Parking Pal

Presented to

Prof. Ronald Papa, Oakland University

MIS 5160 / 4060 - Managing Information Systems Projects

School of Business Administration Oakland University

Fall 2024

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Team Charter

Team Name

The Grizz Girls

Project Description (Vision)

Parking Pal is a company that has been hired by Oakland University to create a system for Oakland Students and employees to view the real-time parking space availability of parking lots on campus. Parking Pal will also provide an app for the users to be able to view, navigate and research all available parking spots on campus.

Team Members

Team Member	Phone Number	Email Address
Jillian Fitzgerald	586-475-2223	jfitzgerald@oakland.edu
Nataly Antias	586-996-1320	natlyantias@oakland.edu
Angely Lee	586-350-6796	angelylee@oakland.edu
Emma Talos	248-571-2770	emmagalan@oakland.edu

Skills and Knowledge Inventory

- **Jillian Fitzgerald -** Basic IS background proficient at troubleshooting and solving IT problems. Adept leadership abilities and skills in Microsoft Office, Databasing, SQL, Visual Basic, and systems design.
- **Nataly Antias -** I have developed strong skills in SQL, Power BI, and Microsoft Office through my professional experience as a Business Intelligence Specialist, where I have used these tools for data analysis and visualization. My foundational knowledge in Python, Java, C, and R comes from my undergraduate studies in computer science.
- **Angely Lee -** Proficient in Microsoft Office, marketing research, and solving IT problems. Intermediate in data processing and building databases. Beginner in SQL, SAS Studio,

and R Studio programming. Able to work effectively in teams, highlighted by strong communication, time management, and collaboration skills.

- **Emma Talos -** Skilled in Microsoft Excel, VBA Macros, and SQL. Experienced in information security and cyber security, specializing in risk management and incident response.

Agreed Upon Meeting Times and Locations

We have agreed to meet either online (Google Meet) or in person on Saturdays or after class on Tuesdays.

List of Agreed Team Rules and Expectations

1. All team members will complete all assigned tasks by the date agreed upon.
2. All team members will have timely and effective communication with the rest of the team.
3. As a group we will divide up the work evenly among all the members.
4. If a conflict arises and the group is unable to resolve it by themselves, we will email the professor for his input.
5. If a member is consistently missing meetings and not putting in the expected effort, we will have a conversation with them and if the problem continues, contact the professor.
6. When completing a section of the project, we will ensure that it is of the highest quality and adds value.
7. All team members will respect each team member's opinions and have an open mind to new ideas.
8. All team members will edit and review the other team members' work and provide feedback when needed.
9. All team members will work together to brainstorm and contribute new ideas for the project.
10. If team members are continually not putting in the highest caliber of effort and slacking off, it will reflect negatively on them in the evaluation process.

Roles and Responsibilities

Jillian Will be in charge of software engineering and app development. They will make sure all the software is properly integrated and maintained. They will be in charge of modifying the application so it matches Oakland University's desired criteria. They will ensure the app works with no errors or bugs.

Angely Will be in charge of technical support and assistant in designing the user interface of the app. They will be the point of contact for any users that need assistance. They will decide how the layout of the app will look and help design any necessary features that must be implemented with the app.

 Nataly Will be responsible for the financial and data analytics side of the project. They will be responsible for approving and managing the budget and payroll along with keeping track of investments and assets. They will also be collecting and analyzing data to determine how many parking lots will be included in the app, and help market the app once it is released.

Emma Will be taking over the project management role and overseeing the project and communicating with the customer to determine what aspects will be included and create and deploy a schedule of what tasks need to be completed and when.

A Code of Ethics

Our team has established the following code of ethics in order to foster a productive work environment for our group project. We are aware it is our responsibility to behave in an upright and polite manner so we can gain each other's trust and respect. By following these established ethics we will be able to have a successful and productive group.

1. Strive to complete all tasks in a timely manner and Equally contribute the same amount of effort in the highest caliber possible
2. Maintain a high level of professionalism with one another and treat everyone equally and with respect
3. Take accountability for mistakes and do not let pride get in the way of asking for assistance

4. Uphold a sense of honesty and do not cheat or use artificial intelligence to complete tasks
5. Be kind and patient with all fellow group members and cultivate a welcoming environment

Signatures

Jillian Fitzgerald	9/24/24
Emma Talos	9/24/24
Angely Lee	10/3/24
Nataly Antias	10/12/2024

Project Scope Statement

Business Case

At Parking Pal, we are a company that is dedicated to making parking easier at busy college campuses. As college enrollment is on the rise, so is the challenge of parking availability on campus. Students and employees alike are often faced with having to navigate overcrowded parking lots, leading to late arrivals and increased stress. Along with that, busy parking lots can also heighten the risk of potential car accidents as frustrated drivers circle endlessly in search of available spots. Situations like these force many drivers to resort to parking very far from their intended destination, requiring them to walk farther distances and complicating their daily routines. At our company, we believe these traditional parking techniques are inefficient and must be updated due to the increasing college admittance, especially on campus where commuting is common among attendees. The current parking systems do not leverage technology to optimize parking management, resulting in lost time and reduced satisfaction. Parking Pal's mission is to streamline the parking process through a mobile app that allows users to view the occupancy of parking lots effortlessly. Our approach to parking lot management aims to enhance the parking experience by integrating technology that provides information on available spot locations and allows for simple navigation for all users. As campuses grow and traffic increases, capable parking management becomes crucial to improving accessibility and reducing congestion. By using our app, users can avoid the frustrations of traditional parking methods and enjoy a more organized, efficient system that addresses their needs. Our goal is to create a stress-free parking experience that gives students and employees one less thing they need to worry about and creates a more positive campus experience.

Project Objective

Parking Pal plans to develop a mobile app to help University attendees view parking availability on campus. We will place cameras around the parking lots that have the ability to scan and determine how full the lots are. On the app, users will easily be able to select which parking lot they would like to view and see how occupied they are. With a simple-to-use interface, users will be able to figure out what parking lot they would like to park in without any frustration. Some other features on the app include, location filtering, campus construction/events that will impede driving notifications, and a navigation function.

This project will begin in November 2024 with a prototype of the app to be completed by December 2025. The cameras will be installed in the designated areas by January 2026 and fully integrated with the app by April 2026. The app will be officially deployed by August 2026 for the start of Oakland University's fall 2026 semester.

Key Deliverables

1. **App key features**
    a. Real time parking lot and parking structure occupancy
    b. Navigation system
    c. Notification reminder for upcoming/ending reservations
2. **Core Functionality**
    a. User account management: sign-up/log-in with school email/phone
    b. Show map of campus parking lots/structures, and buildings
    c. User selects parking lot and app shows occupancy status
    d. Real-time parking demand alerts based on school events
    e. Accidents report system: users can report car accidents on campus
3. **UI and UX design**
    a. Clear layout of app with easy navigation around the app
    b. User homepage dashboard and settings page
    c. Design campus map or incorporate Google Maps for navigation around campus
    d. Design the occupancy/availability status box for the parking lots and structures
    e. Compatible across devices (iOS, Android, web)
4. **Backend development**
    a. Database management to store user data
    b. API access development to connect with external databases for live parking availability and retrieve data on campus events
    c. Admin dashboard: parking management for spot inventory control for accurate tracking of openings, reservations, cancellations and current occupancy
        i. Provide insight on peak occupancy times/days
5. **Testing and Quality Assurance**
    a. Conduct rigorous testing and quality assurance, including functional, performance, and user acceptance testing, to guarantee that the app consistently delivers accurate, real-time parking availability and a seamless user-friendly experience for all users.
6. **Launch and Deployment**
    a. Launch the parking app with final testing, user training, and marketing, while offering ongoing support to improve the user experience.

Milestones

Milestones	Completion Date
Defining Phase	
Project Kickoff: Assemble project team and define project goals (budget, identify resources)	November 1, 2024
Project scope document completed	November 20, 2024
Identify stakeholders and obtain necessary approvals completed	December 10, 2024
Create Work Breakdown Structure (WBS)	December 28, 2024
Planning Phase	
Finalize feature list based on research findings and stakeholder input	January 1, 2025
Market Research: Conduct surveys and focus groups to understand student/staff needs	January 21, 2025
Cost and risk analysis completed	February 22, 2025
Create detailed project plan outlining timelines, resources, and risk management	March 22, 2025
Present the project plan to stakeholders for approval, including timelines, resources, and budgets.	April 5, 2025
Executing Phase	
UI/UX Design Completed: Finalize wireframes and prototypes; conduct user testing for feedback.	May 11, 2025
Database Structure Established: Design and approve the database schema to support all app functionalities.	May 21, 2025
Development of Core Features: Complete user registration, login (with authentication) and real-time availability checks.	August, 2025
Backend Infrastructure Setup: Complete development of server-side logic and establish API endpoints for app communication and real time parking occupancy status	December 12, 2025
Prototype of app completed	April 1, 2026
Launch internal and user acceptance testing	May 21, 2026
Internal and user acceptance testing completed and make final adjustments after obtaining feedback and fix bugs	August 9, 2026
Closing Phase	
Official app launch and Monitor app performance	September 3, 2026
Launch marketing campaign	October 23, 2026
Preparation of documents to handover to maintenance and operational teams completed	November 20, 2026
Finish comprehensive report summarizing the project's objectives, deliverables, outcomes, and overall performance.	December 21, 2026

Technical Requirements

- The system will process and display real time parking availability and be delayed no more than 5 seconds.
- The system will be compatible with iOS and Android.
- The system will be encrypted for data transfer between the app and server.
- The system will use learning algorithms to process feed from cameras and report the occupancy in the parking lots.
- The system will perform backups daily.
- The system will implement multi-factor authentication for all users.
- The system shall be user friendly and focus on actionable data to easily find parking.
- The system will send notifications to users for parking availability/alerts for events like graduations and sports games and send reminders of reservations.
- The system will store user data, parking availability information, and history of bookings in a secure database.
- The system will be able to scale efficiently and handle high volumes of usage.
- The system will allow users to report any accidents on campus parking lots and send it to administrators or relevant campus departments.

Limits and exclusions

- The app will only be available on iOS and Android devices and will only support current versions of both. The app will not be available on Windows.
- There may be occasional discrepancies in the reported parking availability caused by delays or mistakes in the camera data.
- Actual availability may differ from what's reported in the app due to rapidly changing parking demand.
- ParkingPal is not liable for any damage, theft, or parking issues that occur while using the app.
- Poor lighting, camera malfunctions, or heavy rain or snow may affect performance and accuracy, which may cause delays in occupancy reporting and accuracy.
- Notification delivery will be subject to network conditions and user device settings.
- An active internet connection is required to access real time data and to receive notifications. The app will not function without one.
- ParkingPal will comply with data privacy regulations and store data in secure databases, but users must understand that no system is immune to data breaches.
- There may be occasional performance issues during high traffic times where users will experience slower load times and data refresh.
- The app will only be available in English.
- Customer Support will be available during business hours (Monday to Friday, 9 AM to 6 PM). For emergencies, users should contact emergency services like 911.
- ParkingPal is not responsible for incidents that occur in parking lots like theft or damage.
- The accident reporting feature will only notify relevant users and administration but is not responsible for managing or resolving those accidents.

- The system will send notifications for major campus events, but event data and notifications may not be available for smaller or unplanned events not on the campus calendar.

Risks

- Integration Challenges: Potential complications when integrating the app with the parking meter sensors and existing campus infrastructure.
- Notifications: Inaccuracies in real-time notifications could affect user experience.
- App Design: A poorly designed interface will lead to decreased user satisfaction with the app.
- Scalability: Potential challenges, like slow performance or system crashes, may arise when handling heavy traffic during peak times
- Scope Creep: Adding new features to the app may require reallocating resources, which will affect project schedule and possibly, budgets.
- Budget Overruns: Initial budget estimates may not accurately reflect costs of parking meter installation and app development.

Critical Success Factors

- Clear project scope and goals
- A user-friendly app interface that satisfies our client
- Close monitoring of project expenses
- Adaptability to campus changes
- Reliable integration between app, parking meters, and campus systems for seamless functionality

Customer Review - Sign Off

Name	Title	Approval	Data Approved	Signature
Sabrina Carpenter	CEO	Yes	11/11/2024	Sabrina Carpenter

Work Breakdown Structure

Coded WBS

Project Parking Pal

1. Research

- 1.1 Market Demand Analysis
  - 1.1.1 Surveying
  - 1.1.2 Polling
- 1.2 User Requirements
  - 1.2.1 Focus group
- 1.3 Technological requirements

2. Planning

- 2.1 Schedule Development
- 2.2 Project Analysis
  - 2.2.1 Budget
  - 2.2.2 Risk Management
- 2.3 Resource Allocation

3. Design

- 3.1 Develop System Architecture
- 3.2 Database Structure
  - 3.2.1 Design Entity Relationship Diagram
- 3.3 User Interface Design
  - 3.3.1 Wireframe
  - 3.3.2 Mockups

4. Development

- 4.1 Front End Development
- 4.2 Database Setup
- 4.3 API Integration

5. Hardware

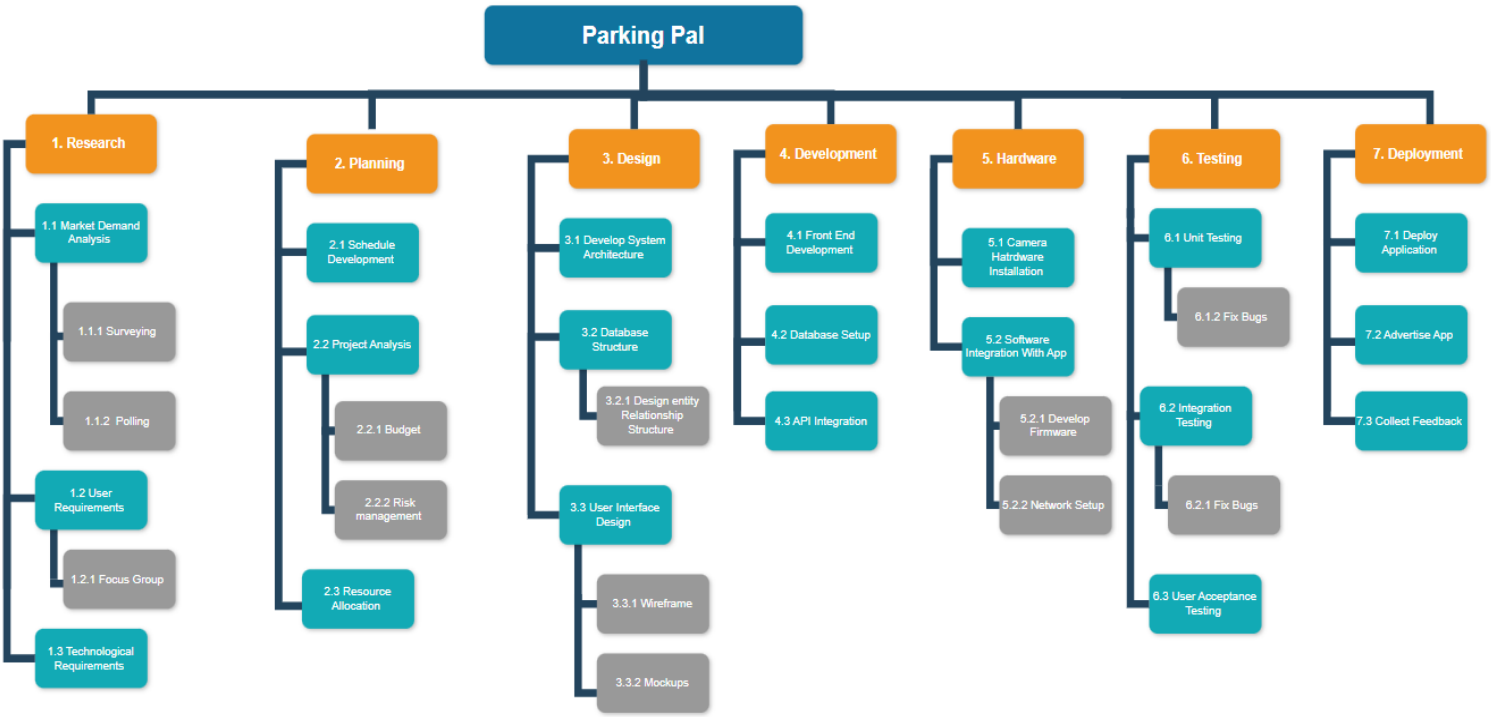
- 5.1 Camera Hardware Installation
- 5.2 Software Integration With App
  - 5.2.1 Develop Firmware
  - 5.2.2. Network Setup

6. Testing

- 6.1 Unit Testing
  - 6.1.1 Fix Bugs
- 6.2 Integration Testing
  - 6.2.1 Fix Bugs
- 6.3 User Acceptance Testing

7. Deployment

- 7.1 Deploy application
- 7.2 Advertise App
- 7.3 Collect Feedback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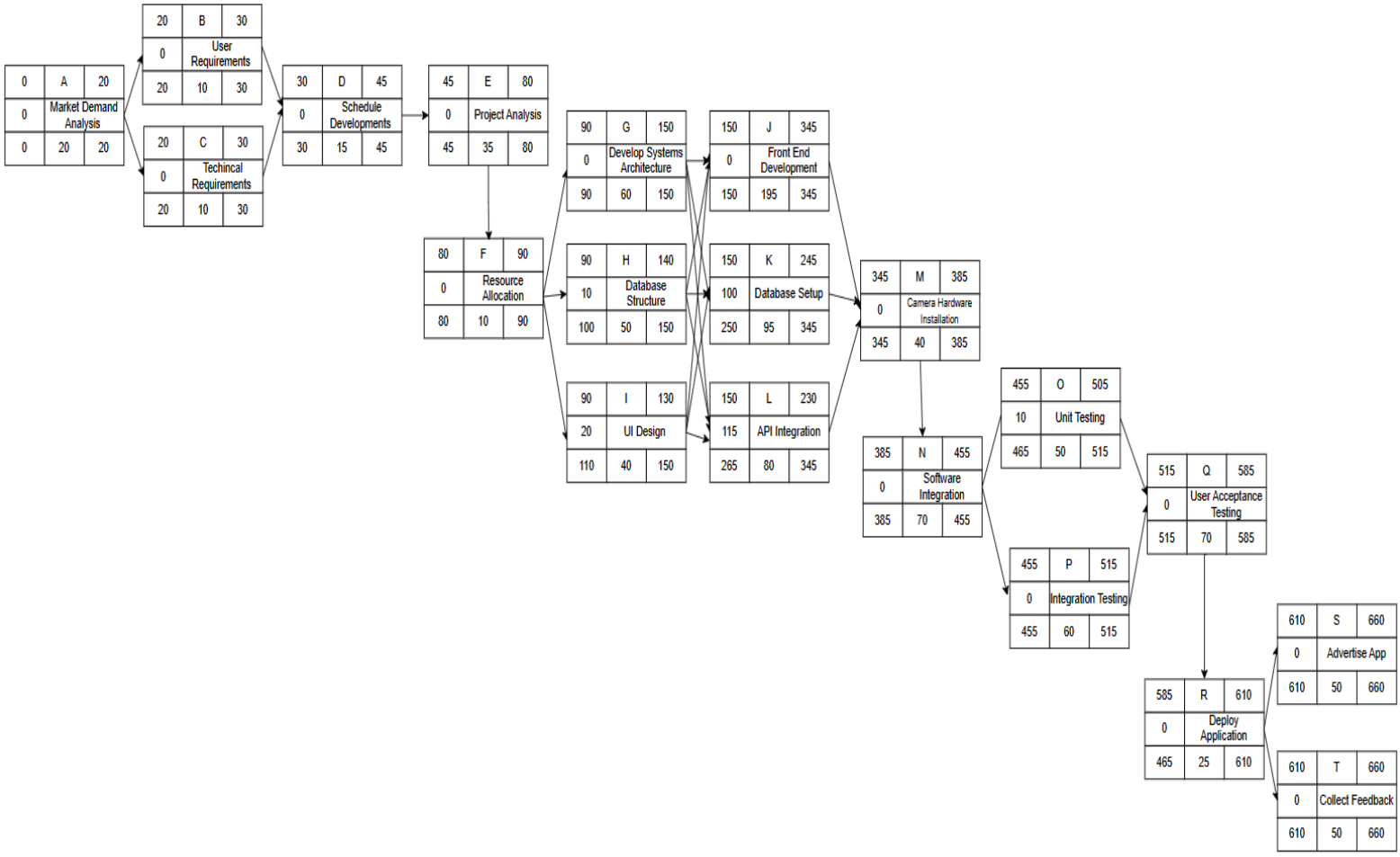
7.1 Deploy Application
7.2 Advertise App
7.3 Collect Feedback

WBS Diagram

Project Network Requirements

Activity	Description	Preceding Activity	Activity Time (Days)
A	1.1 Market Demand Analysis	None	20
B	1.2 User requirements	A	10
C	1.3 Technical Requirements	A	10
D	2.1 Schedule Development	B,C	15
E	2.2 Project Analysis	D	35
F	2.3 Resource Allocation	E	10
G	3.1 Develop Systems Architecture	F	60
H	3.2 Database Structure	F	50
I	3.3 User Interface Design	F	40
J	4.1 Front End Development	G,H,I	195
K	4.2 Database Setup	G,H,I	95
L	4.3 API Integration	G,H,I	80
M	5.1 Camera Hardware Installation	J,K,L	40
N	5.2 Software Integration With App	M	70
O	6.1 Unit Testing	N	50
P	6.2 Integration testing	N	60
Q	6.3 User Acceptance Testing	O,P	70
R	7.1 Deploy Application	Q	25
S	7.2 Advertise App	R	50
T	7.3 Collect Feedback	R	50

Project Network Diagram



Cost Analysis

Cost Breakdown

Category	Description	Cost
Materials	Cloud Service (Azure)	$5,000
Resources	Project Manager	$65,000
Resources	Mobile App Developer, iOS and Android	$70,000
Resources	UI/UX Designer	$50,000
Resources	Backend Developer	$75,000
Resources	Database Administrator	$45,000
Resources	Marketing Manager	$40,000
Resources	Security Manager	$70,000
Expenses	Project Management Tool (Jira)	$200
Expenses	UI/UX Design Tool (Figma)	$500
Expenses	Testing and QA Software (BrowserStack)	$500
Expenses	App Store Fees	$300
Expenses	Marketing and Promotion	$4,000
Support Costs	App Maintenance and Updates	$9,000
Support Costs	Data Backup and Security Updates	$2,500
Support Costs	Real-time Notification System Maintenance	$3,000
Support Costs	Integration and API Management	$5,000
Total		**$445,000**

Revenues & Net Income

The total project cost to initiate the start of ParkingPal will be $445,000. ParkingPal was created to help ease Oakland University's parking situation, and offer students who attend an effortless parking experience each time they arrive on campus. Once the investors in the app confirm that ParkingPal is a useful tool for students with also a potential to generate more profit for them, they hope to increase the number of serviced universities each year. Year 1 will be dedicated to implementing ParkingPal at Oakland University. For year 2, we hope to implement ParkingPal at two more universities with a similar student count, if not more, and so on for the next 5 years.

The estimated number of free users in year 1 comes from Oakland University's MySail page, where they note that for Fall of 2024, they had 15,768 students enrolled. We took this number and are predicting 80% of students will be using our app when attending the campus. Since the number of universities being serviced each year increases, the estimated number of free users is also going to be increasing. We will also be selling our app to each university at a standard unit price of $100,000. Each university purchasing our app will need to cover the costs of their own cameras and parking sensors, which will be added to their unit price of $100,000, based on how many cameras and sensors they need. In year 1, we predict a starting ad revenue of $300,000, and increase each year with the addition of each university. Support and marketing cost also increases each year as we scale up to more universities.

Activities	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Total Project Costs	$445,000	–	–	–	–	–
Estimated Number of Free Users	–	12,614	24,858	37,289	50,007	63,243
Unit Price (App - per university)	–	$100,000	$100,000	$100,000	$100,000	$100,000
Number of Universities	–	1	2	3	4	5
Fixed Ad Revenue	–	$300,000	$400,000	$550,000	$750,000	$1 M
Total Revenue	–	$400,000	$800,000	$1.1 M	$1.45 M	$1.8 M
Total Cost (Support Costs + Marketing)	–	$55,000	$70,000	$85,000	$100,000	$115,000
Net Profit	-$445,000	$345,000	$730,000	$1.02 M	$1.35 M	$1.68 M

Return on Investment (ROI)

5 Year Return on Investment (ROI)	
Total Profit (first 5 years)	$5.125 M
Initial Investment	$445,000
Return on Investment (ROI)	**1,053.93%**

Net Present Value (NPV)

Net Present Value 5 Year Forecast (NPV)	
Initial Investment	$445,000
Cash Flows on an Annual Basis (Net Profit/Year)	
Year 1	$345,000
Year 2	$730,000
Year 3	$1,020,000
Year 4	$1,350,000
Year 5	$1,680,000
Discount Rate	15%
Net Present Value	**$2,682,000**

Payback Period

The payback period for this project is around 1 year and 3 months.

Payback Period	
Year # (before full recovery)	2 years
Estimated Project Cost	$445,000
Annual Savings	$345,000
Payback Period (years)	**1.29**

Cost-Benefit Summary

ParkingPal begins with a rather high initial starting cost of $445,000. This includes expenses, resources, materials, and support costs. Despite the high initial cost of the app, our data-driven forecasts made above show promising results in profit. In year 0, our net profit will be -$445,000 as we cover these startup costs. However, ParkingPal demonstrates rapid profitability, with a net profit of $345,000 in Year 1 and continued growth to $730,000 in Year 2, our payback period is just 1.29 years. In Year 3, we calculated a net profit of $1.02 million, $1.35 million in Year 4, and $1.68 million in Year 5. We also calculated a 5 year forecast Net Present Value of $2,682,000 and a 5 year return on investment of 1,053.93%, demonstrating a promising financial outlook for the app. As our app expands across more universities each year, our revenue increases due to more users, expansion across more universities, and rising advertising revenue. The more users that ParkingPal accumulates, the larger the advertising contracts, since college students represent such a highly desirable demographic. Despite an incremental increase in support and marketing costs each year, the overall revenue growth far outpaces these expenses. Our cost analysis as a whole demonstrates ParkingPals potential for long-term profitability and financial sustainability.

Risk Analysis

Identified Project Risks

1. Integration Risks: Difficulties may arise when integrating the app with existing parking lot cameras and the campus infrastructure. Compatibility issues with hardware or outdated technology could delay implementation.
2. Notification Challenges: Inaccuracies in the real-time notifications about parking availability or meter status could lead to frustrated users.
3. App Design: A poorly designed interface could make the app difficult to navigate, leading to lower user satisfaction and potentially fewer users.
4. Scalability: During peak usage times, the app could experience slow performance or even system crashes, affecting user access to services.
5. Scope Creep: As new features are added to the app, there may be resource reallocations that can delay the timeline or increase costs.
6. Budget Overruns: The initial budget may not cover the total costs for parking meter installation, app development, or unforeseen complications.

Risk Assessment Form

Risk	**Likelihood**	**Impact**	**Detection Difficulty**	**When**
Integration Risks	Medium	High	Medium	Early development phase
Notification Challenges	High	Medium	Medium	During testing phase
App Design	Medium	Medium	High	During design phase
Scalability	Medium	High	Medium	During performance testing
Scope Creep	High	Medium	Low	Throughout project lifecycle
Budget Overruns	Medium	High	Low	During budgeting phase and project execution

Risk Response Matrix

Risk Event	Response	Contingency Plan	Trigger	Who is Responsible
Integration Risks	Thorough testing and early integration planning	Engage expert consultants for integration if issues arise	Issues found during integration testing	Project manager
Notification Challenges	Implement a reliable notification service, with redundancy systems.	Use fallback mechanisms like email notifications if real-time notifications fail	Failed or delayed real-time notifications during testing or live use.	Quality Team
App Design	Hire professional user interface designers and conduct extensive user testing.	Revise design based on user feedback if initial design fails.	User testing feedback indicating confusion or dissatisfaction .	Design Team
Scalability	Design scalable infrastructure (e.g., cloud-based). Conduct load testing	Optimize backend infrastructure or add resources as needed (e.g., cloud scaling).	Performance issues or slowdowns during load testing or peak usage.	Technical lead
Scope Creep	Set clear project scope and have a strict change control process.	Limit feature additions and prioritize essential features.	Requests for additional features or changes during the development process	Project manager, product owner
Budget Overruns	Continuously monitor and track project spending against budget.	Secure additional funding or reduce scope if costs exceed budget.	Significant deviation from budget estimates during regular reviews.	Project manager, Finance team

Risk Management Summary

The project faces several key risks, including integration challenges, notification inaccuracies, poor app design, scalability issues, scope creep, and budget overruns. These risks could impact the project's timeline, costs, and overall success.

To manage these risks, the project will employ a proactive approach:

1. **Risk Identification**: Continuously monitoring risks throughout the project.
2. **Risk Analysis**: Evaluating risks based on their likelihood, impact, and detection difficulty.
3. **Risk Response**: Developing specific responses, such as mitigation or contingency plans, for each identified risk.
4. **Risk Monitoring**: Ongoing tracking and adjustments to ensure risks are effectively managed.

Mitigation strategies include early testing and integration planning, designing a scalable infrastructure, setting clear project scope, and closely tracking the budget. Contingency plans are in place to address risks if they materialize, such as involving additional experts, using fallback systems, or revising the scope if necessary.

Overall, a structured and proactive approach to risk management ensures the project can navigate challenges and achieve its objectives on time and within budget.

Project Kickoff

The project manager will start preparations for the initial kick-off meeting on Friday, October 25, 2024. The Project Kick-Off meeting is scheduled for Friday, November 1, 2024. Any additional meetings, if necessary, will take place the following week.

Agenda

Duration: 1 Hour 45 Minutes

1. **Opening Remarks and Introductions** *(15 minutes)*
    - Welcome message from the project manager
    - Brief introductions of team members and stakeholders
2. **Project Overview** *(20 minutes)*
    - **Background and Context**: Why the project is important
    - **Objectives**: Desired outcomes and success criteria
    - **Scope Summary**: What's included and excluded in the project
3. **Key Milestones and Deadlines** *(15 minutes)*
    - **High-Level Timeline**: Key project phases and schedules
    - **Critical Milestones**: Important achievements and due dates
4. **Team Roles and Responsibilities** *(15 minutes)*
    - **Organizational Structure**: Key players and their functions
    - **Stakeholder Roles**: Defining involvement and expectations
    - **Optional Frameworks**: Introducing tools like RACI for role clarity
5. **Communication Guidelines** *(10 minutes)*
    - **Meeting Frequency**: How often and when meetings will occur
    - **Channels of Communication**: Platforms for updates and collaboration
    - **Escalation Procedures**: Steps for addressing roadblocks
6. **Identifying Risks** *(10 minutes)*
    - Initial discussion of risks and uncertainties
    - Early ideas for mitigation strategies
7. **Tools and Resources** *(5 minutes)*
    - Introduction to project tools and technologies
    - Access and training needs
8. **Discussion and Feedback** *(15 minutes)*
    - Open forum for questions, concerns, and suggestions
9. **Action Plan and Next Steps** *(10 minutes)*
    - Summary of agreed action items
    - Assignment of immediate tasks and deadlines
    - Confirm schedule for the next meeting

Planning Decisions

Our team is made up of seven members, with three core contributors leading the project - Angely, Jillian, and Nataly. Since the project is to be done in under 2 years, we will hold weekly team meetings to review progress, discuss completed tasks, and plan upcoming work. The project is divided into four key phases: defining, planning, executing, and closing. Emma, our project manager, oversees and approves most decisions and tasks. Final customer review and sign-off will require approval from our CEO, Sabrina Carpenter.

Tracking Decisions

Weekly in-person meetings for the project will take place every Thursday in Elliot Hall. Team members are allowed a limited number of excused absences, provided they notify the project manager, Emma, via email, or text message, in advance. As previously mentioned, the CEO, Sabrina Carpenter, will give the final approval for the project, with Emma overseeing and approving each step leading up to that point. Progress will be monitored through a shared schedule, which allows the team to track ongoing developments. Emma will lead the meetings, while Jillian is responsible for collecting data and preparing reports for discussion.

Managing Change Decisions

A structured change management process will be utilized to ensure all modifications align with the project's goals and scope. Any proposed changes will first be documented and reviewed during weekly team meetings. The team will assess the impact of each change on the project's timeline, budget, and resources before proceeding. Emma will evaluate and approve minor adjustments, while significant changes requiring a shift in project scope or priorities will be escalated to the CEO, Sabrina Carpenter, for final approval. All approved changes will be communicated to the team through updated schedules and documented in the project log to maintain transparency and alignment.

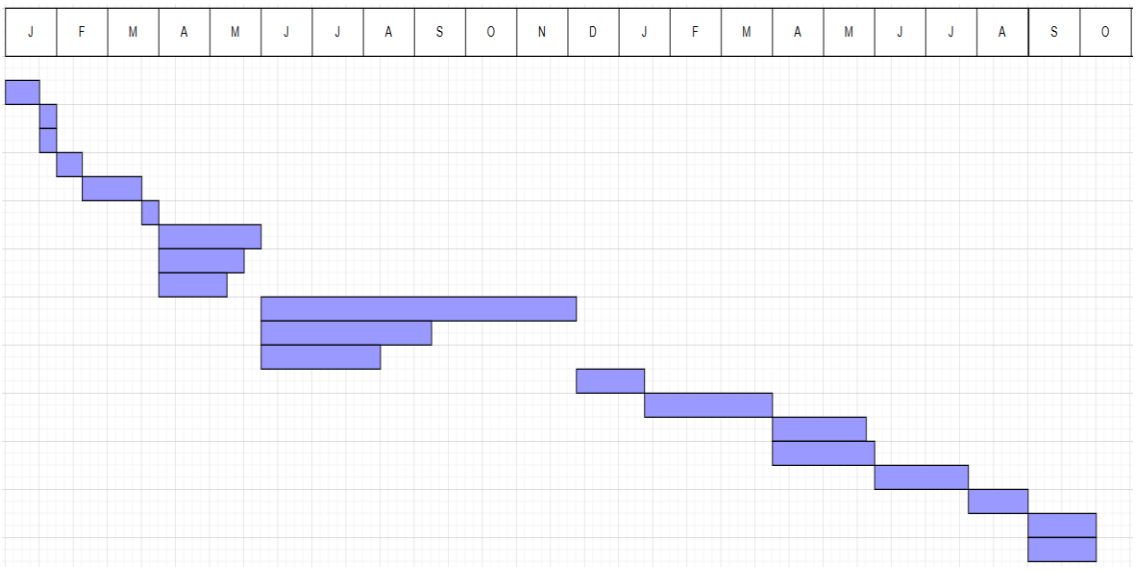
Relationship Decisions

Strong communication and collaboration among team members, stakeholders, and the project manager will directly impact the project's progress. Building positive working relationships within the team fosters trust, encourages open discussion, and promotes problem-solving when challenges arise. Clear, respectful communication with the CEO Sabrina Carpenter, ensures alignment on key decisions and expectations, particularly when seeking approvals. Additionally, maintaining strong relationships with external stakeholders, such as university staff or potential users of the app, allows the team to gather valuable feedback and ensure the app meets their needs. Positive relationships throughout the project contribute to a productive and efficient work environment, which is essential for timely project completion and achieving desired outcomes.

Project Plan / Schedule

Gantt Chart

	Task	Duration	Predecessor	Start	Finish
A	1.1 Market Demand Analysis	20	none	1/1/2025	1/21/2025
B	1.2 User requirements	10	A	1/21/2025	1/31/2025
C	1.3 Technical Requirements	10	A	1/21/2025	1/31/2025
D	2.1 Schedule Development	15	B,C	1/31/2025	2/15/2025
E	2.2 Project Analysis	35	D	2/15/2025	3/22/2025
F	2.3 Resource Allocation	10	E	3/22/2025	4/1/2025
G	3.1 Develop Systems Architecture	60	F	4/1/2025	5/31/2025
H	3.2 Database Structure	50	F	4/1/2025	5/21/2025
I	3.3 User Interface Design	40	F	4/1/2025	5/11/2025
J	4.1 Front End Development	195	G,H,I	5/31/2025	12/12/2025
K	4.2 Database Setup	95	G,H,I	5/31/2025	9/3/2025
L	4.3 API Integration	80	G,H,I	5/31/2025	8/19/2025
M	5.1 Camera Hardware Installation	40	J,K,L,	12/12/2025	1/21/2026
N	5.2 Software Integration With App	70	M	1/21/2026	4/1/2026
O	6.1 Unit Testing	50	N	4/1/2026	5/21/2026
P	6.2 Integration testing	60	N	4/1/2026	5/31/2026
Q	6.3 User Acceptance Testing	70	O,P	5/31/2026	8/9/2026
R	7.1 Deploy Application	25	Q	8/9/2026	9/3/2026
S	7.2 Advertise App	50	R	9/3/2026	10/23/2026
T	7.3 Collect Feedback	50	R	9/3/2026	10/23/2026



Project Management Methodology Summary

The Parking Pal project is using the agile methodology to guide its development. Since we are developing an app for a customer, there is potential for scope changes, and adopting an agile approach gives us the flexibility to adjust our product to any changing requirements. The iterative nature of agile allows us to make continuous progress on the app, with tangible improvements in each cycle. After each iteration, we review our progress, make necessary adjustments, and start a new cycle. Each iteration builds upon the previous ones, ultimately leading to project completion and customer satisfaction.

Responsibility Matrix

Activity	Project Manager	Software Developer	Technical Support Engineer	Financial Data Analyst
1.1 Market Demand Analysis	S			R
1.2 User requirements	S	R	S	I
1.3 Technical Requirements	S	S	R	I
2.1 Schedule Development	R			S
2.2 Project Analysis	S			R
2.3 Resource Allocation	R			S
3.1 Develop Systems Architecture	I	R	S	
3.2 Database Structure	I	S	R	
3.3 User Interface Design	I	S	R	
4.1 Front End Development	I	R	S	
4.2 Database Setup	I	S	R	
4.3 API Integration	I	R	S	
5.1 Camera Hardware Installation	I	S	R	
5.2 Software Integration With App	I	R	S	
6.1 Unit Testing	I	R	S	
6.2 Integration testing	I	R	S	
6.3 User Acceptance Testing	R	S	S	
7.1 Deploy Application	S	R	S	
7.2 Advertise App	S			R
7.3 Collect Feedback	S	I	I	R

R = Responsible
S = Support
I = Informed

Project Closure

Project Closeout Checklist

#	Task	Completed? Y/N
Schedule & Resources		
1	Have all project milestones and deadlines been met, and was the project completed within the agreed timeframe?	Y
2	Have all project resources, including team members and external vendors, been effectively utilized and aligned with the project's needs?	Y
3	Has the final project budget been reconciled, and were all expenses properly accounted for?	Y
4	Have lessons about resource management and scheduling been documented for future projects?	Y
5	Are all team contributions recognized, and have the necessary resources been transitioned for post-project support?	Y
Organization & Management		
5	Has final approval been obtained from key stakeholders, including the CEO, Sabrina Carpenter?	Y
6	Is all project documentation complete and stored for future reference?	Y
7	Have all contracts with external vendors been closed, and were all deliverables met?	Y
8	Has a final project report summarizing performance and outcomes been delivered?	Y
9	Have post-project responsibilities, such as maintenance and support, been handed over to the appropriate teams?	Y
Hardware & Software Requirements		
10	Does the app meet the hardware and software specifications outlined in the project plan?	Y
11	Are all necessary platforms, tools, and integrations fully configured and functional?	Y
12	Have any configurations required for future updates been documented?	Y
13	Did all users in the testing process provide positive feedback?	Y
App Launch		
14	Has the app been fully tested, and are any issues resolved before launch?	Y
15	Is the app ready for deployment, with the necessary approvals in place?	Y
16	Are systems in place for post-launch monitoring and user support?	Y
17	Is user documentation available, and have communications been sent to stakeholders and users?	Y

Lessons Learned / Retrospective

Working on the Parking Pal app was a positive and rewarding experience for the entire team. As with any project, there were plenty of opportunities to learn and grow, and we've identified some key takeaways that will help us improve in future endeavors. After reflecting on both the successes and challenges we encountered, we've compiled a list of lessons learned, along with the reasoning behind each one.

- **Thorough Testing** – Testing should begin as soon as development starts and continue regularly throughout the project. For the Parking Pal app, this included internal testing and automated processes to ensure the app correctly displays real-time parking lot data or verify that the app integrates smoothly with external hardware like parking sensors. Receiving user feedback from potential users also helped give us insight on how to enrich the user experience. While consistent testing requires extra effort, it is well worth it. Catching bugs and addressing potential issues sooner rather than later will save time, reduce costs, and prevent larger problems from arising during the later stages of the project.
- **Planning Scalability** – We wanted to optimize the value of the parking app by designing it to handle future growth and increased demands. Early in the project planning, we focused on addressing the main deliverables such as Oakland University's main parking lots, then we realized that there was potential for expansion. For example, as more parking lots or additional campuses are added, the app should be able to integrate new data sources, sensors, or other features seamlessly. This involved building flexible architecture that can accommodate such updates. Another concern was how the app would perform under varying user loads. We wanted to ensure that the app could handle peak times, such as special school events or the start of the new semester. From this, we optimized the app's backend to handle high traffic efficiently.
- **Profitability** – From scalability, we saw the opportunity to sell the app to other schools which would bring in more return on our creation of the app. Building the app with adaptability in mind, we can tailor it to meet the specific needs of different institutions. The ability to fit different campus maps and integrate new parking data sources opens the door to a bigger market. This will drive long-term growth and financial success through revenue streams such as ad revenue and licensing fees.
- **Stakeholder Management –** Effective stakeholder engagement and building strong relationships with them played a critical role in shaping the app's requirements and ensuring its success. Clear and consistent communication with stakeholders helped us stay aligned with their expectations and address any concerns early in the project. For example, regular updates and feedback sessions allowed us to refine certain features and user interfaces to better meet the needs of users. It was also important to build a good relationship with stakeholders because having trust and a good rapport made it easier to navigate challenges such as timeline adjustments. Hopefully, this will also open doors for future opportunities for more collaborations to expand the app to new campuses or integrate additional features. Overall, having good stakeholder

management not only enhances the project outcome but also creates long-term value for all parties involved.

- **Team Communication** – Our team's success was also significantly influenced by effective and consistent communication among team members. By creating an environment where everyone felt comfortable sharing ideas, raising concerns, and asking questions, we were able to work together more effectively and avoid potential misunderstandings.

Mockup


Parking Pal
Home
Campus Map
REAL-TIME PARKING CAPCITY
Parking Lot:
P36
OAKLAND UNIVERSITY
50
Available
50
Spaces
Total
100
Spaces