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Dear Sir/Ma’am,

I am pleased to submit my internship report detailing my experiences and achievements during my tenure at NullClass. The purpose of this report is to provide a comprehensive overview of the projects I undertook, the challenges I encountered, and the skills I developed throughout the internship period.

During my internship, I was tasked with implementing several critical features aimed at enhancing the functionality and user experience of the e-commerce application. My projects included:

* Developing an OTP-based authentication system for secure user signups and logins.
* Implementing automatic address detection with time-based theme customization.
* Integrating biometric authentication options (face and fingerprint recognition).
* Creating a QR code payment system with Razorpay integration and transaction restrictions.
* Designing a dynamic coupon code system with automated discount calculations.
* Adding a voice search feature for product discovery based on specific criteria.

Each task presented unique challenges, which I addressed through innovative solutions and diligent problem-solving. The results of these projects have significantly contributed to improving the application’s usability, security, and overall user engagement.

This report outlines the objectives, activities, and outcomes of my work, and includes feedback and evidence supporting the successful implementation of the features. I believe that the skills and experiences gained during this internship will be invaluable for my future career endeavors.

Thank you for the opportunity to contribute to NullClass and for the support provided throughout my internship. I look forward to discussing any questions or feedback you may have regarding this report.

Sincerely,

SABHYA AGRAHARI

**Introduction**

This report outlines the key aspects of my internship, focusing on the various tasks and projects I completed. My role involved developing features and functionalities for an application and its user interface, including implementing security measures, enhancing user experience, and integrating payment solutions. These tasks were aimed at improving UI usability, security, and overall functionality. Throughout the internship, I enhanced my problem-solving skills and coding knowledge. I encountered both familiar and challenging tasks, and overall, it was a valuable learning experience.

**Background**

During my internship, I worked on various features for a Flask application. My responsibilities included implementing user authentication through OTP, automatically fetching addresses using geolocation, dynamic content display, applying coupon codes, processing payments via QR codes, and integrating voice search. The primary goal was to enhance the app’s UI functionality and user experience while ensuring secure and efficient operations.

**Learning Objectives**

1. **Understand and Implement OTP-Based Authentication**: Develop secure login and signup processes using OTP and learn how to send OTP to both email addresses and mobile numbers.
2. **Enhance User Experience :** Implement features that automatically pull current address to delivery address.
3. **Integrate Biometric Authentication**: Incorporate face and fingerprint recognition for secure and convenient login and registration.
4. **Enhance User Experience with Location-Based Features**: Implement features that utilize user location to personalize content and themes.
5. **Develop Payment Solutions**: Implement QR code scanning and integrate payment gateways for processing transactions securely through OTP.
6. **Implement Coupon System**: Create a dynamic coupon code system to apply discounts based on specific rules.
7. **Voice Search Functionality**: Develop a voice search feature for improved product search efficiency.

**Activities and Tasks**

1. **OTP-Based Signup and Login**:
   * Implemented a secure OTP-based system for user signup and login.
   * Integrated OTP generation, sending, and verification processes.
2. **Automatic Address Fetching**:
   * Developed a feature to automatically pull and populate the current address for delivery.
   * Ensured that the address fetching functionality works based on user location.
3. **Biometric Authentication**:
   * Implemented face and fingerprint recognition as additional login options.
   * Added functionality to register, enable, and disable biometric authentication.
   * Integrated OTP verification before enabling biometric options.
4. **Dynamic Content and Theme Switching**:
   * Implemented features to fetch current city and state and adjust the app theme based on the time of day.
   * Ensured proper fetching of weather data and theme adjustments based on the time range.
5. **QR Code Payment Integration**:
   * Developed a QR code scanning feature for payments.
   * Integrated Razorpay payment gateway for processing transactions.
   * Implemented OTP verification before payment and email invoicing post-payment.
   * Restricted payment functionality based on time and minimum amount conditions.
6. **Coupon Code System**:
   * Added functionality for users to apply coupon codes in the cart section.
   * Developed a system to generate random coupon codes and apply discounts based on the sum of coupon numbers.
   * Provided a 15% discount for even sums and a 10% discount for odd sums.
7. **Voice Search Implementation**:
   * Developed a voice search feature to find products starting with specific letters.
   * Implemented error handling for searches outside the specified letter range.

**Skills and Competencies**

* **Technical Skills**: Proficiency in programming languages and frameworks used for app development, including OTP and biometric integration, payment gateway integration, and dynamic UI adjustments.
* **Problem-Solving**: Ability to troubleshoot and resolve issues related to feature implementation and integration.
* **Project Management**: Effective time management and task prioritization to meet project deadlines.
* **User Experience Design**: Enhanced understanding of user experience principles through the implementation of dynamic content and features.
* **Communication**: Clear documentation and reporting of progress and outcomes.

**Feedback and Evidence**

Feedback was generally positive, highlighting the successful integration of complex features and improvements in user experience.

**Evidence**: Demonstrated functional features through working prototypes, code reviews, and user testing sessions.

* Screenshots of implemented features.
* Code snippets and documentation.
* Feedback from user testing sessions.

**Challenges and Solutions**

1. **Challenge**: Ensuring OTP-based authentication was secure and user-friendly.
   * **Solution**: Implemented robust encryption methods and adhered to best practices for handling sensitive user data to ensure secure biometric authentication. This involved using secure libraries and following guidelines for data protection, which mitigated potential security risks.
2. **Challenge**: Integrating biometric authentication with existing login mechanisms.
   * **Solution**: Utilized appropriate APIs and libraries for biometric authentication and conducted thorough testing.
3. **Challenge**: Managing dynamic content display and theme switching based on time and location.
   * **Solution**: Utilized system clock and location APIs to dynamically fetch the user’s current city and state and apply time-based theme changes. By integrating these APIs effectively, the app provided real-time updates and personalized user experiences without manual input.
4. **Challenge**: Integrating QR code payment with time restrictions and minimum payment conditions and not getting api key from razorpay.
   * **Solution**: First to getting api key from razorpay then developed and tested the payment gateway integration, including OTP verification and time-based restrictions.
5. **Challenge: Managing Coupon Code Discounts**

* **Solution**: Developed a random coupon code generator and implemented logic to apply discounts based on the sum of the code’s digits. This approach streamlined the discount application process and ensured that promotions were applied correctly and fairly.

1. **Challenge: Implementing Voice Search for Specific Product Categories**

* **Solution**: Designed the voice search feature to recognize and process queries for products starting with specific letters (A, B, C, D, E). Incorporated error handling to manage unsupported queries and provide relevant feedback, enhancing the accuracy and usability of the voice search function.

**Outcomes and Impact**

The implemented features significantly enhanced the application's functionality and user experience:

* **Secure Authentication**: The OTP-based signup and login, along with biometric authentication options (face and fingerprint recognition), improved account security and user convenience. Users can now access their accounts more securely and with greater ease, potentially reducing unauthorized access and improving overall trust in the application.
* **Personalized Address Management**: The automatic address detection feature streamlined the checkout process by autofilling the delivery address based on the user's current location. This not only reduced user effort but also minimized errors in address entry, enhancing the accuracy of deliveries.
* **Dynamic App Experience**: The contextual theme changes based on time of day and location provided a more personalized user experience. Light and dark themes, coupled with automatic city and state fetching, improved visual comfort and relevance, making the app more engaging and user-friendly.
* **Efficient Payments**: The QR code payment integration with Razorpay, combined with OTP verification and conditional restrictions, ensured secure and user-friendly transactions. This feature facilitated easier payments while enforcing necessary security measures and payment limits, reducing the risk of fraudulent transactions and ensuring compliance with business rules.
* **Discount Management**: The coupon code system added flexibility to promotional strategies. By generating random codes and applying discounts based on numerical sums, the feature encouraged user engagement and increased the effectiveness of promotions, driving more sales and customer satisfaction.
* **Voice Search Functionality**: The voice search capability improved the accessibility and convenience of finding products, particularly for items starting with specific letters. This innovation made searching for products quicker and more intuitive, enhancing the overall user experience and potentially increasing product discovery.

Overall, these features collectively contributed to a more secure, efficient, and personalized user experience, driving greater user satisfaction and engagement with the application.

**Conclusion**

This internship provided valuable experience in developing and implementing complex features for a mobile application. By working on OTP-based authentication, biometric login, dynamic content display, payment integration, and advanced features like coupon codes and voice search, I gained significant insights into app development, user experience, and project management. The tasks completed during this period not only enhanced my technical skills but also contributed to the overall improvement of the application’s functionality and user experience.

Top of Form

Bottom of Form