CITY 2 PARK

An intelligent service system
that organize parking space in a busy city

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### Contents

#### Abstract

#### Foreword

#### Part 1 - Desk Research

1.1_Basic background research
   1.1.1 People in Shanghai
   1.1.2 Vehicles in Shanghai
   1.1.3 Parking lots in Shanghai

1.2_Parking system explore
   1.2.1 Explore parking systems in different occasions
   1.2.2 Technology support
   1.2.3 Case studies
   1.2.4 Key flow abstracted

#### Part 2 - Field Research

2.1_Three Samples from field survey in Shanghai

2.2_Survey of Shanghai Transportation Manage Department (STM)

2.3_Questionaire for users and conclusion

#### Part 3 - Personas

3.1_From research to personas

#### Part 4 - Project

4.1_Introduction of the service

4.2_Blueprint

4.3_Service for drivers

4.4_Service for managers

4.5_System map

4.6_Touch points
   3.6.1 Advertisments
   3.6.2 Platforms(Web/Application)
   3.6.3 IC card and parking lot devices

4.7_Storyboard

#### Part 5 - Business mode

5.1_Business canvas

5.2_Money flow analyze

5.3_How does coupon/gift work

#### Part 6 - Future Development

6.1_QR code scanning system with new device

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Bibliography

Website
Nowadays in Shanghai, many factors such as population overload development and the lack of public transportation network, triggering more people to choose private cars. Many factors, short supply of public parking, improper parking region dividing, the weakness of parking management, plus the lack of surface parking space as well as the unknown deeper empty parking spaces, have led to the city parking chaotic system. Thus rational redistribution and management of information has become a moment of much-needed for urban parking system.

This thesis develops a service named City 2 park as an intelligent social service system, which solves the problem of the city’s disordered parking condition, using the platform and media such as City 2 Park Application/parking bars, to create a useful parking lot information sharing network, thus organize better parking in this busy city.

The thesis gives an overview of current situation of Shanghai parking through desk research and field research. With the result of research the thesis developed persona for the service. To explain the service comprehensively and clearly, the thesis present with the methods and contents of offering map / blueprint / storyboard... It also considers business mode for the service, analyzes how the service system functions in the sight of business.

Attualmente a Shanghai tanti fattori come lo sviluppo della sovrappopolazione e la mancanza della rete di trasporto pubblico inducono la maggior parte della gente a scegliere l’uso dei mezzi privati. Tanti fattori come la scarsità di parcheggi pubblici, la suddivisione impropria del parcheggio, la debolezza della loro gestione assieme alla mancanza dello spazio fisico hanno prodotto un sistema caotico di parcheggio nella città. Per tale motivo, la suddivisione razionale e la gestione delle informazioni sono diventati un punto cruciale nel sistema di parcheggio urbano.

La tesi sviluppa un servizio chiamato City 2 park come un sistema di servizio socialmente intelligente, che è in grado di risolvere il problema relativo alla condizione caotica di parcheggio nella città usando le piattaforme e i media come City 2 Park Application/parking bars per creare un network di condivisione di informazioni sull’area parcheggio, tale da organizzare meglio il parcheggio in questa città.

La tesi fornisce un quadro generale sulla situazione attuale di parcheggio a Shanghai attraverso un percorso di desk research e field research. Tramite il risultato della ricerca, la tesi sviluppa una set di personas per tale servizio. Per spiegare completamente e chiaramente il servizio, la tesi presenta la offering map / blueprint / storyboard e le visualizzazioni dell’applicazione. Inoltre, si analizza il business model del servizio, per comprendere come questo possa essere sostenibile dal punto di vista economico.
Foreword

Why so hard?

Last winter I was in Shanghai, had an operation in a hospital. The most popular conversation among people who came to visit me is "Dame it, it took me a hundred years to find a parking space!" or "Guess how fortunate I was! When I arrived the hospital a car was about to leave, and I occupied the park immediately!"

To a girl who was born in a small city and doesn’t drive a lot, it’s a confusing information that I had recognized but not so well experienced. With a strong curiosity, I interviewed some of my roommates / doctors / nurses randomly, got much stronger reactions—— IT’S HARD TO PARK!

This condition made me start thinking. Why so hard to park?
——Too many cars in the city?
——Lack of parking spaces?
——A mess of management?
——Any other visible/invisible reasons?
——Anything we can do to improve the condition?
   What to do to make people park easier?
   ......

Where there is a need, there is a service.
Part 1
Desk research

The vehicle industry high-speed development in China brings traffic jam and air pollution to series of cities, parking difficulty has become the common problem of drivers and city managers. Shanghai, as the city with biggest population, city parking is particularly much of problem.

At the end of 2015 in Shanghai, the city has contained 3,340,400 vehicles. Vehicles in the city increase rapidly, on the other hand the progress of city parking space is far lag of the increasing, the contradiction between cannot be ignored.

The main condition of parking in Shanghai are:
• The rapid increasing need
• The undersupply parking spaces
• The unbalance parking lot structure and low use ratio of public park
According to the latest statistic bulletin in Shanghai, till the end of 2015, the permanent population is 24,152,700. There are 358,500 drivers who have the driving experience less than one year, occupies 5.51% of all the drivers in the city.
Vehicles in Shanghai

In the past three years, the vehicle increased 200,000 annually, including big amounts of endemic cars. It challenges the carrying capability of city transport.
Parking lots in Shanghai

There are different typologies of parking lots in the city: residential area / public area / large-scaled market & restaurant parking area / social service organization parking area …
1.2 Parking system explore

- Explore parking systems in different occasions
- Technology support
- Case studies
- Key flow abstracted
Explore parking systems in different occasions

- Residential area
- Public / social service area
- Large-scaled market & restaurant parking area

The residential area parking lot system main constitute by four parts: 1. Scan and read  2. Entrance and exit control 3. Manage and charge  4. System manage servers

Scan and read
It appears as the format of readable card, mostly of them are ID / IC / RFID. ID card is a card that cannot be written but only has the fixed number, so it’s a kind of low secrecy card which used to not very high level system. IC card is named as integrated circuit card, also named as smart card, the working rate is 13.56 MHz, it’s a card with the function of be read / written and encrypt, thus provide a reliable data record, easy use and unable to be fake. So it’s perfect electronic identification method. The disadvantage of it still exists, such as, it still needs close distance read. RFID is an identification method which transfer signal with electromagnetic wave, the stuff which need to be recognized should have the send and receive system for the electromagnetic wave. RFID system working frequency range is 900MHz ~ 2.4GHz. According to card manufacturing process can be divided into backscatter card surface acoustic wave (SAW) card; according to recognition range can be divided into long-range proximity RFID cards and RFID cards.

RFID proximity card using backscatter technology, which is generally in the range of identification 0.3 ~ 0.6m. Since the recognition distance shorter, still need to identify the cardholder at the time before the reader device to produce identification cards. Long-range RFID card you can maximize the advantages of contactless identification technology. As a result of the surface acoustic wave technology, expanding the scope of identification cards, to improve the recognition rate, in particular, will help ease traffic congestion during the peak period.

Entrance and exit control
There are several functions as below: control the card reading machine, verify the information, in the entrance part it also needs to read the vehicle detection signal and control the bar to open and close.
The most important part is to connect with the manage computer of the parking lot, upload the card read and control information, receive the information and control signal which computer empower.

Manage and charge
The hardware is mainly about central computer and manage software of the parking lot.
The central computer connect with the parking control machine in the way of RS485, in charge of the harmonize and management among different control machines, including empower the users, set the parameters, information communication and analyze, as well as the charge of the parking lot.

System manage servers
This part is the core of the whole parking lot, it controls all the manage computers, download the empowered users to the control machines and save them to the bars. It's like the brain of the parking lot.
The system contains the links of:
Entry management station / exit management station / computer monitoring center. At the
entrance management station there are: bar machine / inductive machine / inter phone / scan machine.

The main function of the system is:
Entry management: When a car enters, the driver can see the information of the parking lot,
which shows the direction of the entrance and the parking space condition inside.
Exit management: The main function is to charge automatically.

The software of the computer management:
1. Real-time monitoring: consists of camera / controller / monitor / video tape recorder. They
   are used to guard the yard and keep safety.
2. Facility management: to control the card scan machine and controller and set parameter for them.
3. Report forms function: build the parking lot report forms in order to accumulate and keep accounts.
4. Software setting: to fix / set / maintenance the software.
5. History check: including accumulate the vehicle flow, check the system bug and check
   the charge condition.

The shopping mall & restaurant parking area system consists of computer / parking lot
manage software / ticket control machine / bars / LED display screen / parking space
guide system / intelligent car searching system / IC card machine. The whole parking lot
manage system runs the central computer monitoring, control the cars with inductive IC
card, to build a safer / more convenient / high effect environment. So the whole parking
lot system consists of three big parts: entrance / exit / manage office. The office can be
set at the entrance or at the exit according to the real condition. This parking system
usually contain the image identification, which can used 24 hours with strong capability
of anti interference, in order to identify accurately for the car license tag. The system
has the function of photograph the vehicle, so it can protect the safety of the yard. The
photograph system can take photo at the entrance and save them into the central
computer, when the car exit the lot, computer will verify with the picture which it took
before, if not, the system will call the security automatically.

The characters of the system:
1. The strong capability of anti interference, series of management methods helped the
   system can be run in any working mode.
2. The strong prevention of thievery, cooperate with the camera and identification system,
it can protect the lot.
3. Different charge system according to different usage of the parking space and different
car typology.
Technology support

The parking lot charging system uses the intelligent IC card. Setting one device at the entrance of the parking lot, in order to build a close environment.

Entrance device and procedure
Temporary car into the parking lot, located in the vehicle lane detection coils the car to the entrance of the issuing machine-panel display lights alert drivers to take the key card. Driver keys in the issuing machine controller that is sending an IC card, the card movement is transmitted to the output port card, the card reader and complete the process. At the same time start the entrance camera, a video image of the vehicle, and based on the corresponding card number, stored in a computer image database at the exit toll. After the driver takes the card, electric fence at the bar the release of the vehicle, the vehicle is automatically put down the railing by the vehicle detection coil. Monthly card when the vehicle enters the parking lot, located in the vehicle lane detection coil to detect the car, the driver put monthly card ballot box panel passing in the inlet induction zone 10 cm distance, inside the ballot box IC card reader to read features and information about the card, determine its effectiveness; if the effective start entrance camera, a video image of the vehicle, and based on the corresponding card number, stored in a computer database at the exit toll. Electric fence from the bar the release of the vehicle, the vehicle automatic vehicle detection coil down through the railings; if invalid, the alarm light, does not allow entrance.

Exit device and procedure
Some of the major export outlet reader, electric fence, charging display, vehicle detection equipment, walkie-talkies, color camera components. When temporary drove out of the parking at the exit, the driver IC card to the parking toll, exit at the computer to automatically adjust the image according to the entrance IC card records information, manual contrast and automatically calculates the fee payable, and by charge display to alert drivers pay. Toll charges and image contrast after confirmation, push the Enter key, electric fence rises. After the vehicle passes buried under a vehicle lane detection coil, electric fence automatically fall, at the same time load the computer will record the vehicle information into the payment database. Monthly card when the vehicle left the parking lot, located in the vehicle lane detection coil to detect the car, the driver put monthly card ballot box panel passing in the outlet area of 10 cm from the sensor, IC card reader inside the ballot box read take the card’s features and related IC card information, determine its effectiveness; while the entrance fee at the computer automatically adjust image contrast manually. Confirmation and monthly toll card is valid, electric fence column released from the vehicle, the vehicle after the vehicle is detected by the sensor, railing automatically collapse; if invalid, the alarm, do not allow release.

Exit device and procedure
Charge control by the charge control device at the computer, UPS, printer reports, console, manual entry button, export the manual button, voice prompt system, intercom system. Through the toll operator responsible for the temporary control of the computer cards, monthly cards, card management and special charges, the image contrast by reducing vehicle recognition and license plate recognition and reading and writing time, improve vehicle access traffic speeds. Image contrast and an ID card used in conjunction with thoroughly achieve the purpose of theft of the car. Access to image archiving, to eliminate the false free vehicles. "A car with a card": tight control cardholder access to parking behavior. , intelligent management of import and export, is also responsible for issuing a control signal corresponding to the report printer, yards while completing data collection download, check printing reports, statistical analysis, system maintenance and monthly card sale function.
When entering the parking lot, users scan the IC card, the system will record all the information, including checkin/record/charging. The strobe will close immediately after the car entering, in case of being stolen. The inductive coil is aiming at sensing the car entry.
Case studies and the analyze
Parking Panda is an online marketplace and optimization platform for parking. It enables parking owners and managers (private and commercial) to capitalize on their parking inventory by dividing extra traffic when yield is low and improving pricing when the lot is full. People in need of parking can save money and time by finding a place to park and paying right from their mobile phone.

How it works

- Reserve parking in advance so you know have a guaranteed space ahead of sports games, events, and trips to the city
- Compare real-time prices for thousands of lots and garages in over 40 cities and save up to 70%
- Find and book parking with just a few taps on-the-go instead of circling the block looking for parking
- Instantly access and redeem your parking confirmation from the app for an easier, stress-free parking experience

Parking Panda

• Search where you are headed to view surrounding parking options
• Browse through parking options based on your schedule
• Compare prices and amenities from various parking locations
• Instantly reserve and pay for your space on-the-go
• Easily redeem your reservation directly from your phone
SpotHero is an app recommended by Forbes because it can help you find and compare parking and reserve a spot for up to 50% off the drive-up rate. The app has its own dedicated unsold spots from parking facilities in the area. You can quickly reserve one of those spots from your phone and enjoy a discounted rate in the process. Not only will you save money, but you also won’t need to worry about losing your prized spot to another driver. It is available in most large cities and is introducing new locations everyday.

Features
- It provides long time parking spaces renting, a way helps people who need a fixed location of parking to easily handle life with parking.
- It provides the information of parking facilities in the city, which is more convenient than other similar services.

Disadvantages
- Since the service provide long-term parking, some of the parking lots are without guarding, it may cause some secure problem.
- Once people made the reservation, it’s not so easy to cancel it, the procedures are really complicated.
JustPark is Europe’s leading provider of pre-bookable parking. The idea is simple: we connect drivers with anyone who has a spare space - whether that’s in a car park, private driveway, church, school, or pub.

Features
- The concept of using free private parking spaces is connective and sustainable, it bounds two user groups: drivers and space owners.

Disadvantages
- Low efficiency since the parking spaces resources are from private people
- Secure problem, with not very strict verify of the owner may cause the safe problem.

For drivers
Search: Browse 200,000+ spaces in 1,000+ cities on the website - or choose one on the go with apps for iPhone and Android. Filter by date, time, distance, price and type of space until user find his perfect match.
Book: Reserve space and pay securely online using a credit card, debit card or PayPal - or using Android or Apple Pay on mobile. User can message the parking space owner if he has any specific questions.
Park: Drive straight to reserved space, park up, then head off. JustPark is great for parking near stadiums, airports, stations, hospitals and in city centres - plus avoid those peksy traffic wardens.

For space owners
List your space for free: You can add a driveway, car park, empty hotel spaces or anything else
Control availability: Only rent out your spaces when it suits you - whether that is from 9 till 5 or all the time.
Get paid: Get regular bookings and payments straight to your bank or paypal account.
The **Handy Park** provide car parking spaces in really handy locations in Belfast city centre and other towns in Northern Ireland. Whether user is a commuter to the town or visiting on a shopping trip, with the wide variety of car parks they have the perfect space.

**Features**
- The service sets parking lots (not information) all around the country especially the parking information in the upstate countryside, it’s very convenient for those who always travels among different places even in a small countryside.
- With the parking lot supplier (the service), the payment and the parking are comparatively safe.

**Disadvantages**
- Since the service set parking lots instead of using already exist parking lots, the quantity is a little bit low and not all the areas are covered.
As the name says, **Airport parking Reservation** is all about airport parking in the United States, Canada and United Kingdom, promising discounts of up to 70 percent at partner facilities. The site also operates ParkSleepFly, a site devoted to said deals, where travelers pay for a single night’s stay at an airport hotel in a package that allows them to leave their vehicle at the hotel’s parking facilities until they return (usually includes a shuttle to the terminal).

**Features**
- The service is aiming at airport parking, which is a big issue inside the topic parking. The service provides parking information and reservation in different cities, helps people who always travel by plane to manage their parking.
- The check-in and check-out system in the service are much more completed and reliable than most other parking services I have seen.

**Disadvantages**
- There is few staff of the service working in the airport to help people deal with accidental problem (according to the feedback of the service online).
ParkMe offers the largest and most accurate parking database in the world. With over 84,000 locations in over 64 countries, it can compare the most available spots and save every time you park. You can also reserve a spot in advance with your credit card so you never have to worry about losing your spot again. The app can even tell you where to find parking up to two weeks into the future.

Features
- The service provides very complete function about parking in the city, including parking lots map, complete information and pictures, the guidance and reservation system, even the interaction and network between user groups.
- The procedure is very clear, it always appears at the bottom of the interface, reminding people which step are they in.
Shanghai Parking
Developed by Shanghai Traffic Manage department (STM) and Loe design consulting company

Main funciton
• Search parking lot
• Show the rest parking space
• Real pictures of parking lots
• Accurate guiding

Disadvantages
• Not well developed service system with its platform, only presents dots and basic informations of parking lots, lack of interaction between users and system.

Main steps abstract from case studies
SEARCH (Search/find/compare)
BOOK (Pre-pay to reserve)
PARK (Enjoy the service)

Main shortage explore from case studies
• The simplex function and information
• Secure problem caused by simple and easy verify
• Lack of later-period service

Main features learn from case studies
• Simple and clear procedures, people can always easily get used to it
• Complete function and comprehensive information providing
• The network building between drivers and parking space suppliers

Main innovation of my proposal apart from case studies
• Feed back between users and managers of parking lot creat a network with trust, fair and transparent
• Credit points provide exchange for other gifts
• In China, it’s the first regionally system providing parking space booking and online payment
• Rich and complete information of the parking lots provide reasonable choices
• According to the area and parking lots that users use most, custom-made a personal preference and advice, make the system into a habbit
Part 2
Field research

In order to get clear and real information from not only the website and books but also from the real society, I did the investigation through the methods of field survey combine with questionnaire.

• Three samples of field survey
  To reach the aim of getting first hand of society information, I went three times (weekdays and weekends) to observe and took photos, at the same time analyze for the conclusions of this condition.

• Survey of Shanghai Transportation Manage Department (STM)
  I visited the staff from Shanghai Tranportion Manage Department (STM) about the project they are developing, gathered some key information of the working procedure in the process.

• Questionaire for users and conclusion
  In order to understand more about what the users think I developed a questionaire and send them to different contries.
2.1 Three samples of field survey
Very crowded street parking spaces, in some way influence the traffic.

the entrance VS the exit

one empty parking VS another fully parked

Very empty spaces on the other side.
I arrived at the shopping mall in the mid-day. Because the lack of parking space underground, a lot of vehicles had to park at the temporary parking space beside the road, the 40 spaces were already fully parked. There were also other 35 cars parked at the improper place, which got out of line. [Temporary parking spaces]

On the other hand, there were 75 parking spaces in the parking lot on the east side of the shopping mall, which was fully parked. There were other 2 parking lots with 100 spaces, which in fact parked 225 cars. At the same time the underground parking lot was full of 500 cars.

So in statistics there were 675 parking spaces set for the shopping mall, but in fact there were 845 cars parked. [Parking lot set for shopping mall]

At the same time, a parking lot under the Trading Ground with 200 parking spaces, which in fact only half spaces parked. [Parking lot nearby]

This is the parking data from Friday.

At the other two days, the parking spaces underground were more or less 50%~80% occupied. But the parking spaces were always fully / over parked.
Full of cars parking in front of the shopping mall.
In this area there are several shopping malls. Jiali Market had an underground parking lot with 300 spaces, which was fully parked, there were also more than 30 cars waiting outside the lot; Dayang Market had an underground parking lot with 500 spaces, which was fully parked; Wanda Shopping Mall had an underground parking lot with 200 spaces, which was fully parked, beside the building there were 70 spaces which actually parked with more than 100 cars; In conclusion, the plaza is a busy commercial area that developed in the early year, which means it cannot provide enough parking service afford to the need nowadays.
In all the ground parking lots that can be seen around the hospital, there’s nearly no empty spaces.
Compared with the commercial area, cause the lack of sig shopping malls, there are not so much parking lots set around the hospital, there’s only one hospital parking lot, and some temporary parking spaces beside the road.

The hospital underground parking lot has 320 parking spaces, which is always fully parked. [Hospital parking lot]

The main temporary parking spaces were mostly around Liangdao Road, Zhonghua Road and Jiefang Road. There were more or less 175 spaces. But in fact, the real parking number is more than 340. [Temporary parking spaces]

During the survey, I got one important information from the guard. The guard told me that there was a mid-size parking lot in an office building, which is only one street beside the hospital. After visiting the office building I got to know, there were 300 parking spaces and most of time it is occupied more or less 30%. This is the individual parking lot that should be explored. [Parking lot nearby]
2.2 Survey of Shanghai Transportation Manage Department (STM)

In the progress of researching, a platform named “Shanghai parking” has always come into my view. After deeper explore, I realized that it’s the platform developed by Shanghai Transportation Manage Department (STM) and an internet consulting company.

In order to explore more information, I contacted with Shanghai Transport Manage Department (STM) and the internet consulting company, had conversation with staff in both two organization.

In the conversation I get to know, in order to increase the transparent of the use information and calculating, decrease the “hard to park” problem, they have developed a car parking system with “internet for parking”, cooperate with Shanghai Revenue and part of the commercial public parking lot. They collect the real time parking data, and build the Shanghai public parking information platform.

From 10th December, an application named “Shanghai Parking” started to test, it provides the basic information of the parking lot and the guiding. For now there are more than 200 parking lots and more than 300 streets which are capable of parking.

How to build the real-time database?

The parking lot manager will receive the real-time information, easy to control the whole area. Thus build the basic data system. To see the whole system macroscopical, collect and gather basic data systems, analyze and prensent them into a intergrated system, thus the real-time database.
2.3 Questionaire for users

In order to get a better conclusion of questionnaire and broad answerers, I published the questionnaire both on the Internet and in the street of Shanghai.

The questionnaire is published on the internet for 15 days, after calculate there were 227 clicked and 198 answers instead.

Also I printed 300 copies of the questionnaire and handed out on the street of Shanghai, in three different places for different group of person. In the end I got back 223 copies as return and 221 of them were valid.

To sum up, in the process of survey, I totally got 419 answers and I calculated them as follows:

Q1. What is the normal transportation of your daily life?
   - bicycle: 21%
   - public transport system: 39%
   - car: 45%
   - others: 5%

Q2. Have you ever met parking problem?
   - yes: 82%
   - no: 18%

Q3. Have you ever met the problem below when parking:
   - no parking spaces always: 69%
   - mess of the management: 23%
   - illegal parking: 56%
   - unreasonable parking spaces set: 80%
   - no secure: 17%

Q4. Which are the occasions that the parking problems you have met?
   - shopping mall: 73%
   - residential area: 34%
   - restaurant: 46%
   - amusement park: 33%
   - school: 79%
   - hospital: 76%
   - the company that you work in: 25%
   - the area of large activity: 87%

Q5. What do you think are the defect of the parking lots today?
   - lack of guide signal/information board: 54%
   - the straitness of the road: 41%
   - the high price: 20%
   - lack of the parking spaces: 88%
   - the open air area: 28%
Q7. What do you think is the main cause of the hard parking condition?
- No prospective in the city planning: 23%
- Drivers are lack of the standard parking conscious: 11%
- The incomplete management of the relevant department: 21%
- All of the above: 45%

Q8. What do you think are the common problems when parking?
- The less parking spaces and more cars need to park: 70%
- The nonstandard parking result in one car occupies two spaces: 34%
- High price of some parking lots: 13%
- A mess of management in the parking lot: 55%
- The inconvenience caused by the far away parking lot: 78%
- The unreasonable entrance and exit design: 29%
- Others: 23%

Q9. What field do you think need to be improved in the parking?
- Limit the car purchasing for each family: 9%
- Improve the financing input about the parking lots build (such as big public parking lots): 37%
- Add underground parking lots for new buildings: 79%
- Rebuild the old districts and add new parking spaces: 59%
- Add more temporary parking spaces beside the road: 34%
- Improve new parking devices: 21%
- Start using intelligent parking information management system: 23%
- Set more visible guiding signal: 67%
- Expedite the public transportation and develop the green transportation: 68%
- Improve the law about parking: 17%
- Others: 7%

Q10. What are the solving measures that you are agree with?
- Add underground parking lot: 26%
- Adjust the parking collocate according to time: 39%
- Improve other platforms/services to ease the serious condition: 45%

Q11. What do you think is important for a service for parking?
- Where is the parking lot nearby: 99%
- Price: 39%
- The open time: 94%
- The information detail for each parking lot: 76%
- The parking spaces remain: 29%
- How does the parking lot serve: 23%
- The secure problem: 52%
- Others: 25%
3.1 From research to personas

After the basic research and social survey, especially the exhaustive observation of the potential users, I developed four personas based on fictional characters, each of them gathers up the features of an existing social group.

In this way the personas assume the attributes of the groups they represent: from their social and demographic characteristics, to their own needs, desires, habits and cultural backgrounds.

In this service there are four personas:

Ye Qiuyue, represents the group of users that have needs of parking service at fixed time and in fixed location;

Wang Zijian, represents the group of users that have needs of parking services at variational time and in variational location;

Zheng Qiang, represents the group of users that have needs of parking service at both fixed and variational time and in public location;

Thomas, represents the group of users are not familiar with the city and public service, in search for a comprehensive parking guide in the city.
Ye Qiuyue is the owner of a small size restaurant and a mother of a 6-year-old girl. She lives in the side of the city, her restaurant is not very far from her apartment.

Everyday she has to drive to purchase food from different suppliers and drive all he vegetable and meat back to her restaurant. It usually takes more or less two hours.

At the same time, it’s the first year that her daughter enters the primary school, which is 28 Km far from their home. She has to drive her daughter to school in the morning, and pick her up in the afternoon.

She feels not very inconvenient since she has to find parking spaces a lot of times in a day.

“I always drive my daughter to school and back to home, at the same time I always drive between restaurant and food suppliers. I always need to park in different places!”
I drive a lot during my work, it usually took time to find a proper parking spaces and sometimes the unconvenient situation influence my work. I need a better parking guide and service!

Wang Zijian has graduated from the university for 4 years and now work in a big company as a manager assistant.

He lives near the company, it only takes 20 minutes to drive. But he still drives to the company because of ---- as all the assistant do, he always needs to drive his boss to meet clients.

At the same time, he always needs to contact and meet the suppliers and factories which have cooperate relationship with the company.

He sometimes feels vaxed when the parking thing takes so long time and influences his work time.

- 26 years old
- Has a girlfriend
- Manager assistant in a big company
- A 6-year-old daughter
- Drives a lot in daily life
- Lives near to the company

“I drive a lot during my work, it usually took time to find a proper parking spaces and sometimes the unconvenient situation influence my work. I need a better parking guide and service!”
Recently I go to hospital everyday to take care of my wife. It bothers me that the lackness of the parking spaces around the hospital. Sometimes I have to park in another street and walk 20 minutes to the hospital.

Zheng Qiang is a logistics staff in his company, he has a son who’s now in the college and now he lives with his wife. Recently his wife got healthy problem and had an operation in the hospital, the doctor said it took more or less one month to recover. Everyday when he finish his work, around 6 p.m. he has to rush to the hospital and take care of her.

It’s hard to find a parking space at that time, especially in a hospital that is famous in this city, he thinks he needs more parking information.

- 52 years old
- Married 27 years
- A 21-year-old son in college
- Logistics staff in the company
- His wife recently had an operate in the hospital
- Lives far from the hospital

Basic features analyze

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Problems</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain knowledge</td>
<td>Cannot find parking lot</td>
<td>Fixed place</td>
</tr>
<tr>
<td>Technology knowledge</td>
<td>No parking spaces</td>
<td>Fixed time</td>
</tr>
<tr>
<td>Experience</td>
<td>High price</td>
<td>Variational time</td>
</tr>
<tr>
<td>Cannot find entrance</td>
<td>Parking is too far away</td>
<td>Unfamiliar variational place</td>
</tr>
<tr>
<td>No information resource</td>
<td>Impatient</td>
<td>Fixed place</td>
</tr>
</tbody>
</table>

"Recently I go to hospital everyday to take care of my wife. It bothers me that the lackness of the parking spaces around the hospital. Sometimes I have to park in another street and walk 20 minutes to the hospital."
It's hard for me to find a parking place as convenient as local people. I need help and guide very much in my daily life."

Thomas is a German and he has been living in Shanghai for 8 years.

He likes to explore different faces of this city, he tries different bars, different restaurants, different museums, sometimes he takes a one-day suburban travel.

But he always meets the problem that each other foreigner faces: the language problem.

It’s not so easy to find a parking lot at any time that he wants, not to speak of those guidepost written in Chinese. He’s learning Chinese but in the moment he feels depressed during the experience of parking in the place that he’s not familiar with.

- 45 years old
- German lives in China for 8 years
- Design director in a consultancy company
- Not so good at Chinese
- Likes one-day suburban travel when free

Basic features analyze

Knowledge

- Domain knowledge
- Technology knowledge
- Experience

Problems

- Cannot find parking lot
- No parking spaces
- High price
- Parking is too far away
- Cannot find entrance
- Unfamiliar variational place

Activities

- Fixed place
- Fixed time
- Variational time
4.1 Introduction of the project

The service City 2 park is an intelligent social service system, which solves the problem of the city’s disordered parking condition, using the platform and media such as City 2 Park Application/parking bars, to create a useful parking lot information sharing network, thus organize better parking in this busy city.

There three main functions of this service:

1. The service provides the accurate and general information of the parking condition in the city through data gathering / analysing / presenting, including the guidance of parking, to creat a safe and comprehensive parking environment for users.

2. Parking reservation, the service provide the possibility to book for the parking in advance with safe and quick purchasing system, in order to help users to organize their life easier.

3. Community building, to build a community amongst the users and provide a platform for them to share the experience and feeling, thus construct the welcome atmosphere, improve the interact between users and service.
4.2 Blueprint

The blueprint is based on a graphical technique that displays the process functions above and below the line of visibility to the customer: all the touchpoints and the back-stage processes are documented and aligned to the user experience.

In the blueprint of this service, it presents all the actions of all the stakeholders during the process with all the touch points, including the influence amongst each other.
4.3 Service for drivers

Information
The service is mainly providing more convenient parking experience with information of parking, including the parking map and details of parking lots (free spaces/price/feedbacks/pictures/etc.), gives the most useful information in the shortest time.

Reservation
The service provide users the function of book the parking space in advance, with reminder included, in order to help people organize their life better.

Guidance
After making sure the destination, provide the guidance for drivers, with the traffic information and best path advice, to help users reach the destination easily.

Sharing
The service builds network for users, a drivers’ community for sharing experience in the process of any link. It help people feel united, users will have more sense of belonging when they can give advice and be suggested.

Gifts & Coupons
During the process of usage, with the credits accumulated users will get relevant small gifts as thanks, or get coupon for relevant service for cars like car washing and so on.
Register with App
User get to know the service and start using it through the App.

Actions:
User has strong need of parking and gets to know the service. He registers with his basic personal information and starts the experience.

Touchpoints:
- Advertisement (Internet / Entity adv / others)
- Website or Application

Emotion:
Curious, cautious, exited.
Search for parking lot

Two different ways:
1. make an appointment in advance to prepare
2. to solve the predicament at present

Actions:
User has the need and start with the service. He searches for the parking lot with two different ways: search around me, search with set destination.

Touchpoints:
• Application

Emotion:
Suspicious, curious, exceptant.
Actions:
User opens the page of one parking lot, and starts to scan the details, including destination / price / open time / free spaces and feedback from other users. In this user can decide the parking lot that he thinks most helpful and suitable.

Touchpoints:
• Application

Emotion:
Suspicious, hesitate.
Check the bill

User check the bill information from calendar, in order to organize. Also the reminder will keep notice.

Actions:
User choose one parking lot he prefers and makes the reservation, including the destination, starting time and end time. It saved to the calendar system automatically, also with the reminder det.

Touchpoints:
• Application

Emotion:
Get familiar, want to use more.
Actions:
When user starts to park in the condition of reservation, scans the IC card and enter the parking lot, sets an alarm to remind the finish time, in order to finish the park in time and keep the parking lot in organized management.

Touchpoints:
- Application
- Parking lot devices
- IC card

Emotion:
Convenient, comfortable
Feedback
After the experience of one park, user can give a feedback of this parking lot to share with other users. Thus to build the network among users.

Actions:
After finish and pay for the parking, user can give feedback when the system reminds. Feeling sharing and discussing makes him felt more grateful.

Touchpoints:
- Application

Emotion:
Grateful, start to rely on the service and the drivers’ community.
4.4 Service for other stakeholders

As a second-user of this system, the parking lots managers are provided a better environment of parking, more organized parking system and more reasonable users distribution.

To the shopkeeper who are selling things relevant to cars like car perfume / car cleanser, the service provide them a better and wider platform.

Parking lots are the public places with huge visitor flowrate, which are good places for advertisement. In order to get sponsorship, the service provides its platform for advertising as return.

A system with more reasonable arrangement pushes the more efficient income among the parking lots, as well as less fine causing from wild parking.

In the benefit relationship, the service provides more potential foreground gor the gifts providers, to help them improve the product popularity.
4.5 System map

The system map provides clear material flow and money flow in the system, amongst all the stakeholders, with the main activities held.

**Material flow:**
- Parking lot managers provide the parking spaces to drivers.
- Parking lot managers provide real-time data of parking to the system, and then system gather and present to drivers.
- Parking lot managers provide spaces for advertisement to other benefactors.
- Drivers give feedback to the system, after verify the system send it to the parking lot manager.
- The gifts providers provide gifts for drivers.

**Money flow:**
See in part 5.
4.6 Touchpoints

- Advertisement
- Platforms (Web/Application)
- IC card and parking lot devices
Advertisement

The touchpoint advertisement is the first moment that user get to know the service and realise how it works and helps people with their parking difficulty. The advertisement must be simple and clear, and above all, wide spread.

There are ways of advertisement:
Internet:
Pop-up advertisement on relevant website
Videos on Youtube
Advertisement on social media

Entitative:
Post in the public spaces
Platforms:
Key flow of the application
IC card and parking lot devices

When user starts parking in the parking lot, the touchpoints are IC card and the parking devices.

IC card:
It’s the most common and widely used purchasing media, cause it records user's information and easily recognized by the scanning machine. As the card scanned, the parking information will be recorded and reported to the system.

Parking lot devices:
In the parking lot charging system, the devices include scanning machine, inductor, bar, camera.
4.7 Storyboard

The service storyboard shows the manifestation of every touchpoints and the relationships between them and the user in the creation of the experience.

In the storyboard below, user experiences two condition and deal with the situation through two main functions of the service.
Li Ming lives in a big city for several years, he recently purchased a car.

He started to meet problems about parking in the city.

He did researched for solution, and met City 2 Park. After realizing the basic function of the service, he registered online with personal information.

He downloaded the application on the phone and started the trying.
One day he was driving on the street and got to a place that was not very familiar to him. He needed to park, but there was no obvious parking lot.

He took out the phone and started to use the application to search for the parking lot nearby.

He chose one spot and glanced over the detailed information, including the pictures, opening time, empty spaces, price, feedbacks.

He decided the destination and start the guidance.
He reached the parking lot.

He scanned the IC card for entering and exiting.

He got credit calculated through the process. With the established credits he changed gifts.
The other day, he was planning to go to a new place, so he searched for the destination.

He received the parking lot and set the alarm.

The alarm calculating during the parking.
He parked in the parking lot.

He scanned the IC card for entering and exiting.
He paid with the phone.

He finished the parking experience and gave the feedback as suggested.

He got credit calculated through the process. With the established credits he changed gifts.
### 5.1 Business canvas

<table>
<thead>
<tr>
<th>KEY PARTNERS</th>
<th>KEY ACTIVITIES</th>
<th>VALUE PROPOSITION</th>
<th>CUSTOMER RELATIONSHIPS</th>
<th>CUSTOMER SEGMENTS</th>
</tr>
</thead>
</table>
| - Parking lot managers  
- Department of public space management  
- Gifts providers  
- Sponsors | - Online sharing platform running  
- Parking managing  
- User community building  
- Stakeholder relationship dealing  
- Server maintenance | - For people who struggled to find an efficient way to park in cities, this system is a flexible and intuitive one to guide users to an ideal parking lot, at the same time it helps people to organize life with more plentiful parking. | - Application provides responsive solution towards different types of users’ needs  
- User network enhance the valuation of different parking lots  
- Parking lots reasonable arrangement of parking resources | - Users who need a reservation on a certain time and certain place in advance.  
- Users who are on the road and need a parking space nearby in a hurry  
- Parking lots holders  
- Car gifts sellers  
- Advertisers |

<table>
<thead>
<tr>
<th>KEY RESOURCES</th>
<th>CHANNELES</th>
</tr>
</thead>
</table>
| - City parking spaces  
- Vehicles around the city  
- Partnerships | - Awareness: Advertisement, Word of mouth, Social media  
- Evaluation: Self experience, experience sharing  
- Purchase: Online application store, IC card  
- Other: Customer service |

<table>
<thead>
<tr>
<th>COST STRUCTURE</th>
<th>REVENUE STREAMS</th>
</tr>
</thead>
</table>
| - Manufacturing and maintenance of facility  
- Application system maintenance, data gathering and analyse  
- Real-time data system maintenance  
- Advertisement | - Advertisement  
- Sponsorship |
5.2 Money flow analysis

- Users pay directly to system
- System is the media between the payment of users and parking lot managers
- Other sponsors (advertisers) provide the system financial support in order to get the platform of advertisement
- Other sponsors (advertisers) provide the parking lot managers financial support in order to get the platform of advertisement
- Users use credits from the system to change for the gifts from gifts sellers, or buy them with money
Part 6
Future development

Nowadays the intelligent parking lots are slowly substituting the place of traditional parking lots. With the intelligent parking system, smart devices are more appared and recommended. In the future development of City 2 Park, a new parking device which set for the scanning the QR code of reservation will help a lot. To think about the future development of this service, I designed the parking bar for the following function:
• The scanning function helps to change the way of purchasing
• The report and record function helps the services system to improve the speed and the precision of building data base.
Parking bar: new parking device for intelligent parking lots

The main function of the Parking bar is to scan the QR code from the phone, in order to
1. get detail information of the reservation
2. report user’s parking action immediately
3. make the procedure much easier without IC card
4. record each of user’s operation and save them as history.

Simple flow line, striking color collocation.
The experience when park with the PARKING BAR

① Search for aiming parking lot, and get to the destination with the guide of application.

② Scan with the QR code in the phone from the bill that you have already ordered. The recognition system of QR code (infrare ray) will read the code and recognize your information.

③ The parking bar presents the detail information of your parking reservation, including starting time, estimate end time, order number, costs and so on.

④ With the alarm set, enjoy your parking experience.
Aiming at reducing the difficulty of park in the city Shanghai, the service is mainly developed to presenting information and building network amongst all the stakeholders. The main core is to organize better all the data gathered and people connected.

The service is developed to satisfy people’s need, the thesis above is just a proposal about this issue.

Fortunately, during the survey of the developers (a design consultancy company and the staff from Shanghai Transportation Department) for the application "Shanghai Parking" (see in the case study), they recognized my proposal and showed interests in it, we are now planning to manage the improvement of the service.

Hope the development of the service will be favoring processing, and the project will be continuing.
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