

UI/UX Design and Evaluation of a Parking Management System (User & Admin)

by

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An internship report submitted to the
Department of Computer Science and Engineering
in partial fulfillment of the requirements for the degree of
B.Sc. in Computer Science and Engineering

Department of Computer Science and Engineering
Brac University
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Declaration

It is hereby declared that

1. The report submitted is my own original work while completing degree at Brac University.
2. The report does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The report does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I have acknowledged all main sources of help.

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Abstract

This report contains the results of a four-month-long UI/UX internship at Crystal Technology Bangladesh in the field of the design of a full Parking Management System that includes the user-facing and administrator-facing interfaces. The user application supports parking location discovery, slot availability in real time, booking and payment, and profile dashboard. The admin system consists of control dashboard, parking slots management, user and booking management, and analytics. The work was done from a low fidelity prototype (light theme) to a high fidelity, dark SaaS design (blue-gray surfaces with teal/violet accents). The design process was based on an academic approach: requirement elicitation, creation, task analysis, rapid wireframing, component driven design, accessibility review and moderated usability testing. The skills gained from the internship included gains in design systems, information architecture, accessibility, responsive behavior, error state copy, and design to development hand off. The final deliverables are a Figma component library, redlines/specs, and annotated user flows for mobile and desktop breakpoints.

Keywords: UI/UX, SaaS, Figma, Component Library, Dark Theme, Accessibility, Usability Testing, Parking Management, Admin Dashboard

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Chapter 1

Introduction

1.1 About Internship

Internships serve as the classroom theory. As a UI/UX intern I was embedded in a product squad at Crystal Technology Bangladesh with the task of taking a Parking Management System from concept to production ready specification. I worked across the areas of discovery, wireframing, prototyping, interaction design, and validation. The scope was specifically left as both the experience of the driver (find, book, and pay for a slot), and the experience of the administrator (manage capacity, manage slots, resolve bookings, and examine analytics).

1.2 About this Report

This report is a documentation of methods, artifacts and outcomes, and follows an academic format. It includes company context, training, detailed project activities, acquired knowledge and recommendations. The goal is to create an adaptable design so that users can use it with ease and flexibility.

1.3 Research Objectives

Helping client needs into measurable UX objectives (discoverability, time-to-book, error-recovery rates).

Build a dark SaaS with a data density design system that is scalable.

Define information architecture supporting both real-time operational activity and retrospective analysis.

Use moderated usability testing to validate core flows, then make adaptive responses to the results.

Produce developer-consumable specifications and tokens and document decisions.

1.4 Aim of the Internship

The goal was to be able to deliver a coherent, accessible, and performant UI/UX specification for a two-sided parking platform and in the process consolidate professional design practice—including accessibility, responsiveness, and collaboration.

1.5 Methodology

Our approach was user oriented and practical. We first learned about the people who would be using the product by conducting short interviews, closely studying competing products, and testing early designs with internal teams. To help us make decisions, we drew on known principles of usability and accessibility standards as well as typical patterns from successful SaaS dashboards. Work was done in short two-week cycles: the problem was explored, the problem was defined, designs were created and refined then the results were reviewed with stakeholders. Throughout, we used a small but reliable toolset—Figma for designing components and flows and Figma Inspect to hand designs to developers.

1.6 Expectations and Outcomes

Initial Expectations: To clarify a prototype. Outcomes: Complete component library, breakpoints for mobile/tablet/desktop, comprehensive flow annotations, admin analytics visualizations, a production ready spec with redlines.

1.7 Key Learnings

Important lessons learned include how to balance real-time telemetry with historical insights, design for contrast in dark themes, and dashboard architecture for glanceability. The internship helped to reinforce the importance of small testable increments of design and clear acceptance criteria.

Chapter 2

Company Profile

2.1 Overview

Crystal Technology Bangladesh is a web and enterprise applications service company. The organization blends product design with engineering delivery with a focus on maintainability and quantitative figures of merit.

2.2 Vision and Mission

Vision: develop reliable digital frameworks that possess human interfaces. Mission: add value to the product without making it unusable to access, use, or be secure. This is translated to regular application of design systems and evidence-based iteration.

2.3 Process and Collaboration

Work is done in sprints using visible task boards, asynchronous review and design critique. Rationale, screenshots and acceptance checks are supposed to be included on the pull requests and design proposals.

2.4 Tools and Platforms

Design: Figma, FigJam. Project: Figma. Communication: Slack/Meet.

Chapter 3

Training and Development

3.1 Onboarding

Conventions of design Onboarding included conventions of space (scale of spacing), typographic ramps, grid usage, and conventions of naming. A shadowing was an opportunity to conduct observation of design critiques and sprint ceremonies.

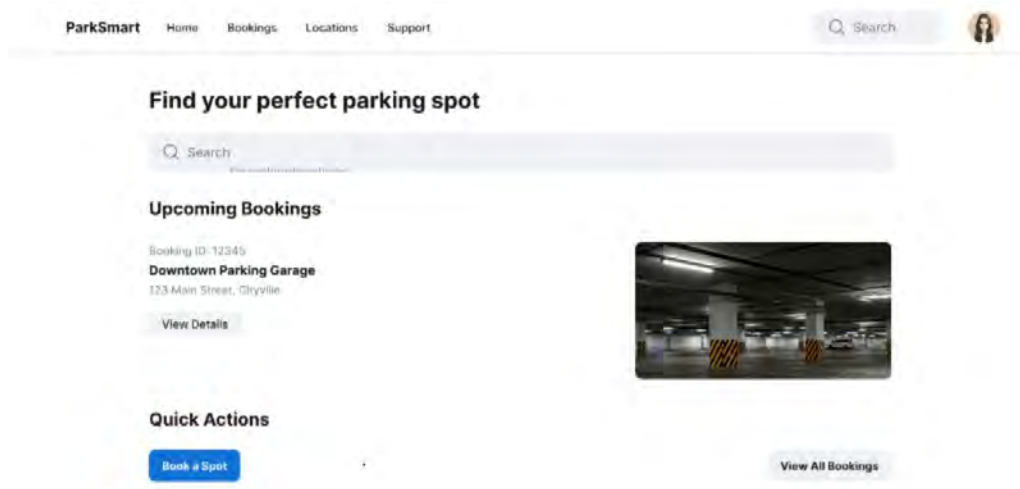


Figure 3.1: User home page prototype

3.2 Learning and Support

Studying combined design guidelines, and mentorship. Weekly critiques were based on hierarchy, affordances and copying error states. It was in the form of feedback, and before/after examples and brief micro-exercises were used.

3.3 Skills and Tools Learned

The competencies were extended to component-first design, interactive prototyping, auto-layout mastery, variant management and tokenization (color, type, spacing). The practices of accessibility, focus order, keyboard traps, and contrast, were built in.

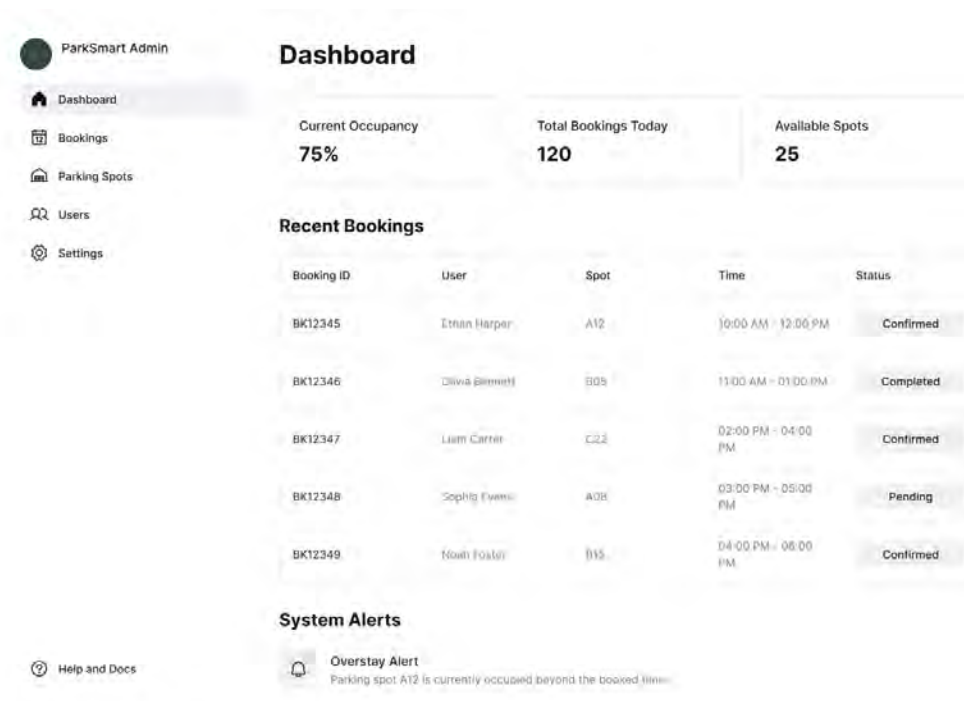
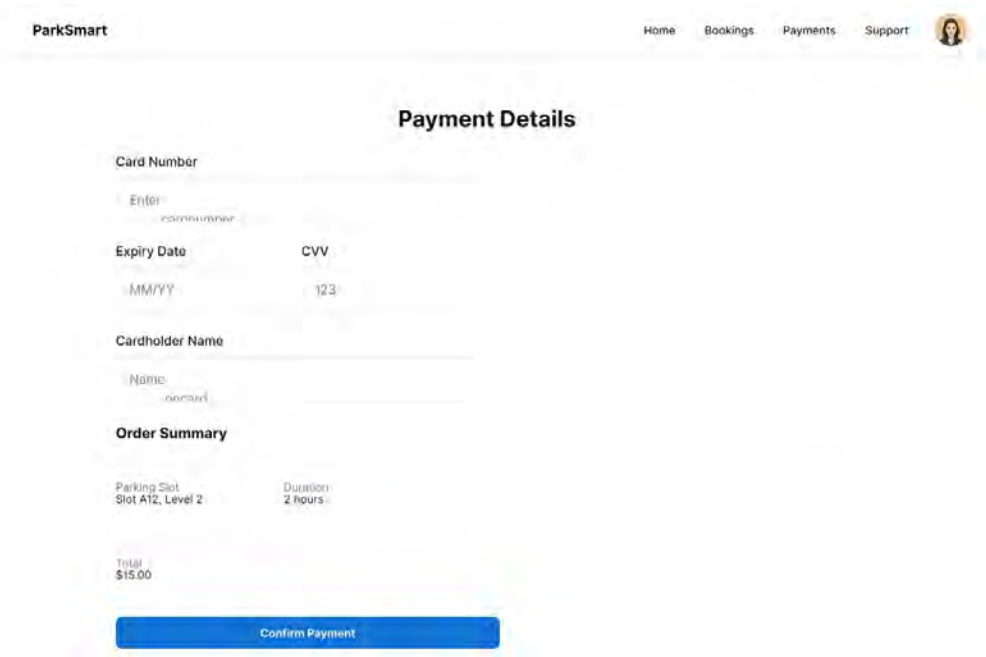


Figure 3.2: Admin dashboard prototype



The image shows a web-based payment system prototype for 'ParkSmart'. At the top, there is a navigation bar with links for 'Home', 'Bookings', 'Payments', and 'Support', along with a user profile icon. The main heading is 'Payment Details'. Below this, there are three sections: 'Card Number' with a placeholder 'Enter card number', 'Expiry Date' and 'CVV' with placeholders 'MM/YY' and '123' respectively, and 'Cardholder Name' with a placeholder 'Name'. Below these is an 'Order Summary' section showing 'Parking Slot: Slot A12, Level 2' and 'Duration: 2 hours'. At the bottom of the summary, it says 'Total: \$15.00'. A large blue button labeled 'Confirm Payment' is at the very bottom.

Figure 3.3: Payment system prototype

3.4 Mentorship and Guidance

Mentorship focused on rationality of decisions. Each major change had to include a problem statement, alternatives to the problem, and evidence (usability findings or references).

3.5 Personal Growth

Individual development was focused on the ability to describe the design purpose in a concise way, accept the criticism in the constructive form, and transform the feedback into the systemized updates (tokens, components).

Chapter 4

Activities and Responsibilities

4.1 Project Overview

The Parking Management System is a two-sided internet application. The user application allows finding, reservation, and billing. The administration program offers administrative control and analytics. The last design is based on the dark SaaS theme (blue-gray 900 surfaces, mid-gray content blocks, teal/violet accents). High-contrast readability and brand uniqueness are achieved with this design.

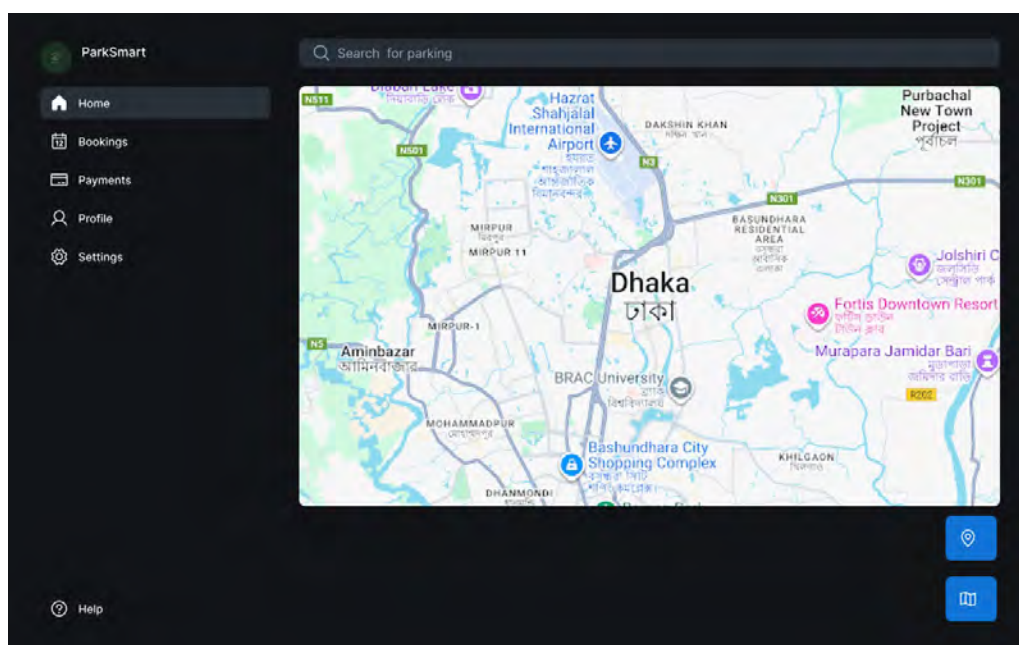


Figure 4.1: Parking management system home page

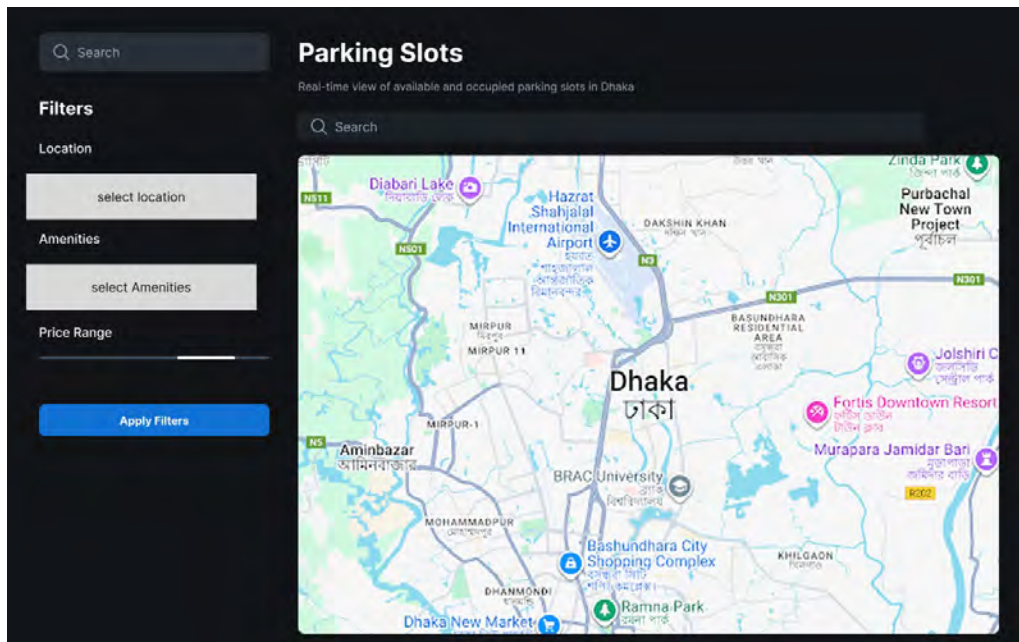


Figure 4.2: User parking slots

4.2 Research and Requirements

Through the internship, the theory in design was transformed into a disciplined, repeatable design practice. The Management System Parking system had now become unsightly to the users because they could not easily know which parking was free, prices were confusing and the check out was long. Along with features, you also have quality objectives: the design must be usable, must work on various screen resolutions and must also work on slow or unreliable internet. Lastly, you established success objectives to help you know how you are doing: a user needs to pick a slot within 30 seconds, the form needs to fail less than 3 per cent of the time and the administration dashboard needs to be loaded with meaningful information in less than 5 seconds.

4.3 Information Architecture

The IA is used to segregate real-time activities and reference material. Home, Find Parking, Book and Pay, Profile. Admin: Slots, Analytics, Dashboard, Users and Bookings, Analytics, Settings. Examples of cross-cutting utilities are search, notifications, and help. The orientation is ensured to have a user friendly design.

4.4 Design System

An integrated design system was developed to be able to be used again to make it consistent and fast to deliver. We established color tokens of core roles—surface, raised, overlay, accent-teal and accent-violet—hence there is harmony of themes across screens. Typography is based on 12–32 px fully fixed line-height type scale and letter-spacing optimized to allow reading on a dark surface. The library includes the app shell, cards, tables, forms, dialogs, toasts, tabs, pagination and charts (with sparklines, area and bar). Every element can have explicit interaction states: hover, focus-visible, disabled, busy, and error, and keyboard focus rings are never obscured, so it is always possible to rely on visual feedback in a navigation process.

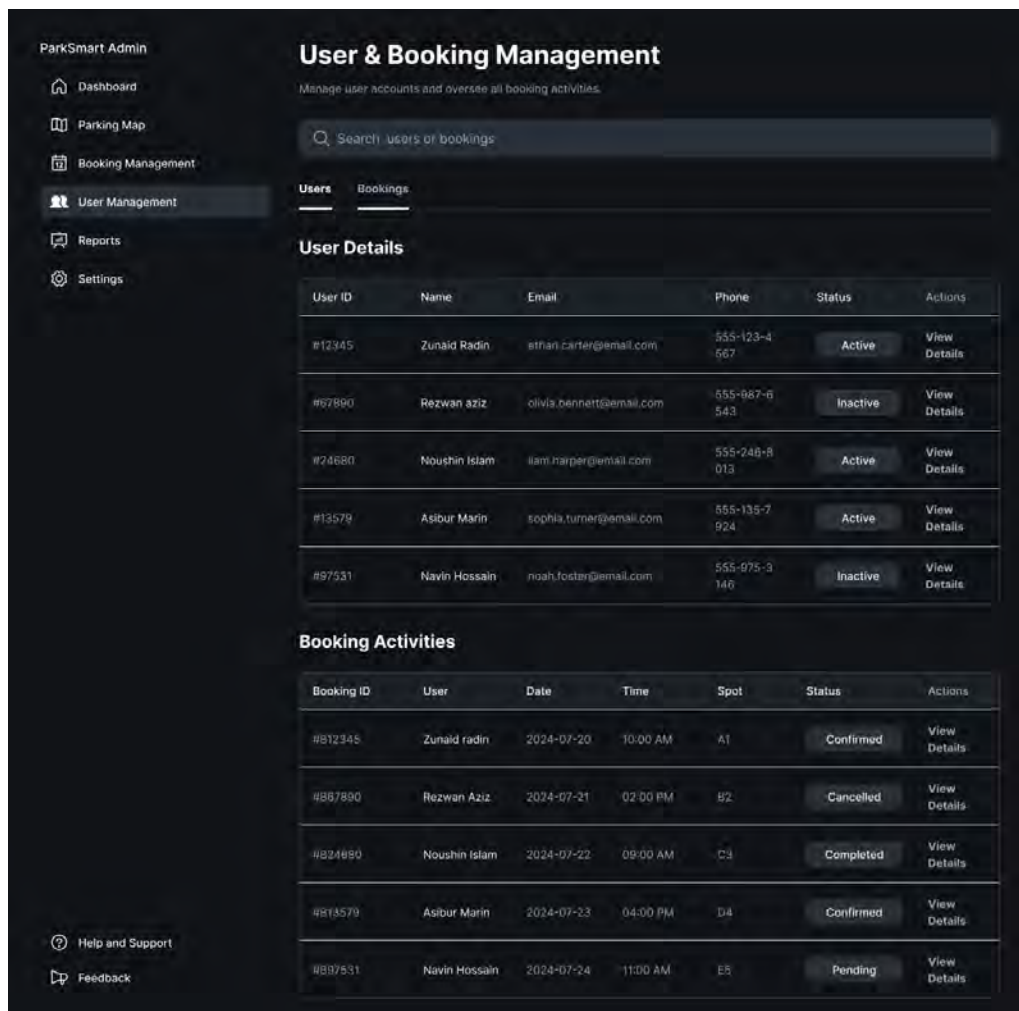
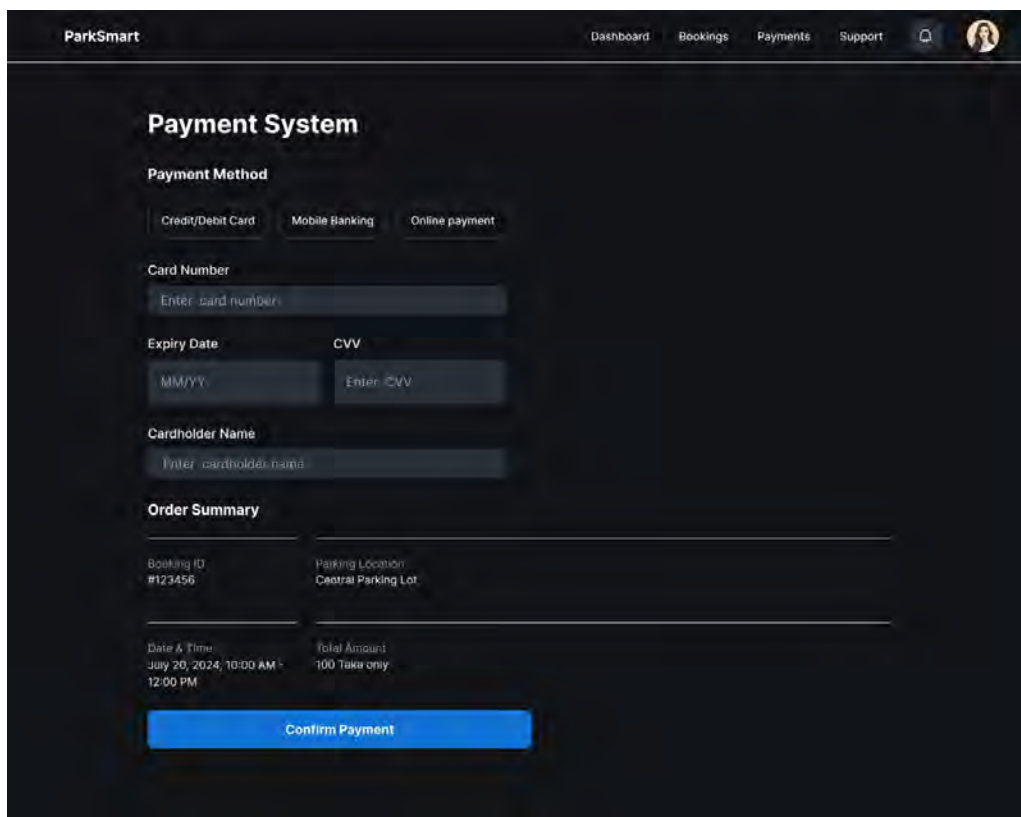


Figure 4.3: User booking and management Admin

4.5 User App (Flows and Screens)

Homepage focuses on wayfinding: search of location, recent bookings and fast actions. The map/list hybrid indicates availability and price at the sight of the eyes. Booking flow: location selection—time window selection—slot selection—confirmation selection—payment—receipt. The invalid time ranges, sold-out lots and network retries are considered as edge cases. The payment stage consists of in-line validation, explicit fees and legal copy. Profile dashboard is where vehicles, payment methods, receipts and preferences (notifications, privacy) will connect.



The screenshot displays the 'Payment System' interface within the ParkSmart application. At the top, a navigation bar includes 'ParkSmart', 'Dashboard', 'Bookings', 'Payments', 'Support', and a user profile icon. The main content area is titled 'Payment System' and features a 'Payment Method' section with three options: 'Credit/Debit Card', 'Mobile Banking', and 'Online payment'. Below this, the 'Card Number' field is labeled 'Enter card number:'. The 'Expiry Date' field is labeled 'MM/YY' and the 'CVV' field is labeled 'Enter CVV'. The 'Cardholder Name' field is labeled 'Enter cardholder name:'. An 'Order Summary' section follows, containing a table with booking details. At the bottom, a large blue button labeled 'Confirm Payment' is visible.

Order Summary	
Booking ID #123456	Parking Location Central Parking Lot
Date & Time July 20, 2024, 10:00 AM - 12:00 PM	Ticket Amount 100 Taka only

Figure 4.4: User payment system

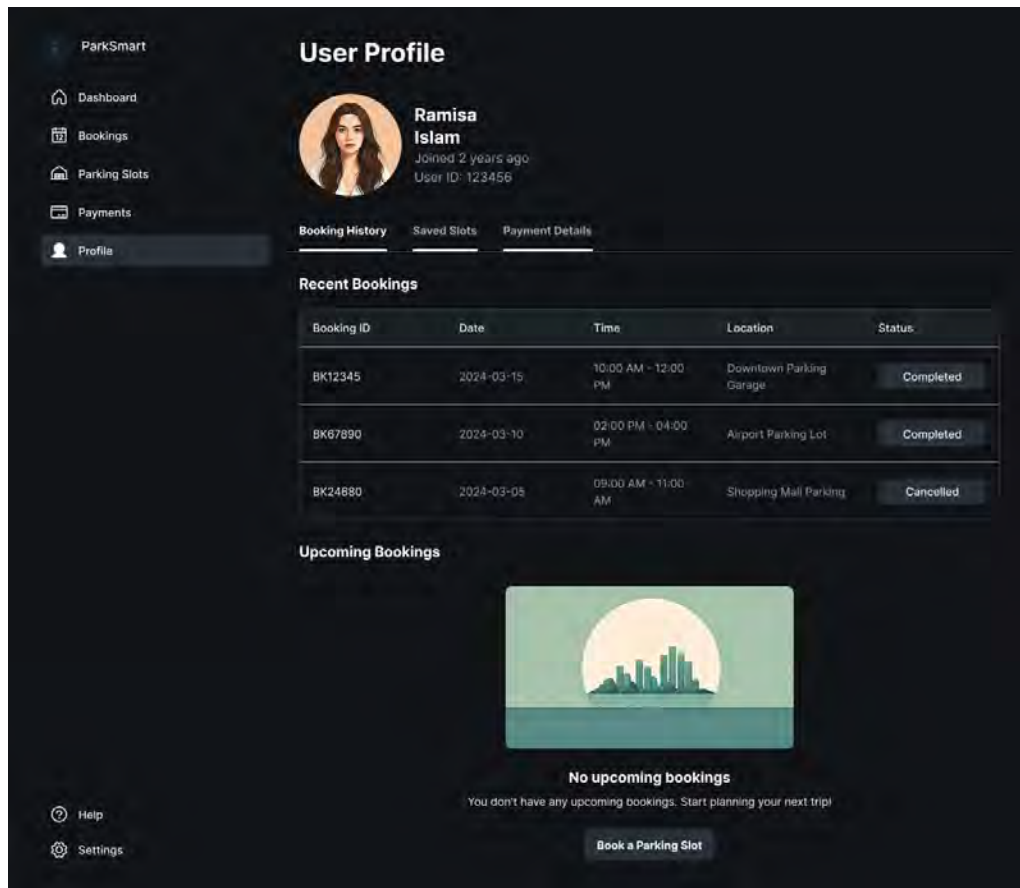


Figure 4.5: User profile and Dashboard

4.6 Admin App (Flows and Screens)

The Admin dashboard provides the view of occupancy, revenue, check-ins per hour, and open incidents. Slot management consists of visualization of lot plans and a table that has bulk actions, filters, and inline editing. User/booking management offers the guardrailed search, role assignment, and refund/void operations. The analytics combines the occupancy history, busiest hours, dwell time distribution, and violation reports and allows the export.

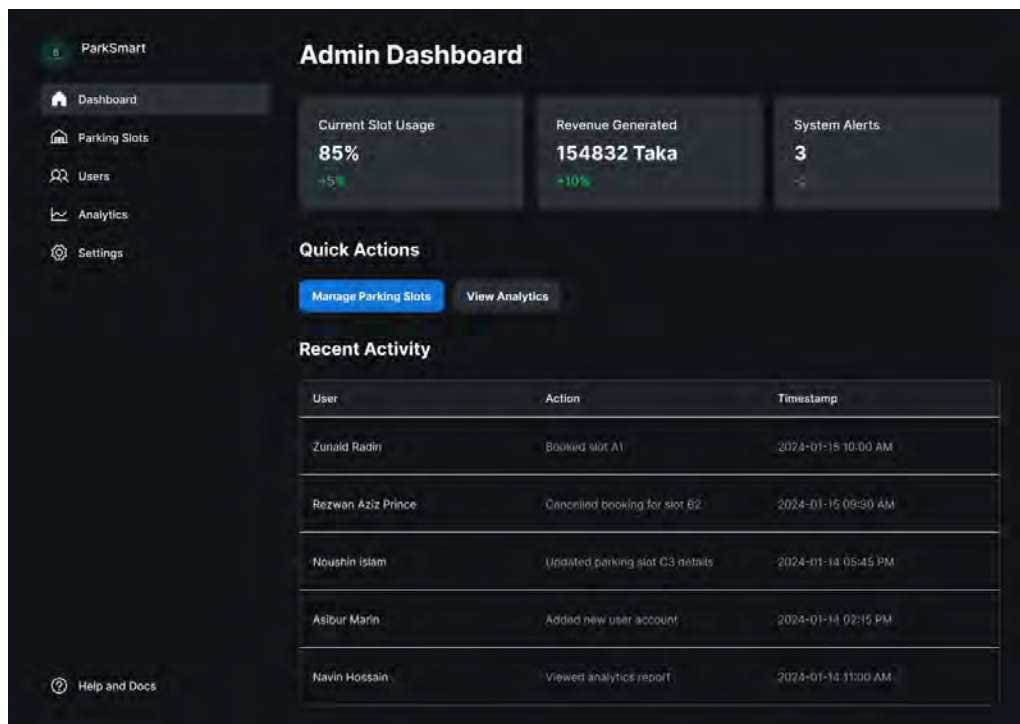


Figure 4.6: Admin Dashboard

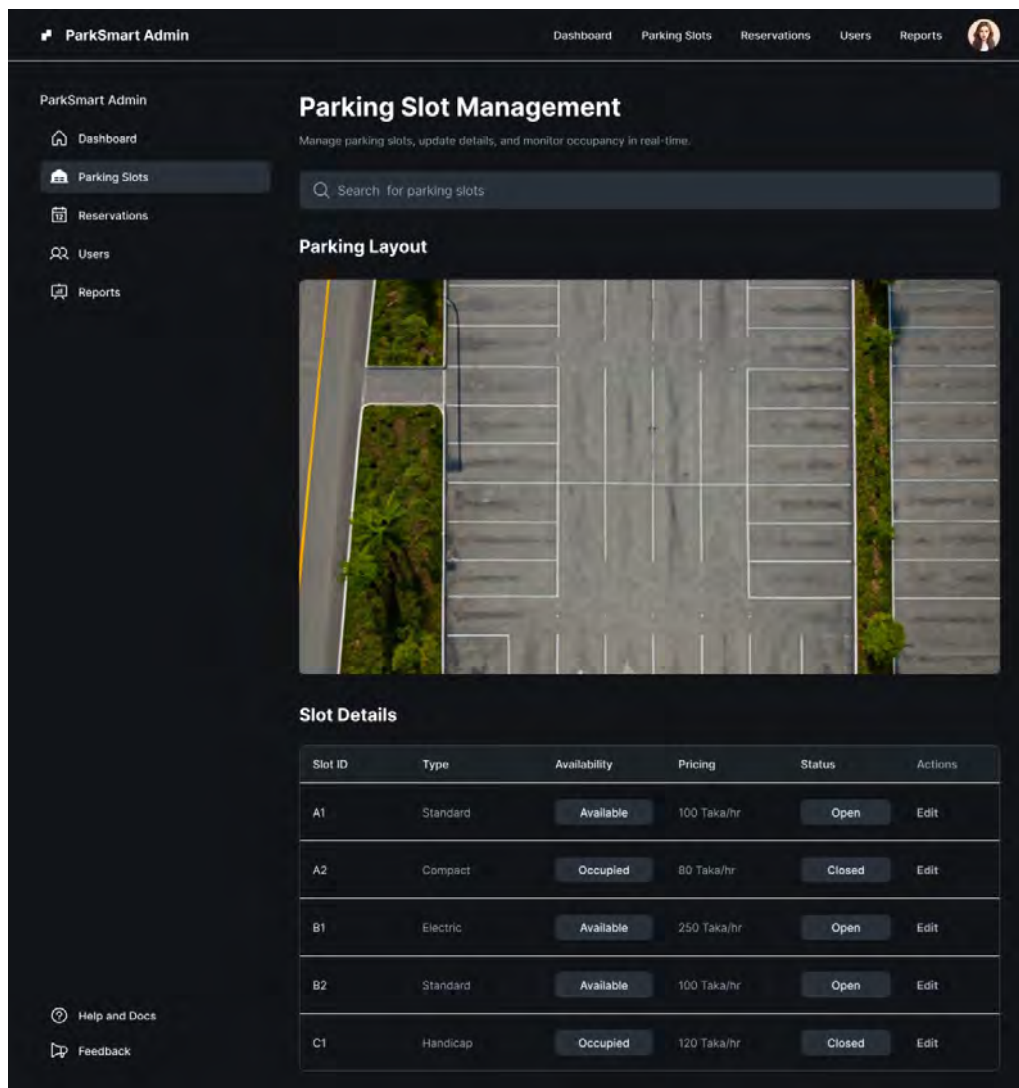


Figure 4.7: Admin parking slot management

4.7 Accessibility and Inclusive Design

Text and interactive dark theme contrasts were checked in the whole design. Focus order is a succession of visual order, dialogs trap focus and are escape-dismissible. Form items employ clear labels, helper messages and error messages, which identify the issue and solution. Touch devices are 44x44 px in size.

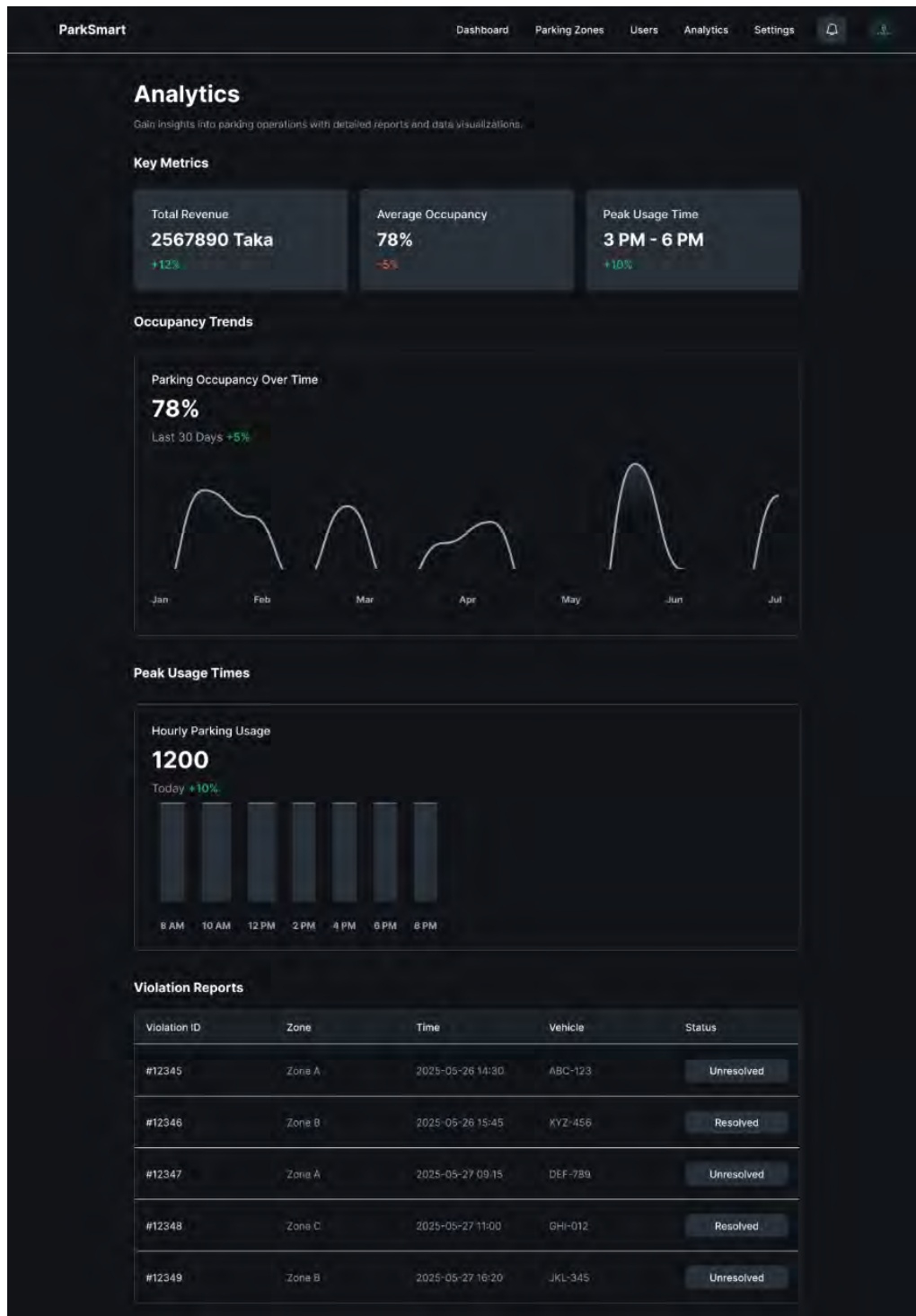


Figure 4.8: Admin analytics

4.8 Usability Testing

Two rounds were conducted where scripted tasks were used (find slot, change time, complete payment, locate receipt; in the case of admins: resolve incident, export report). Some of the measures consisted of task success, time on task, error count. Results: list-first worked better on small screens, more transparent fee display led to less abandonment, persisted filter chips and previous views in the administration were required. These items were dealt with by iterations.

4.9 Challenges and Solutions

To trade-off between data density and readability, we added progressive disclosure and gave the user the ability to crop the tables through a customized columns control to only see the relevant fields. To render the dark theme, we increased the palette of neutrals and imposed tokenized foreground/background pairs in order to keep uniform and available contrast across screens. To minimize payment anxiety we would have added trust indicators (logos, security indicators), brief micro-copy explaining each action and undo non-destructive actions. And to ensure performance of the maps we provided lightweight list fallback and did not load the map until the user indicated interest—by engaging in any of the following behaviors: scrolling to the area of the map or tapping a location.

4.10 Handoff and Collaboration

Handoff packages contained component variants, usage notes and tokens. Redlines recorded the spacing, the icon sizes and touch targets. A focus, keyboard pathways, empty/error state, and responsive break point QA checklist was used.

Chapter 5

Acquired Knowledge

5.1 Problem-Solving Method

Adopted a technique that is based on hypotheses: replicate, isolate, propose, test, and document. This minimized regressions and enhanced the accuracy of the estimates.

5.2 Technical/UI Skills

Creating Figma (variables, auto layout, interactive components), colour variations, making tables for operations, and accessibility implementation.

5.3 Soft Skills

Formalized criticism, brief design explanations and enhanced cross-functional communication was enhanced. Risks and decisions were focused on through stand-ups and reviews.

5.4 Industry Understanding and Insights

The advantages of SaaS dashboards include a user friendly interface, saved views, and default roles. The flow of payments needs to be transparent and have regular recovery paths. Dark themes require a compact and adaptive typeface.

5.5 Lessons Learned and Future Skill Targets

Lessons: write every requirement, test every step and organize choices in the form of tokens. Goals: state transition motion rules, design quality automation and more complex analytics UX.

Chapter 6

Conclusion

The internship was a transformation of theory into disciplined and repeatable practice of design. The Parking Management System has now been based on a proven information architecture that decouples operations that require time and reference and account functions to enhance wayfinding and lessen cognitive loads. The acceptance criteria are coded as accessibility, performance, and quality gate to ensure that build and QA are not ambiguous. A consolidated handoff (redlines, interaction notes, semantic tokens, and annotated flows of both user and admin journeys) is received by engineering, making it possible to implement predictably and review it much faster. The solution is already production ready and designed to be easily extended in the future, where the seams are explicitly highlighted to accommodate further extensions (license-plate recognition, dynamic pricing based on occupancy/peaks, and other payment providers). Incremental improvements can be made using light observability hooks (event logs and success/error telemetry) and versioned components, without destabilizing the core experience—a maintainable basis can be made that can be extended to the demands of the operational experience without being destabilized or compromising usability and delivery discipline.

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