shopEase

Final Year Project Proposal

by

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Revision History

Compiled By	Checked By	Date	Reason for Change	Version
M. Shaheer Gul	Sir. Rana Fasial	23rd Sep 2023	Initial Version	1.0

Project Description

The proposed project's objective is to leverage geofencing technology to build a dynamic mobile application that would facilitate interaction between customers and retailers. Customers can locate nearby stores, receive personalized notifications, and place orders using the app, which was developed with React Native, Node.js, and MongoDB. Businesses may register stores, maintain profiles, and advertise deals. Geofencing will enhance the shopping experience by dispersing timely and location-specific promotions. This platform seeks to simplify the retail experience by offering tailored interactions and promoting a busier, more productive shopping environment.

1 Introduction

The project debuts "shopEase," a versatile Android mobile application designed to bridge the gap between sellers and buyers with a focus on small, locally-based businesses with limited resources. The program aims to democratize the retail industry by building a platform where sellers may register their companies, describe their services, categorize their products, and promote sales using geo-fencing technology.

When a consumer enters a geo-fenced area, sellers can notify them and give timely promotions to effectively market their goods and interact with them. However, consumers have access to a customized shopping experience, notifications of nearby sales, the opportunity to view product details, find the closest retailers, and make purchases all through the app. To help clients find the shops, the program provides map navigation, which also improves the whole shopping experience. This helps to connect nearby companies with potential customers.

2 Application/Literature Review

In this section, we discuss literature and market survey. The data analysis plays a crucial role in system analysis, so studying the existing system and marketing trends is essential to gain domain knowledge. We, as a team, surveyed a number of existing e-commerce systems, identified some existing problems, and then introduced our system, which addresses them.

2.1 Related Technologies

- **Geofencing:** Geofencing is a virtual boundary around a physical area. Whenever a user enters the fenced area, an event will trigger, notifying the user. The event may be an alert, notification, warning, etc.
- **Geo-Conquesting:** Geo-conquesting is a virtual boundary around a competitor's area to attract customers away from the competitor towards you by using location-

based advertisement.

- **Geotargeting:** Geotargeting delivers ads to customers according to their interest. Geotargeting depends on consumer criteria such as demographics, behavior, and interest, etc.

2.2 Related Projects

Many projects have been completed using these technologies in the past, and our project is no exception.

2.2.1 Golootlo Golootlo is the first and largest QR-based discount app in Pakistan, offering substantial discounts across 65 cities.

- **Features:**
  - Geo-located Discounts: Users can find discounts in their vicinity.
  - QR Code Scanning: For easy access to discounts.
  - Widespread Merchant Network: Available across many cities.
- **Limitations:**
  - Limited Geofencing Capabilities: May not notify users proactively when they are near a discount.
  - Geo-Conquesting: Not utilized to attract users near competitors.

2.2.2 Daraz Daraz is a comprehensive online marketplace operating in South Asia and Southeast Asia.

- **Features:**
  - Wide Range of Products: Offers a variety of products across different categories.
  - Geotargeting: Personalized ads and offers based on user location and behavior.
- **Limitations:**
  - No Geofencing: Lack of proactive notifications to users based on their location.
  - Geo-Conquesting: Not leveraged to drive traffic from competitors.

2.2.3 Hummart Hummart is a Karachi-based online grocery store.

- **Features:**
  - Online Grocery Shopping: Convenient grocery shopping from home.
  - Home Delivery: Delivers to any location in Karachi.

- **Limitations:**
  - Limited Geographic Service: Only available in Karachi.
  - No Geofencing or Geo-Conquesting: Does not utilize location-based technologies for proactive user engagement or competition.

2.3 Proposed System

Our proposed system aims to overcome the limitations of the existing applications by incorporating Geofence Monitoring. This feature will allow the sellers and purchasers to interact more efficiently. Sellers can register their business and maintain their shop profile on the app, create notifications about brands, and attract purchasers near the shop with current offers. Purchasers will receive alerts or notifications about the brand's current offers or limited-time promotions from a seller located nearly when they enter the geofenced area.

- **Android Support:** Indicates whether the application is supported on Android devices.
- **Retailer Register:** Shows if retailers can register themselves on the platform.
- **Order Booking:** Whether the application allows for order booking.
- **Delivery :** Specifies whether the application provides a delivery option for orders.
- **GPS Monitoring:** Signifies if the application has GPS monitoring capabilities.
- **Push Notification:** Indicates if the application can send push notifications.
- **Retailer Access:** Signifies if the retailers have access to the platform.
- **Geofence Monitoring:** Indicates whether the application supports Geofence Monitoring.

Table 1: Applications Comparison

Features	**GoLootlo**	**Daraz**	**Hummart**	**Proposed System**
Android Support	✓	✓	✗	✓
Retailer Register	✓	✓	✗	✓
Order Booking	✓	✓	✗	✓
Delivery Option	✗	✓	✓	✓
GPS Monitoring	✗	✓	✓	✓
Push Notification	✗	✓	✗	✓
Retailer Access	✗	✓	✗	✓
Geofence Monitoring	✗	✗	✗	✓

3 Problem Statement

In today's hectic world, customers regularly struggle to locate desired items in malls, wasting time and making them unhappy. It is also unknown what products are available and what specials are running at the moment. Retailers search for a platform where they can register their business, update shop information, and send timely notifications in order to enhance sales and consumer engagement. The introduction of a system that establishes a virtual perimeter around particular areas using modern geofencing technology would enable nearby businesses to alert customers to special offers and deals, luring them into the store and bridging the communication gap between buyers and sellers.

4 Project Aim and Objectives

1. The retailer should be able to register their shops.
2. The retailer should be able to maintain the shop's categories.
3. The retailer should be able to maintain their shop's profile.
4. The retailer should be able to offer sales.
5. Customer should be able to register.
6. Customer should be able to view nearby shops.
7. Customer should be able to book an order.
8. Customer should be able to receive a push notification about the sales in the geofenced area.
9. Customer should be able to view offers.
10. Customer should be able to contact with retailer.
11. Customer should be able to add interest in specific categories.

5 Scope and Significance

5.1 Project Scope

The proposed project aims to develop a mobile application that enhances the interaction between retailers and customers through geofencing technology. The scope of the project includes the following modules and functionalities:

1. **Registration and Login**: Both sellers and buyers can create accounts and log in using their registered accounts.

2. **Order Management**: Buyers have the ability to book orders, and sellers can post products and manage orders.

3. **Category Search**: Buyers can search for specific items, such as shirts, within relevant categories, facilitating an efficient shopping experience.

4. **Geofencing and Notification**: Implements virtual boundaries to send targeted notifications to buyers when they enter a geofenced area, informing them of relevant offers and promotions.

5. **Retailer Module**: Enables retailers to register shops, maintain shop categories and profiles, and offer sales.

6. **Customer Module**: Allows customers to register, view nearby shops, interact with retailers, and receive personalized notifications based on their location and interests.

This system is designed to streamline the shopping experience, enhance customer engagement through targeted marketing, and potentially increase sales for retailers.

5.2 Project Significance

This project is a game-changer for several reasons:

- **More Store Visits**: Customers receive alerts about nearby shops, making them more likely to visit. More visits mean more buying!
- **Smarter Advertising**: Stores can send special offers to people nearby who are interested, making advertising more personal and effective.
- **Happier Shopping**: People can easily find stores and deals, making shopping more enjoyable and less of a hassle.
- **Boosting Sales**: With more visits and better advertising, stores are likely to sell more products!

6 Project Development Methodology

In this project, we will use a step-by-step approach to build our system. Imagine our project as a big puzzle; we will focus on solving one piece at a time until the whole picture is complete. Each piece represents a small goal or a task, also known as a module or objective.

Here are the steps we will follow:

1. **Identify Modules:** Break down the project into smaller, manageable pieces (modules).

2. **Develop Iteratively:** Work on one module at a time, making sure it functions well before moving to the next.

3. **Test Each Module:** After completing a module, test it thoroughly to ensure it works correctly.

4. **Integration:** Once all modules are developed and tested, combine them to form the complete system.

5. **Final Testing:** Test the entire system to make sure all parts work together seamlessly.

This methodology will help us focus on each part of the project, ensuring that every detail is addressed, and the final system is robust and efficient. A block diagram will be used to visually represent the modules and how they interact, providing a clear overview of the project's structure.

7 Tools and Technologies

For the successful implementation of this project, a variety of tools, languages, and technologies will be employed. Here are the major ones:

7.1 React Native

React Native will be used for developing the front-end of the application. It is a popular open-source framework that enables the development of mobile applications using JavaScript and React. The choice of React Native is due to its ability to deliver high-performance, native-like user experiences across both Android and iOS platforms.

7.2 Node.js

Node.js will serve as the back-end platform for our application. It is renowned for its scalability and efficiency, making it suitable for building fast and scalable network applications. Its non-blocking, event-driven architecture enables the development of lightweight, high-performance applications.

7.3 MongoDB

MongoDB, a NoSQL database, will be used for storing and managing data. It is chosen for its flexibility, scalability, and ability to handle large amounts of data and traffic. MongoDB's document-oriented nature makes it a good fit for handling the diverse, hierarchical, and semi-structured data inherent in this project.

7.4 Express.js

Express.js, a minimal and flexible Node.js web application framework, will be utilized to build the API for our app. It provides a robust set of features to develop mobile and web applications, making it quick and easy to set up a secure, modular, and fast application.

7.5 Redux

Redux will be incorporated for state management in the React Native application. It will help in managing the state of the application in a predictable way, making it easier to track changes and debug the application.

7.6 JWT

JSON Web Tokens (JWT) will be used for securing communication between the client and server. It will help in ensuring the integrity and confidentiality of the information exchanged.

7.7 IDEs and Development Tools

Various Integrated Development Environments (IDEs) like Visual Studio Code will be used for coding, debugging, and testing the application. Additionally, version control using Git and GitHub will be implemented to manage the codebase and track changes.

7.8 Cloud Services

Cloud services like cloudinary or AWS may be utilized for deploying the application, ensuring scalability, security, and availability.

8 Work Plan

8.1 Team Structure

Table 2: Team Structure

Sr. No.	Team Members	Role
1	M. Shaheer Gul (2080210)	Project Manager
2	Sheryar Arif Qureshi (2080227)	Quality Assurance Engineer
3	Zamin Ali (2080211)	Analyst

8.2 Work Distribution

Table 3: Work Distribution

Sr. No.	Team Member	Work Assignment
1	M. Shaheer Gul (2080210)	Analysis, Design, Testing
2	Sheryar Arif Qureshi (2080227)	Analysis, Design, Testing
3	Zamin Ali (2080211)	Analysis, Design, Testing

8.3 Gantt Chart

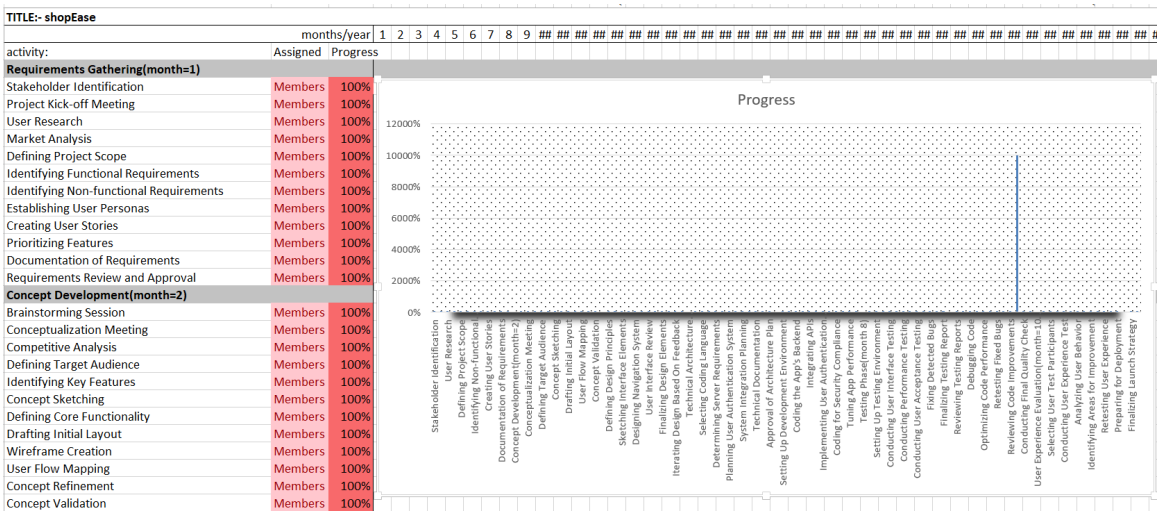

Figure 1: Gantt Chart 1

Designing Screens(month 2,3)		
Defining Design Principles	Members	100%
Creating Style Guides	Members	100%
Sketching Interface Elements	Members	100%
Designing Screens	Members	100%
Designing Navigation System	Members	100%
Creating Interactive Prototype	Members	100%
User Interface Review	Members	100%
Incorporating Feedback	Members	100%
Finalizing Design Elements	Members	100%
Prototype Testing	Members	100%
Iterating Design Based On Feedback	Members	100%
Final Design and Prototype Approval	Members	100%
Technical Architecture Planning(month=3,4,5)		
Choosing Development Framework	Members	100%
Selecting Coding Language	Members	100%
Defining Database Structure	Members	100%
Determining Server Requirements	Members	100%
Identifying Required APIs	Members	100%
Planning User Authentication System	Members	100%
Identifying Security Measures	Members	100%
System Integration Planning	Members	100%
Architecture Blueprint Creation	Members	100%
Technical Documentation	Members	100%
Peer Review of Architecture Plan	Members	100%
Approval of Architecture Plan	Members	100%

Figure 2: Gantt Chart 1.1

App Development(month=5,6.7)		
Setting Up Development Environment	Members	100%
Coding the App's Frontend	Members	100%
Coding the App's Backend	Members	100%
Implementing User Interface	Members	100%
Integrating APIs	Members	100%
Setting Up Database Connections	Members	100%
Implementing User Authentication System	Members	100%
Embedding Required Functionalities	Members	100%
Coding for Security Compliance	Members	100%
Reviewing Code Quality	Members	100%
Tuning App Performance	Members	100%
Preparing for Initial Testing	Members	100%
Testing Phase(month 8)		
Developing Test Cases	Members	100%
Setting Up Testing Environment	Members	100%
Performing Functionality Testing	Members	100%
Conducting User Interface Testing	Members	100%
Performing Compatibility Testing	Members	100%
Conducting Performance Testing	Members	100%
Implementing Security Testing	Members	100%
Conducting User Acceptance Testing	Members	100%
Bug Reporting	Members	100%
Fixing Detected Bugs	Members	100%
Regression Testing	Members	100%
Finalizing Testing Report	Members	100%

Figure 3: Gantt Chart 1.2

Debugging and Improvements(month=8,9)		
Reviewing Testing Reports	Members	100%
Prioritizing Bugs for Fixing	Members	100%
Debugging Code	Members	100%
Implementing Bug Fixes	Members	100%
Optimizing Code Performance	Members	100%
Refactoring Code for Clarity	Members	100%
Retesting Fixed Bugs	Members	100%
Updating Documentation	Members	100%
Reviewing Code Improvements	Members	100%
Implementing Additional Feature Requests	Members	100
Conducting Final Quality Check	Members	100%
Preparing for User Experience Evaluation	Members	100%
User Experience Evaluation(month=10 ,11)		
Planning User Experience Test	Members	100%
Selecting User Test Participants	Members	100%
Setting Up User Test Environment	Members	100%
Conducting User Experience Test	Members	100%
Collecting User Feedback	Members	100%
Analyzing User Behavior	Members	100%
Evaluating Usability Metrics	Members	100%
Identifying Areas for Improvement	Members	100%
Implementing Design Changes	Members	100%
Retesting User Experience	Members	100%
Finalizing User Experience Report	Members	100%
Preparing for Deployment	Members	100%
Finalizing Launch Date(month=12)		
Finalizing Launch Strategy	Members	100%
Preparing App Store Listing	Members	100%

Figure 4: Gantt Chart 1.3

References

[1] S. Moyers, "Geofencing-Marketing," [Online]. Available: https://www.spinxdigital.com/blog/geofencing-marketing/. [Accessed 29 September 2020].

[2] A. @Bickov, "The Ultimate Beginners Guide to Geofencing Marketing," 1 Feb 2018. [Online]. Available: https://blog.mediaplans.net/the-ultimate-beginners-guide-to-geofencing-marketing-9758984e6027. [Accessed 29 September 2020].

[3] L. Alton, "Location-Based Marketing Will Rely on Mobile in 2017," 2 May 2017. [Online]. Available: https://www.sitepoint.com/location-based-marketing-will-rely-mobile-2017/. [Accessed 29 September 2020].

[4] W. Young, "Location-Based Geo-Targeting Boosts Paid Search Ad Performance," 3 February 2015. [Online]. Available: https://searchengineland.com/location-based-geo-targeting-boosts-paid-search-ad-performance-importance-truly-local-data-search-marketing-decisions-213765. [Accessed 29 September 2020].

[5] S. Asadollahi, "PDEng Project Report," 2019.

[6] S. E. Ahmed, "Tour Mate: A Mobile Application for Detailed Tour Plans," 2019.

[7] J. Walz, D. Nack, R. Piatt, & A. Koltnow, U.S. Patent Application No. 14/841,574, 2016.

[8] N. Li, Y. Du, & G. Chen, "Survey of Cloud Messaging Push Notification Service," in *2013 International Conference on Information Science and Cloud Computing Companion*, pp. 273-279, IEEE, December 2013.

[9] A. E. Fentaw, "Cross Platform Mobile Application Development: A Comparison Study of React Native Vs Flutter," 2020.