Power EnJoy

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Project Discussion

Discussion Scheduler

- Goals, requirements, functionalities and architectural part. → Gabriele Bressan
- OnStar, car system and Components → Simone de Santis
- how the system will appear and testing → Pietro Di Marco

Goals...

- System allows only **logged customers** to see available vehicle.
- Customers will be able to **reserve chosen car** for 1 hour before they pick it up.
- User that exceed the **pickup time** will be charged.

Goals...

- User that reaches the reserved car is able to **open it only using mobile app.**
- System during the trip shows details **about ETA**
- System computes **automatically charges and discounts** related to the user’s behaviour.

Assumption

Smartphone with GPS and Internet

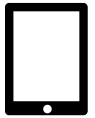
Payment using credit card made by an external entity

Assistance service 24h

Parking areas are located uniformly in the city

Requirements about car...

Equipped with iPad



Passengers limit

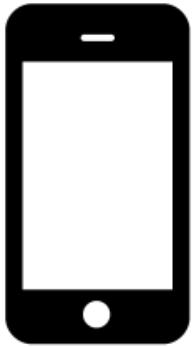
Unique identified

Equipped with OnStar

But After all these words

how the user can interact with the system?

Three different ways...



Mobile App

- View Available car
- Reserve/Delete car
- Historical Trips
- Open car

Web App

- View Available car
- Plan a trip
- Historical Trips
- View safe areas

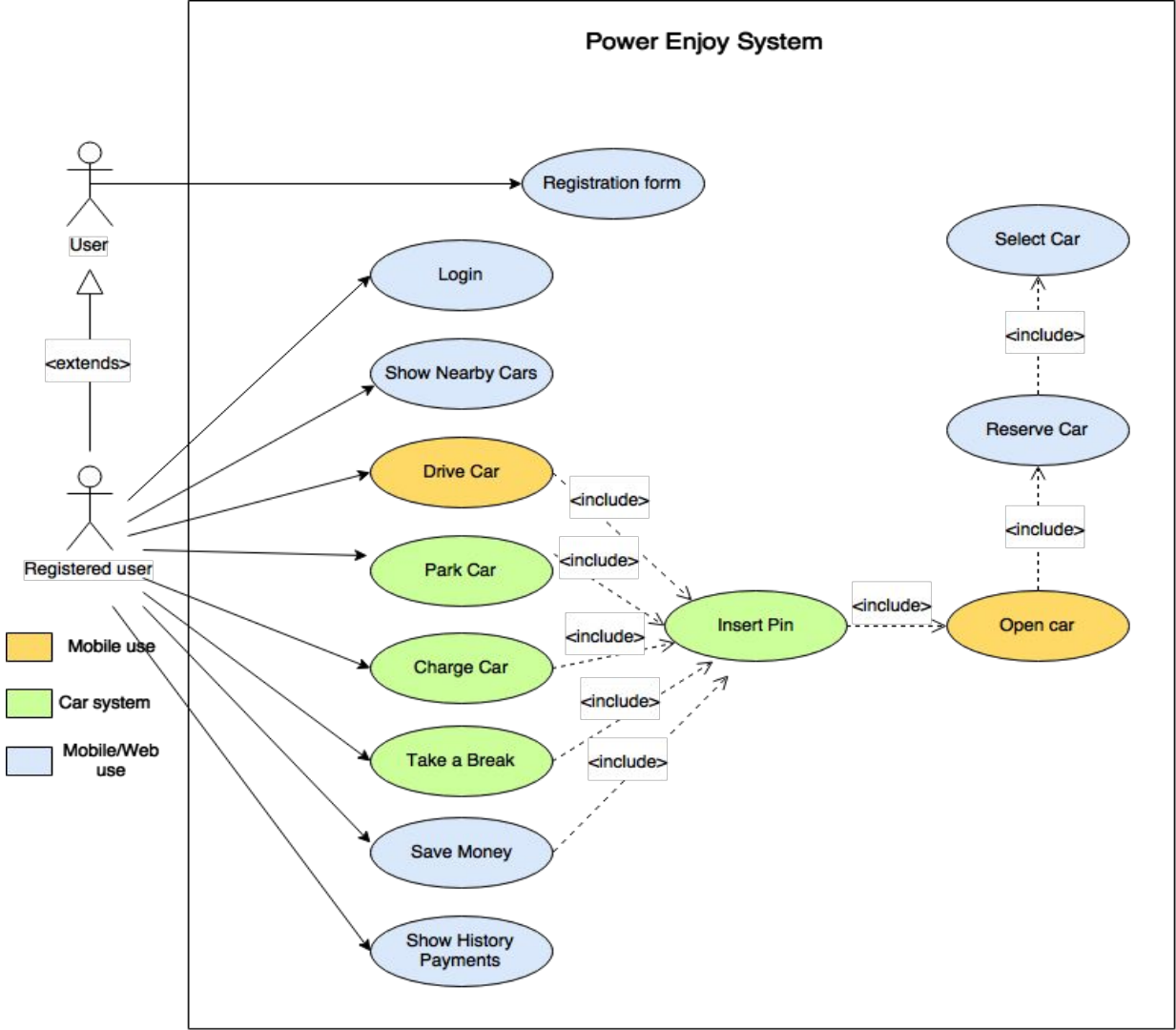
iPad System

- View car info
- Modify car status

USE CASES

Assumptions:

1. the power enjoy App installed and always working.
2. The User's cell phone is always on and online.
3. The user takes always with him his cell phone.



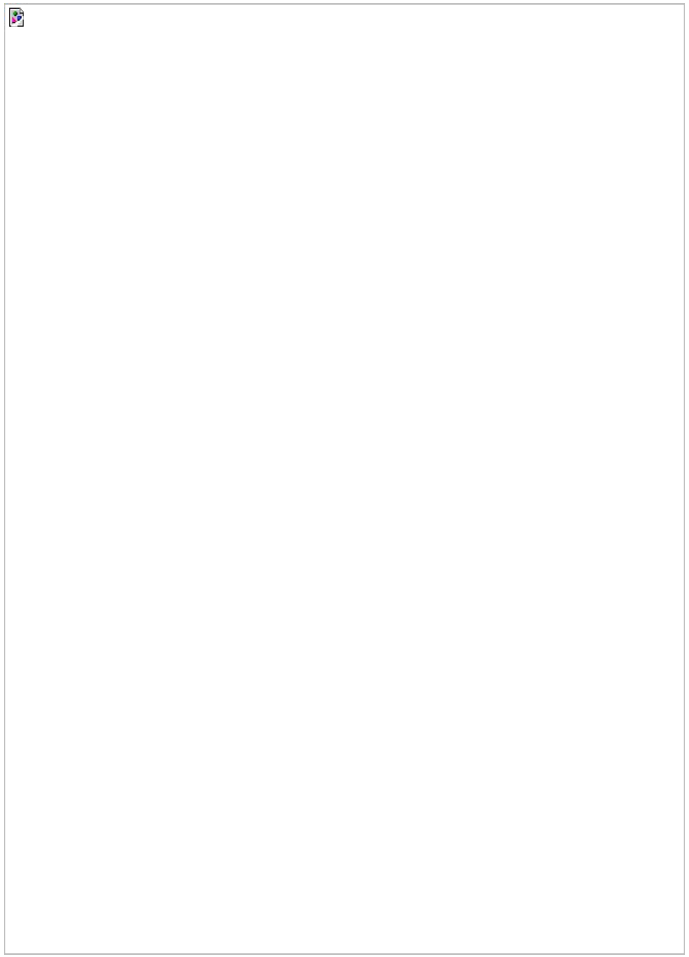
What is the better architectural design

to execute these functionalities?

Four logical layer

There is an **advantage in performance** because each layer has a specific task and functionality

There is an **advantage in security** aspect due to
an assignment of specific security credential to each layer.



Now Simone will talk about the part that characterizes our system

Searching some suitable Vehicle...!

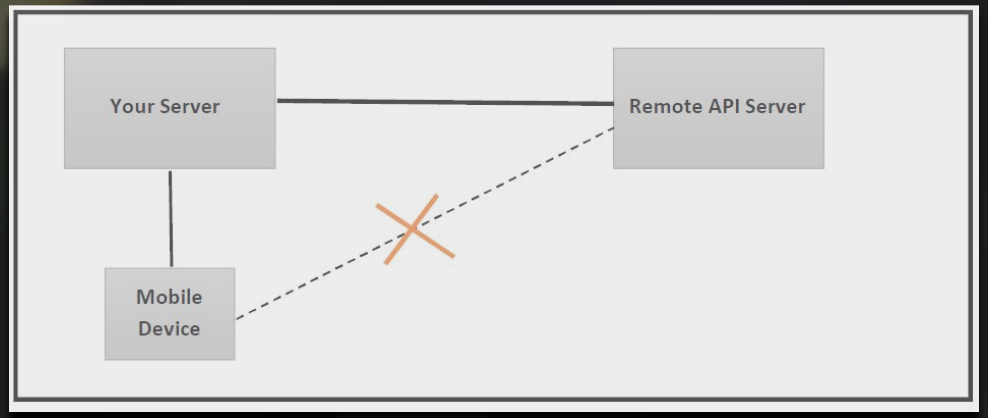
System Vehicle Interaction

Facing out the different solutions available in the automotive industry. We've analyzed the opportunities in electric vehicles. General Motors will sell starting from 2017 Opel Ampera-e, an electric vehicle with 200 miles range autonomy.

GM has given to us thanks to our request, the access to developer resources, description of API, and developer credentials.
This car has already installed OnStar Hardware technologies. In addition we insert in each car an iPad with an installed App which interact only with PowerEnJoy Server.

System Vehicle Interaction

The design of this system needs to use technology already developed. Since Remote API servers expect to interact with another server, System's architecture must reflect this line. Architecture will consider a web server that communicates with both the user's phone and the iPad but on the other side invokes command on Remote API Server.



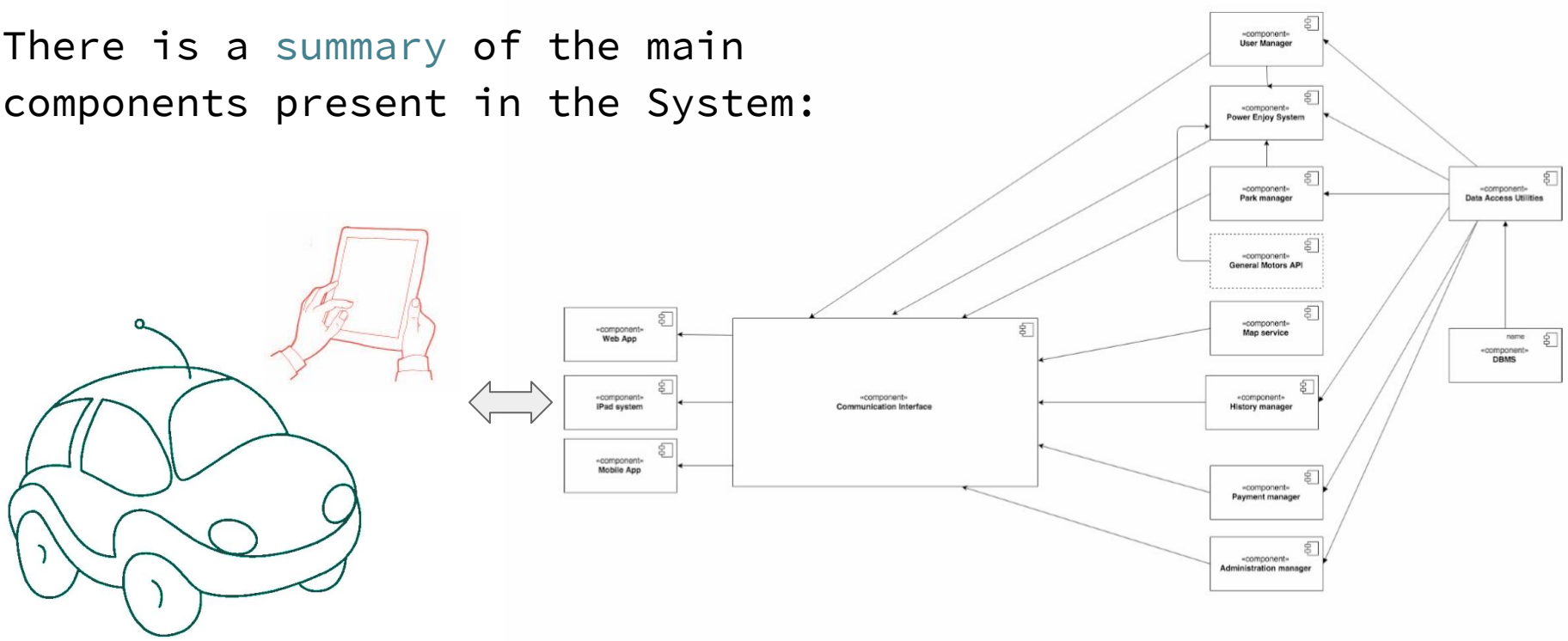
General Motors API Used

API Name	Description	API Use (Y/N)
Subscribers	List subscribers on an Account	N
Subscriber	Get a specific subscriber on an Account	N
Vehicles	List vehicles on an Account	Y
Vehicle	Get a specific vehicle on an Account	Y
Start Vehicle	**Remotely start the vehicle**	**Y**
Cancel Start Vehicle	Remotely stop the vehicle	Y
Lock Vehicle Door	**Remotely lock the vehicle doors**	**Y**
Unlock Vehicle Door	**Remotely unlock vehicle doors**	**Y**
Vehicle Location	**Retrieve the location (latitude/longitude) of a vehicle**	**Y**

Alert	Remotely alert (horn honk/flash lights) a vehicle	Y
Turn By Turn Route	Request to send directions to a vehicle based on destination and start location	Y
Send Destination	Request to send destination to the onboard navigation unit of a	Y
Retrieve Diagnostics	**Query a vehicle for diagnostic data**	**Y**
Batch	Request to send a set of commands for vehicle(s) for fleet clients	N
Telemetry Data Service	Location data stream.	Y
Trip Data Service	Data collected during a trip including: Seatbelt, Hard Braking, Hard Acceleration, Engine Idle etc..	Y
DTC	Data stream of active Diagnostic Trouble Codes.	Y
Remote Vehicle Disable/Enable	Ability to immobilize and remobilize the vehicle.	Y
Electric Vehicle Services	Services available to electric and hybrid vehicles.	Y

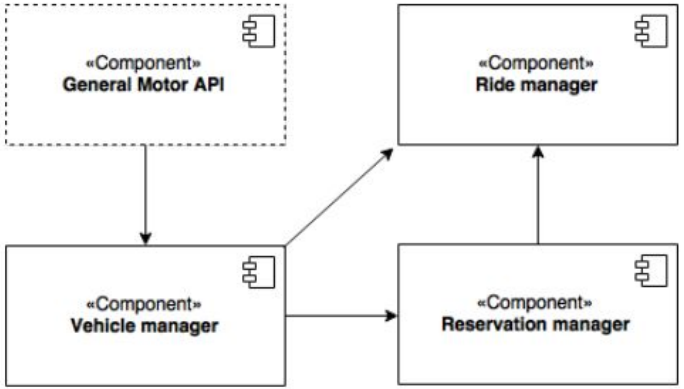
Component Interaction

There is a summary of the main components present in the System:



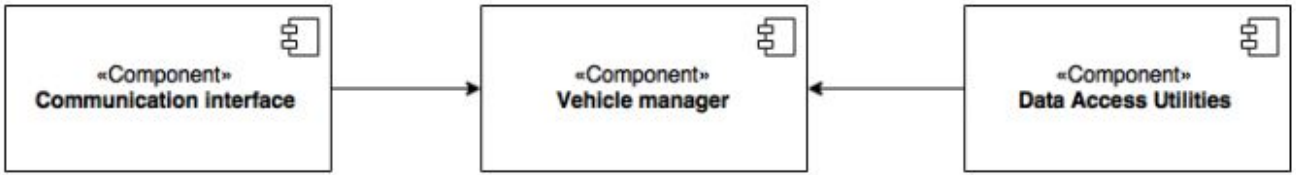
Let's focus on some components

In the system there are some components strictly connected, these are Vehicle Manager, Ride Manager and Reservation Manager.



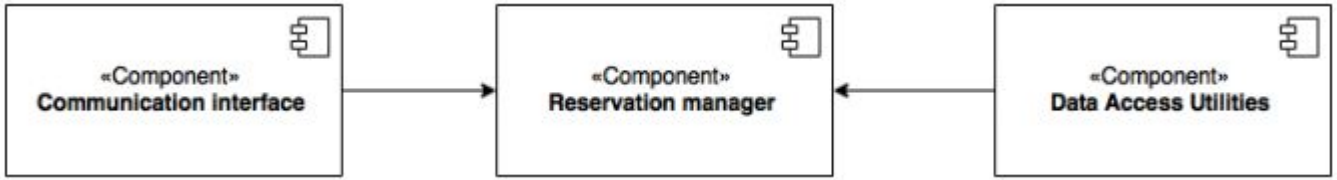
Vehicle Manager

Vehicle manager is a Bean that is able to manage all the information about a car, also by invocation of remote command throw GM API. This let the possibility to lock or unlock vehicle doors, start engine ignition, and get information about all the sensors or stats data.



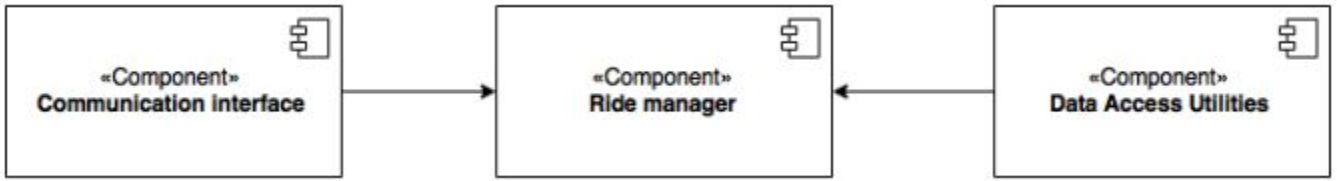
Reservation Manager

Reservation Manager assist users to search and reserve an available car, giving information about it such battery level and distance from user.

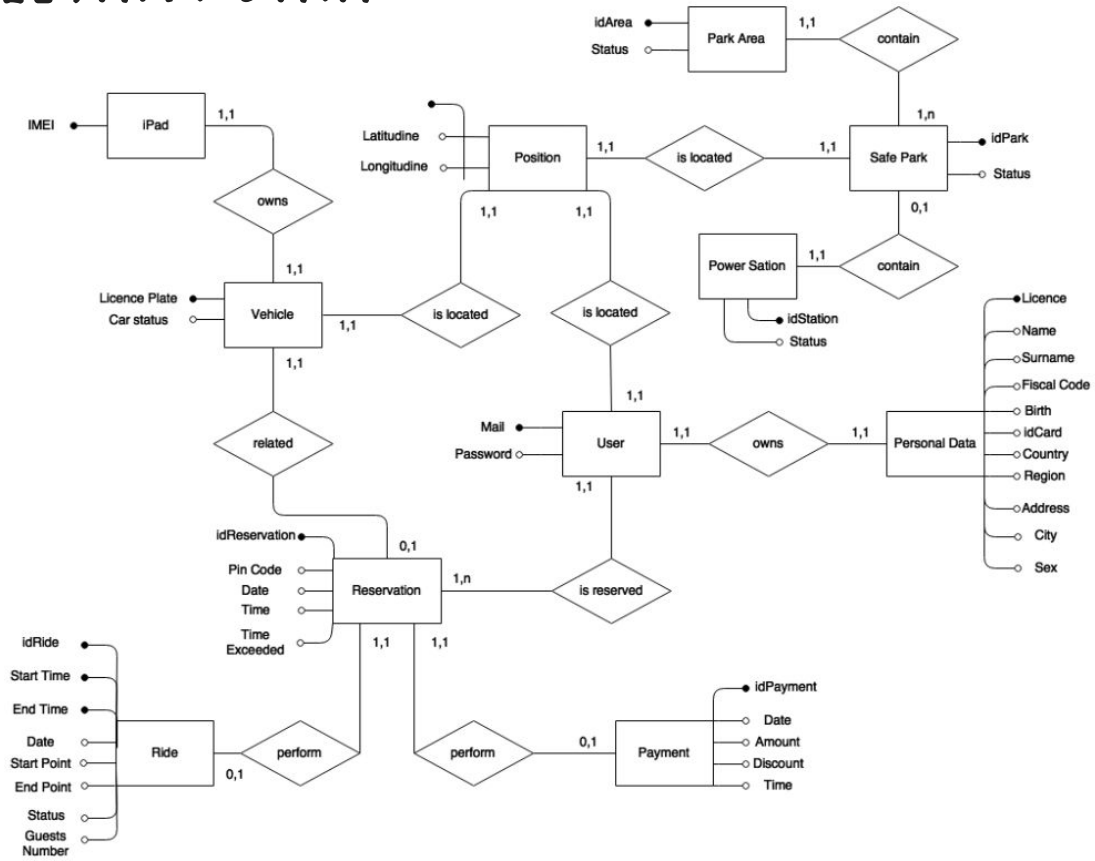


Ride Manager

This Manager controls all the information about a ride, such as start time, stop time, number of guests, distance covered during the trip and the ride status. These check are made in real time, because the user needs to know his ride status showed on iPad. This beans will communicate also with discount manager to apply the discount rules during the payment manager.



Relevant Data



Now Pietro will describe how the system appears

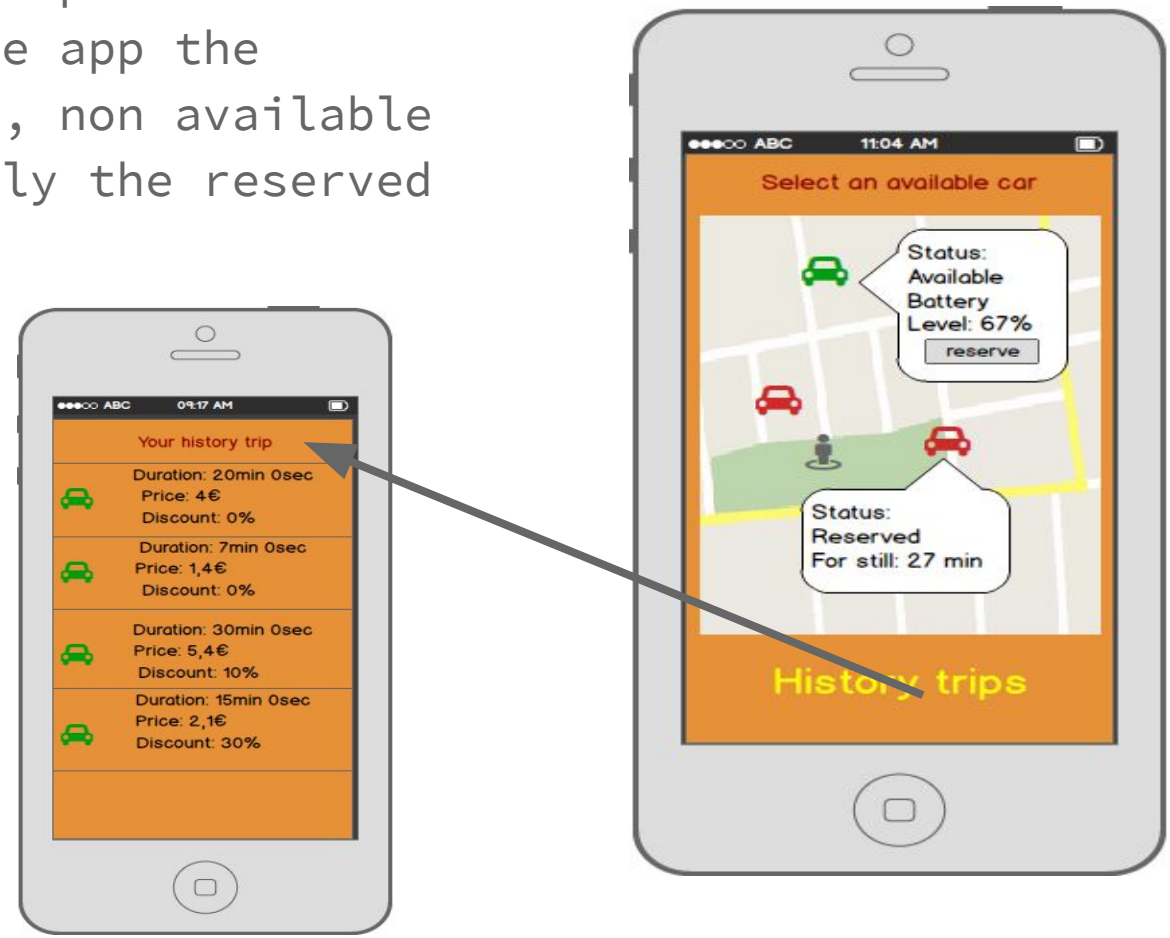
How the system will appear?

Here we can see the first scenario...

Create an Account button lets the user perform the registration into the system

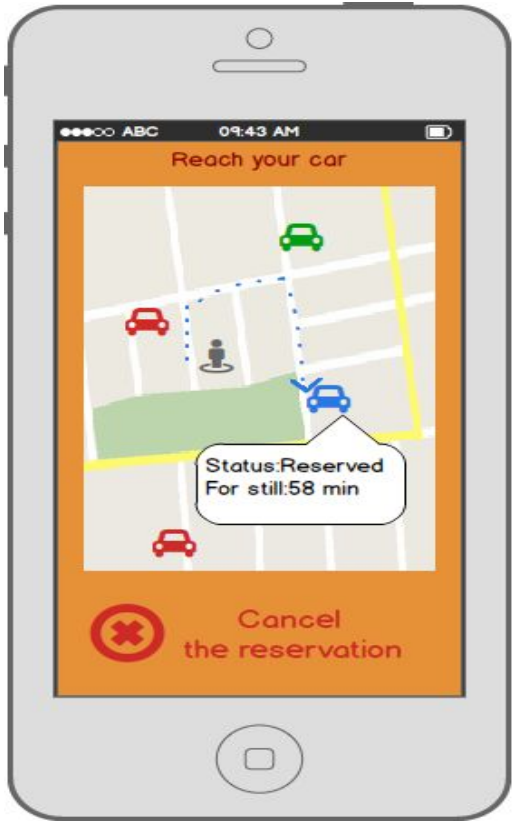
The user clicks the Login button to access into the system

The system locates the position of the user displaying in the app the available cars(Green), non available cars(Black) and finally the reserved ones..

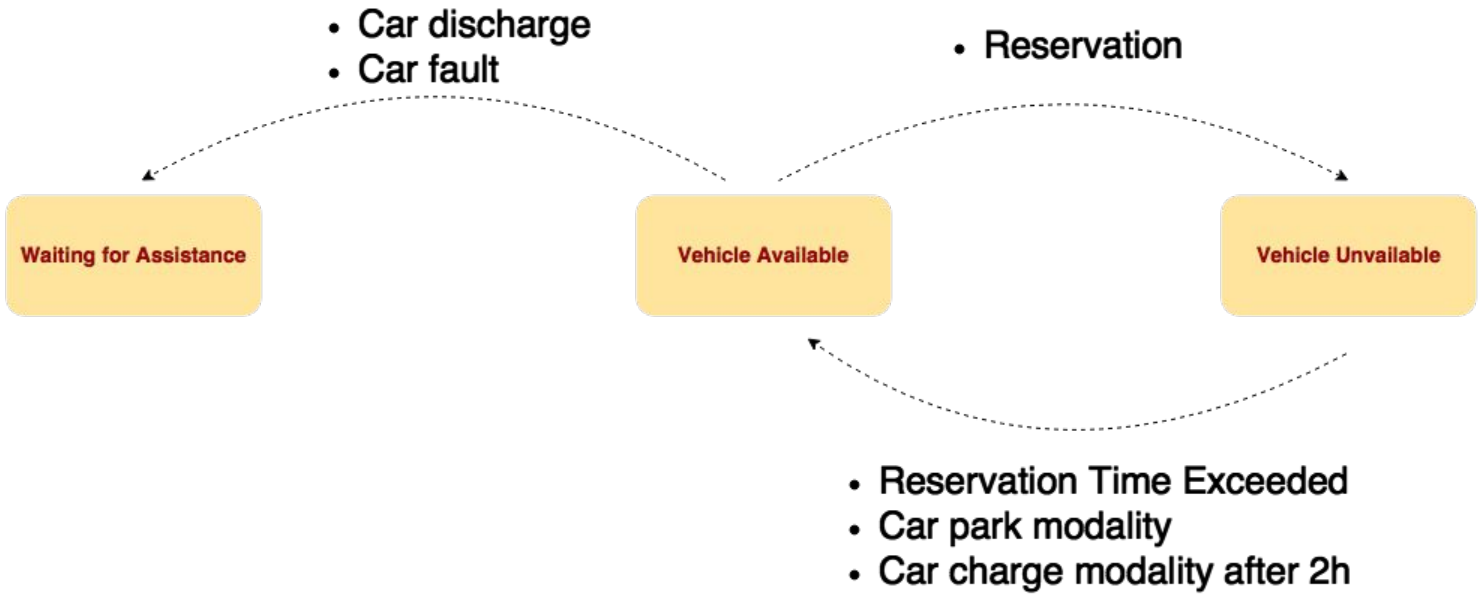


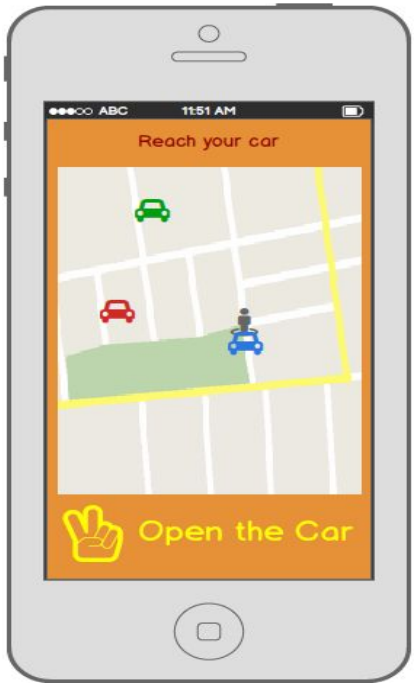
The user clicks on reserve

The system show information about the reserved time…



States of the vehicle





The system detects the position of the user and displays the open car button

The system displays the pin code that the user should insert into the iPad

Power EnJoy
An electric Car Sharing System

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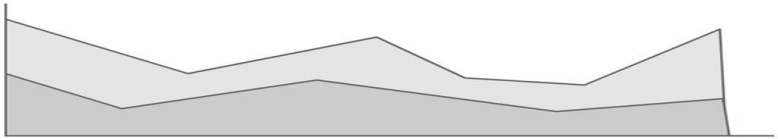
Home | Map | Vehicle | Payments | Contact | Create an Account

Login: username password Button

Best Way to Move around the City



Save Money

11 November 2009

Using our system you will save money, it's easy to start. Register and start Driving!

Guidelines - Respect Environment

No Pollution!

Social

- Add Us On Facebook
- Add Us On Twitter
- Add Us On Myspace

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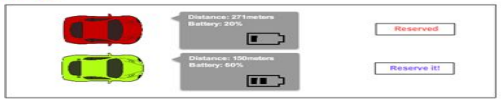
Welcome, username Logout

Look for a Car

Address:

Cars Nearby:



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Welcome, username Logout

List of all Payments

Date(ddmmyyyy)	Start Time(hh:mm:ss)	Duration(hh:mm:ss)	Total Amount($)	Discount(%)
01/01/2018	12:20:10	00:34:15	3	15
07/01/2018	07:24:11	00:13:17	1	0
09/01/2018	18:10:03	00:35:15	15	0

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Registration

Fill all required data:

First Name: Last Name:

Email: Repeat Email:

Password: Repeat Password:

Sex: Male Female

Birth: 31 01 1998

City: Region:

ZIP Code:

Tax Code:

Identity Card: N° Identity Card:

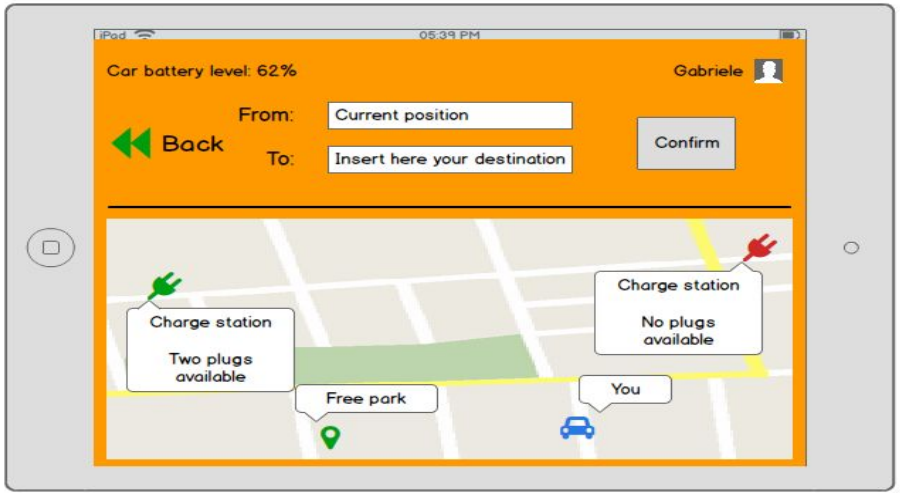
Release Date: Dn Dn Dn

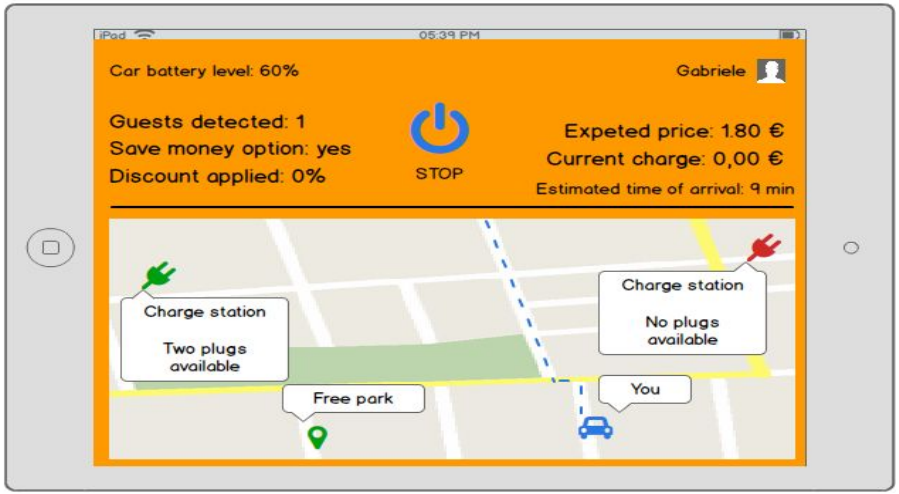
Expiration Date: Dn Dn Dn

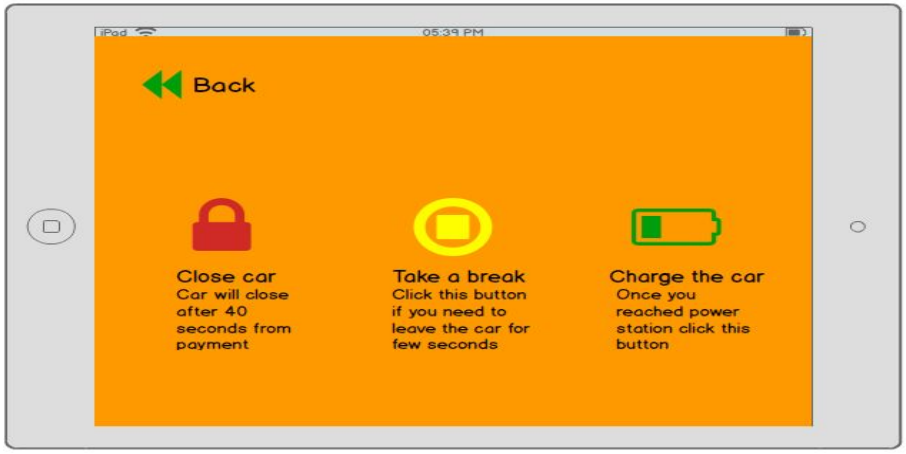
Cancel Register

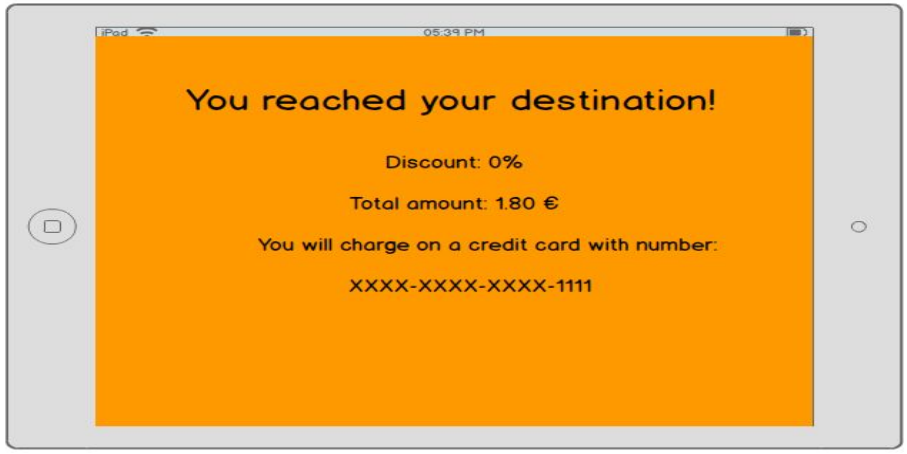

iPad
05:39 PM
Hi, Gabriele
Insert your pin code here...
1
2
3
4
5
6
7
8
9
Delete
0
Confirm


iPad
05:39 PM
Car battery level: 62%
Gabriele
You wish
activate save
money option?
No
Yes


iPad
05:39 PM
Car battery level: 62%
Gabriele
Back
From:
Current position
To:
Insert here your destination
Confirm
Charge station
Two plugs
available
Free park
Charge station
No plugs
available
You


iPad
05:39 PM
Car battery level: 60%
Gabriele
Guests detected: 1
Save money option: yes
Discount applied: 0%
STOP
Expeted price: 1.80 €
Current charge: 0,00 €
Estimated time of arrival: 9 min
Charge station
Two plugs
available
Free park
Charge station
No plugs
available
You


iPad
05:39 PM
Back
Close car
Car will close after 40 seconds from payment
Take a break
Click this button if you need to leave the car for few seconds
Charge the car
Once you reached power station click this button


iPad
05:39 PM
You reached your destination!
Discount: 0%
Total amount: 1.80 €
You will charge on a credit card with number:
XXXX-XXXX-XXXX-1111


iPad
05:39 PM
Resume your trip


iPad
05:39 PM
Insert PIN received on your mobile phone to resume the trip
Insert your pin code here...
1
2
3
4
5
6
7
8
9
Delete
0
Confirm

Testing

The interaction between components

The most important subsystems which we describe:

1. Administration Manager
2. Power enjoy manager
3. Payment handle manager

Administration Manager

- Administration Manager -> Data Access Utilities

The interaction between the administration manager and data access Utilities lets to add new vehicles and power stations such as to delete users

Power enjoy manager

- Reservation Manager -> Data Access Utilities
- Vehicle Manager -> Data Access Utilities
- Ride Manager -> Data Access Utilities
- Reservation Manager -> Vehicle Manager

Payment handle manager

- Discount Manager -> Data Access Utilities
- Discount Manager -> Payment Manager

The discount manager get information about the possible discounts from the database, elaborate them and applies the proper reductions to the payment

Integration between subsystems

Power Enjoy Manager -> General Motor API

The Power Enjoy system communicates with the GM API to get the information about the vehicles and perform actions on them…

End