I Dream of Parking

Requirements Specifications

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1. Preface

The “I Dream of Parking” program is intended for the modern day user who simply struggles with finding parking. Parking is often an overlooked task as time is often allotted for transportation, grooming, and other such tasks, but very rarely does the excuse “I couldn’t find parking” get addressed. That’s where our program comes in. Through the use of this program, users will find parking to be less of a tedious experience, thus giving them more time to focus on more important tasks.

2. Introduction

“I Dream of Parking” is a software application that will simplify the process of finding an available parking space in a parking lot. The application will be designed to calculate the best remaining parking space in the parking lot for each arriving vehicle. With this information, a display of the parking lot is updated to show the location of this parking space and a parking space ticket will be printed for the vehicle to display on its dashboard when parked.

This program is essential due to the fact that people would rather spend time doing productive tasks rather than circling parking garages looking for an unoccupied space. The time spent looking for parking may not seem like much of an inconvenience, but over time it adds up; up to 17 hours per year for the average consumer. This wasted time can negatively impact one’s day, both emotionally and mentally.

This fast and organized method of deciding for each vehicle the next space to take will save time and energy for everyone entering the parking lot, allowing more time, and possibly money, to be spent at the destination.

3. Functional Requirements

3.1. System Requirements

1. The parking lot system will record the entering and exiting of users in the parking lot.
2. The parking lot system will determine the best remaining parking space for each entering user.
3. The parking lot system will assign the parking spaces of exiting users to entering users when the space becomes available.
4. The parking lot system will know if and when the parking lot is full.
5. When the parking lot is full, the user will be alerted before attempting to enter the parking lot.
6. The parking lot system will generate a physical parking space card for the user to display in the dashboard of their vehicle when parked. The parking space card will display the parking space they have been assigned.
7. The parking space card will contain a magstripe that will hold information about the user. Information stored will include the parking space assigned and the time when entering the parking lot system. This parking space card will be swiped by the user when exiting

the parking lot system. This will allow for the parking lot system to update the parking space from the final state, back to the initial state.

8. The parking lot system will have an administration mode for authorized users (parking lot system engineers, employees, security, etc.).
9. Authorized users will be able to make changes to the parking lot in the event of parking lot system errors, forced removal of vehicles, poor parking of other vehicles, environmental conditions, or in the event that a user loses or does not receive a parking space card.
10. The parking lot system will also allow for the user to manually interact with the display for additional testing and demonstrations.
11. The parking lot system will store the entering and exits of users from the parking lot into a database.

3.2. Visual Requirements

1. The parking lot system will divide the parking lot into two columns. The rows in each column will be labeled with a letter (A-L). The row enumeration will increment the first row in the left column, then the first row in the right column, then to the next row of the left column, etc.
2. Each parking space in a row will be numbered (0-9). The spaces will increment from left-to-right in each row, regardless of what column the row is apart of.
3. The initial state of a parking space is empty. A parking space in the parking lot that is in its initial state will be colored green.

4. The idle state of a parking space is when the space is assigned to a user, but yet to be occupied. A parking space in the parking lot that is in the idle state will flash yellow.
5. The final state of a parking space is occupied. A parking space in the parking lot that is in its final state will be colored red.
6. The visual display will contain an overhead view of the parking lot.
7. The parking spaces in the lot will be numbered, as will their row letters.
8. The row letters and parking space numbers will be located in the center of each parking space, e.g. “A0”.
9. The parking spaces will be colored according to their current state.
10. The visual display will contain a button, centered, in the lower-third of the screen for the user to press in order to receive a parking space. The button will contain text explaining to the user to press it to receive a parking space.
11. Once pressed, this button updates its text to tell the user to press it again to continue.
12. When a parking space is assigned a separate window will be created to display the parking space card that the user would receive when printed.
13. This parking space card will contain the assigned parking space and the date and time the space was assigned.
14. The visual display will contain a button, located in the bottom-right corner of the screen for users to press in order to leave the parking lot.
15. This button will simulate the input of the parking space card by randomly selecting a parking space to be freed up.

16. The visual display will contain a button, located in the bottom-left corner of the screen for a technician or employee to press in order to access administrative settings.
17. Once an authorized user gains access to administrative settings, the visual display will be updated.
18. The button that was pressed to prompt the login window will now say “Administrator Logout.”
19. The button used to get a parking space will be hidden.
20. The button to leave the parking lot will be hidden. In its place will be a button labeled “Clear All Parking,” which will set all spaces to available.
21. When the “Administrator Logout” button is pressed, this button will log the user out administrative settings and return to the initial visual display.

3.3. User Functionality

1. Arriving users will drive their vehicle into a ticket booth with a control arm. The user will be presented with a visual display of the parking lot. The user will press the button located in the center of the lower third of the display. Once pressed, the parking lot system will determine the parking space for the user.
2. The parking lot system will create a parking space card and create the separate display of it when created.
3. When a user is being told what parking space they have been assigned, the parking space will be in an idle state. The parking space will then go to the final state. At this time the control arm will rise, allowing the user to enter the parking lot.

4. In the event that a users does not park in their assigned parking space, the authorized administrative user will be required to manually update the system to account for this error.
5. Exiting users will drive their vehicle into a separate ticket booth. The user will swipe their parking space card, allowing the system to update the parking space they are leaving, and will discard the card. At this time the booth will allow a control arm to rise, letting the user exit.

4. Non-Functional Requirements

4.1. Performance Requirements

1. The parking lot system will allow for 120 parking spaces to be occupied when the parking lot is at capacity.
2. The parking lot system will be operable daily from 8:00 AM to 8:00 PM. Downtime within normal working hours will not exceed 1 minute in any one day.
3. In the event of system downtime, ticket booth operators would be expected to manually assign parking spaces and update the system once recovered.
4. The parking lot system will respond to a parking space request in 3-5 seconds.

4.2. Operational Requirements

1. The parking lot system will determine the best remaining parking space by finding the first available parking space in the parking lot. The parking lot system will determine what the first available parking space by checking each parking space in each lettered row. By this "A0" is first, followed by "B9" and continuing until "L9".
2. The parking lot system database will contain information for each parking space.

4.3. Security Requirements

1. The parking lot system will allow authorized users to access an administrative mode in order to directly change the state of a parking space.
2. Authorized users will receive a private 4 digit access pin to enter when trying to access administrative settings.

4.4. Testing Requirements

1. When black-box testing the parking lot system with manual input, test users will be able to manually activate the display to generate a parking space.
2. When white-box testing the parking lot system with manual input, test users will be able to provide test scenarios in order to ensure that edge cases and outstanding circumstances are handled correctly.

4.5. System Evolution

1. The parking lot system will have the ability to configure parking lot to varying number of rows and spaces per row.
2. The parking lot system will allow for a payment system for time spent in parking lot.
3. The parking lot system will allow users the option to select spaces with no occupied spaces surrounding their space.
4. The parking lot system will allow users to reserve spaces.

5. Basic User Stories

5.1. On Entrance

1. Driver pulls into ticket booth.
2. Driver presses button to find parking space.
3. System computes next best parking space.
4. System updates screen to display this space, bright and flashing.
5. System waits 3-5 seconds and prints out parking space card for driver.
6. Booth raises arm and driver pulls forward.

5.2. On Exit

1. Driver pulls into exit booth.

2. Driver inserts parking space card.
3. System reads card.
4. System clears parking space, sets it to empty.
5. Booth arm raises and driver exits.

5.3. User Parks in Incorrect Space

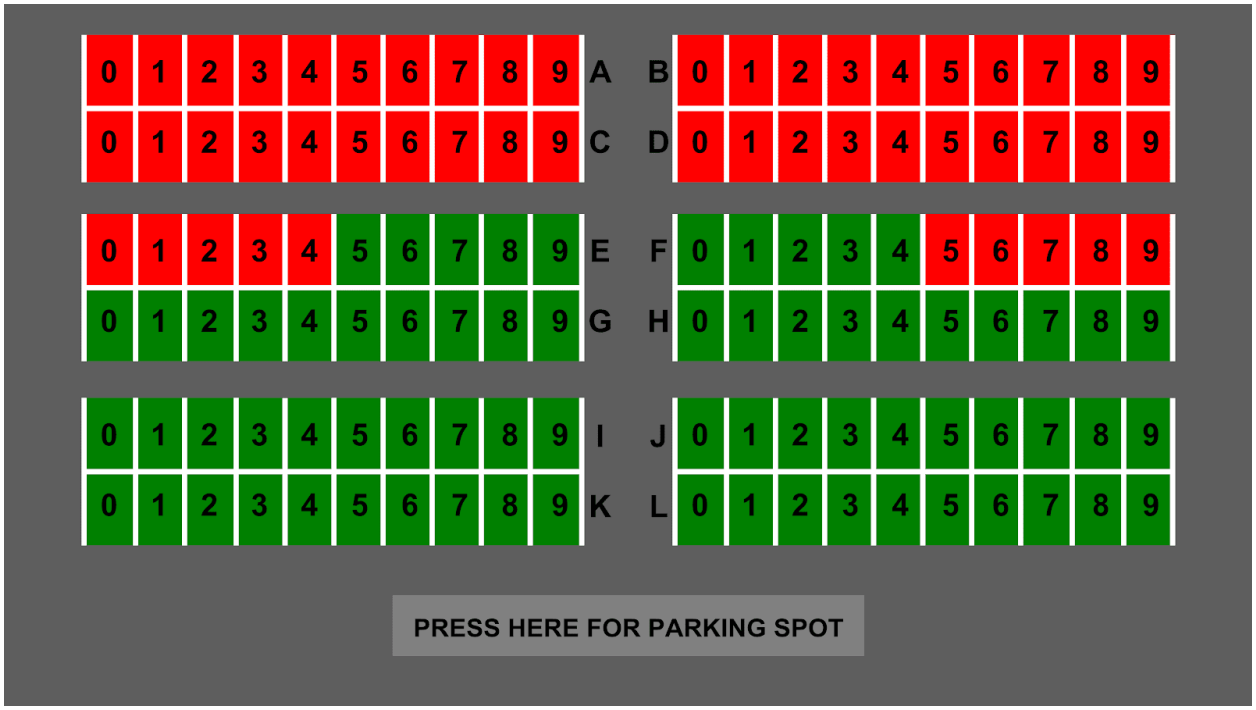
1. User requests ticket and is assigned to a space.
2. User parks in incorrect space and goes about their business.
3. Security guard doing rounds will see the car is parked in an incorrect space (as security guard will be an authorized user).
4. After ticketing a car, the security guard would open his own console with the "Administrator Mode" feature and correct system to account for the space that the car parked in.

5.4. User Does Not Like Their Space

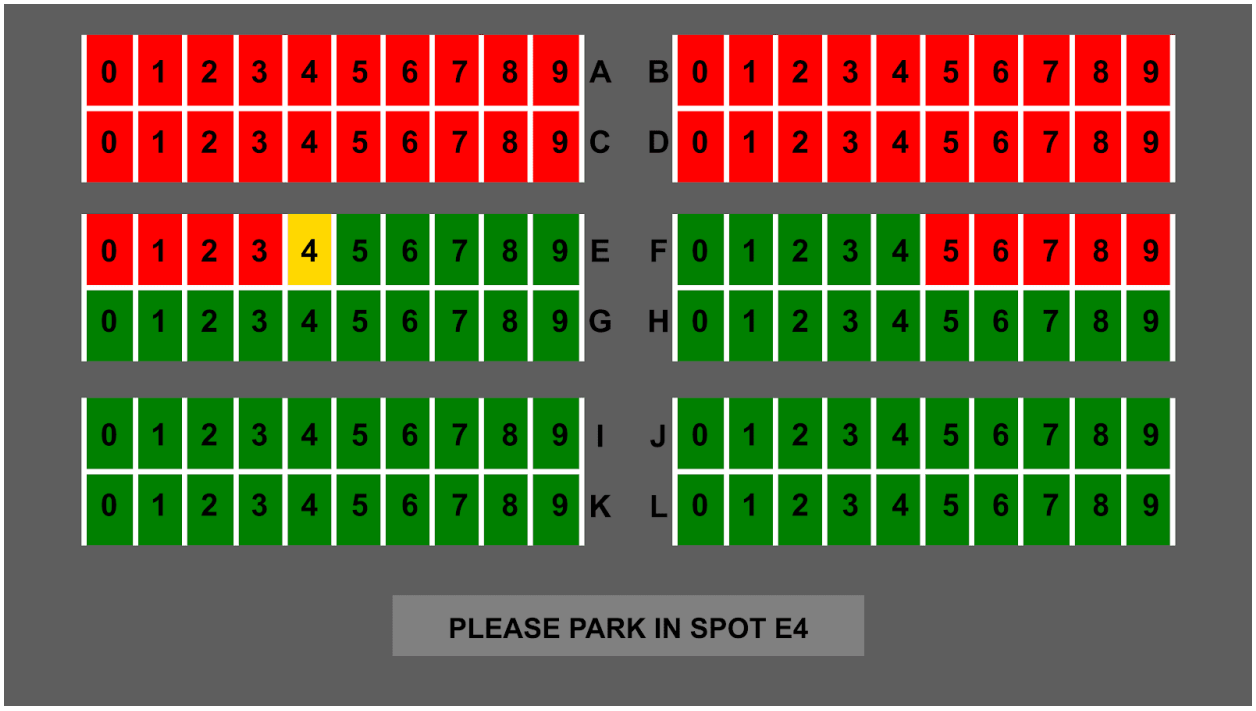
1. User requests ticket and is assigned to a space.
2. User does not like his space and goes to the security booth to request another space.
3. Security guard manually chooses a different space for the user with the "Administrator Mode."
4. User happily parks in their new space.

6. System Models

6.1. Parking Lot System Before Assigned a Parking Space



6.2. Parking Lot System When Assigned a Parking Space



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6.3 Parking Space Card