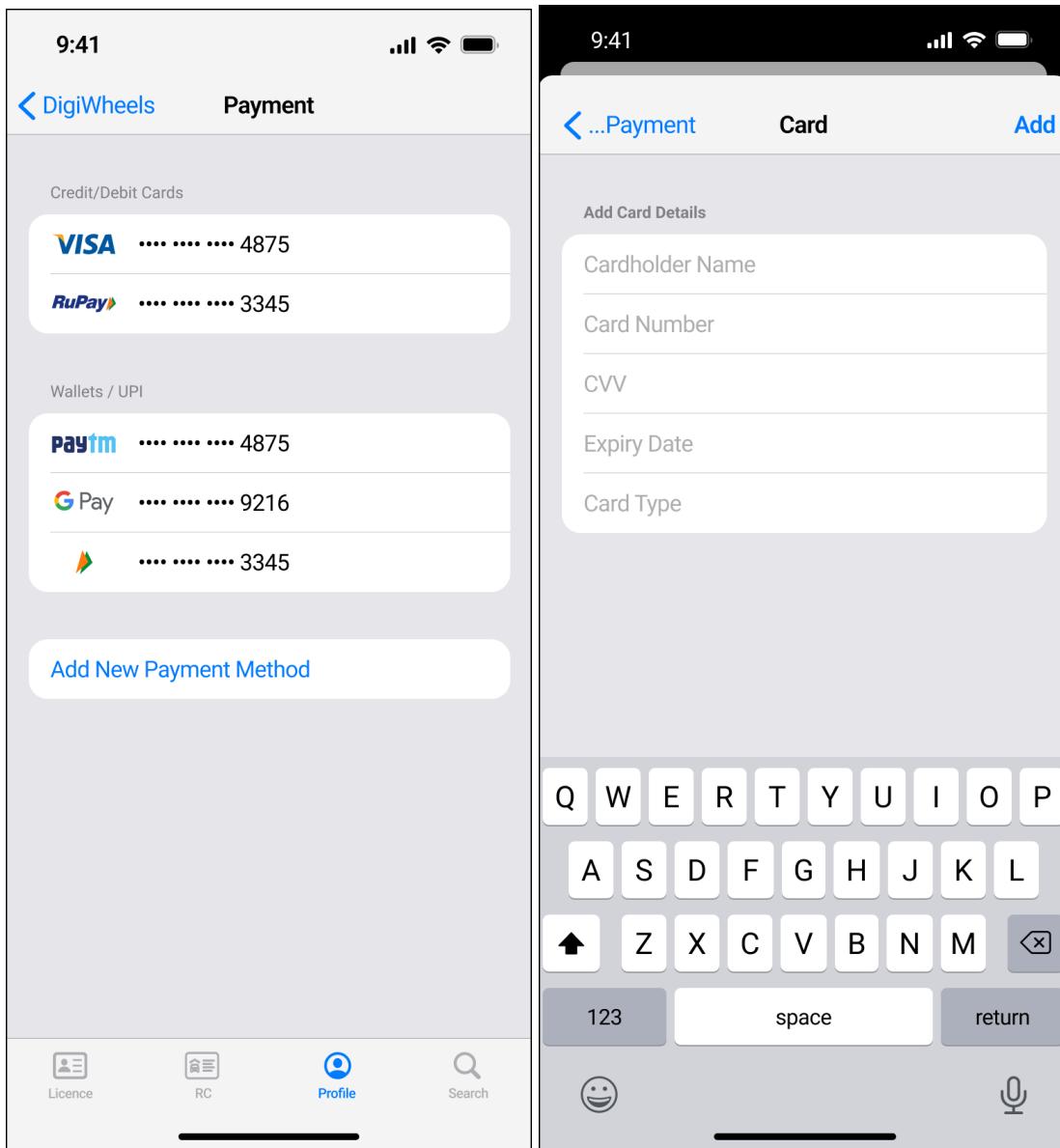


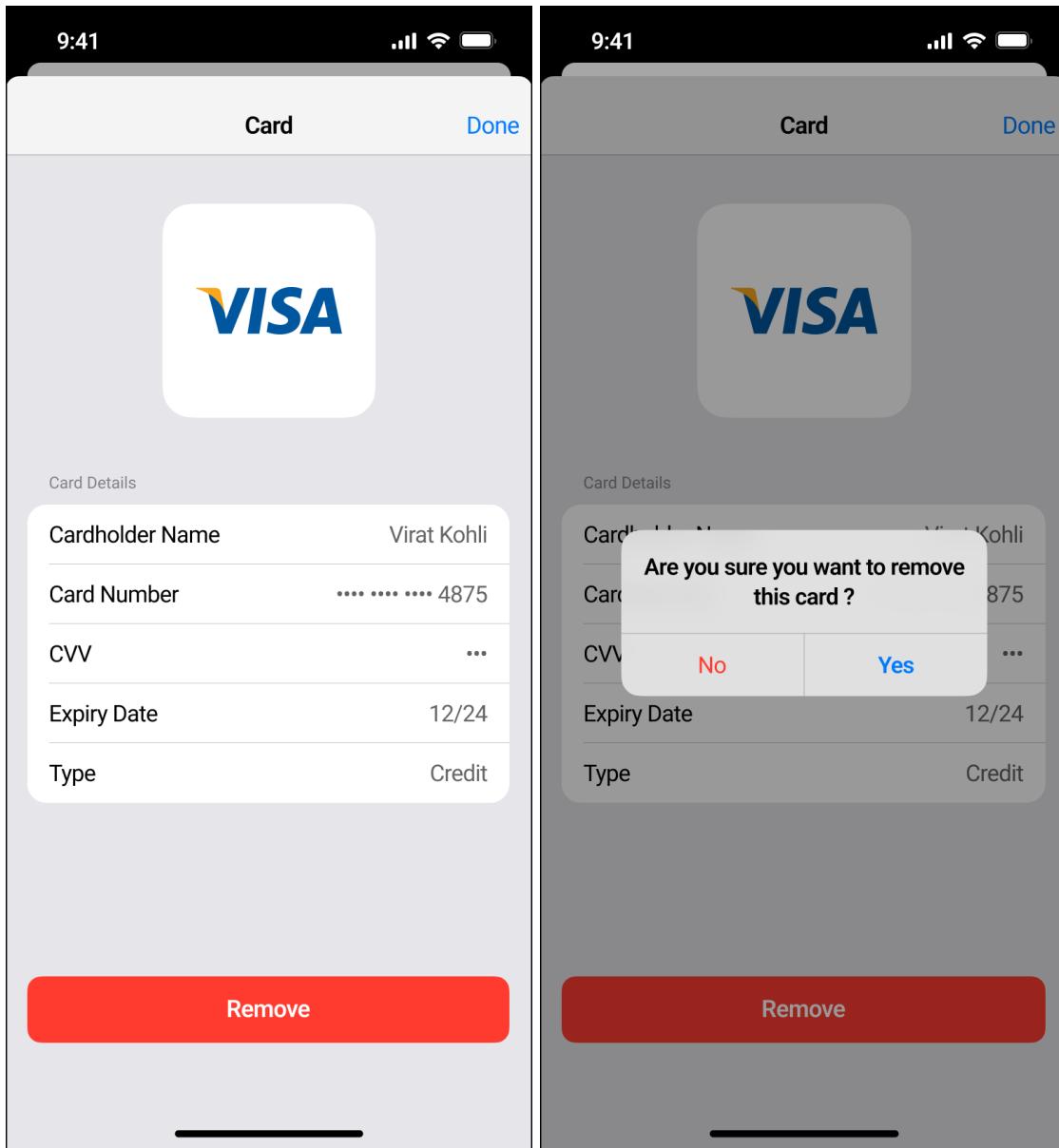
9. Manage Payment Functionality

Functionality

Users will be provided with the functionality to manage payment methods. He can add new payment methods, edit the ones already added or remove the ones which the user feels are not required. The application displays just the right amount of data i.e., in censored form so that the details remain private. The application uses confirmation dialogues in actions that are dangerous so that the user is very sure of what he intends to do.

Photos of the implementation





Universal Usability

- **Cultural and International Diversity:** The credit card and wallet details are provided in both textual and icon format. The system has an inbuilt translation capability on the keyboard as indicated by the globe and the mic icon below the keys, where the user can input the data in his own language and the operating system translates the said data to the English language. This way, any person from any background can use the app.
- **Diverse Cognitive and Perceptual Abilities:** The application uses ample colours to indicate dangerous actions. So that, in case a person who is technology unaware accidentally clicks a button, action would not be committed without a final warning and confirmation dialogue. Hence, even a novice user, as well as an advanced user, can navigate the app.

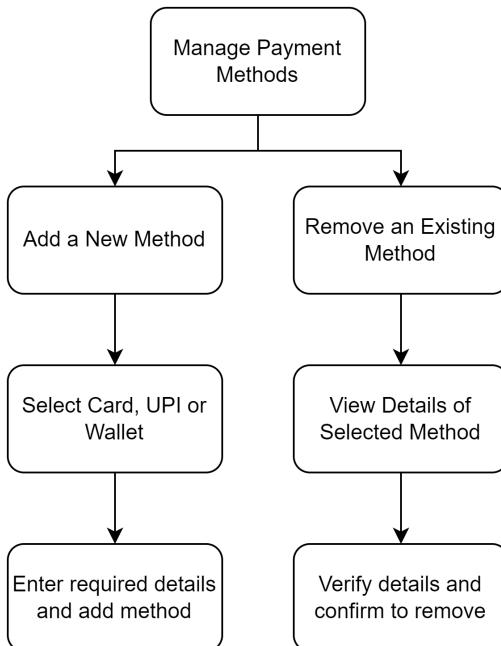
Design Principles

Reduce Short Term Memory Load - Once the payment method is added by filling in the details, the user can quickly select his/her desired method while making payments in the app, e.g., paying fines or booking slots for driving applications. He/she would not need to enter the same payment method multiple times as once entered payment methods (wallet, UPI, etc) are saved locally in the app. This way the short-term memory load of the user remains as minimal as possible.

Interaction Style

Menu Selection: While adding the card, the user will be required to select the appropriate menu option from a list of available options. While removing the card, the user had to confirm his intention to “really” remove the payment method by selecting the “yes” option from the alert popup menu.

Hierarchical Task Analysis



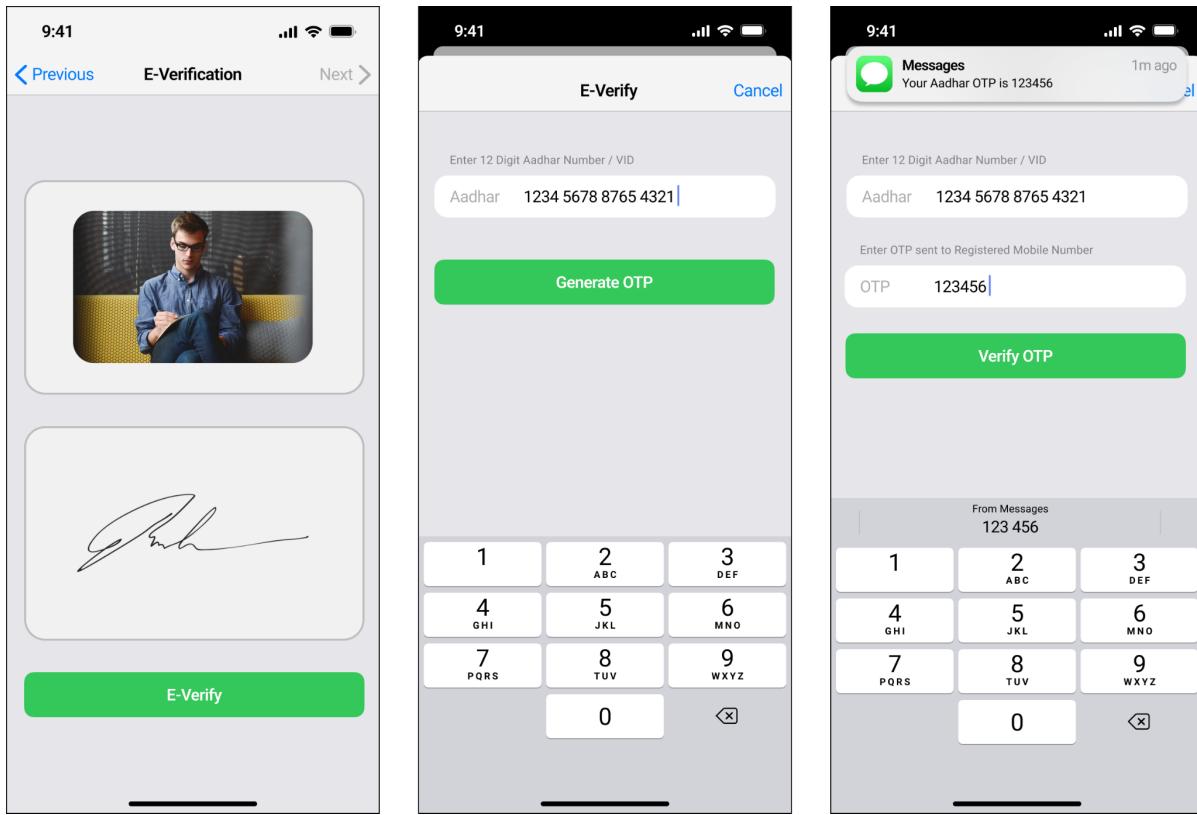
10. Apply for Licence

Functionality

Applying for a licence option will allow users to apply for a new learning licence or if the user wants to apply for a renewal of a driving licence. For this, the user has to fill in the details like the first name, middle name, last name for profile option, mobile number, Email id as contact information, city name and state name as RTO information and in the last driving licence number in case of a renewal of dl. Then the user will be asked to choose the vehicle type and then he will be asked to upload the photo and signature followed by entering the aadhar card number with OTP verification and then the appointment will be created successfully for the licence creation.

Photos of the implementation

The figure consists of three screenshots of a mobile application interface for applying for a driving license (DL).
1. **Profile:** This screen shows the 'Profile' section where the user has entered their First Name as 'Virat'. It also includes fields for Middle Name, Last Name, and DOB. Below this is the 'Contact Information' section with fields for Email and Mobile number.
2. **RTO Information:** This screen shows the 'RTO Information' section where the user has selected 'Gujarat' as the State and 'Ahmedabad (GJ01)' as the City. There is also a placeholder for 'Enter Existing DL (Only if Applicable)' and a field where the DL Number 'GJ01 20191234567' has been entered.
3. **Categories:** This screen shows the 'Categories' section where the user can select categories they wish to apply for. The categories listed are MCWOG, MCWG, LMV, MGV, HMV, and HGMV. 'MCWOG' and 'LMV' have a checked checkbox next to them, while the others are unchecked.



Universal Usability

- **Diverse Cognitive and Perceptual Abilities:** For uploading the photo the app will ask the user to capture the live photo and for the signature, the user will be asked to upload an image of the signature. To verify the aadhar card number OTP will be fetched from the messages and will be provided above the numeric keypad so by clicking on that number OTP will be filled automatically.

Design Principles

- **Consistency**
 - Similar fields are provided in the same font style and font size to enter similar data
 - Submit buttons and their design are kept rectangular in shape with curved edges and placed at end of the form and in the centre so that users can find them easily
 - The green colour is used to signify themes or any primary or secondary action elements.
- **Reduce Short Term Memory Load**
 - For the verification of the Aadhar Card OTP is automatically fetched from the messages so that by clicking on the OTP above the numeric keypad user can just click on that number OTP will be automatically filled up in the adhar card verification procedure.

Interaction Style

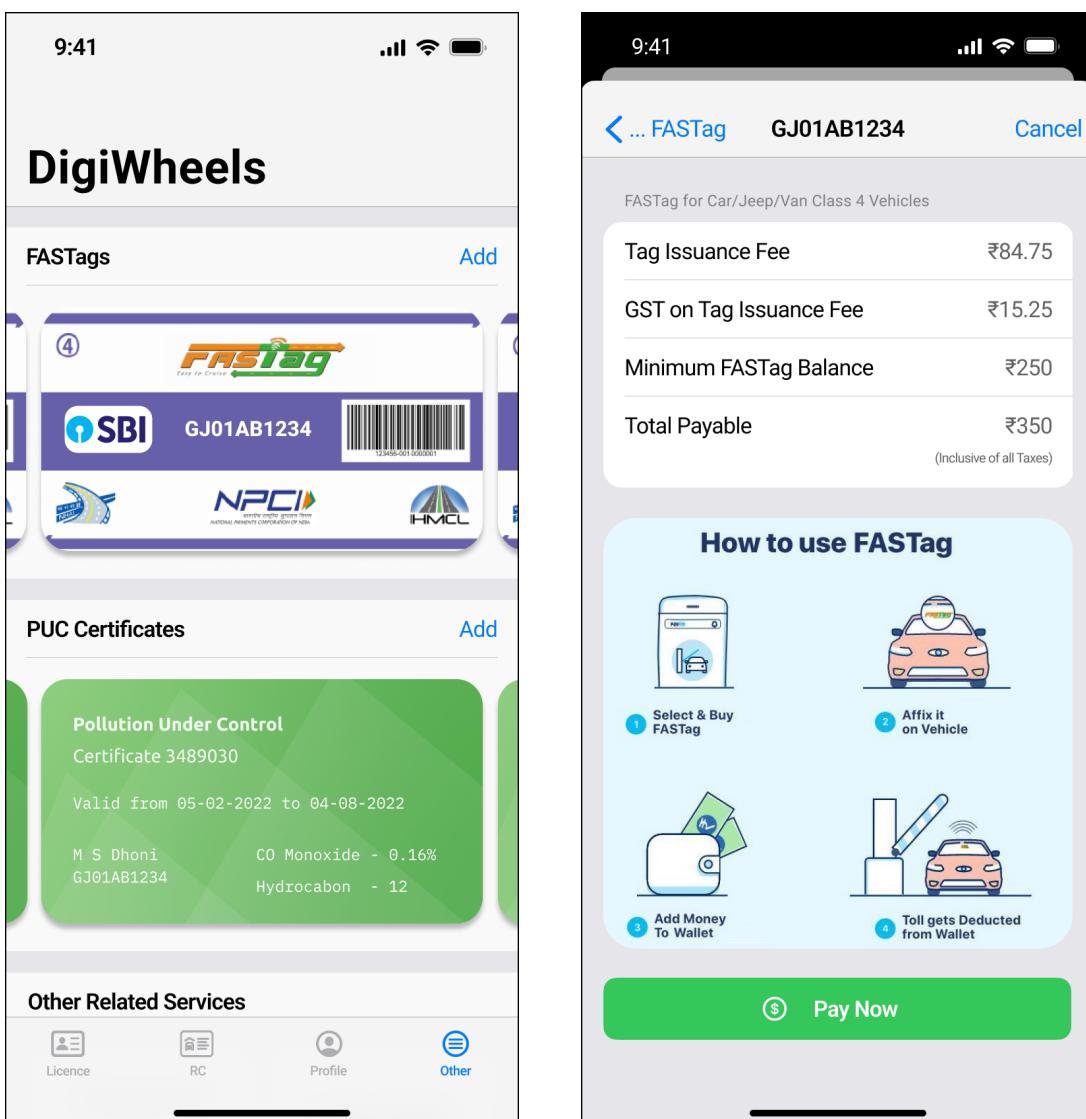
- **Menu Selection**
 - For selecting the vehicle type application has provided the option of selecting one or more options from the different vehicle types like MCWG, MCWOG, LMV, MGV, HMV and HGMV etc.
- **Form Fill-in**
 - To apply for a new driving learner licence or to apply for a renewal of a DL we have provided the form fill-in facility to enter the full name, Email id, mobile number, state name, city name and driving licence number.

11. Manage FASTag

Functionality

The ‘Manage FASTag’ option will help users to add the FASTag of the vehicles into the application and also users can pay the toll tax via the mobile app by adding digital money into the wallet. For adding the FASTag first user has to add the RC and then the user can add the FASTag by entering the RC book number and then can pay the toll tax.

Photos of the implementation:



Universal Usability

- **Diverse Cognitive and Perceptual Abilities:** After entering the RC book number of the vehicle used will be displayed the virtual FASTag and after clicking on that user can pay the toll tax amount.

Design Principles

Prevent Errors - The user has to enter only the RC book number for adding the FASTag and for checking the payable amount. So, users are only required to enter one field for FASTag which will help to prevent errors.

Interaction Style

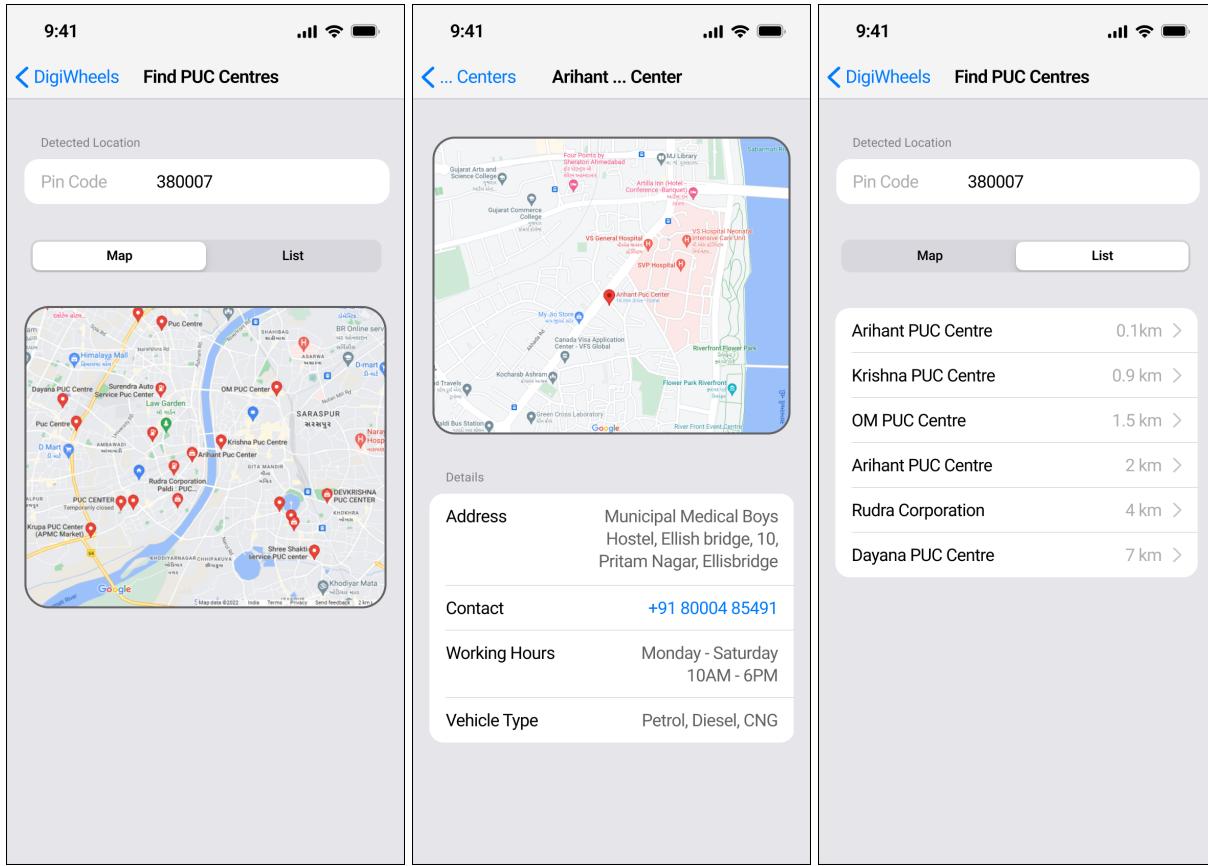
- **Form Fill in** by filling a textbox for entering the RC number for adding the FASTag.

12. Find nearby PUC Centres

Functionality

Find nearby PUC centres option will help the user to find the PUC centres near to user's live location or the user can check the nearby centres using by entering the Pincode. It will list down all the nearby PUC centres near that Pincode or near the user's live location.

Photos of the implementation



Universal Usability

- Diverse Cognitive and Perceptual Abilities:** It will help the user to find nearby PUC centres via entering the pin code or the user can also find nearby PUC centres near to the user's live location.

Design Principles

Reduce Short Term Memory Load - If the user wants to know nearby PUC near to any particular then he can enter the pin code of that area and if he doesn't know his house area pin code then also he can click on find nearby PUC centres near to his live location which will reduce the mental load of the memory.

Integration of All Features

The home page of the application acts as the entry point after logging in. The navigation bar at the bottom provides easy access to all the top-level features i.e., related to the licence, RC, profile or search. The licence navigation option has all the features related to licence such as adding/viewing the licence, applying for a new learner/driver's licence, booking appointments, tracking application status, and many other functionalities. These top-level buttons and menus direct the user flow to inner pages as described above in the three features. Similar to the licence navigation option, the RC navigation option provides access to all the vehicle registration certificate related functionalities. The profile navigation option provides all the functionality related to the user's account and its related features such as changing the name and contact info, resetting the password, turning on or off and metric unlocking features, and adding PIN login to the application. Among a diverse feature set, one of the important features is managing payment methods. A user can add or remove his/her credit/debit cards, UPI and wallet and other forms of payment. He can also log out from the other devices logged in such as laptops, desktops and other mobile devices. Finally, he can sign out of the application if the functionality is no longer required.

Figma Link

<https://www.figma.com/file/F7DCzEMGs17EA10lySuPza/HCI-Project?node-id=0%3A1>

9:41

DigiWheels

Licence

GJ01 20221234567

Validity: 09-02-2042

Address: Ahmedabad University, GICT Building, Central Campus, Navrangpura, Ahmedabad, Gujarat 380009

VIRAT KOHLI

Licence Related Services

- Apply for LL/DL
- Book Appointment
- Track Application
- Renew DL

Licence RC Profile Other

9:41

DigiWheels

Registration Certificates [Add](#)

GJ01AB1234

Owner Name: M S Dhoni

Address: Ahmedabad University, GICT Building, Central Campus, Navrangpura

Vehicle Class
Four - Wheeler
 Petrol

Registration Certificate Related Services

- Transfer Ownership
- Apply for Duplicate RC

Licence RC Profile Other

9:41

DigiWheels

Payment

Credit/Debit Cards



..... 9216



..... 3345

Wallets / UPI



..... 4875



..... 9216



..... 3345

Net Banking



..... 4875



..... 3345

[Add New Payment Method](#)

Licence RC Profile Search

9:41

DigiWheels



PUC Certificates

[Add](#)

Pollution Under Control

Certificate 3489030

Valid from 05-02-2022 to 04-08-2022

M S Dhoni CO Monoxide - 0.16%

GJ01AB1234 Hydrocabon - 12

Other Related Services

Find Nearby PUC Centers

Customer Support

Licence RC Profile Other

Chapter 5: Difficulties Encountered and Resolved

Description of debugging/trouble-shooting

1. Finding pre-made components

A user is already accustomed to the existing interface. Therefore, it becomes vital to design new interface components in such a way that they mould to the user's existing muscle memory. Thus, for options such as dialog boxes, headers, bottom navigation bar, layout design such as user does not require any operations manual to figure out the interface and easily becomes accustomed to it.

2. Learning new design software

According to our initial research, Figma turned out to be the best option for us. It had the best combination of feature set and collaborative tools. However, the initial learning curve of the software was extremely steep. Even to figure out the basic operations such as adjusting font size, changing colours, adding text boxes, and many other tasks required a lot of knowledge which warranted a use of manual and video tutorials. In order to create the first screen, it took 30 minutes. As we progressed further, we became more proficient with the tools.

3. Maintaining consistency within different screens

As the project grew larger, it became difficult to keep track components and maintain consistency at the same time. When a design consistency was found, it required backtracking the same design in multiple screens and correcting the change. The same components appeared across multiple screens and vice versa. This required checking for consistency across multiple screens.

Chapter 6: Real-Life Implementation Perspectives

Problems encountered for real-life implementation

1. Mobile platform consistency

Our project was developed in a limited time frame of approximately two months which had many features. In this duration it was possible to design the application from beginning to end only for the iOS platform. However, the target audience uses Android phones too and so it is important to design it if thinking for a real-life implementation.

2. Government approval is difficult to obtain as sensitive data is to be accessed

The application manages important documents like licence, registration certificates, pollution control certificate, fastag, etc. These all contain crucial information from the user perspective which should not be compromised at any cost. Thus, getting government approval to fetch and update data is difficult to convince in real life.

Proposed solutions for real-life implementation

1. Develop a similar consistent interface for iOS and Android

The solution to the design inconsistency is to create a native interface for both the iOS and Android platforms. This would require using native elements of the said platforms such as depth, layers and blur of iOS along with the shadows and colours of Android design patterns. While a similar interface of iOS can be implemented on Android and vice versa, it would lead to a higher cognitive load on the users as they would need to relearn the new interface.

2. Use the existing mParivahan backend

Since creating a new backend is not a feasible solution, the existing backend of the mParivahan app can be used in place. This would mean that the government would be more willing to give access to the API of the backend to a third party as the government has the control over it. Third parties such as us, would only have access to read the data and not modify it.

Chapter 7: References

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