Queen's Parking Mobile

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INTRODUCTION

QueensParking is a software application that allows users to find and reserve parking spaces in a specific area, usually a city or town. The application typically uses GPS technology to locate parking facilities and display information such as the location, availability, and price of parking spaces. It also offers additional features such as booking parking spaces, checking availability, and updating your parking space. The aim of such apps is to make the parking experience more convenient, efficient, and stress-free for the user, while also helping to reduce traffic congestion and air pollution caused by detours to find a parking space.

RELATED WORK

Source 1: Edmonton's mobile parking system

"Through regular surveying of our visitors and clients, we have consistently identified parking as an area where we can make the greatest impact on guest satisfaction," said Olaf Miede, General Manager, of Edmonton EXPO Centre. "As we elevate our health and safety protocols in response to COVID-19, contactless systems ensure a seamless parking experience and uphold our commitment to ensuring our venue is among the safest places to attend events." [1]

To improve overall guest satisfaction. General Manager Olaf Miede noted that regular surveys show that parking is a key area that can be improved. Given the popularity of COVID-19, contactless systems, such as the ParkMobile app, have been implemented to ensure a seamless and secure parking experience. The use of these systems aligns with the venue's commitment to maintaining a high level of health and safety protocols.

Source 2: HonkMobile app

"The HonkMobile app is easy to use and allows customers to pay for parking from their smartphones before departure, during their trip or upon arrival at their destination, adding significant timesaving and convenience to the parking process. Users receive alerts 15 minutes prior to the expiration of their parking session, providing them with the opportunity to pay for additional meter time remotely."(Marketwired, 2015) [2]

The HonkMobile app is designed to make parking more convenient by allowing customers to pay for parking from their smartphones. The app's particular focus on ease of use and flexibility that makes it relevant to the interaction design community and its potential to simplify and streamline the payment processes that makes it relevant to the HCI community. The app's novel features, such as the ability to receive alerts 15 minutes before expiration and to remotely extend the billing time, makes it different from other parking payment solutions. The rationale behind the app is to save customers time and effort while paying for their parking. All In all, the HonkMobile app is a relevant and valuable contribution to the interaction design and HCI community that addresses a common problem in an innovative way.

As with any technology, the application may have some challenges and limitations. HonkMobile also has them, such as technical difficulties. Users may experience technical difficulties when using the application, such as slow load times, errors or crashes. Compatibility. The application may not be compatible with all smartphone models or operating systems, which may limit its use by some users. Integration with parking infrastructure. The application may not be compatible with all parking systems and infrastructure, which may limit its functionality in certain locations.

Source 3: Toronto's Green P Mobile app

The update of GreenP application is to make the payment of urban parking fees more convenient, but these changes are more challenging for users. The new design replaces the direct parking time input window with a confusing chart, and the introduction of the "quick time" option increases this confusion. The interface becomes cluttered and more difficult to browse, and the user has not received any notice of these changes in advance. As a result, the next time they use the app to pay for parking, they are caught off guard and face an unfriendly experience. ("People in Toronto Are Hating the Latest Update to the Green P Parking App") [3]

Source 4 : SpotHero

"The results suggest that parking reservation platforms are instruments for dynamic pricing and market segmentation that hold promise for increasing parking utilization. These

platforms also have potential to support the movement to create ‘Smart Cities’. ” [4]

SpotHero is a popular parking app that allows drivers to find, book, and pay for parking in real-time. SpotHero has been integrated with smart city technology in some cities, allowing drivers to find parking spots that are available in real-time. This integration allows city officials to monitor parking demand and optimize the use of parking spaces.

PROBLEM DESCRIPTION OR DESIGN CONCEPT

Kingston's parking system is well-known for its inefficiency and inconvenience, particularly for students who park in busy areas frequently. We conducted research on university campuses in Kingston to gather insights from our target users, student drivers, about their parking experiences. Through on-site interviews and open-ended questions, we collected their perspectives on the current parking system, identifying difficulties and gathering suggestions for improvement.

According to the results of our interviews, one of the problems faced by drivers is paying for parking at the pay stations. The current process involves walking to the pay station, operating the machine and waiting for the ticket to be printed, all of which must be done outside, regardless of the weather. This process is not only complex but also exposes drivers to adverse weather conditions.

Another issue is the difficulty of securing a parking spot close to their destination, especially for drivers who regularly park in busy areas such as city centers and university campuses. This daily challenges further exacerbated by the shortage of available parking spaces, causing drivers to spend too much time looking for a parking space and forcing them to travel further distances.

Given these problems, it is a priority to devise a solution to make the parking system more accessible to drivers. Our team plans to target Queen's University, St Lawrence College and Princess Street as trial areas to use our product. As mentioned above, our software is aimed at streamlining the entire parking process for student drivers, so that they can spend their valuable time focusing on their academics.

USER CHARACTERIZARTION

Our target users are students at Queen's University who usually drive to school. A significant percentage of students struggle to find a parking spot, especially in the harsh weather conditions of winter. Student parking at Queen's University is limited and the prime parking list is usually full a few days before the start of the school year. Therefore, our target users are also students who have not obtained a parking permit.

Our target user group is mostly aged between 18-28 and includes all university students. This group is primarily composed of Generation Z, who are referred to as "digital natives." Born between 1995-2009, they grew up with smartphones and the internet and are familiar with various technical products. They are young and have average good hearing, vision, and memory. They are comfortable with touch tasks and using multiple functions.

We serve all genders as the student group has no gender limitations, and the functions of our product treat users equally.

We target university students who are mostly undergraduates or have higher education backgrounds. These students have sufficient knowledge and experience with cell phone technology and the internet. According to a 2023 marketing report, 75% of Generation Z consider mobile phones their preferred device. The most common first choice of media for students is their cell phones, making it easier for them to solve parking problems on the spot. This makes it easier for them to notice, become interested in, and eventually get used to our app. Their experiences will allow them to interact deeply with our design.

For culture, we take into consideration several factors. Firstly, the main language used by our users is English, which will also be the official language of our app. Only 15% of Queen's University's students are international students. Secondly, our target users are primarily from the middle class and above, who have a greater likelihood of owning a car and driving to university daily. They can also afford to pay for parking consistently. Most importantly, our target users have a sense of social responsibility, as they follow parking rules and are willing to park in designated spots and pay for them. This reflects the driving regulations and laws of the larger society, making our product suitable for social needs.

DESIGN

Our software is designed to help school students park quickly and easily locate parking spaces, and as such, we prioritize providing fast service. To achieve this, we focused on creating an easy-to-use and accessible user interface during the product and UI design process. Specifically, on the app's first page, we streamlined the functionality by removing redundant modules and relegating them to the bottom function bar, which is less frequently used. This allowed us to feature only the five most commonly used function modules on the main screen, including Main Campus Quick Parking, Parking Reservation, Parking Calendar, Parking Around School, and West Campus Parking, as depicted in Figure 1.

Meanwhile, in terms of UI design, according to the classroom, these five modules will have their button sizes determined by their frequency of use and will be reasonably arranged on the phone screen. For example, the most important quick parking button will be placed at the top and will be the most visible button. The entire quick parking process will also be designed to be very fast and convenient.

In terms of accessibility, we found that the main demand for campus parking is mainly from Queen's students. Therefore, in terms of UI design, we will tend to cater to the aesthetics of young people: the icons and interface of the whole app will be like the design of the current mainstream youth software. That is, take the rectangular button as the main but the four vertices of the rectangle are curved. And these rectangular buttons will be neatly arranged in one piece. The overall color choice will be based on the main color of our logo design. And according to the visual perception principle described in the class, the color will not exceed four colors: black, white, gray, and orange. This is in line with the color characteristics of our products, but at the same time will not be too rich in color to make people feel visually fatigue. I believe that our design is not only to meet the aesthetics of young people, but also to show the vitality of our students at Queens University. It reflects the attitude of the young people of Queen's.

At the same time, we believe that accessibility is not only about catering to the mainstream user group, but also about catering to the disabled and minority groups as mentioned in the class. So, the app will be accessible to users with disabilities, such as by providing text-to-speech functionality or large font sizes.

In addition, we used the law of similarity as well as the law of symmetry for the logo design. We think this logo expresses the main purpose of the software. At the same time, the unsaturated colors are in line with the current color design trend. It has a modern look.

DEVELOPMENT

As I mentioned in the design section, our team will prioritize responsiveness, simplicity, and ease of learning. But at the same time, we also put a lot of effort into other GUI design principles. We took a lot of reference from the UI design ideas of mainstream young people using software, and we reduced the number of features on the home page and arranged them in an orderly fashion, which greatly increased the simplicity and orderliness. We considered adding a lot of features to help people with disabilities and minority groups, which is our consideration for adaptability. The main features are voice to text and multilingual settings. the logo has a grey and orange color scheme. It is very industrial and modern, but also very recognizable, which reflects visibility.

Also, to make the prototype interactive, we will include interactive elements such as buttons, dropdown menus, and sliders, and use animations to provide feedback to the user. We will also ensure that the prototype can be implemented using appropriate technologies, and that it can be tested and evaluated in a meaningful way.
In the process of designing the first draft, we gave priority to hand-drawing a general plan of how to arrange the functional modules in the mobile interface. After finalizing the general design and style of the interface, we went to Pixso for the initial UI design, which is a very convenient and easy-to-use UI design software. This is the software and platform we will use for the initial design. However, in the process of using it, we found that Pixso was not enough. For the detailed icon design and some specific functional codes and interaction design, we needed some additional software to assist us. For example, PS and ccs code compiler and some color mixing software.

USER SCENARIOS

Scenario 1:

Richard is a current student at Queen's. He has a small car. It is a great convenience for him to go to school and shopping, but the biggest headache for him every time is that he needs to spend five to ten minutes to find a parking space before class. This time he overslept and had 20 minutes before class, which was more than enough time to drive from his house to school, but not enough time to find a parking space and pay for it. So, he opened the recently launched Queen's Parking, and within four or five clicks of the screen as he walked to the garage with his shoes on, the app had automatically found a space for him and paid for his parking through online payment. When he arrived at school, all he had to do was park in the designated space and he was ready to go to class.

Scenario 2:

Maria, a senior citizen with mobility issues, was looking for a parking space close to her Queens School office. She opened the parking app on her smartphone and because she is not very ambidextrous, searched by voice for an accessible parking space near her office. She finds an open space reserved for people with disabilities. She uses the directions provided by the app to navigate to the location and parks. She uses the app to pay for parking and leaves the parking lot with ease.

Scenario 3:

Cersei, also a current Queens student, wanted to go downtown near the Queens campus to find a bit of food to sample after her morning classes were over. So, she tapped on the parking app and tapped on the neighborhood option. She found a restaurant of her choice and the app gave her the closest parking spot. After she paid for the parking spot on her phone, she was able to pull her friend into the parking spot and get out of the car and head straight to the restaurant without taking a precious lunch break. Leaving more time to get to her afternoon class.

USER EVALUATION

Method:

To perform user testing, we recruited 10 participants who were representative of the target audience for our prototype. Our interviewees, who were mostly students at Queen's University aged 18 to 28, as previously stated.We demonstrated our low-fidelity prototype to the interviewees and provided them with clear instructions on which button to click, and informed them that each button corresponds to a specific page.

To be specific, when users open our app, they are directed to the homepage displayed in Figure 1. Clicking the 'Recent Parked' button will redirect users to the page shown in Figure 2, where they can check the location of their parked car and the remaining time. Clicking the 'Spot Booking' button will bring up the page shown in Figure 3 for reserving a parking spot. The buttons at the bottom of our app are primarily for navigation. On the 'User' page, users can check their settings, add payment methods such as credit cards, debit cards, or PayPal, change their password, and request help from us. The 'Map' function features a search bar at the top of the page that allows users to input their destination and save their history. This feature enables them to easily locate a parking spot around those places the next time they want to park.

Our team conducted interviews with students from Queen's University in our immediate surroundings. Each interview lasted approximately 10 minutes, during which we utilized a combination of open-ended and closed-ended questions to capture data about our application. Below are the questions we asked during the interviews:

1. What is your insight on our app's main page?

2. Do you think the background color is gentle enough?

3. Can you easily read the letters on each page?

4. Do you think our app is User-friendly? Why or why not?

5. Have the various parking functions in the app helped you in your life?

6. Are the functions you need easily accessible without external guidance or assistance?

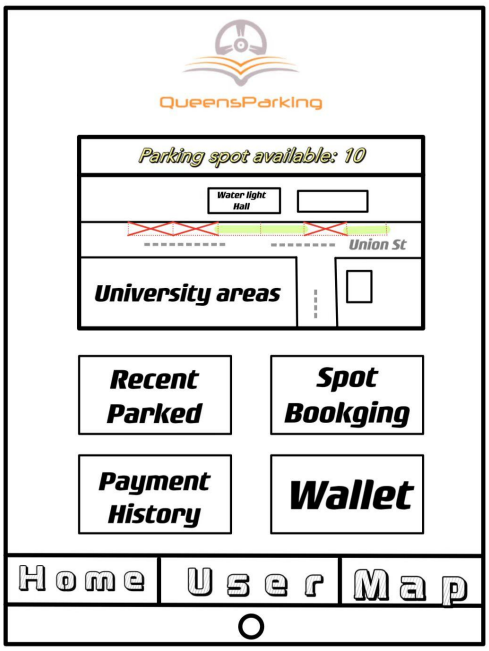

Figure 1. The 'Home' page.

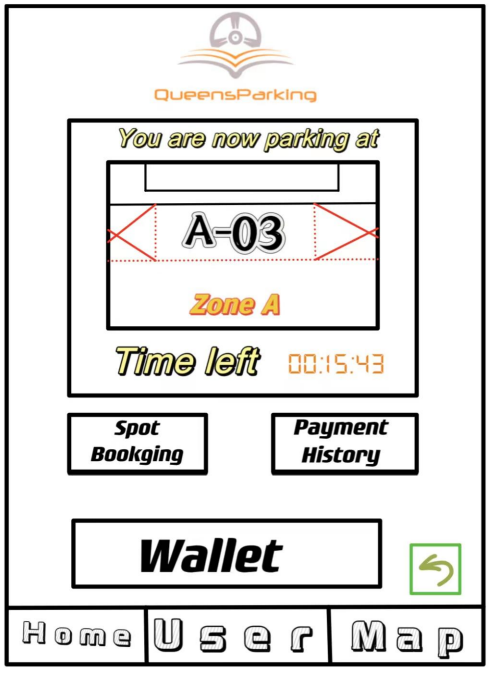

Figure 2. The 'Recent Parked' page.

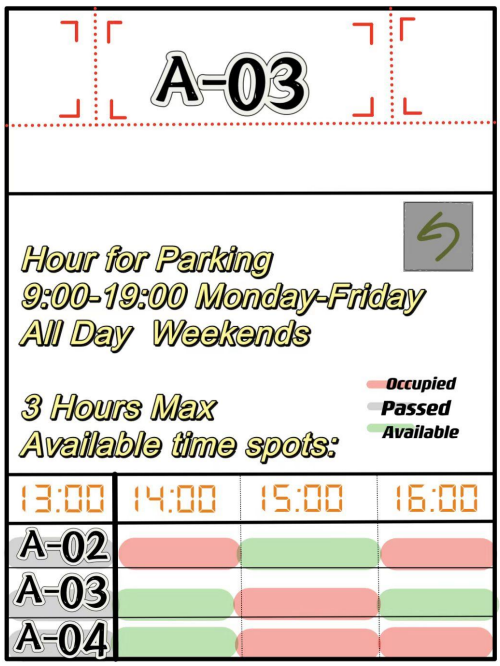

Figure 3. The 'Spot Booking' page.

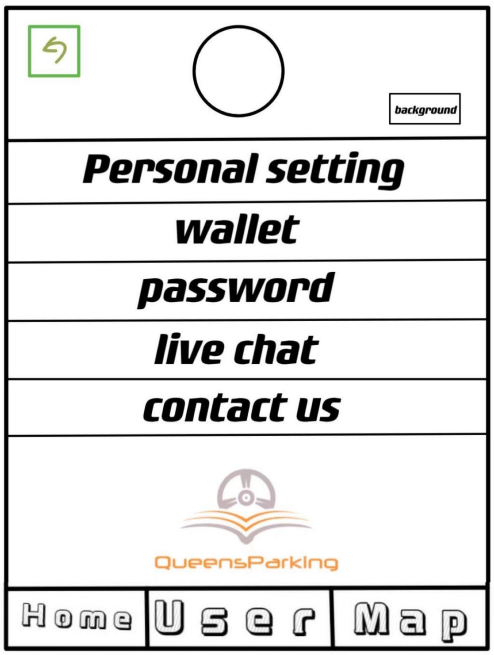

Figure 4. The 'User' page.

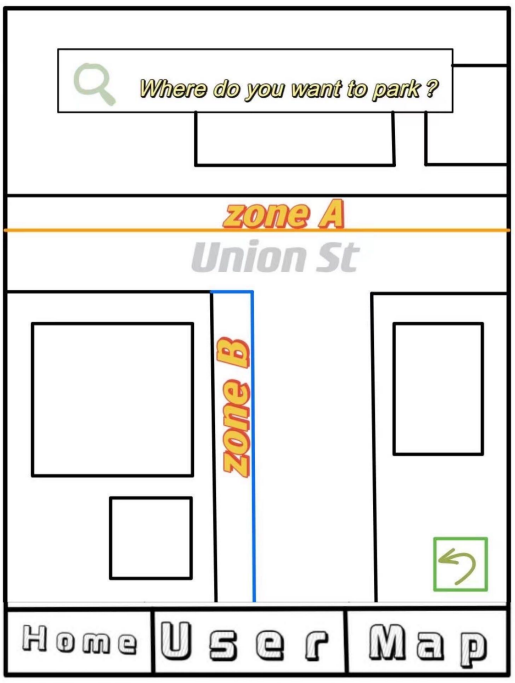

Figure 5. The 'Map' page.

Findings:

Based on the feedback we have received from our users, we have found that our design approach of prioritising user needs in the layout of the main functional modules has been well received by our users. They appreciate the ease of finding the functional modules they need, which allows them to complete their tasks more efficiently. The colour scheme and simplicity of the design was also praised by many users.

However, we also found some areas for improvement in terms of the usability of the application. Some users reported issues with parking space updates. Specifically, some users found that they were unable to update their parking spaces after their parking time had expired, which resulted in them having to stop working, and go to find a new parking space. This was a significant inconvenience for these users and raised questions about the overall user experience of the app.

Despite this, we have been able to identify opportunities for improvement based on this feedback. We are currently working on redesigning the parking update process to make it more intuitive and user-friendly. We are also exploring ways to streamline the navigation of the app to further improve the user experience. Our goal is to make the app as

user-friendly as possible while still meeting the needs of our users. We believe that by listening to our users and taking their feedback on board, we can continue to improve the app and provide the best possible user experience.

Recommendations:

In order to improve our app, one important aspect to consider is the lack of a function that allows users to extend their parking time. While only a few interviewees brought up this issue, we believe it is a crucial point that could greatly enhance the overall user experience. By implementing a feature that enables users to easily extend their parking time within the app, we can provide a more convenient and seamless experience for our users. This could also potentially increase user retention and satisfaction, as well as differentiate our app from competitors that may not offer such functionality. Therefore, we strongly recommend prioritizing the development of this feature as part of our app improvement strategy.Secondly, we recommend incorporating accessibility features, such as text-to-speech and screen reader compatibility, to make the application more inclusive. Finally, we suggest incorporating personalization features such as user profiles and personalized recommendations to improve the overall user experience.

To apply these recommendations, we plan to redesign the user interface to incorporate more intuitive navigation options and simplify the interface. We will also include accessibility features, such as text-to-speech and screen reader compatibility, to make the application more inclusive. Finally, we will work on incorporating personalization features such as user profiles and personalized recommendations to improve the overall user experience. Overall, we believe that implementing these changes will greatly improve the usability, accessibility, and user experience of the application.

REFLECTION

After completing our project, our team conducted a comprehensive review of our progress. We continuously adjusted our approach as we gained a deeper understanding of the project requirements and explored creative solutions. Initially, we held a brainstorming session to consider potential project ideas. Eventually, we identified the parking problem in the Kingston area as an opportunity to develop an application that would retrieve available parking spots specifically for students.

Throughout the project, we discovered that user experience is a crucial consideration in any design project. User testing can provide invaluable insights into how users interact with the system and how the system can be improved to better meet their needs. As a result, we successfully created a low-fidelity prototype of our app that showcases all the functional buttons and their respective pages. During user interviews, we received positive feedback mainly about the simple and streamlined user interface that provides easy access to frequently used functional modules from our target audience. We are taking this feedback seriously and using it to further improve our project, enhancing the user experience.

Our team placed a significant emphasis on aesthetics and color scheme during the design process, recognizing their critical role in shaping the user experience. In addition, we prioritized accessibility by incorporating features like text-to-speech functionality and larger fonts, ensuring that the application is inclusive and accessible to users with disabilities or visual impairments. Our primary goal was to create a phone app that could be utilized by everyone, regardless of their abilities or vision limitations.Our commitment to accessibility is grounded in our belief that technology should be designed to be inclusive and equitable for all users, and we believe it is especially crucial to incorporate these principles into mobile app design.

Incorporating the laws of similarity and symmetry in the logo design is a sound decision as it enhances the logo's recognizability and memorability for users. By utilizing these design principles, the logo becomes more visually appealing and easier to remember, leaving a lasting impression on the user's mind.

We considered conducting user testing to ensure that the application's design meets the needs and preferences of the target audience - school students. This could involve gathering feedback on the functionality, ease of use, and overall app design and making changes based on that feedback.

In conclusion, our application design thoughtfully incorporates the principles of GUI design and effectively meets the needs of our target audience. We firmly believe that our application has the potential to significantly enhance the parking experience for students in the Kingston area. We look forward to further user testing and feedback to continuously improve and refine our application.

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