2022

CarKing

User Interface
Design Project report

جامعة أم القرى
UMM AL-QURA UNIVERSITY

CARKING
CAR PARKING

TITLE

CarKing

User Interface Design Project Report

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TASKS TABLE

CARKING
CAR PARKING

TASKS	Sahar	Nebras	Amal	Alaa	Sara
Questionnaire			✓		✓
Pre Design		✓			
Prototype	✓	✓	✓	✓	✓
Design principle	✓			✓	
User experience goals	✓				
Usability goals				✓	
Usability Testing	✓	✓	✓	✓	✓
Conclusion					✓

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ABSTRACT

This report describes the development of our User Interface Design project. The report starts by introducing the application description which would give the readers some background on the application. After that it shows the problem that will be solved through our application, afterwards, we will dive into the system itself and discuss the development process, which begins with the conceptual model, followed by the system's appropriate interaction type chosen, which is considered which interface is best for our application.

The report also presents the challenges of implementing our application and states the main problem that led us to implement this application.

Next, the report presents established requirements and collects data to help understand the user's needs. Then specifying the target audience and implementing the prototype depending on them.

The last thing the report shows is the result of the user testing of the prototype and summarizing the feedback.

INTRODUCTION

1.1. Background

The purpose of this project titled "CarKing" is to provide an application that is user-friendly, free of cost system for parking.
It's an application that helps users reserve parking by displaying notifications to the user of available parking's. Also, It provides other services such as hiring someone to park the cars and wash them. In addition, provide a monthly parking subscription to regular users.

1.2. Aims and Objectives

- AIM

The aim of our application is to saves people time and effort and change the user experience with reserving parking to an easy and quick experience.

OBJECTIVES

Developing the transferable skills in logical analysis, communication and project management necessary for working within team-based environment.

You should gain the ability to select tools and methodologies that are fit for specific purposes.

1.3. Target Audience and their context

Our application's intended audience is the ones who going to get advantages from our application and are most likely to be interested in the system.
Specification of our target users and their context:

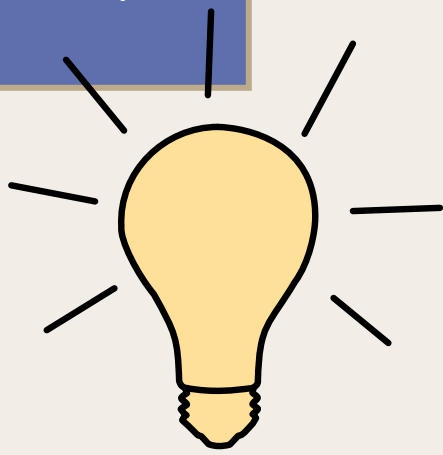
1. Users driving cars.
2. Visiting regular places (they provide parking and subscription).

1.4. Problem Definition

A.	Waste of time and effort when searching for available parking's.
B.	Expensive cost to reserve parking.
C.	Lack of organizers who arrange people and the way they park cars.
D.	Randomness and lack of a clear mechanism to reserve parking.

1.5. Solutions

A.	Notify the user if the place he chooses has available parking or not, if so let him reserve the convenient parking for him.
B.	Parking prices are available to all segments of society, with discount codes and the feature of a monthly subscription to reserve fixed parking.
C.	Each place registered on the application must show the users how to park correctly in their parking area.
D.	Each place must have rules for reserving parking. For example; the user must reserve parking before two days of his date in some restaurants.

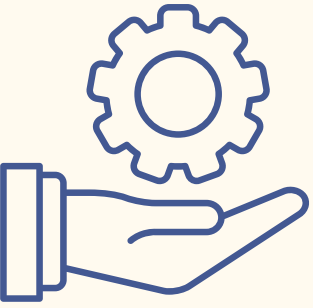


1.6. Usability Goals

Effectiveness	Our system is working as it's supposed to do
Efficiency	The system helps users in carrying out their tasks
Safety	The system secure the users information from being misused
Utility	The system provides the right kind of functionality
Learnability	It's easy to learn to use the system

1.6. Experience Goals

Helpful	During the rush hour, the system helps users to avoid the traffic on the parking
Satisfying	The experience is related and similar to the real parking system
Enhancing the society	The system save a lot of user time by knowing in advance if there's available parking



Development analysis

2.1. Conceptual Model

Metaphor: real parking space
Concepts: car, parking, car wash, payment, monthly subscription, hiring person, reserve
Object relation: reserve parking space, the car is parking, the hiring person park or wash the car, monthly subscription to parking.
Mapping: car corresponds to a physical object, parking to its physical location.
Function: reserve parking space, hire someone to park the car and wash it, monthly parking subscription, users can see their account information.
Function relationship: enter user information before reserve, reserve before parking, pay after reserve, hire someone then choose the service, subscribe then pay.
Data: new parking space added by developer, payment method added by typing data, user information added by typing data.

2.2. Interaction & Interface Type

- **Interaction type:**

- Instructing (because the Application implements actions according to the user's choices from the services)
- Exploring (because the user may use the application while moving through real or virtual parking)

- **Interface type:**

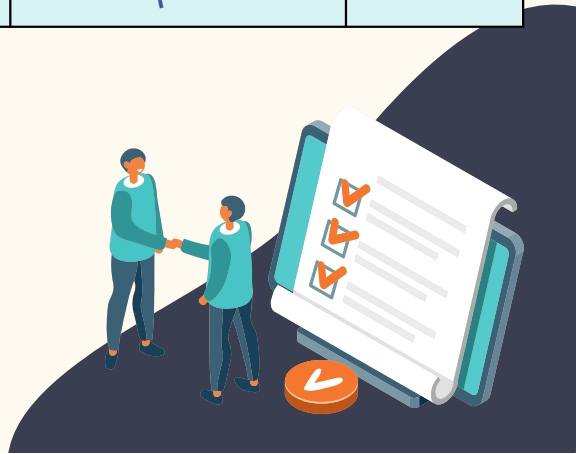
- Mobile (because it's an application on mobiles)
- Touch (because user mostly use the application with touch, press buttons, select choices, and write his information)
- Smart (because it can notify the user and provide many services)

Establishing Requirements

Part #1

1.Evaluation Questions

المستخدم	هل تعتقد أن فكرة التطبيق مفيدة وتلبي احتياجاتك كسائق مركبة؟	ما الوقت المستغرق لتسجيل معلومات المركبة في التطبيق وحفظها ؟	عند البحث عن الموقع في الخريطة كم عطلا واجهت في النظام؟	بناءاً على ملاحظتك ، كم خطوة أحتجت لحجز موقف في التطبيق؟
1	نعم	0.5-1 دقيقة	3	4
2	نعم	1-2 دقيقة	1	3
3	نعم	1-2 دقيقة	1	3
4	ربما	1-2 دقيقة	1	3
5	ربما	0.5-1 دقيقة	1	2
6	نعم	0.5-1 دقيقة	0	3
7	نعم	3-2 دقيقة	3	3
8	ربما	1-2 دقيقة	+3	4
9	نعم	1-2 دقيقة	1	3
10	نعم	1-2 دقيقة	1	3
11	نعم	0.5-1 دقيقة	2	3



Establishing Requirements

Part #1

2.Draft Questions

1	الجنس	10	في اعتقادك ماهي الأماكن اللتي تحتاج منك لحجز موقف قبل الذهاب إليها؟
2	العـمر	11	هل قمت بإستخدام تطبيق لحجز مواقف السيارات من قبل؟
3	المستوى التعليمي	12	ماهي ابرز العيوب او المميزات التي واجهتك خلال تجربتك للتطبيق الذي ذكرته اعلاه؟
4	المهنة	13	اذا أجبت بـ لا فبإمكانك الاطلاع على التطبيق
5	ما مستوى خبرتك في استخدام التقنية	14	هل تعتقد أن فكرة التطبيق مفيدة وتلبي احتياجاتك كسائق مركبة؟
6	هل تملك مركبة؟	15	ما الوقت المستغرق لتسجيل معلومات المركبة في التطبيق وحفظها ؟
7	هل تشكل لك مواقف السيارات مشكلة تؤثرعلى حياتك؟	16	عند البحث عن الموقع في الخريطة كم عطلا واجهت في النظام؟
8	هل يهمك تسهيل عملية حجز المواقف لك ولمن حولك؟	17	بناءاً على ملاحظتك ، كم خطوة أحتجت لحجز موقف في التطبيق؟
9	هل تؤيد وجود تطبيق يساعدك في حجز موقف؟	18	ماهي الخدمات التي تتوقع وجودها في تطبيقنا؟

Establishing Requirements

Part #1

3.Pilot Test

#	Draft Questions	Modified Questions	Justification
1	Age (18 - older than 33)	Age (younger than18 - older than 33)	Some users are younger than 18
2	Education level (primary - college)	Education level (primary - college) + other	It wasn't covering all categories
3	Career (choose one)	Career (choose multiple)	User might be both student and employee
4	Do you have a vehicle?	Do you drive a vehicle?	User might have one but don't drive it
6	Do you support having an application that helps you book a parking spot?	Do you support having an application that helps you book a parking spot before or during your arrival at your destination?	To make it clearer
7	What services do you expect to have in our application?	What services do you expect to have in our application to improve your experience as a user?	To draw the user's attention and clear the idea of the application

Establishing Requirements

Part #1

4. Final Questionnaire

1	الجنس	10	في اعتقادك ماهي الأماكن اللتي تحتاج منك لحجز موقف قبل الذهاب إليها؟
2	العـمر	11	هل قمت بإستخدام تطبيق لحجز مواقف السيارات من قبل؟
3	المستوى التعليمي	12	ماهي ابرز العيوب او المميزات التي واجهتك خلال تجربتك للتطبيق الذي ذكرته اعلاه؟
4	المهنة	13	اذا أجبت بـ لا فبإمكانك الاطلاع على التطبيق
5	ما مستوى خبرتك في استخدام التقنية	14	هل تعتقد أن فكرة التطبيق مفيدة وتلبي احتياجاتك كسائق مركبة؟
6	هل تقود مركبة؟	15	ما الوقت المستغرق لتسجيل معلومات المركبة في التطبيق وحفظها ؟
7	هل تشكل لك مواقف السيارات مشكلة تؤثرعلى حياتك؟	16	عند البحث عن الموقع في الخريطة كم عطلا واجهت في النظام؟
8	هل يهمك تسهيل عملية حجز المواقف لك ولمن حولك؟	17	بناءاً على ملاحظتك ، كم خطوة أحتجت لحجز موقف في التطبيق؟
9	هل تؤيد وجود تطبيق يساعدك في حجز موقف قبل أو أثناء وصولك لوجهتك؟	18	ماهي الخدمات التي تتوقع وجودها في تطبيقنا لتحسين تجربتك كمستخدم؟

Establishing Requirements

Part #1

5. Tabulated Results

طابع زمني	الجنس	العـمر	المستوى التعليمي	المهنة
ص 2022/05/17 5:36:50	أنثى	من 18 إلى 25		
ص 2022/05/17 7:29:11	أنثى	من 18 إلى 25		
ص 2022/05/17 8:58:23	أنثى	من 18 إلى 25		
ص 2022/05/17 9:13:35	أنثى	من 18 إلى 25		
ص 2022/05/17 9:37:15	أنثى	من 18 إلى 25		
ص 2022/05/17 10:40:58	أنثى	من 18 إلى 25		
ص 2022/05/17 10:57:18	أنثى	من 18 إلى 25		
م 2022/05/17 12:19:56	أنثى	من 26 إلى 33		
م 2022/05/17 12:34:23	أنثى	من 18 إلى 25		
م 2022/05/17 12:40:05	ذكر	من 18 إلى 25		موظف
م 2022/05/17 12:52:15	ذكر	اكبر من 33		
م 2022/05/17 12:56:53	ذكر	من 18 إلى 25		
م 2022/05/17 1:05:10	أنثى	من 18 إلى 25		
م 2022/05/17 1:24:42	أنثى	من 18 إلى 25		
م 2022/05/17 1:26:31	ذكر	من 18 إلى 25		
م 2022/05/17 1:43:52	ذكر	من 18 إلى 25		وظف
م 2022/05/17 1:44:07	ذكر	من 18 إلى 25		
م 2022/05/17 1:48:22	أنثى	من 18 إلى 25		
م 2022/05/17 2:00:58	أنثى	من 18 إلى 25		
م 2022/05/17 2:37:53	أنثى	من 26 إلى 33		

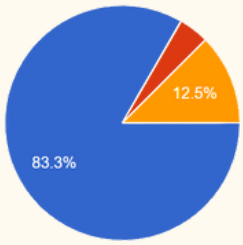
ردود النموذج 1

Establishing Requirements

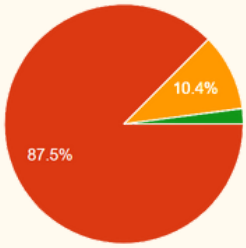
Part #1

5. Results Analysis

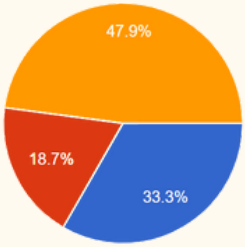
هل يهمك تسهيل عملية حجز المواقف لك ولمن حولك؟



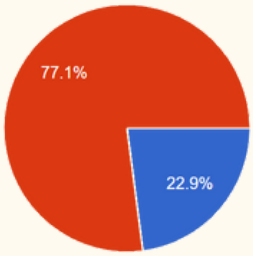
العمر



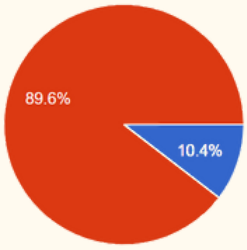
هل تشكل لك مواقف السيارات مشكلة تؤثرعلى حياتك؟



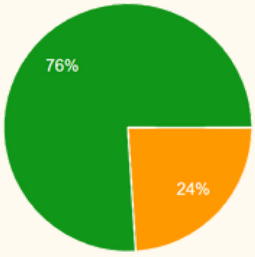
الجنس



هل قمت بإستخدام تطبيق لحجز مواقف السيارات من قبل؟



التعليم



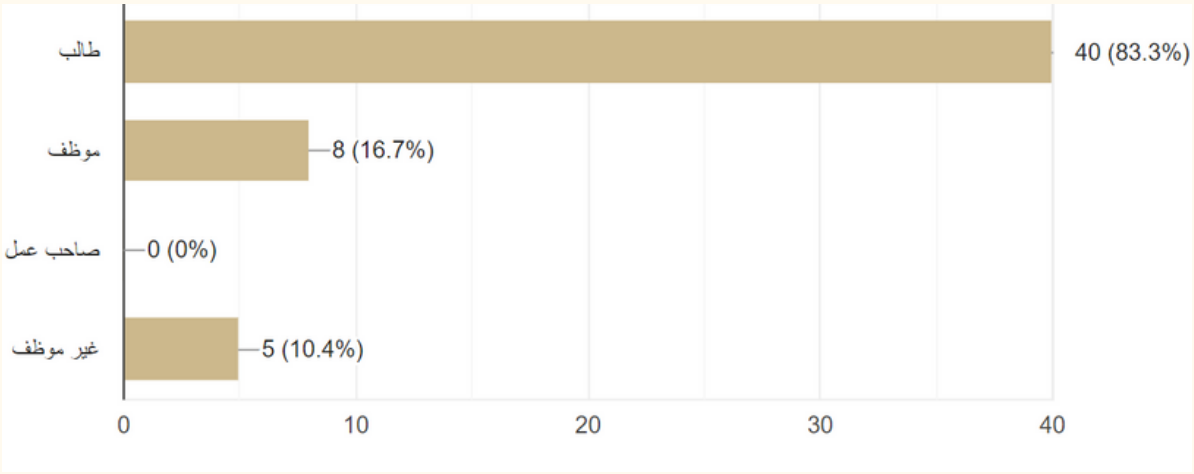
هل تؤيد وجود تطبيق يساعدك في حجز موقف قبل أو أثناء وصولك لوجهتك؟

Establishing Requirements

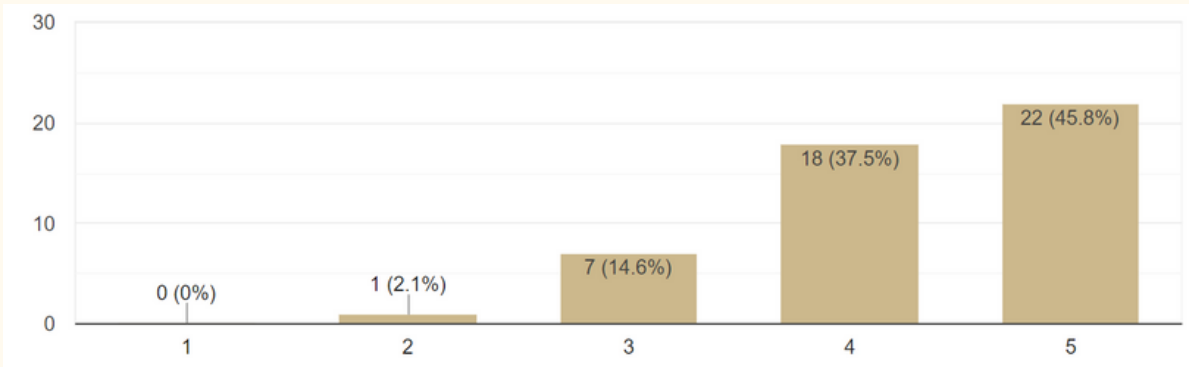
Part #1

5. Results Analysis

المهنة



الخبرة في استخدام التقنية

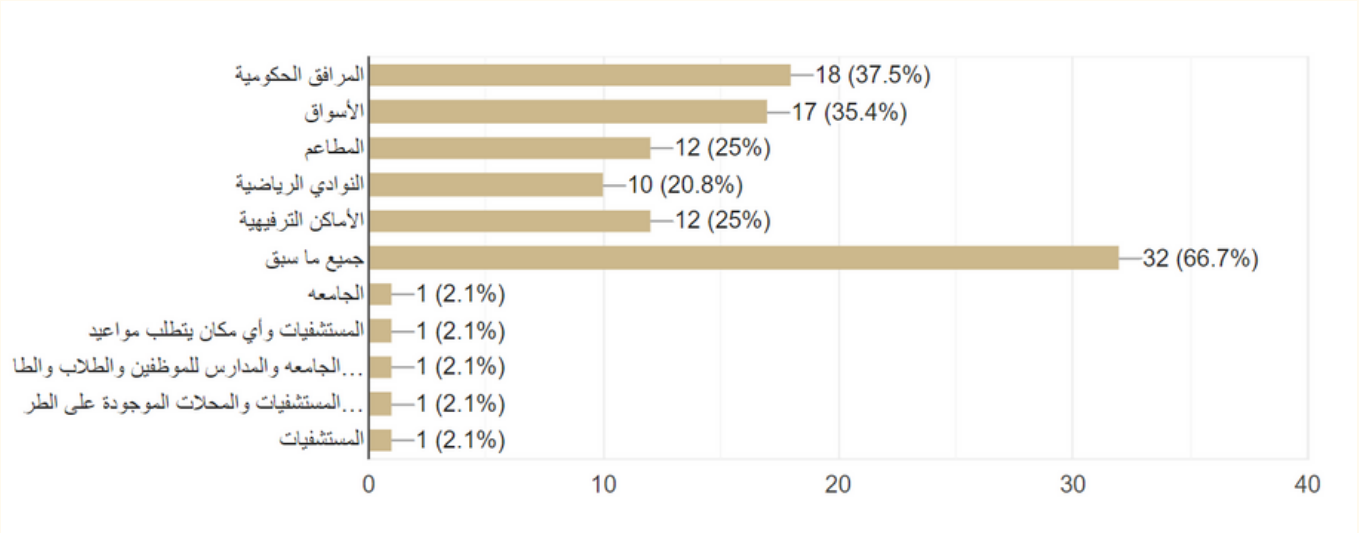


Establishing Requirements

Part #1

5. Results Analysis

في اعتقادك ماهي الأماكن اللتي تحتاج منك لحجز موقف قبل الذهاب إليها؟



ماهي ابرز العيوب او المميزات التي واجهتك خلال تجربتك للتطبيق الذي ذكرته ؟

تصميم الواجهات جذابه

المميزات سهولة الاستخدام والوصول السريع للخدمات
العيوب عدم وجود خاصية إضافة سيارات متعدده

هل قمت بإستخدام تطبيق لحجز مواقف السيارات من قبل؟

Establishing Requirements

Part #1

5. Results Analysis

ماهي الخدمات التي تتوقع وجودها في تطبيقنا لتحسين تجربتك كمستخدم؟

- معرفة وجود موقف شاغر ام لا
- تنوع خيارات طرق الدفع
- وجود مكان لتعبئة الوقت المقدر في استعمال الموقف
- يكون سهل في تحديد الموقع، التطبيق يكون فيه اللغة العربيه
- سرعة الاستجابة
  دقة مكان الموقف
  والتحقق من انه فارغ
  الدفع بطرق الدفع الالكترونية
- عمل التطبيق بدون إتصال بالنت
- سهولة استخدام و وضوح التطبيق
- حفظ بيانات البطاقة

Establishing Requirements

Part #1

5. Results Summarization

We received answers from 59 people. 81.4% of them were females and 18.6% of them were males.
The majority were between the ages of 18 to 25, representing 88.1%. 10.2% were from 26 to 33, and the last group was 1.7% who were over 33 years old.
88.6% had a university education. 19.4% had a high school education. 84.7% were students, 15.3% were employees and 10.2% have no job.
47.5% are experts in technology while 39% see themselves with the least degree, 7% consider themselves normal users, and only 1.7% with very limited knowledge of technology.
67.8% were people who aren't driving cars, and ONLY 32.2% do.
45.8% of people think of car parking as a possible problem that could affect their daily lives. WHILE 39% already see it as a major problem, and ONLY 15.3% consider it "not a problem".
86.4% care about facilitating the car parking process for themselves and people around them, 10.2% may care about certain conditions, And 3.4% don't care at all.
100% of people want to have an application that helps them book a parking spot before or during their arrival at any destination.

Establishing Requirements

Part #1

5. Results Summarization

We also received different answers to the "what places you need to reserve a parking spot before going to it" question. 69.5% vote for all the above which are {Government facilities, markets, restaurants, sports clubs, and recreational places}. 33.9% vote for government facilities, 30.5% vote for markets, 22% for restaurants, 18.6% for sports clubs, and 23.7% vote for recreational places. On the "Other" section, multiple people wrote {Hospital, university, School, airport}.

89.9% of people never used a parking app, and ONLY 10.2% do. Those 10.2% people used parking apps called "Mawgif" and "Thaki" and they describe them as having a unique graphical user interface, ease of use, and quick access to different services. But the cons were the disability of adding multiple cars.

69.5% of people think that the parking app is useful for the car driver. 28.8% of people think the app may be useful. ONLY 1.7% think it is not useful.

The first evaluation question was "How long does it take to record and save vehicle information in the application?" 54.5% of people took from 1min to 2min. WHILE 36.4% took from have a min to 1min. And only 9.1% of people took 2min to 3min maximum.

Establishing Requirements

Part #1

5. Results Summarization

The second evaluation question was "When searching for a location on the map, how many errors did you encounter in the system?". 54.5% of people faced only one error, WHILE 18.2% faced 3 errors, And 9.1% faced no errors. The same percentage faced 2 errors, and also faced more than 3 errors.
The third and last evaluation question was "Based on your observation, how many steps did it take to reserve a parking spot in the app?". 72.7% of people took 3 steps to reserve parking, WHILE 18.2% took 4 steps, and 9.1% took only 2 steps.

the last question on the questionnaire was "What services do you expect to have in our application to improve your experience as a user?". We received 45 answers, And the most common were { adding multiple cars, saving different payments methods, adding apple pay on the payment method, ease of use, and quick access to services}

Pre - Design

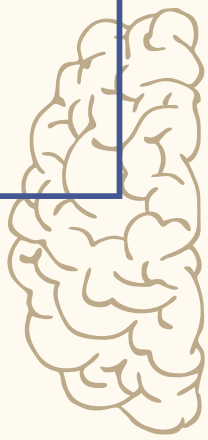
Part #2

	Meaning for Target Users	Design Implications
Attention	- The design of interfaces is simple to reduce distractions to be able to find what they need and to concentrate on one task at a time to accomplish specific task. - The layout of user interface from left-aligned (left to right) in English and right-aligned (right to left) in Arabic, so users have an easy time understanding the content. - Make important information highlighted, clear, bold to reduce the cognitive overload on the user for more usability and better user experience.	- All essential information will be on the same page and break down the complex tasks into steps such as using progress bar to increase user attention on current task. - Design the registration forms in a way that user's attention towards the fill of each field of the form and allows to submit after it complete. - Highlighted the important information and images and make it stand out and use strong font weight to increase contrast.
Memory	- Design memorable experience interfaces that promote recognition method and reduce recall method. - limitation of short-term memory to process information that make users cannot remember a lot of Information. - Using visuals and images that convey all the information to the users but not more than needed.	- Instead of design the form with using recalling method to remember lot of information, such as input field, writing time or date, we reduce it by using select from a list of options and menu. - Use categories to display different service in the applications that make it easy to remember - Using familiar icon and pattern for common tasks so that users would know which function associated with them. - Designing an interface like "search history" page and view "last viewed services" page to help users follow what they previously done.

Pre - Design

Part #2

	Meaning for Target Users	Design Implications
Perception	- Using effective visual ways of grouping information, such as white spacing or empty spacing to grouping information, and it helping the user attend to relevant information. - Groups the important and related pieces of information together so that the user attention remains intact. - Balance the colors and make it fully contrast to the rest of the page to appeal to the eye, and to differentiate some design elements.	- Grouping the main function in tab bar to make it easier to find when needed, and group related object close to each other with associated button to increase user attention by minimize the details. - Use consistent and engaging icons with labels, adding gradient overlay on the image to enhance the text contrast on images, and use a consistent color scheme.
Planning and Decision-Making	- The application provides three main services to select from and monthly subscription plan in addition to them. - Each plan has a series of procedures user must decide which is best option to follow to get the services.	- Designing the options of the services in a way that shows the differences between them to make it easy to decide which one to choose.

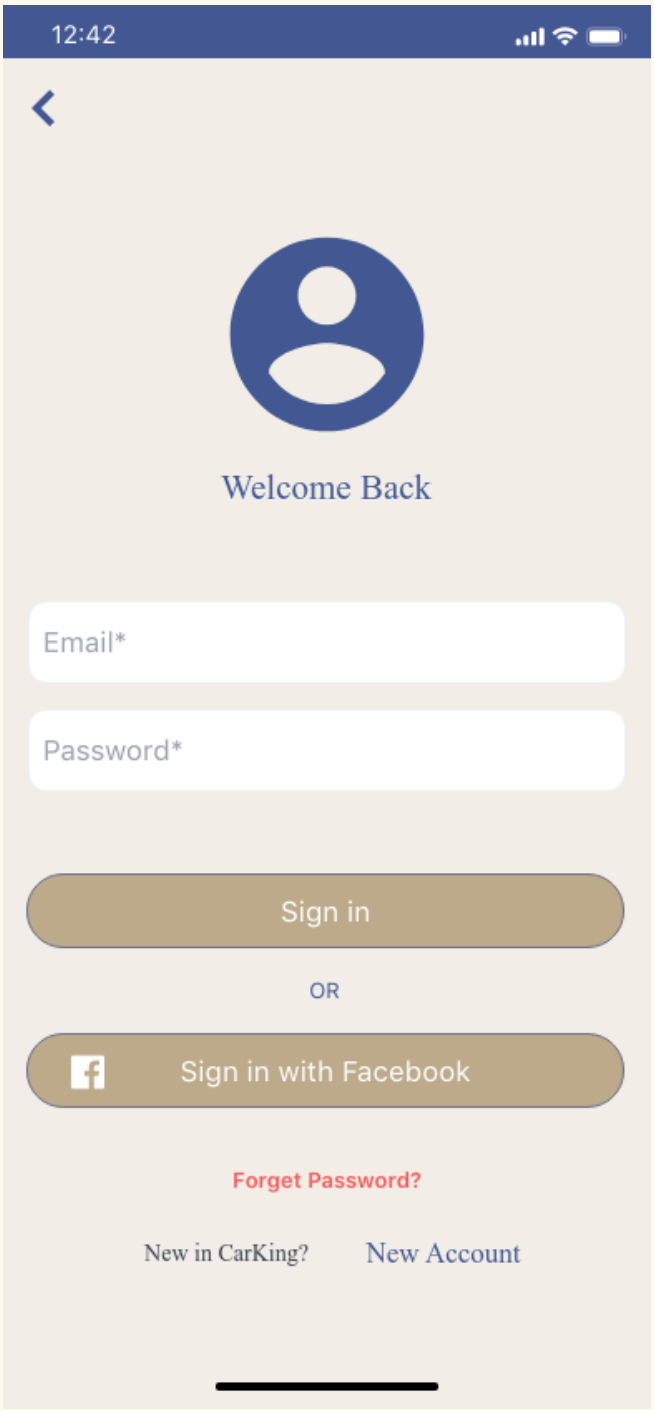


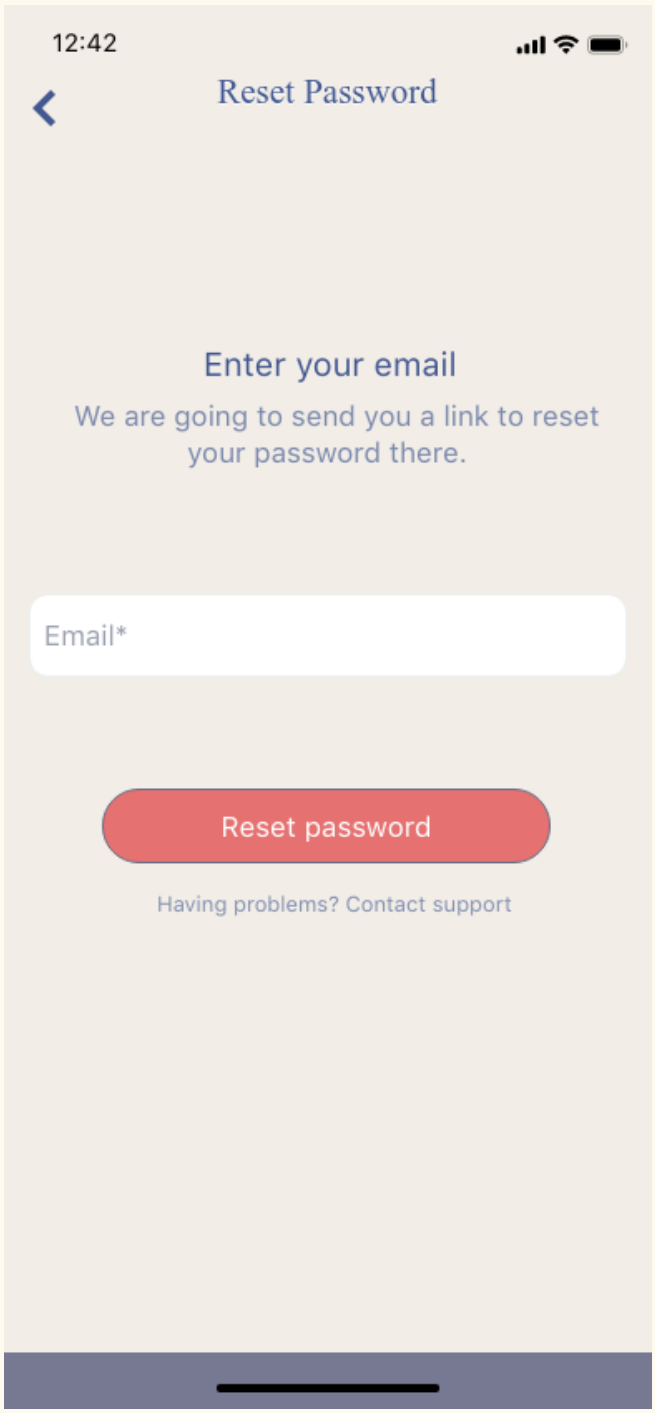
Prototype

Part #3

Prototype

Part #3





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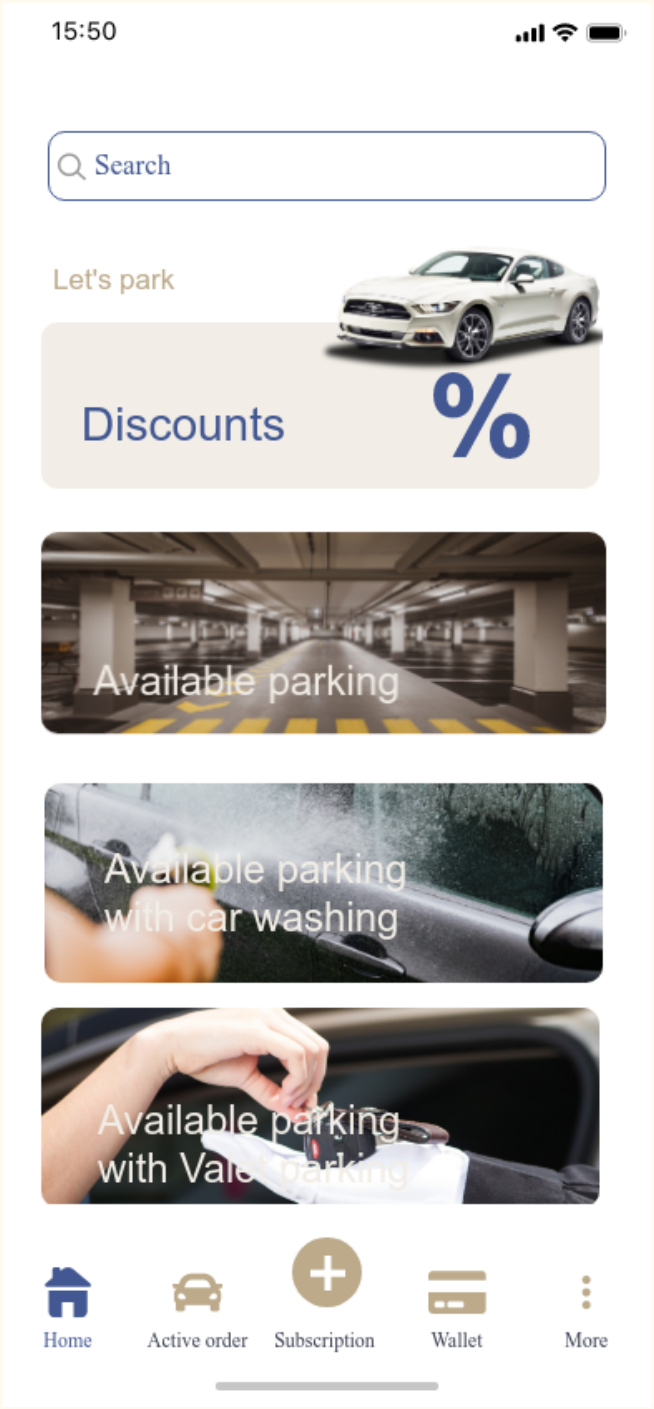

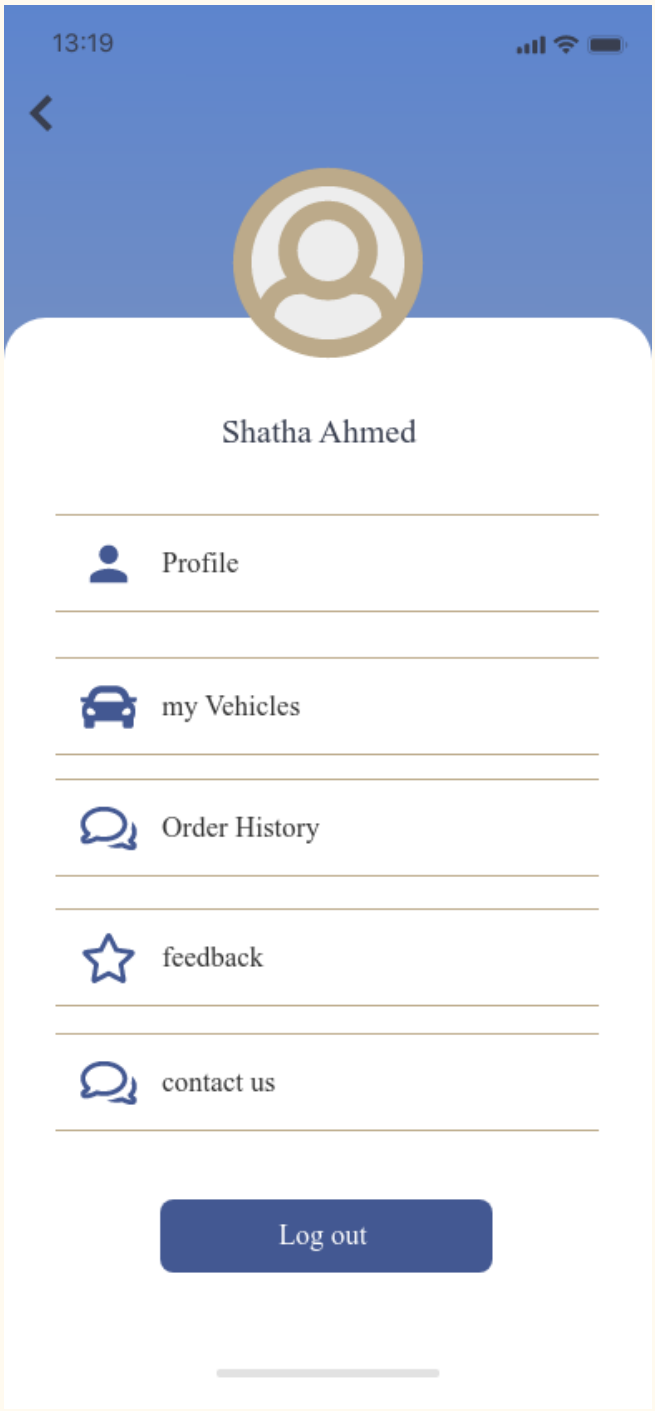

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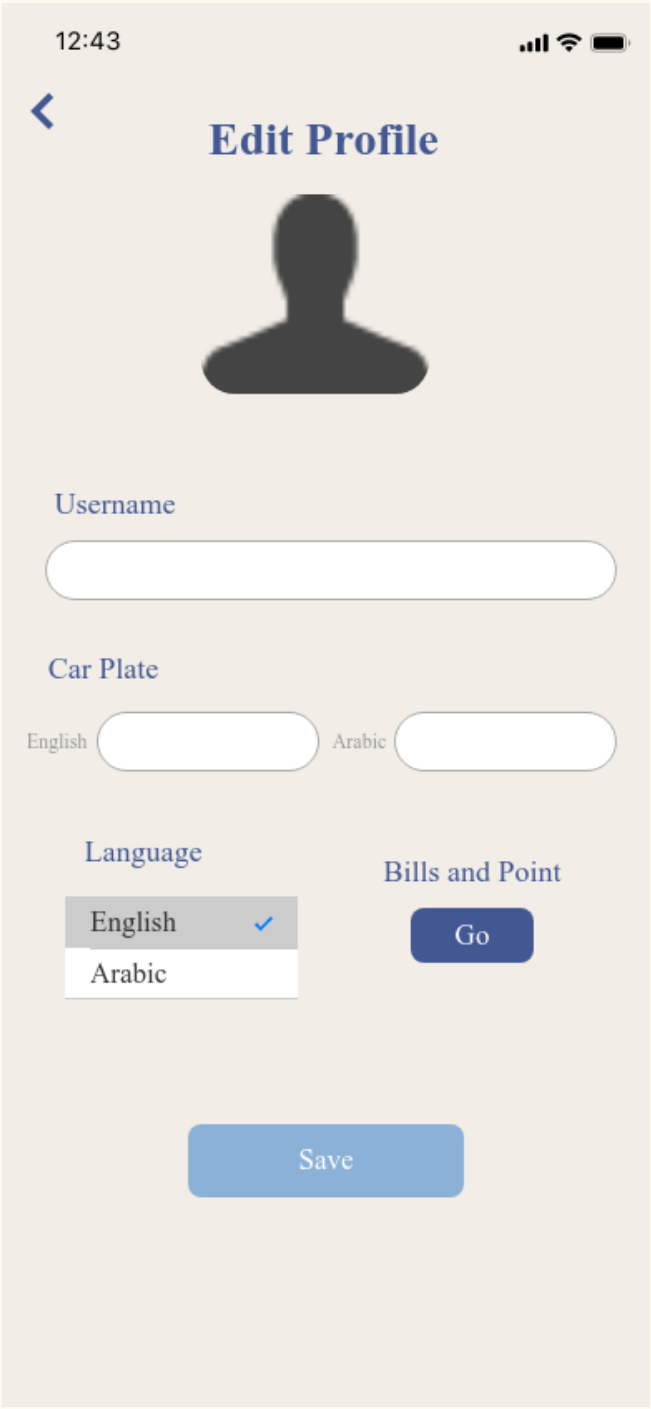

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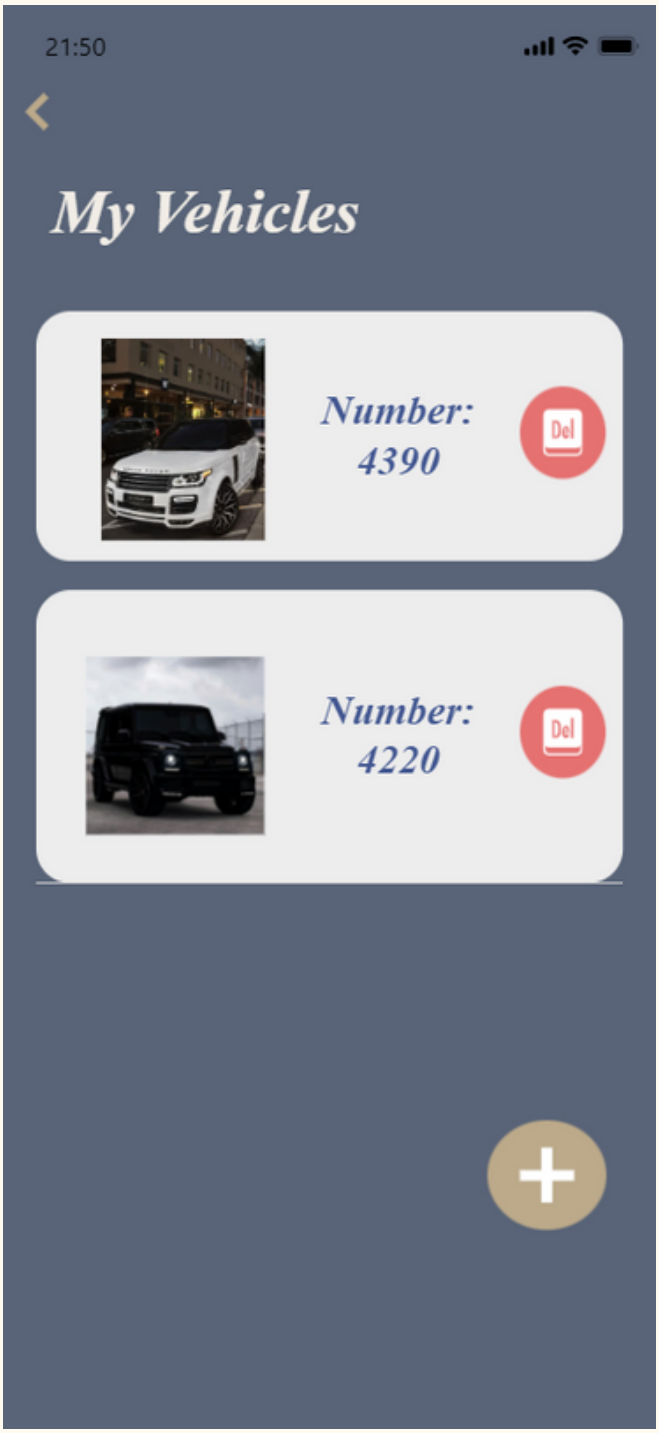

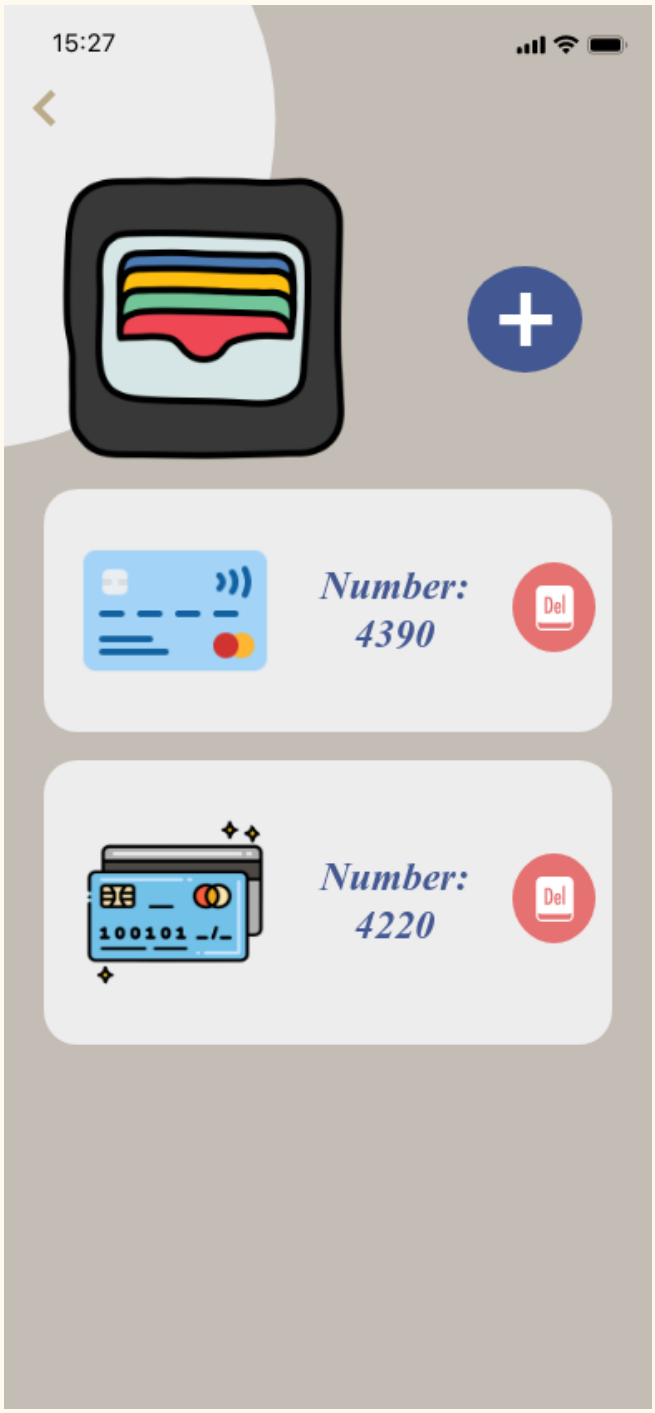

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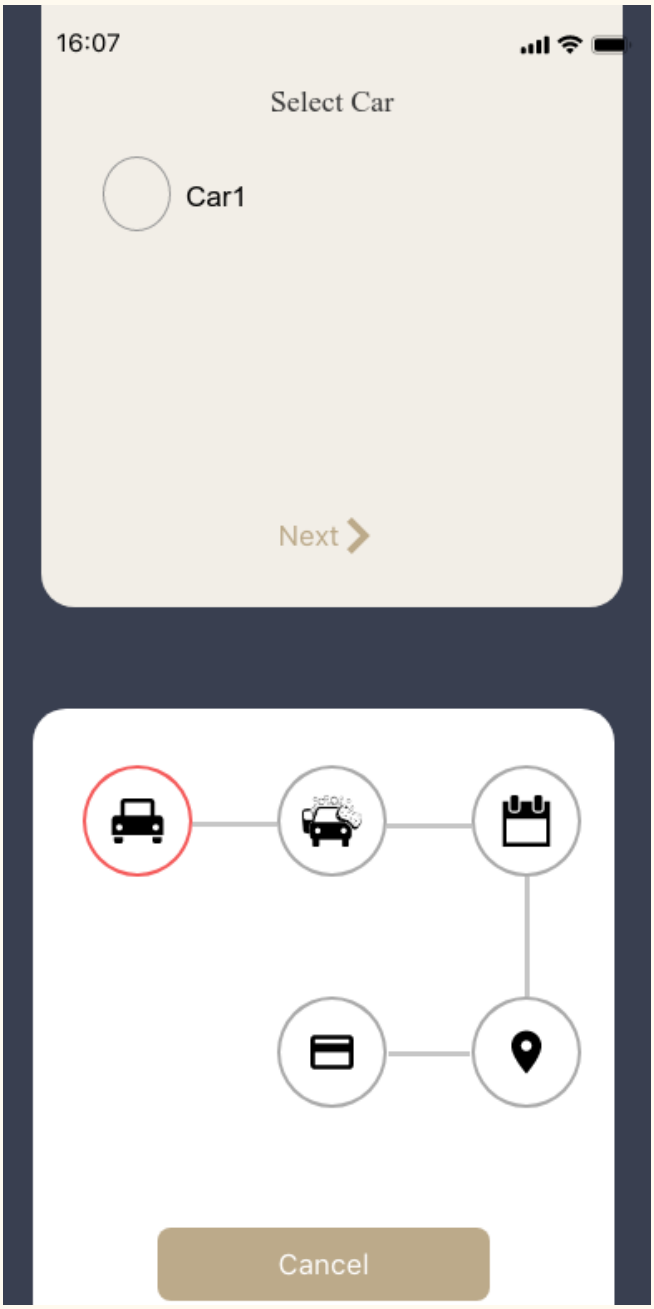

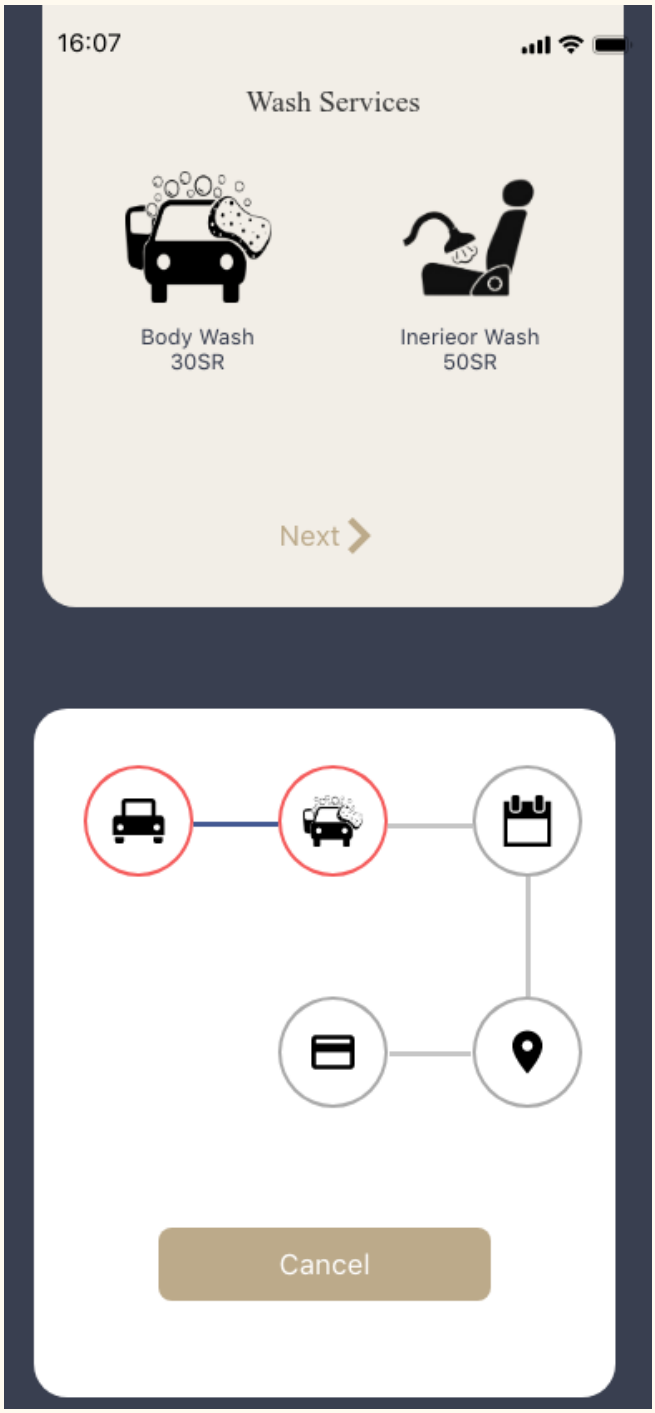

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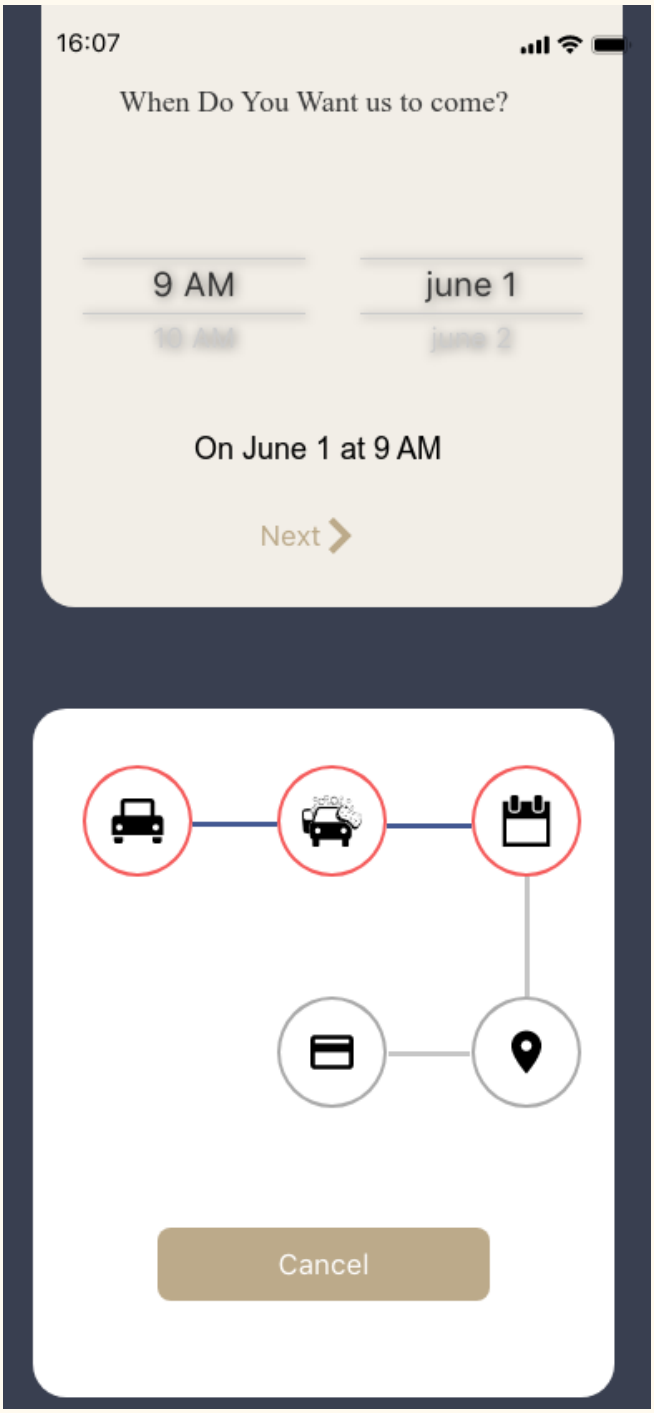

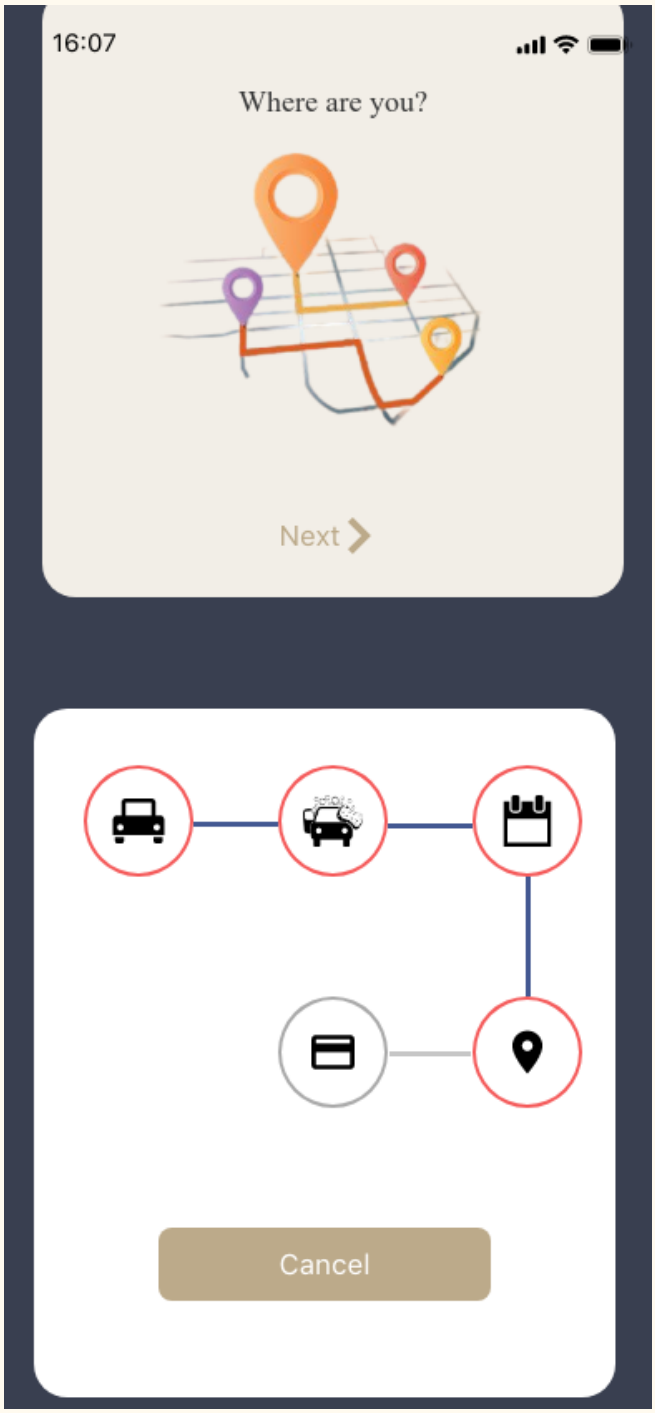

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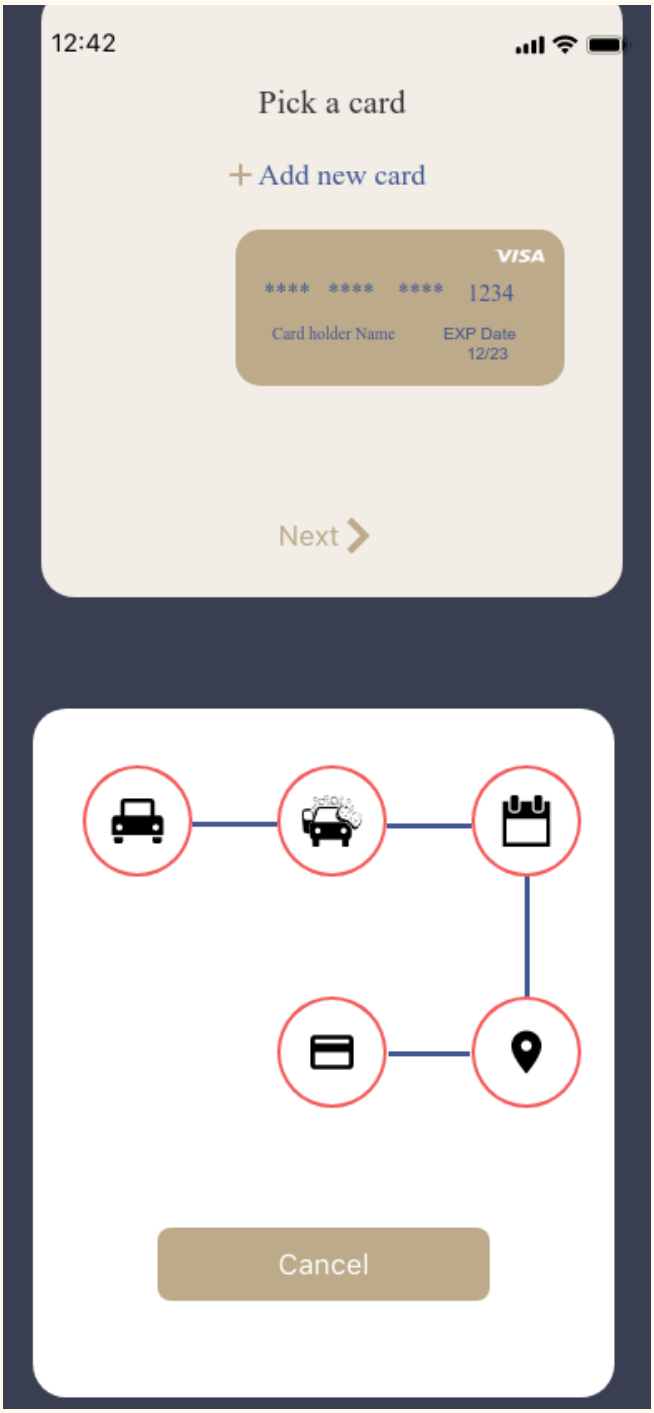

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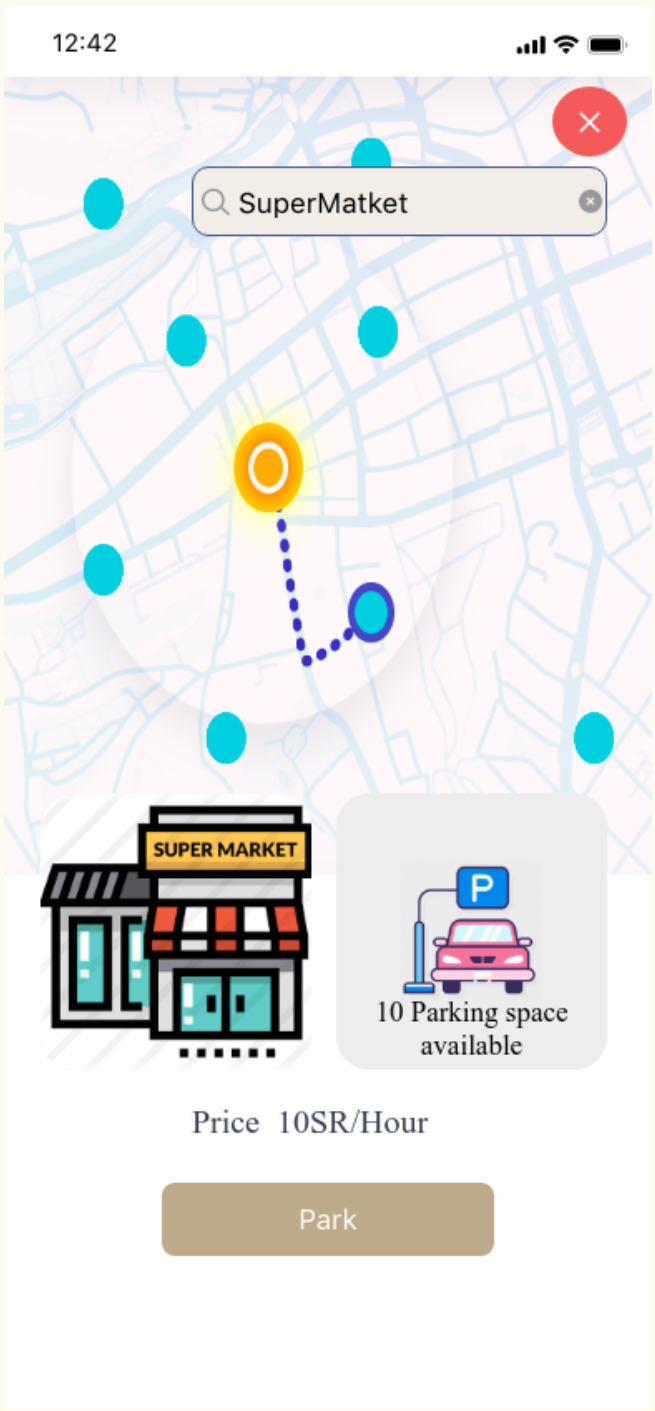

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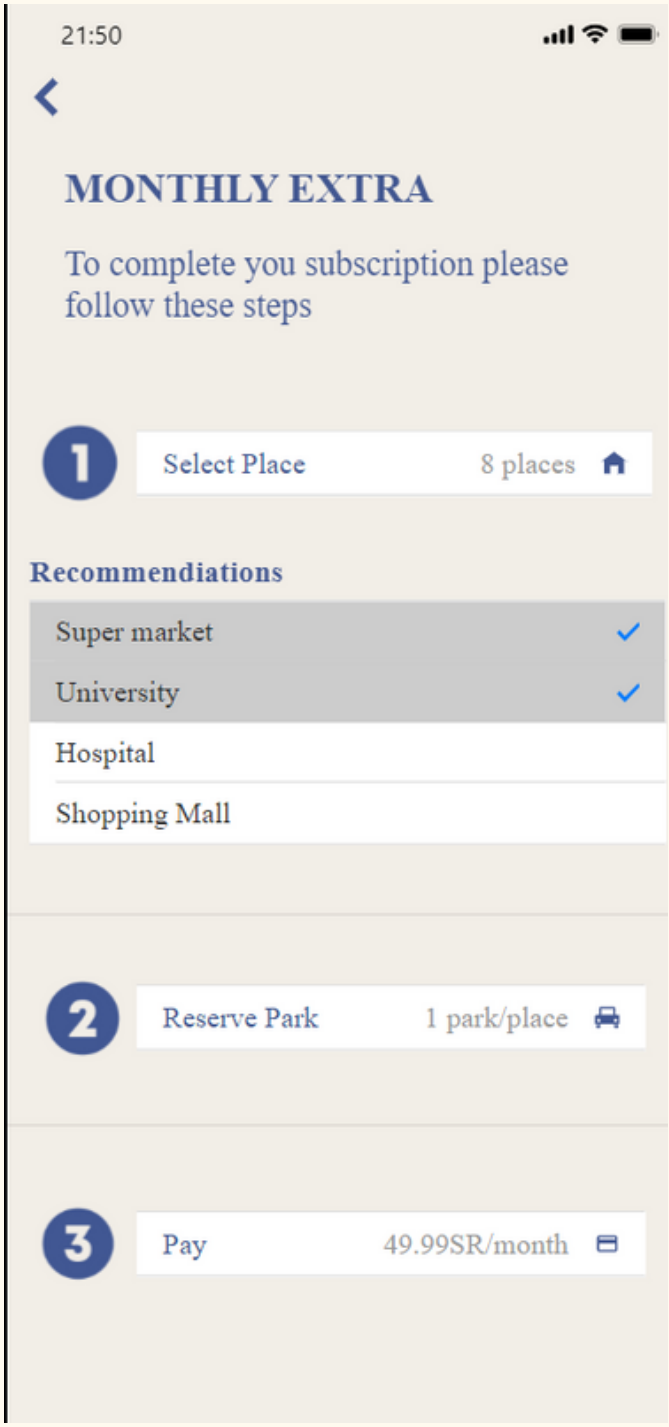

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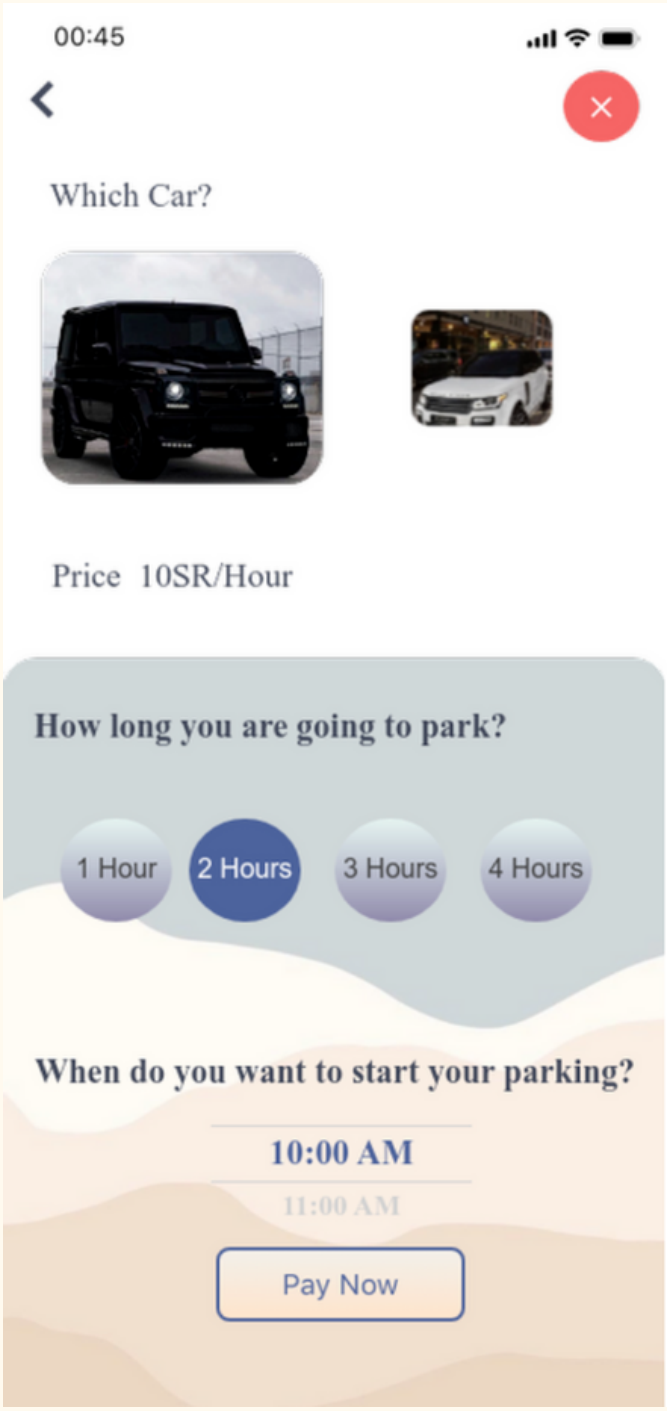

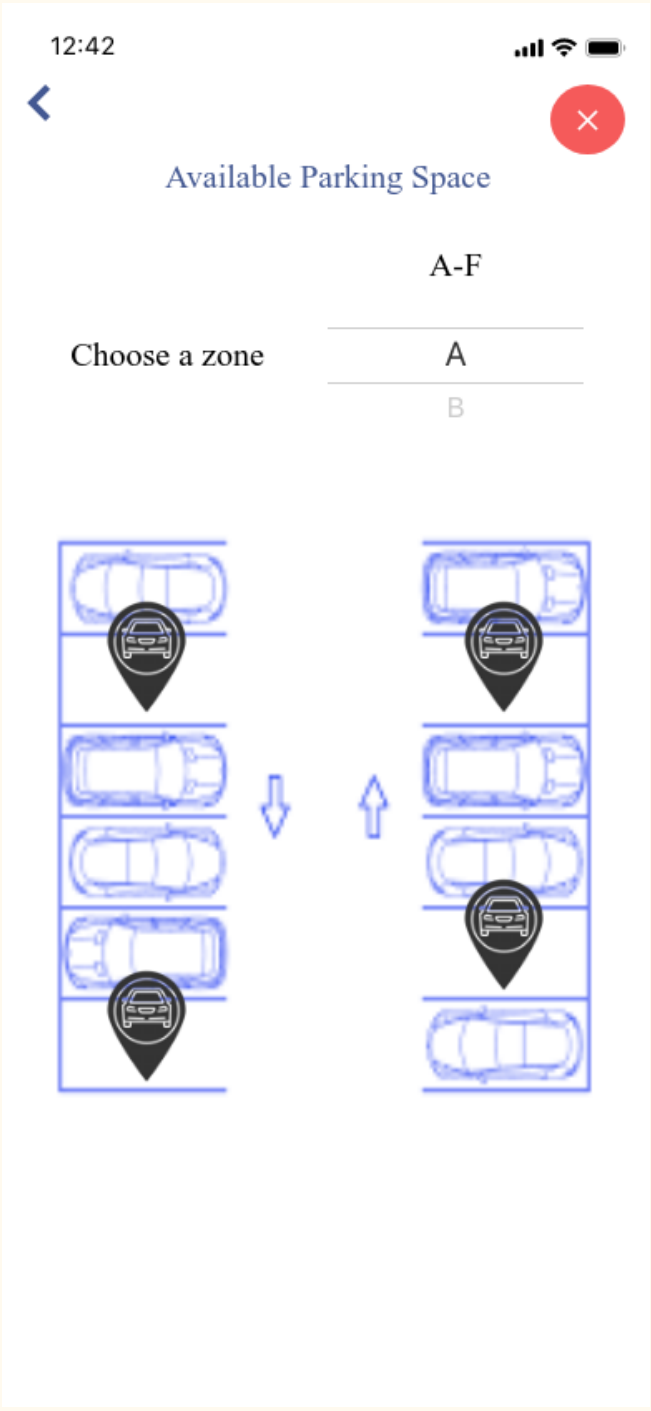

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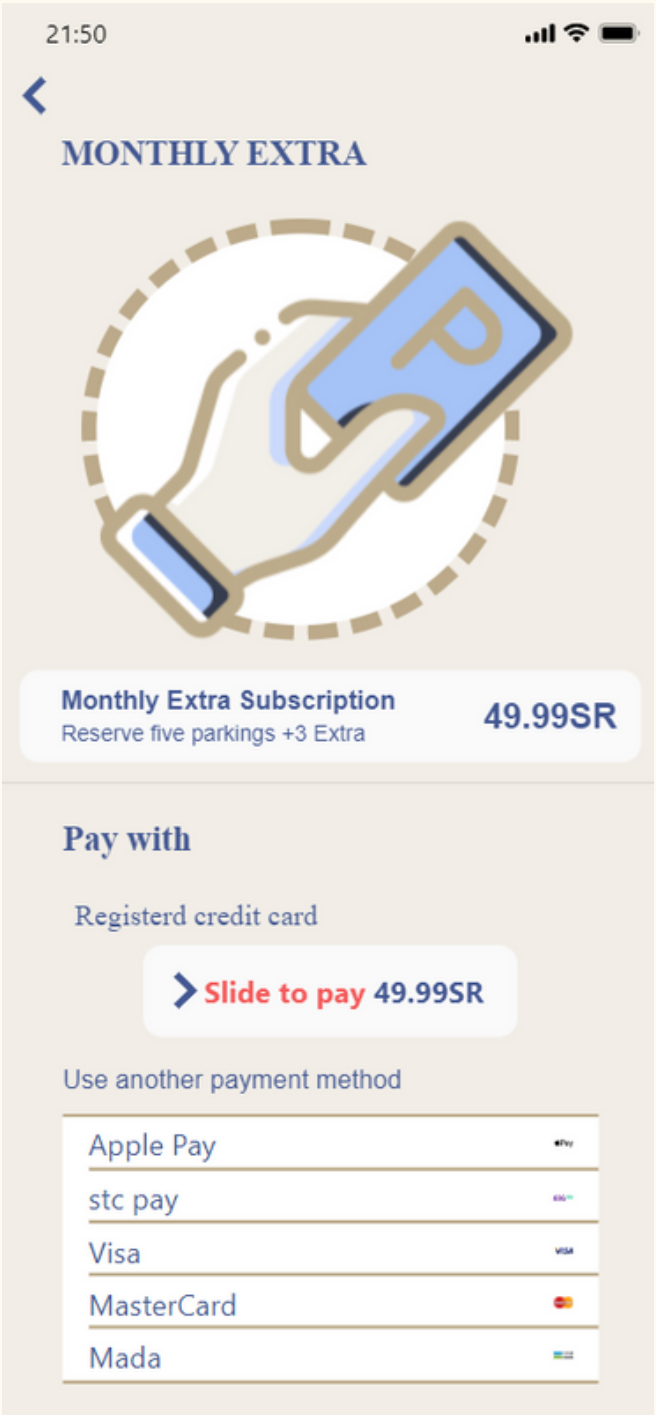

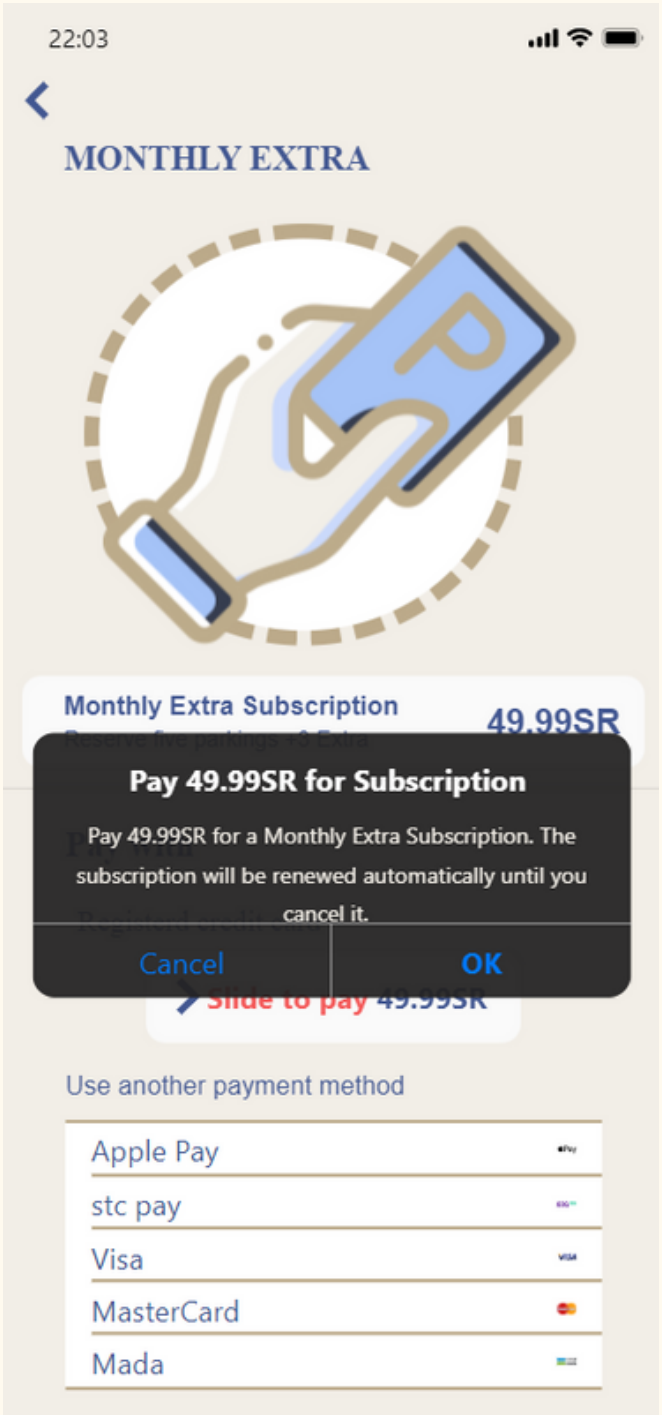

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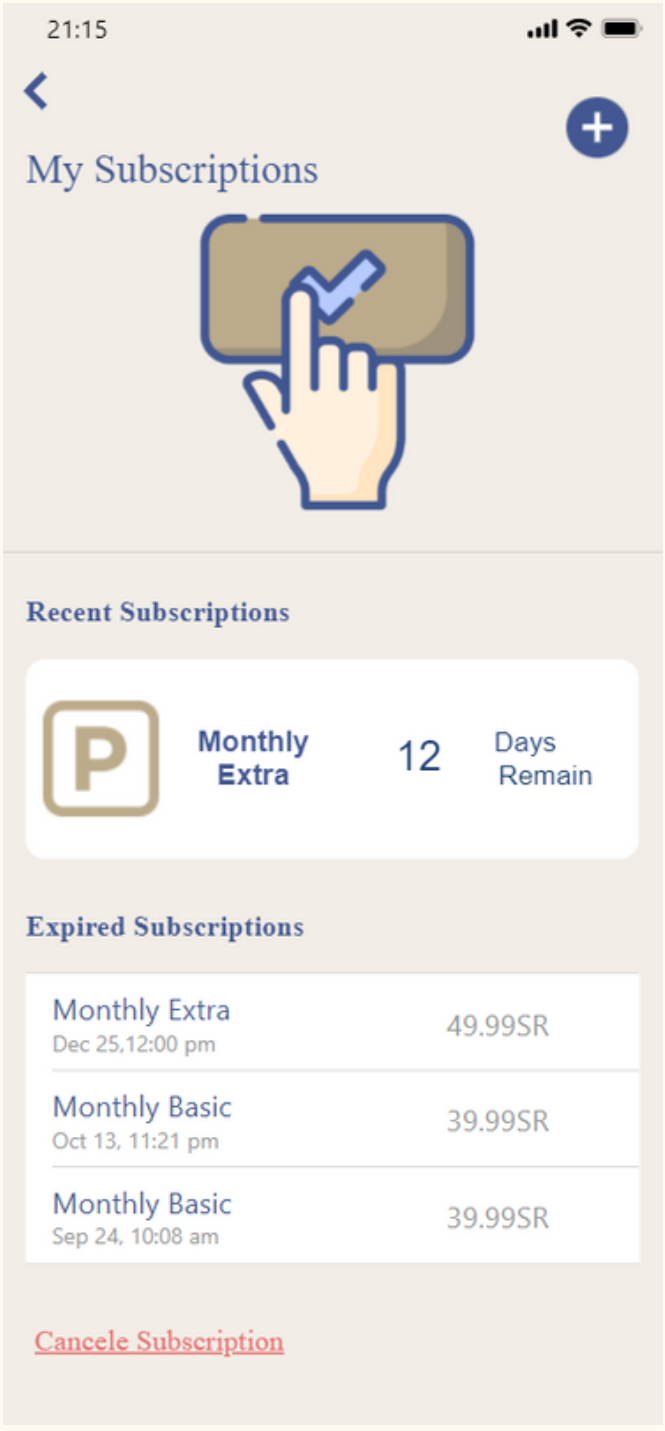

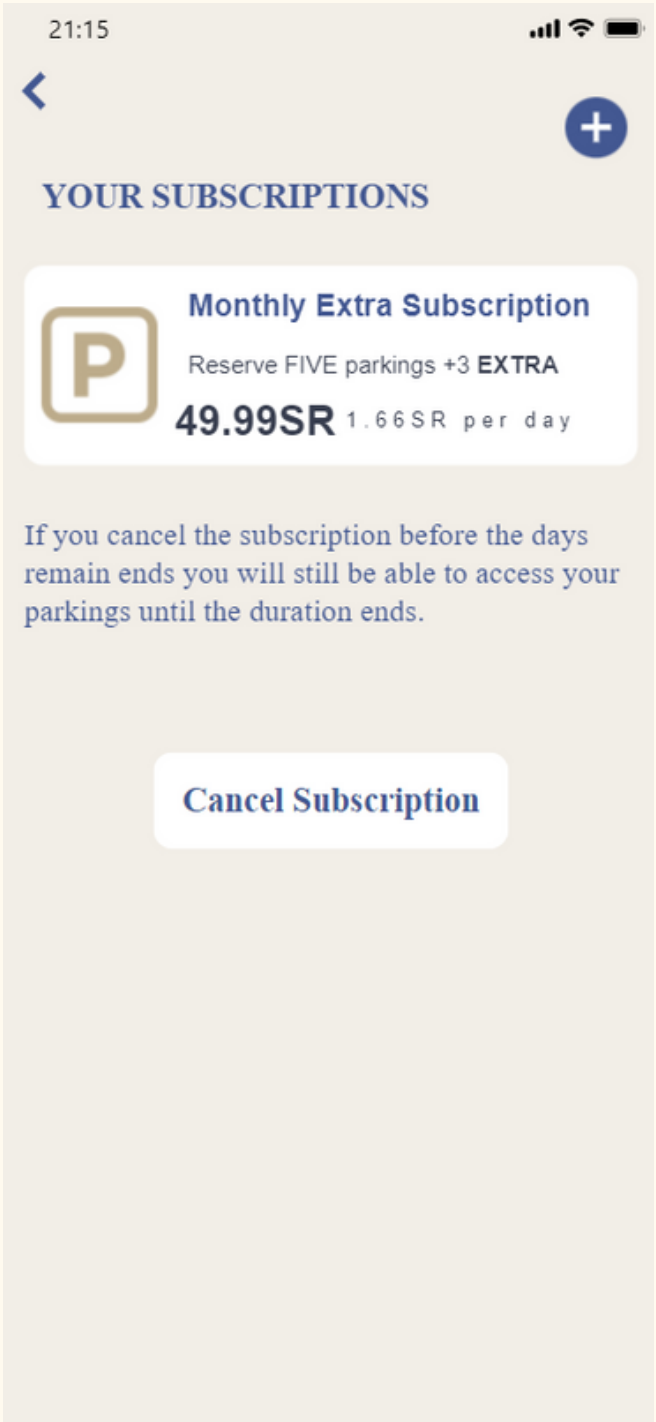

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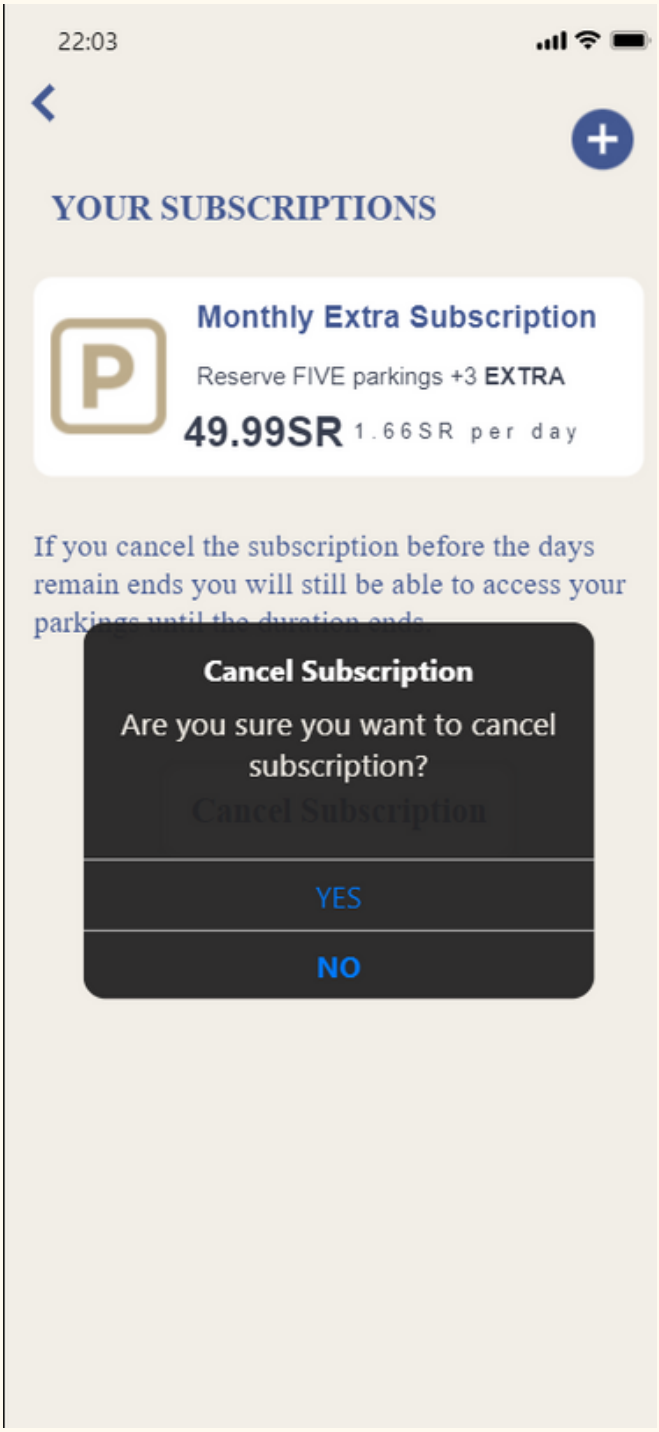

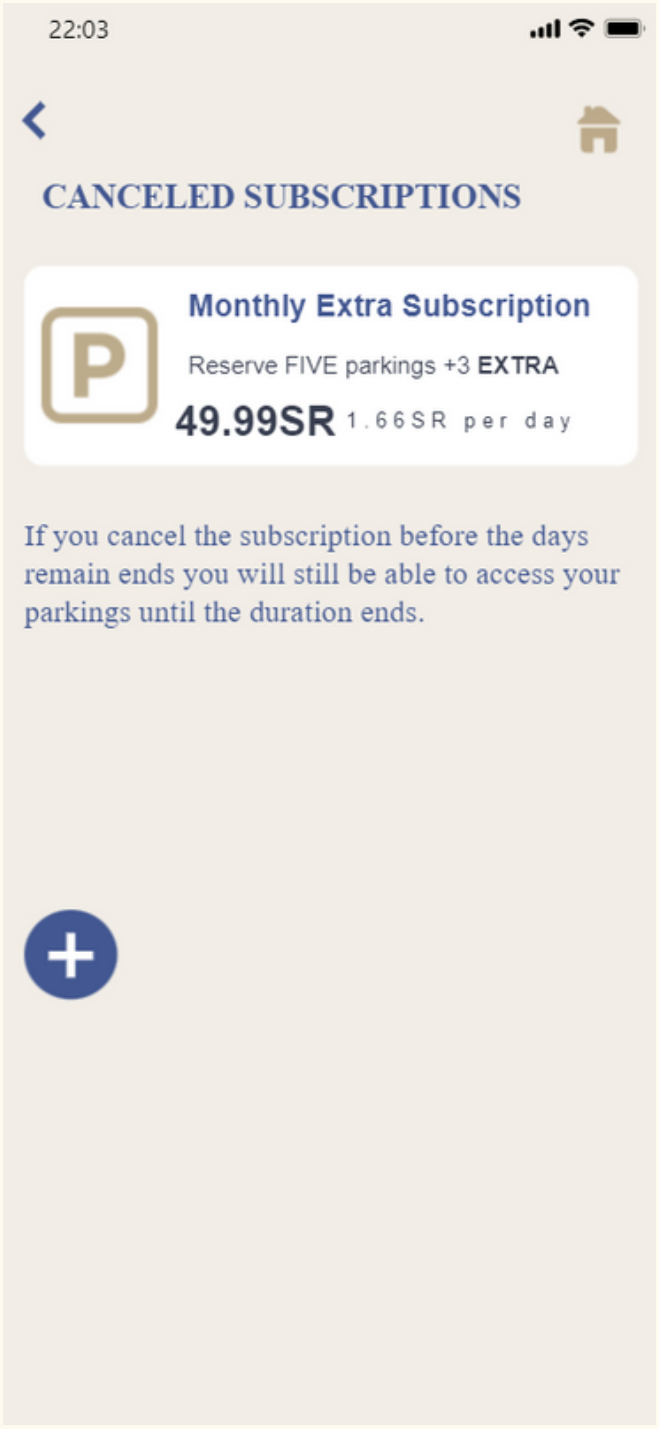

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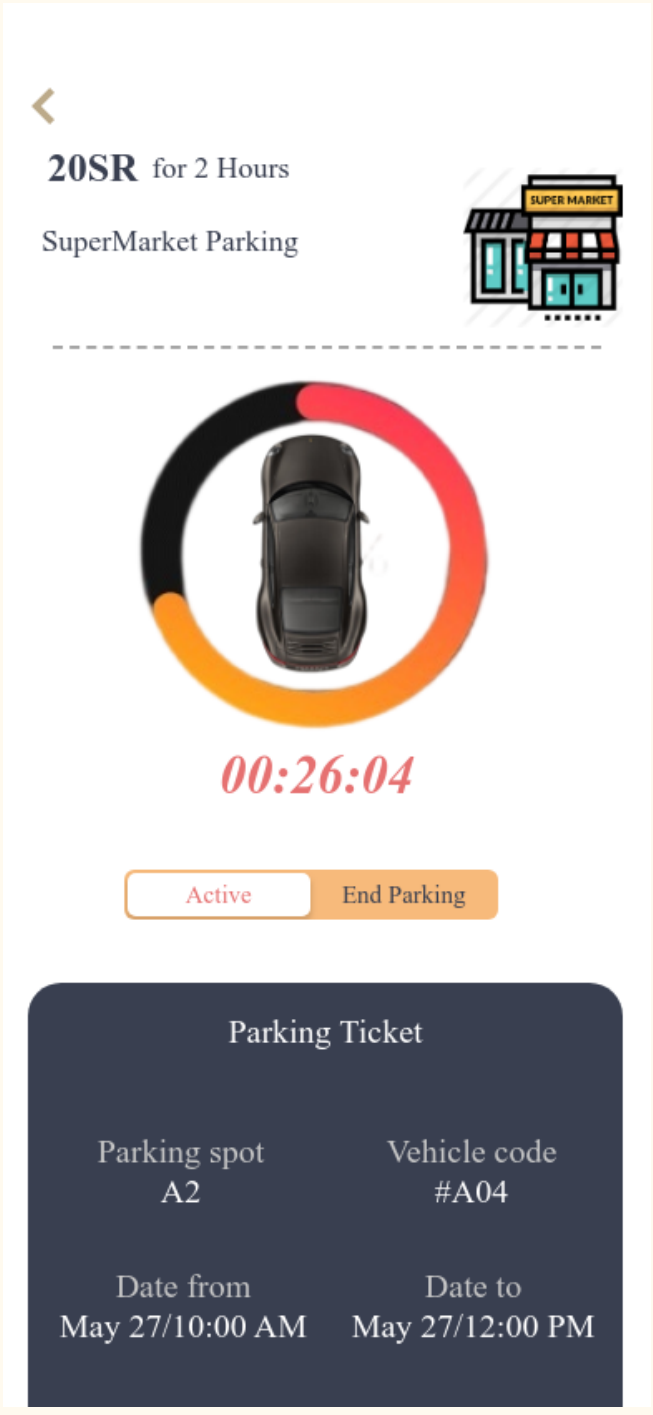

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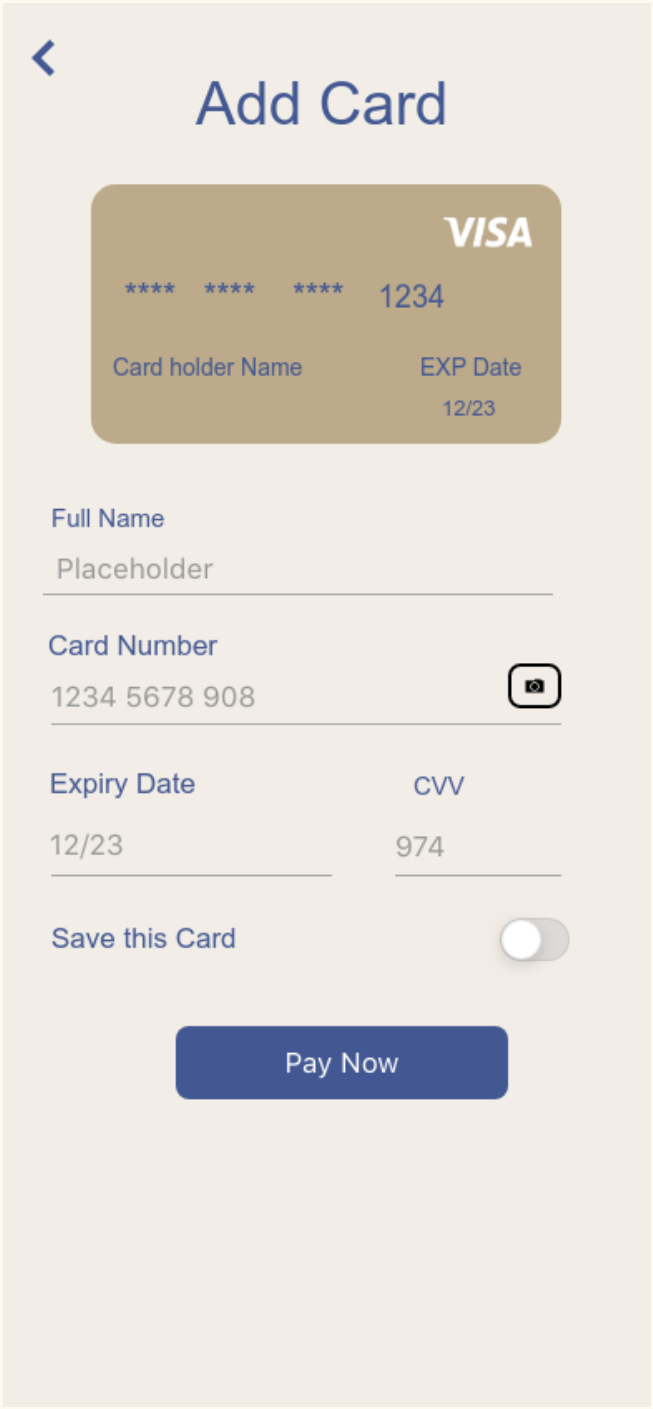

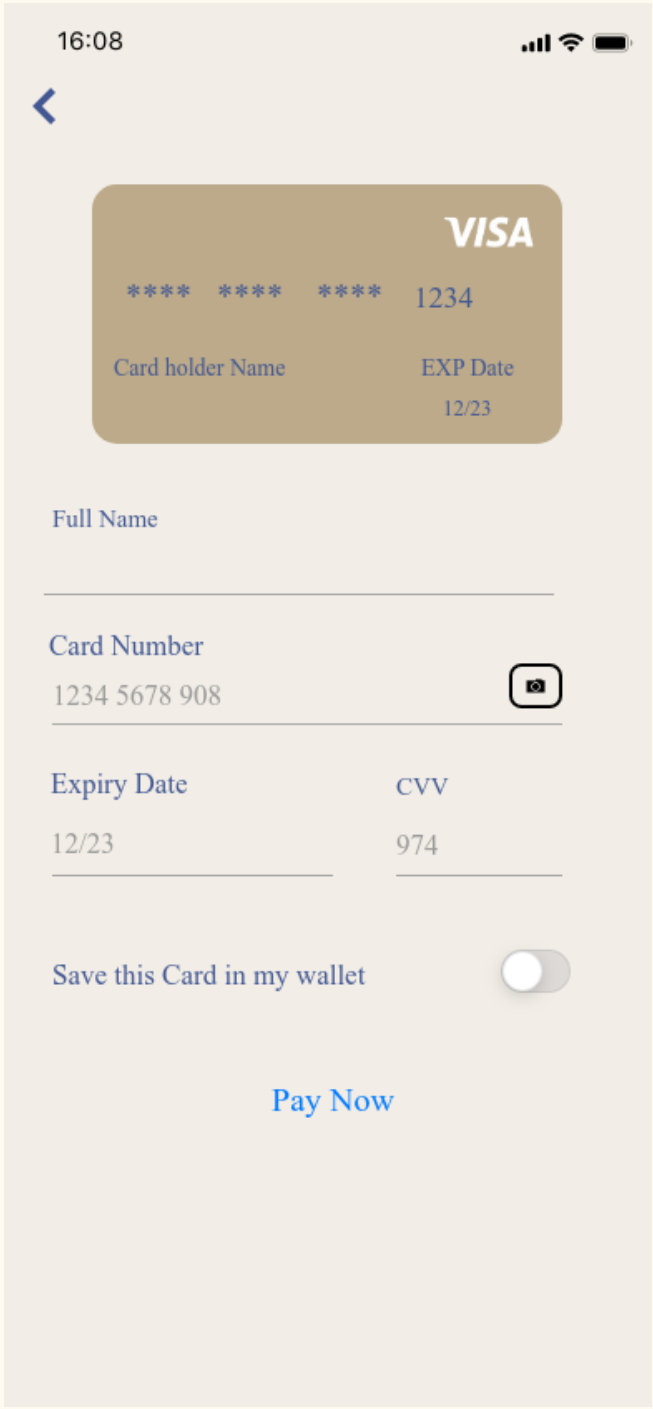

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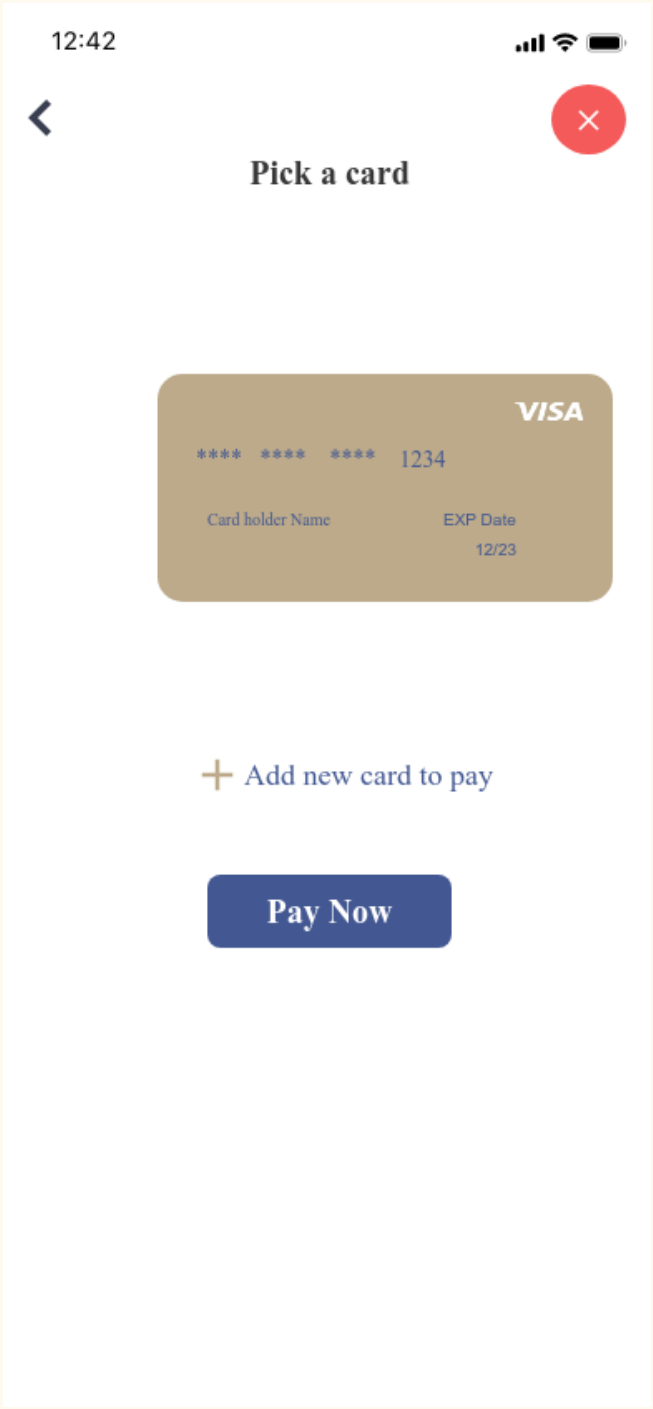
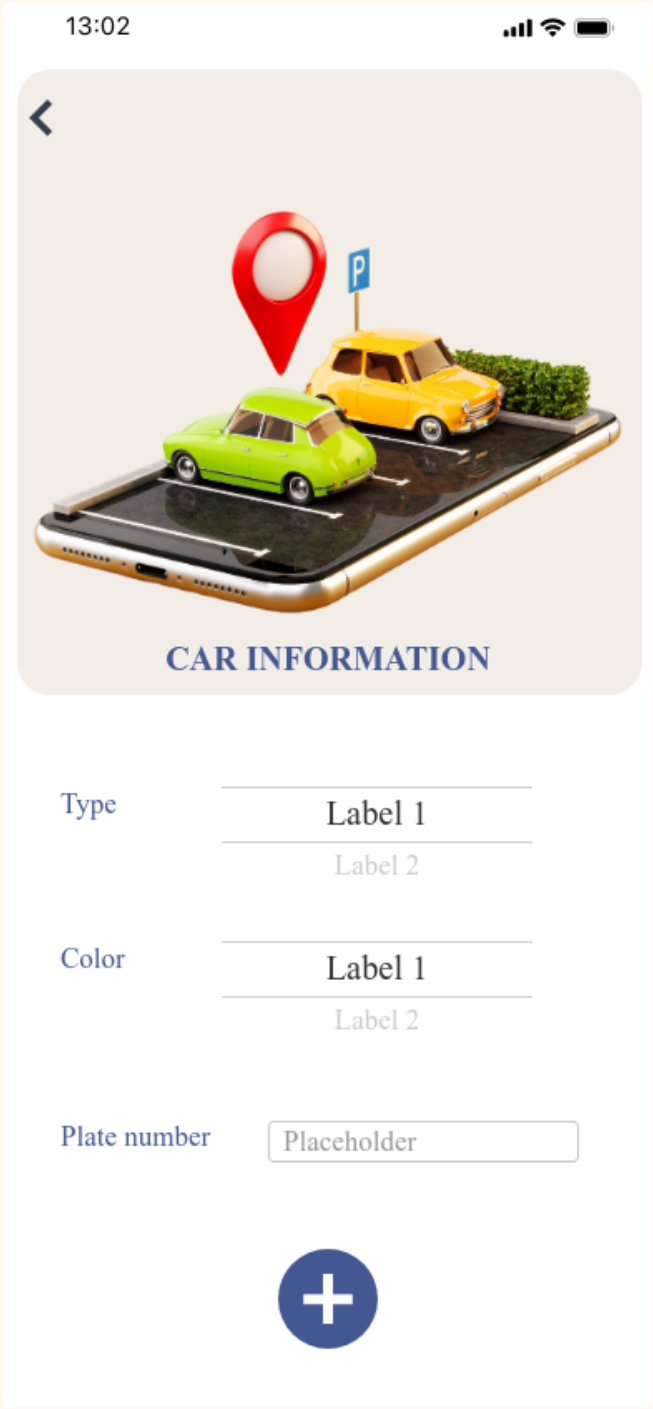




Design Principles

Part #4

Feedback	Giving relevant feedback through tasks, conforming success, and providing useful feedback in case of error. This is done by giving them a notification message about whether their payment process has been done successfully or not. In addition, if the user selects a time period or the duration he wants to use the parking spot, then the selected option will be in a different color and a click sound
Constraints	restricts, a user from performing a certain action until he performs some action, an example of the constraint in our app, is that the user will be able to see the sequence of actions he should take and enter the desired information to lastly confirm the booking and payment processing. This helps in booking a parking spot or car washing with all information entered and not skipped to avoid any mistake.
Affordance	Affordances make our life easier as they support our successful interactions with the world of physical things and virtual objects. That achieved with the buttons, every button are highly symbolic and mostly use the hints taken from the real world so that users could understand them quickly
Consistency	Main benefit in Consistency that the interfaces are easier to learn and use. That achieved with the unified currency which is riyal Saudi because the app specified for KSA. also the app use the 12 hour format.
Visibility	Good designs don't overwhelm users with alternatives or confuse with unneeded information. That achieved when the user about to reserve parking he will know immediately what to do next and he did't confuse, also in the subscription and in the other task the user will know directly what to do

Experience Goals

Part #4

Helpful	The users are able to search for the place they are going to and show its location and then display the parking spot and show the available spots to book. It also offers other services to users that help them in their daily life routines such as car washing and parking.
Satisfying	We tried to create a user experience that is satisfying, easy, pleasant, and natural for the user as much as possible to be able to book a parking spot early and quickly. we are making sure that the app performs the right functionality and the intended ones and this is done by seeing the user reaction to our app, thus we provide a rating and communication through emails services in the app that helps us to improve our app in the places that the users found the problem and errors in the app. Also reward points for each time the user ends the parking before expirations
Enhancing the society	The users know in advance if there are any free or available spaces to park in and how many available ones are in that place that you are going to, and pre-book. Additionally, there are 2 languages supported by the app • Arabic • English
Clear Language	The app uses an easy and clear language by using terminologies that are not ambiguous or abusive and the user can get the meaning directly and quickly using short sentences .

Usability Goals

Part #4

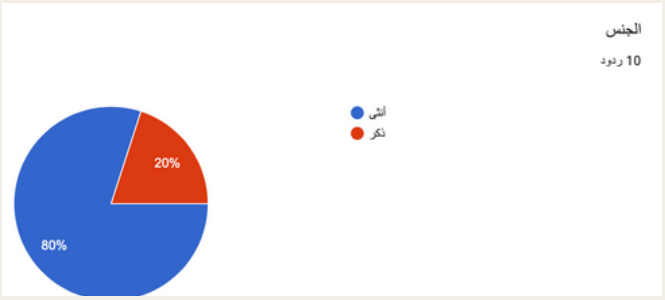
Effectiveness	Effectiveness is a measure of how well the app does what it is designed to do. that achieved when the user complete the task of reserving the parking, and achieved when other task completed such as payment or add card even when the user choose any service such as car wash or subscription.
Learnability	The app provides interface include simple brief about the app to facilitate the use of the application to the user
Safety	To protect the user from any dangerous condition and undesirable situations, the app achieved the safety with log out button. we seperate the log out button from save info button and if the user choose to cancel the subscription a notification will appear to confirm his choice
Efficency	because the user interact with the app that means the user want to do the task quickly and in the right way, so every task will not take more than 1 minute and the task will be completed in the right way
Utility	Utility is about providing functions that users need in the first place. so the app provide all the requirements and task that suppose to be in the app such as reserve parking space or hire someone to wash the car and the subscription service.

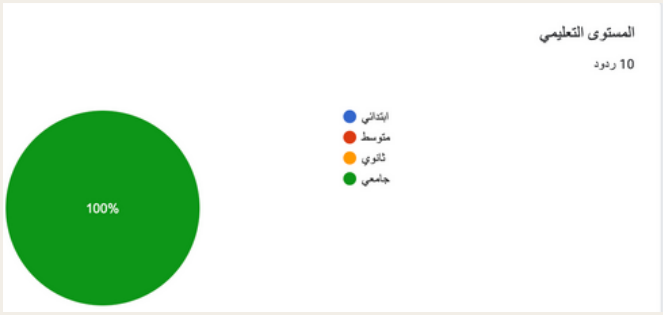
Usability Testing

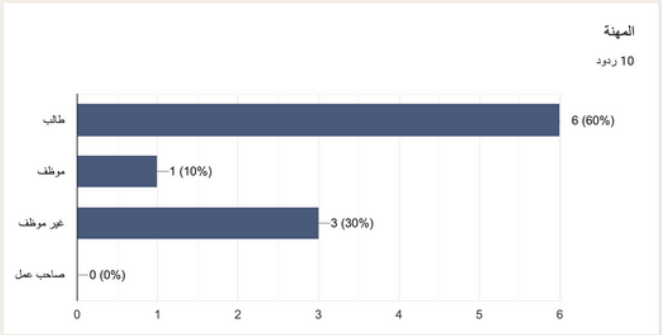
Part #5

Participants Description

10 participants involved in the evaluation of the prototype where most of them female university student and their agers range between 18 to 25 years old.







Usability Testing

Part #5

Environment Description

All participants were tested in their homes, user interaction with the prototype were observed and the time taken to perform the task was calculated by the observer

Tasks Describtion

1. Record vehicle information in the application and save it
2. Find a location using the map
3. reserve a parking

Usability Testing

Part #5

Users \tasks	Record vehicle information in the application and save it	Find a location using the map	reserve a parking
User1	21 sec	54 sec	93 sec
User2	55 sec	32 sec	28 sec
User3	15 sec	40 sec	24 sec
User4	30 sec	37 sec	31 sec
User5	19 sec	35 sec	27 sec
User6	23 sec	33 sec	39 sec
User7	45 sec	28 sec	40 sec
User8	37 sec	25 sec	38 sec
User9	30 sec	19 sec	20 sec
User10	39 sec	35 sec	18 sec
Average	31.4 sec	33.8 sec	35.8 sec

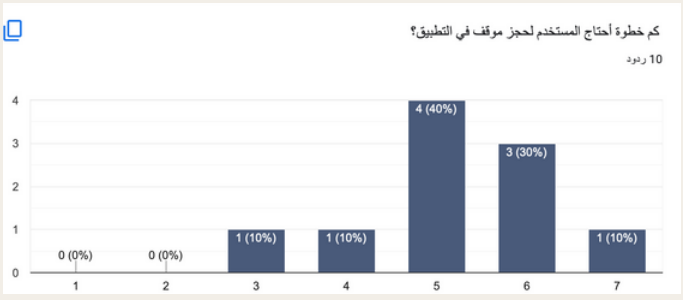
Usability Testing

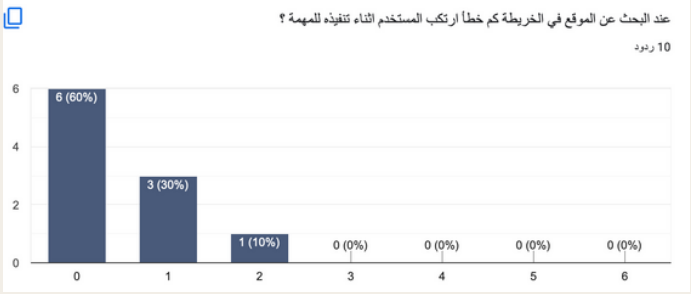
Part #5

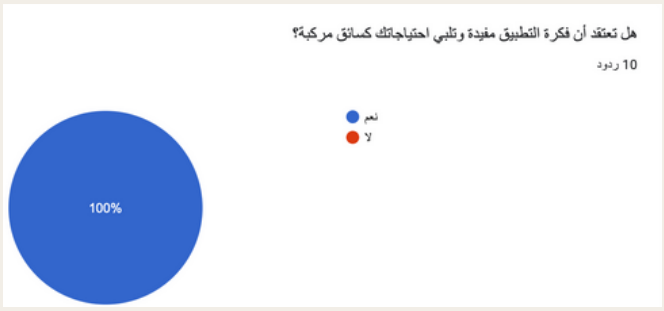
Prototype Evaluation

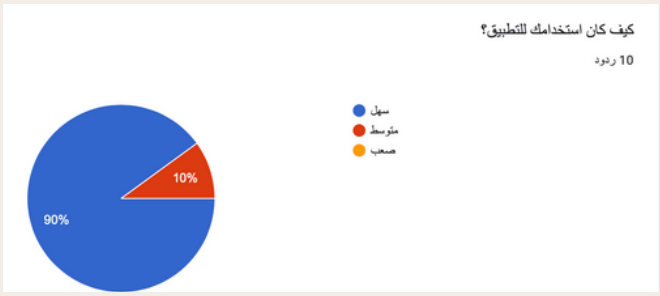
objective measure

subjective measure









Usability Testing

Part #5

post-test questionnaire

- The estimated average time the participants took to complete adding vehicle information in the application and save the task is 31.4 sec.

- 40% that is 4 of 10 of the participants took 5 steps to reserve parking and 10% of the participants took 3 steps to reserve parking and 30 % took 6 steps to reserve parking and 10 % took 4 steps to reserve parking while 10% took 7 steps to reserve parking.

- 30%(3 of 10) of the participants face two errors while looking to find his/her location using the map and 10%(1 of 10) of the participants face an error while looking to find his/her location using the map.

- Most of the participants found the app's services easy to use and the design of the interfaces comfortable and harmonious.

- Also, All the participants found that The idea of the app is useful and meets their needs as drivers.

Conclusion

At the end of this project, we learned a lot about the user requirements and how to establish data and organize them to develop a system.

In addition, we understood the nature of the parking problems more deeply and how specific users want the application to be done. We established this with the help of the questionnaire we sent and the resulted data from it.

And the most important thing was when we implemented our prototype considering all this information to achieve the user's needs.

References

1.Questionear Form Link

https://forms.gle/RVSVGcbg27m9MW55A

2. ProtoType Link

https://pr.to/YLMXMG/