

CSBB-254
THEORY OF APP DEVELOPMENT

PROJECT REPORT
ON
THE TITLE

CAMPUS DARSHAN

THE ULTIMATE 360 DEGREE VIRTUAL CAMPUS TOUR



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DECLARATION

We, the undersigned members of the group, hereby declare that the project report titled CAMPUS DARSHAN is our original work and has been carried out under the guidance of Dr. KARAN VERMA, Associate Professor , NIT Delhi.

We affirm that all the information presented in this report is authentic and accurate to the best of our knowledge. Any external sources of information used in this project, such as books, articles, websites, or other references, have been duly acknowledged and cited.

We further declare that this project has not been submitted in part or in full for the award of any other degree or diploma to any other institution or university. It is solely prepared for the purpose of fulfilment of the requirements of the B.Tech program at NIT Delhi.

We take joint responsibility for the contents of this project report and understand that any academic dishonesty or plagiarism in this work will have serious consequences, including but not limited to academic penalties and loss of reputation.

We would like to express our gratitude to all those who have provided their support and assistance throughout the duration of this project. Their contributions have been invaluable in the successful completion of this work.

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ABSTRACT

In an era where digital accessibility is crucial, Campus Darshan redefines how students explore higher education institutions by offering a 360-degree virtual campus tour experience. The mobile application leverages modern technologies such as AI, AR, Firebase, and Google Maps to simulate realistic campus environments accessible from any location worldwide. It offers personalized tour experiences based on user interests, interactive narration, and insights into campus life, facilities, placement statistics, and nearby amenities. With features like time-travel visualization, real-time event livestreams, and an integrated merchandise store, Campus Darshan provides a comprehensive and immersive pre-admission engagement tool. The app is designed with scalability, responsiveness, and inclusivity in mind, ensuring a seamless experience for students, parents, and administrators alike. This project aims to bridge the accessibility gap in higher education and enhance decision-making for prospective students through innovation in virtual experiences.

INTRODUCTION

1.1 Problem Statement

Background:

In today's fast-evolving digital landscape, the process of selecting the right college has become increasingly complicated, especially for students located far from their desired institutions. The traditional model of physically visiting campuses is often constrained by geographical distance, financial limitations, and tight academic schedules. As a result, many students, particularly those from international or remote backgrounds, miss out on experiencing a college environment before making critical decisions.

At the same time, educational institutions are struggling to stand out in an increasingly competitive environment where attracting diverse and qualified students is vital. Generation Z, who are digital natives, expect immersive, interactive, and personalized content experiences. Static brochures or outdated videos no longer capture attention or inspire trust. The need for more transparent, accessible, and engaging campus experiences has become urgent, particularly after global events like the COVID-19 pandemic, which amplified the importance of virtual solutions in education.

Problems Identified:

- **Limited Physical Access to Campuses:** Students face difficulties visiting campuses due to long distances, high travel costs, and time constraints. This affects their ability to make informed decisions about their future.
- **Lack of Immersive Digital Experiences:** Most college websites offer only photos and text-based content, which do not provide the sense of 'being there' that an in-person visit offers.
- **Low Global Reach and Personalization:** Colleges often fail to engage international students or provide experiences tailored to individual interests like sports, academics, culture, etc.
- **Information Gaps and Lack of Engagement:** Prospective students often have unanswered questions about campus life, facilities, or placement opportunities, which erodes trust and impacts enrollment.

1.2 Scope of the Project

To overcome the above challenges, we propose the development of an interactive and technologically advanced mobile application named **Campus Darshan**, designed to bring

campus visits to students' fingertips. It is a 360-degree virtual tour platform that integrates AI, AR, real-time data, and personalized content to create a lifelike campus exploration experience from anywhere in the world. The application will revolutionize the way students engage with colleges before enrollment.

The platform includes the following features:

- **AI-Powered Personalized Tours:** Tailors the virtual tour experience according to user preferences. For example, a student interested in science will see laboratories and research hubs, while a sportsperson will be guided through sports complexes and arenas.
- **Interactive Narration in Real-Time:** AI chatbots embedded within the app answer queries like “What is the history of this department?” or “What are the most popular student clubs here?”, making the tour both informative and interactive.
- **Virtual Campus Life Simulation:** The app lets users view how the campus looks during major events like fests or convocations and even allows simulated viewing at different times of day.
- **Placement & Internship Showcase:** Real-time success stories, recruiter stats, and department-wise placement records help students evaluate career prospects before applying.
- **Local Area Exploration:** The virtual tour expands beyond the campus boundaries to include PGs, hostels, restaurants, and attractions using Google Maps API integration.
- **Virtual Merchandise Store:** Users can explore and buy official college merchandise such as hoodies, mugs, and stationery directly through the app.
- **AR Integration and Time-Travel Mode:** Augmented Reality enables students to explore physical brochures using smartphones, while the time-travel feature showcases campus views from the past, present, and even upcoming infrastructure plans.

The app ensures accessibility to all, with multilingual support and mobile-first responsive design, making it usable by students across different regions and devices.

1.3 Purpose of the Document

The main objective of this document is to provide a comprehensive overview of the **Campus Darshan** application, including its design, features, architecture, and deployment strategy. It details both functional and non-functional requirements, use cases, technical stack, and design models that were used in the development of the app.

This document will serve as a reference manual for developers, project stakeholders, academic evaluators, and maintenance teams, ensuring a common understanding of the project goals and implementation plans. It aligns the development efforts with user needs, technological feasibility, and institutional outreach objectives to ensure that Campus Darshan delivers maximum educational and experiential value.

REQUIREMENTS ELICITATION

2.1 Stakeholder Identification

Identifying and engaging key stakeholders is fundamental to the successful development and deployment of the **Campus Darshan** virtual tour platform. Each stakeholder group plays a vital role in shaping the app's functionality, user interface, and content, ensuring that the system delivers maximum value across the student ecosystem. The following are the major stakeholders involved:

- **Prospective Students**

These are the primary users of the app, including high school graduates, undergraduate applicants, and international students who wish to explore colleges remotely. They require a reliable and immersive virtual tour experience that helps them evaluate the campus, academic facilities, placement potential, and student life before applying. Their expectations for interactive and personalized content make them central to the app's design philosophy.

- **Parents and Guardians**

Parents, especially those whose children are considering studying in distant or international institutions, play a key role in decision-making. They are interested in assessing the safety, location, living accommodations, and infrastructure of the college. The app helps them gain virtual visibility into the campus environment and nearby amenities, empowering them to make informed choices alongside their children.

- **College Admissions Teams and Administrators**

These users are responsible for managing institutional content within the app. They upload 360° media, verify data accuracy, update placement information, and manage events like livestreams or digital open houses. Their participation ensures that the platform is up-to-date, institutionally verified, and consistent with the college's branding and marketing strategy.

- **Campus Tour Curators and Technical Designers**

This group includes content creators, developers, and AR/VR technicians responsible for generating immersive and accurate virtual tours. They work behind the scenes to stitch panoramic visuals, code AI interaction flows, and integrate features such as multilingual narration and time-travel modes.

- **Alumni and Brand Ambassadors**

Alumni users can revisit their campus digitally and share testimonials or experiences that future students may find helpful. Their input builds authenticity and contributes to

community-driven content. In addition, brand ambassadors from student councils or clubs can participate in curating guided experiences and student life showcases.

● **App Administrators and Support Team**

Platform admins are tasked with managing access, maintaining technical performance, monitoring analytics, resolving bugs, and moderating misuse or inappropriate content. They ensure the platform is secure, operational, and user-friendly for all stakeholders. Their role also includes responding to feedback, rolling out updates, and maintaining overall app health.

These stakeholders form the backbone of the Campus Darshan ecosystem, each contributing unique perspectives and responsibilities. Their continuous interaction with the platform helps improve its functionality, ensures relevance to diverse user needs, and upholds institutional trust and credibility.

3. FUNCTIONAL REQUIREMENTS

3.1 Authentication

3.1.1 User Authentication

User Requirement:

Users should be able to securely access the Campus Darshan platform through login and logout functionalities. They must be assured of their data privacy and account integrity while navigating personalized campus tours and using interactive features.

System Requirement:

- The system shall support secure login and logout operations using encrypted password-based authentication.
- Session handling shall be implemented via token-based mechanisms, including refresh tokens and token expiry, to ensure that users can log in across multiple sessions without compromising security.
- Authentication will be powered by Firebase Authentication, supporting both standard email-password login and OAuth-based integrations such as Google Sign-In for enhanced convenience and speed.
- The system shall maintain session consistency across devices while preventing unauthorized access by validating user identity before granting access to personalization, narration, or event features.

3.2 Location-Based Campus Exploration

3.2.1 Real-Time Geolocation Integration

User Requirement:

Users should be able to explore nearby amenities and local highlights (e.g., hostels, restaurants, PG accommodations) surrounding the campus using integrated location services.

System Requirement:

- The app shall request geolocation permissions from users via standard OS-level prompts.
- Upon approval, the system shall fetch the user's current location and use Google Maps API to display nearby POIs relevant to student life (accommodations, cafés, ATMs, bookstores).
- The system shall categorize these nearby landmarks based on filters such as "Food," "Stay," and "Essentials."
- Location data will only be used transiently for proximity filtering and shall not be stored permanently without explicit user consent.

3.3 Tour Personalization by Interest Area

3.3.1 AI-Driven Customized Experience

User Requirement:

Users should be able to receive customized campus tour content based on their specific interests—such as academics, sports, clubs, or arts—so the experience feels personally tailored and relevant.

System Requirement:

- The system shall present an onboarding questionnaire to collect user preferences before launching the tour.
- Based on selected interests, the AI module shall dynamically modify the tour path—e.g., showing research centers to science students, or sports arenas to athletic users.
- The customized journey shall be stored locally for continuity across sessions, with the option to reset or update preferences anytime.
- All personalized content shall be fetched from pre-indexed 360° media segments tagged according to interest domains.

3.4 Interactive AI Narration

3.4.1 Real-Time Q&A with AI Assistant

User Requirement:

Users should be able to ask questions during the tour—such as campus history, placement stats, or club information—and get instant AI-powered responses.

System Requirement:

- The system shall include an AI chatbot with real-time NLP capabilities trained on institutional data.
- It shall support voice and text-based interactions and answer queries like “What’s the rank of the CSE department?” or “What fests happen here annually?”
- The AI shall retrieve pre-validated information through a question-matching engine integrated with a college-curated knowledge base.
- Responses shall be generated within 3 seconds for optimal user experience.

3.5 Event Exploration & Livestreams

3.5.1 Dynamic Event Display and Replays

User Requirement:

Users should be able to access upcoming and past campus events including cultural fests, convocations, or placement drives, either through livestreams or archived replays.

System Requirement:

- The system shall support integration with real-time streaming APIs (e.g., YouTube Live, Vimeo) for live events.
- Archived events shall be stored in a categorized repository and viewable through the app.
- The system shall display event metadata including title, description, date, time, department, and speaker profiles.
- Users can RSVP for upcoming events and receive push notifications/reminders accordingly.

3.6 Time-Travel Campus View

3.6.1 Visualizing Campus Evolution

User Requirement:

Users should be able to view how a particular building or campus zone looked in the past and how it is planned to evolve in the future.

System Requirement:

- The system shall store separate 360° media files representing different eras (e.g., past, present, future).
- An interactive timeline slider shall allow users to switch between versions to see structural and design changes.
- The future view shall include AI-generated visualizations of upcoming infrastructure projects.
- All views shall maintain synchronized navigation to preserve orientation as users move through time.

3.7 AR and Merchandise Integration

3.7.1 Augmented Reality and E-Store

User Requirement:

Users should be able to view 3D models of campus buildings via AR and purchase official college merchandise like hoodies, mugs, and notebooks directly through the app.

System Requirement:

- The AR module shall support scan-to-view interactions using printed brochures or QR codes, triggering real-time 3D campus previews.
- The virtual store shall list products categorized by type, size, and price, with integrated payment gateway (Razorpay/UPI).
- Inventory and delivery data shall be fetched in real-time from a cloud database.
- Users shall receive order confirmations and status updates via in-app alerts and emails.

3.8 Personalized Dashboard

3.8.1 User-Specific Metrics & Navigation

User Requirement:

Each user should be able to access a dynamic dashboard summarizing their app usage, saved content, watched events, merchandise orders, and tour history.

System Requirement:

- The dashboard shall auto-generate content based on user type (e.g., student, parent, admin).
- Key sections include “Saved Spots,” “Event Participation,” “Order History,” and “Tour Progress.”
- It shall support real-time updates and allow deep navigation into submodules such as upcoming webinars or placement videos.
- The dashboard shall be optimized for mobile and tablet screens using responsive UI components.

4. NON-FUNCTIONAL REQUIREMENTS

4.1 Performance

1. Scalability for Tour Streaming and Location Services

- The system should efficiently handle a growing number of simultaneous users accessing 360° virtual tours, AI narration, and geolocation services without noticeable delays or performance degradation.
- Optimized data fetching and smart caching strategies shall be implemented to ensure that loading panoramic views, retrieving event videos, and navigating interactive maps remain smooth even under high user load conditions.
- Load balancing techniques and Firebase’s dynamic resource allocation will ensure uninterrupted service availability during peak usage hours, such as during admission windows or livestreamed college events.

2. Responsive Authentication and Tour Access

- Login and logout functionalities must execute within 2 seconds under average network conditions to ensure a frictionless onboarding experience.
- Dashboards should load quickly with near-instant access to saved tours, event participation, merchandise orders, and personalized suggestions.
- All major interactions—such as changing tour preferences, browsing the AR gallery, or switching between languages—shall complete within 2–3 seconds to maintain a real-time feel and retain user attention.

3. Role-Based Access and Feature Gating

- Access to various modules such as admin dashboards, content uploads, and analytics shall be role-based, supporting different types of users including Students, Parents, Institution Admins, and App Moderators.
- Firebase Authentication shall be coupled with optional multi-factor authentication (MFA) to secure high-privilege accounts, such as those of campus representatives and data curators.
- Feature flags shall be used to enable/disable beta features for specific user groups without affecting overall app stability.

4.2 Reliability

4. Uptime for Tours, Narration, and Maps

- The platform should maintain 99.9% uptime for critical services like virtual tours, AI narration, local area mapping, and live event streaming.
- Redundancy through Google Cloud infrastructure shall ensure availability even in case of partial system outages.
- Fallback mechanisms like retry logic and cached 360° views will allow users to continue exploring even if connectivity is temporarily lost, with data re-synchronization upon reconnection.

5. Data Backup for Personalization and Event Logs

- All critical user-specific data—including personalization preferences, event RSVPs, tour progress, chat history, and order records—shall be backed up to secure cloud storage at

regular intervals.

- Periodic integrity checks and restore drills shall be conducted to ensure data recoverability in case of accidental loss or corruption.
- Versioning mechanisms will allow rollbacks in case of issues caused by feature updates or faulty uploads.

4.3 Maintainability

6. Modular Design for Tour Engine and Content Management

- The system will adopt a modular architecture where each core feature—such as authentication, personalized tours, narration, merchandise, and AR visualizations—operates as an independent service.
- This modularity will facilitate focused debugging, rapid updates, and scalability without disrupting unrelated functionalities.
- Codebase will follow clean component-based structure with reusable blocks, ensuring faster integration of future technologies like multilingual NLP engines or virtual reality support.

4.4 Usability

7. Intuitive User Experience for Tours, Events, and Store

- The application interface will be designed with a mobile-first approach using visually guided navigation, soft color palettes, and touch-friendly components to suit a wide range of user demographics including students, parents, and administrators.
- Dashboards will include personalized widgets such as “Recommended Campuses,” “Explore Again,” and “My Bookmarks,” while gamified elements like trivia badges will enhance engagement.
- All content and controls will be accessible within 2–3 taps, and multilingual support will be integrated to assist international users in understanding narration, menu items, and event descriptions.

5. TECH STACK

The technical architecture adopted for the **Campus Darshan** platform is designed to deliver scalability, seamless real-time experiences, and compatibility across devices. Leveraging modern mobile development frameworks and cloud-native infrastructure, the app supports interactive virtual tours, AI narration, AR integrations, and multimedia streaming with high performance and efficiency.

5.1 Programming Language and Frameworks

- **Language Selection:**

Campus Darshan is built using **JavaScript** and **Typescript** which enable scalable and maintainable codebases. The frontend leverages **React Native (with Expo framework)** to create cross-platform mobile applications using a unified codebase that supports both Android and iOS environments efficiently.

- **Framework Integration:**

React Native allows for rapid UI development with reusable components and dynamic responsiveness. It supports modularity, integrates with AR/VR libraries like Three.js and Pannellum for rendering immersive 360° views, and interacts seamlessly with third-party APIs. Backend functionality is handled using **Firebase Cloud Functions**, providing serverless execution and real-time database triggers.

5.2 Database Management

- **Database Choice:**

The app utilizes **Firebase Firestore**, a flexible, scalable NoSQL database tailored for real-time applications. It efficiently stores and manages dynamic data such as user preferences, tour progression, event metadata, merchandise orders, and AI-chat logs. Firestore's document-based structure makes it ideal for syncing user-specific data across multiple devices and sessions.

5.3 Future Extensibility

- **Scalability Support:**

Campus Darshan's serverless and modular architecture ensures effortless scalability.

Whether it's increasing user traffic during admission cycles or integrating new modules like VR or voice localization, the app is designed to scale without any disruption to existing services or infrastructure.

- **Feature Enhancements:**

Future versions will incorporate **AI-powered tour suggestions**, **multilingual voice narration**, and **real-time visitor heatmaps**. Support for wearable AR devices, advanced data analytics for institutions, and student feedback modules are planned in upcoming releases.

5.4 External Data Sources

- **API Integration:**

Campus Darshan integrates several key third-party APIs to enhance functionality:

1. **Google Maps API** – For mapping local accommodations, cafés, and exploration features.
2. **Firestore Authentication API** – Ensures secure user identity verification using OAuth (e.g., Google login).
3. **Google Cloud Storage** – For hosting 360° panoramic media and tour files with quick delivery.

- **Data Optimization:**

Real-time updates are made possible through Firestore's synchronization capabilities, eliminating manual refresh. Cached assets like thumbnails, narrations, and maps reduce load times and enhance in-app performance, especially on mobile data.

5.5 Distributed System Design

- **Scalability Requirements:**

The cloud-native Firebase backend supports distributed operation, allowing the app to serve users globally with minimal latency. Automatic resource scaling under high demand ensures uninterrupted access to real-time features like narration, livestreams, and content playback.

- **Deployment Strategy:**

Campus Darshan is deployed to major app platforms including the **Google Play Store** and **Apple App Store**. For development and offline testing, the app can be accessed via **Expo Go**. Backend services are hosted on **Firebase's global cloud infrastructure**, ensuring fast, redundant, and secure delivery worldwide.

5.6 Resource Management

● Optimization Techniques:

Campus Darshan incorporates multiple strategies to optimize resource usage:

1. **Firestore security rules** to prevent excessive reads/writes and minimize billing costs.
2. **Firebase Cloud Messaging (FCM)** for sending push notifications and updates efficiently.
3. **Lightweight UI Components** in React Native to reduce processing and memory load.

● Resource Utilization:

The app is optimized to consume minimal bandwidth and battery power, making it ideal for users on older devices or slow internet connections. Data usage is capped for media-heavy sections, with adjustable quality settings based on network strength.

5.7 Error Detection and Recovery

● Error Handling:

Robust error-handling is embedded throughout the platform via:

1. **Try-catch blocks** in the frontend for preventing crashes during navigation and media rendering.
2. **Firebase logging** and **Crashlytics integration** for tracking real-time bugs and API failures.
3. **Fallback pages** for failed network requests, unavailable tours, or corrupted assets.

● Recovery Strategies:

If a network or service error occurs, users receive instant feedback with retry options or offline alternatives (e.g., cached views). Any data entered during offline sessions is automatically synchronized once the connection is restored. These strategies ensure fault tolerance and a smooth user experience even during unexpected downtime.

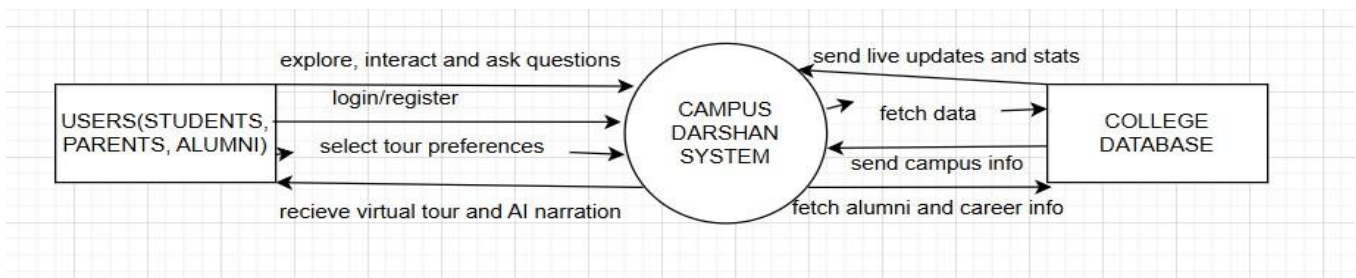
Diagrams / Models

1.1 Context Model - (Data Flow Diagrams)

Context models are designed to represent the external environment in which a system operates. They illustrate what exists outside the system's boundaries and how the system interacts with external entities. These models help identify key inputs and outputs, and they are influenced by social and organizational factors that determine where those boundaries should be drawn. Architectural models, on the other hand, provide a structural overview of the system and depict its relationship with other connected systems or components.

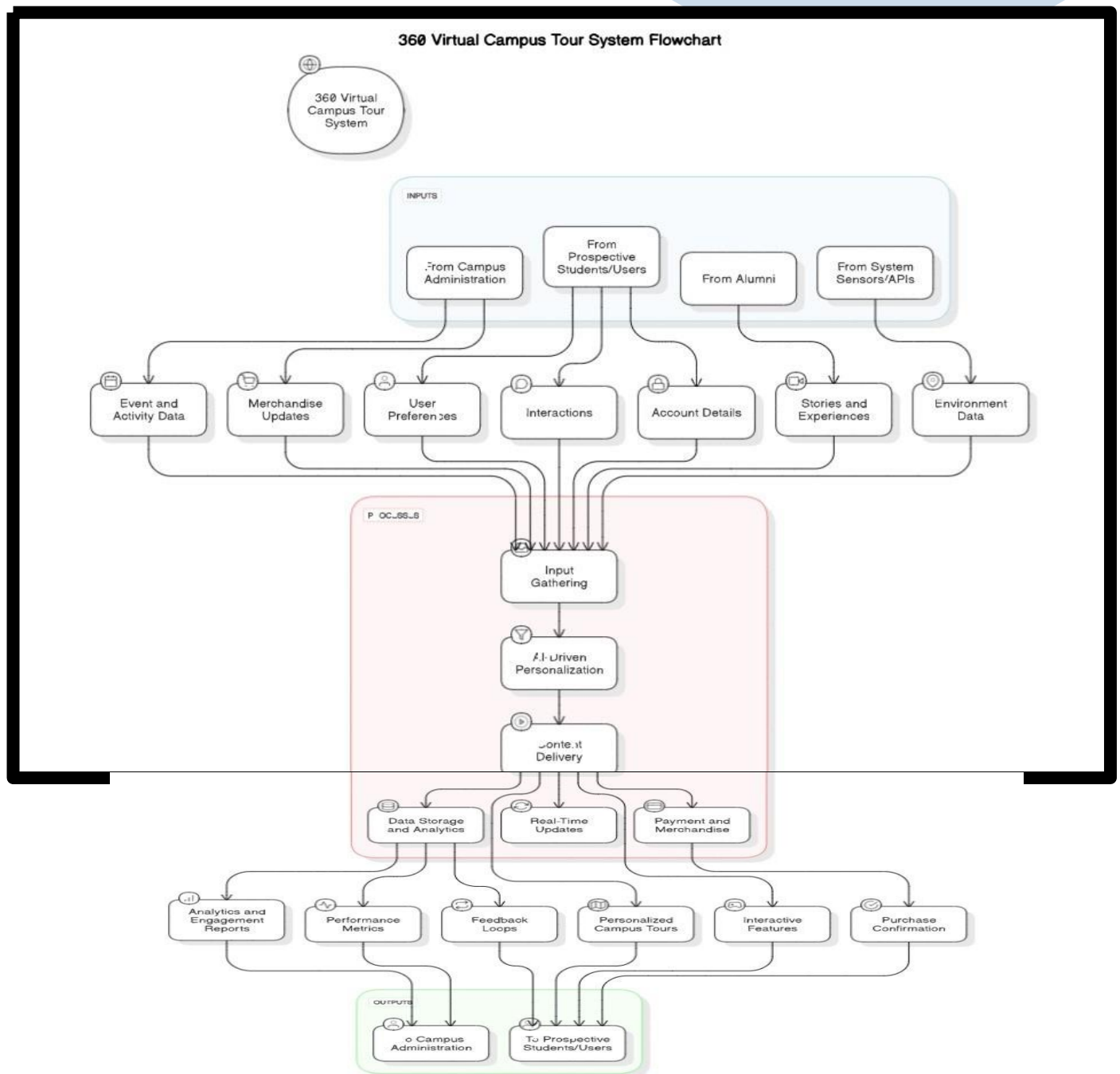
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This provides a simplified, high-level overview of the entire system or process being analyzed. It presents the system as a single unified function, highlighting its interactions with external entities. The focus is on offering a quick, intuitive understanding of how the system fits within its broader operational environment. This type of model is often referred to as a **Context Diagram** due to its emphasis on external relationships.

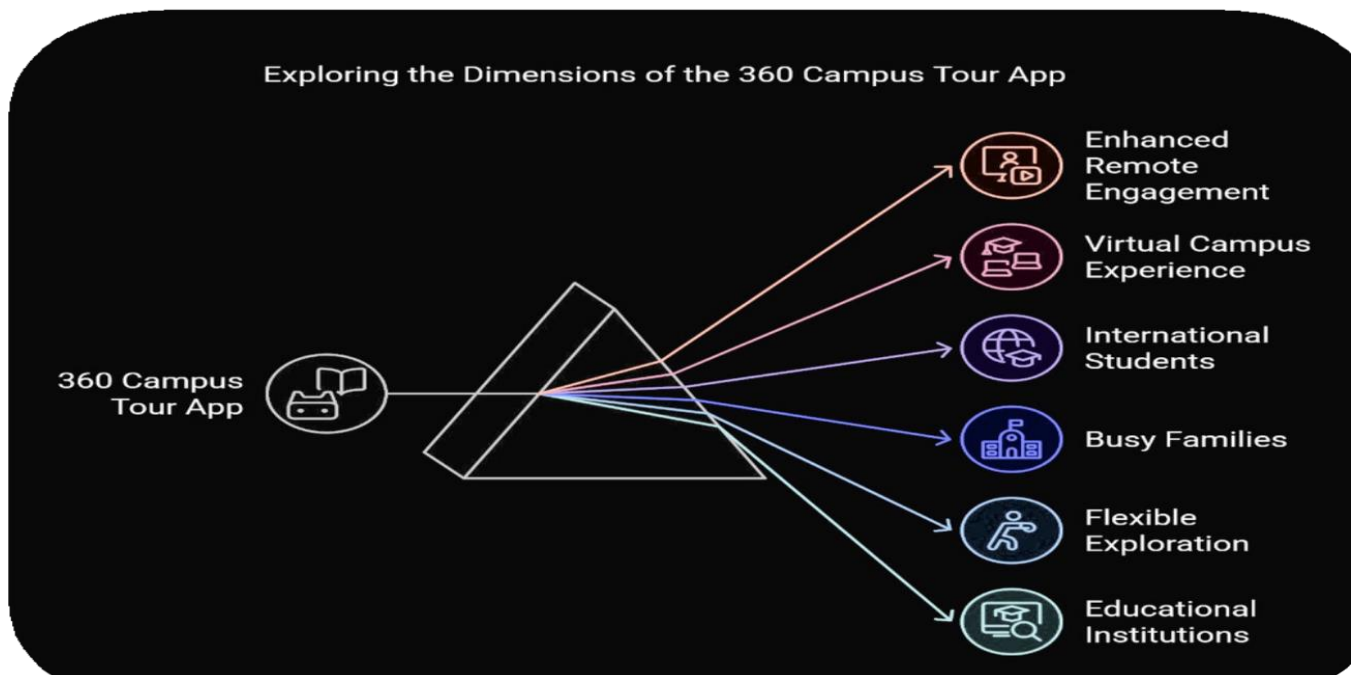
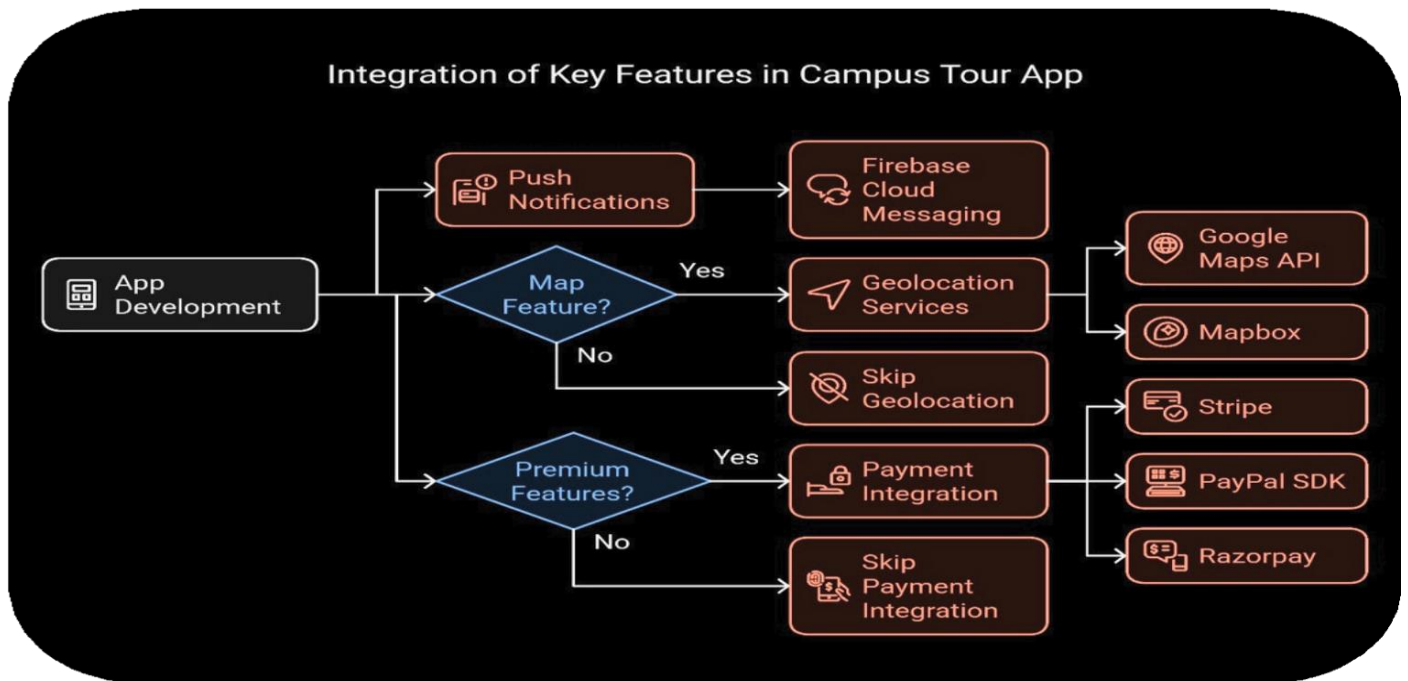


FLOW CHART -

A **flowchart** is a graphical representation used to illustrate the logical flow and sequence of operations within a system or process. It depicts various actions, decisions, and workflows through standardized symbols such as arrows, rectangles, and diamonds. Flowcharts help in understanding how a task progresses from start to finish, making them valuable for analyzing, designing, and communicating complex procedures in a simplified and visual format.



ADDITIONAL DIAGRAMS-



1.2 Timeline - (Gantt Chart)

A **Gantt chart** is a visual tool used to represent the schedule of a project over time. It functions as a type of bar chart that outlines the start and end dates of individual tasks, displaying them along a timeline. The primary objective of a Gantt chart is to provide a clear and intuitive overview of the project's structure, including task durations, sequencing, and dependencies. This makes it an essential tool for planning, tracking progress, and managing timelines effectively.



6.DEPLOYMENT & MAINTENANCE

6.1 Deployment

Deployment Strategy

- **Phased Rollout:**

Campus Darshan will initially launch in a phased manner, starting with a selected group of partner institutions including a few colleges and universities across diverse regions. The controlled launch will focus on validating core functionalities like personalized tours, AI narration, and livestream access. User feedback from early adopters will be instrumental in resolving usability issues, fixing bugs, and improving content before scaling the rollout to a national and eventually global audience.

- **Beta Testing:**

A closed beta phase will be conducted with pre-enrolled students, institutional representatives, and alumni volunteers. This will help test app performance under real-world scenarios including different devices, internet conditions, and user roles. Beta testing will specifically assess responsiveness in 360° rendering, accuracy in AI-generated narration, and effectiveness of AR and merchandise modules.

- **Training and Onboarding:**

To ensure users can fully leverage the app's features, Campus Darshan will include guided onboarding screens, interactive walkthroughs, and tutorial videos. Separate instructional modules will be developed for students, parents, and admin users. Institutions will be provided with guidelines for uploading content, managing events, and configuring campus-specific features.

Technical Environment

- **Hosting:**

Campus Darshan will be hosted on a cloud-native backend, using **Firebase** and **Google Cloud Platform** for scalability, speed, and reliability. Firebase Firestore will manage real-time data such as user sessions, interaction logs, and event activity. Firebase Hosting will deliver frontend builds, while media assets including 360° tours and AR models will be served from **Google Cloud Storage**.

- **Security Measures:**

All data interactions will be encrypted using **SSL/TLS protocols** to prevent interception and tampering. Firebase Authentication with **OAuth 2.0** will provide secure login methods (e.g., Google Sign-In). Regular security audits and penetration tests will be performed to

safeguard sensitive user data and institutional media from unauthorized access or data breaches.

- **Backup and Recovery:**

Daily automated backups will be scheduled for Firestore and Cloud Storage repositories. A disaster recovery plan will be implemented with version control and point-in-time recovery options. In case of a critical failure, services can be restored within minutes using mirror environments and continuous integration pipelines.

Data Migration

- **Initial Data Integration:**

Pilot institutions will have their digital assets—such as past event recordings, building floorplans, and placement statistics—imported into the Campus Darshan system to provide students with a rich historical context. Content mapping will be handled to align media files with the AI narration and timeline slider features.

- **Data Quality Assurance:**

Before launch, all uploaded data will go through validation checks to ensure completeness, consistency, and accuracy. Redundant entries will be eliminated, naming conventions standardized, and all content tagged appropriately for interest-based personalization.

Launch Plan

- **Announcement:**

The launch will be accompanied by a comprehensive outreach campaign across social media platforms, student forums, educational blogs, and official college handles. Promotional content will include teaser videos, influencer testimonials, and previews of interactive tour features. Early users will receive incentives such as limited-edition merchandise coupons or beta badges.

- **Support Systems:**

A dedicated multilingual helpdesk will be operational during the launch phase, offering real-time assistance through in-app chat (Stream Chat API), support tickets, email, and phone channels. A detailed FAQ section and live webinars will address onboarding queries and feature walkthroughs.

6.2 Maintenance

Regular Updates

- **Feature Enhancements:**

Campus Darshan will follow an agile development cycle with new feature rollouts based on user analytics and community feedback. Planned enhancements include AR gesture support, personalized event recommendations, multi-language support with regional accents, and deeper AI integration with student preferences.

- **Performance Optimization:**

Monitoring systems will track backend processes like Firestore queries, media rendering, and authentication load times. Identified bottlenecks will be resolved through code refactoring, asset compression, and query optimization to ensure a consistently fast and smooth user experience across devices.

Bug Fixes

- **Issue Tracking:**

A centralized issue tracking system using **Firebase Crashlytics**, **Jira**, or **GitHub Issues** will log user-side and server-side errors in real-time. Bug reports will be categorized based on severity and frequency, and assigned to developers for timely resolution.

- **Timely Resolution:**

High-impact bugs such as login failures, tour interruptions, or transaction issues will be addressed within 24–48 hours. Minor visual inconsistencies or non-critical bugs will be batched and resolved in weekly patch updates.

User Support

- **Helpdesk Services:**

Campus Darshan will maintain a round-the-clock user support infrastructure including a chatbot, manual ticket resolution, and access to tutorial documents. Users will receive assistance with tasks like resetting login credentials, exploring new campuses, and placing merchandise orders.

- **Feedback Loop:**

Users will be encouraged to rate experiences post-tour or post-event. Feedback will be

collected through in-app forms, micro-surveys, and occasional interviews. This data will be used to influence future roadmap decisions.

- **Knowledge Base:**

A publicly accessible knowledge base will be updated regularly with how-to articles, troubleshooting guides, and new feature highlights. This will empower users to self-resolve common issues and learn more about advanced app capabilities.

Security Management

- **Regular Audits:**

Quarterly security audits and code reviews will be conducted to ensure adherence to best practices and compliance with international privacy regulations such as GDPR and India's Digital Personal Data Protection Act (DPDPA).

- **Compliance:**

User data handling and storage policies will be aligned with prevailing data protection laws. All third-party integrations will be reviewed for compliance and risk assessment.

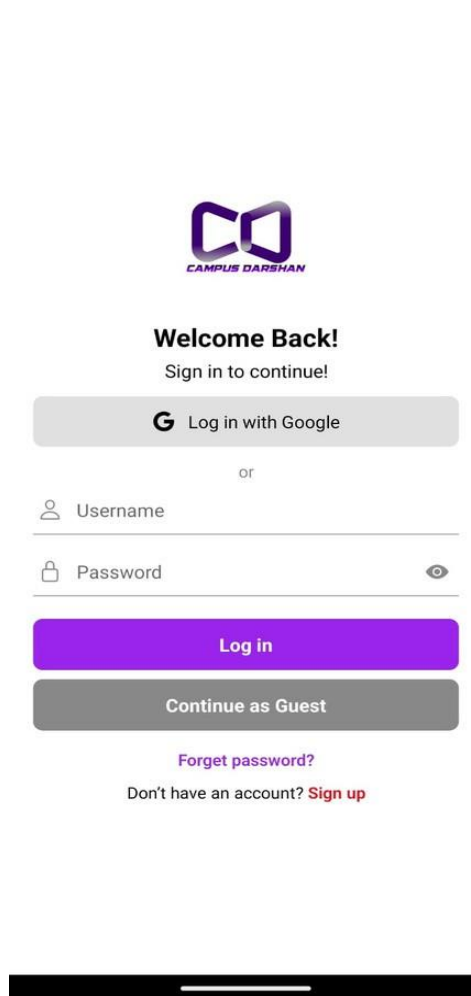
Scalability

- **Capacity Planning:**

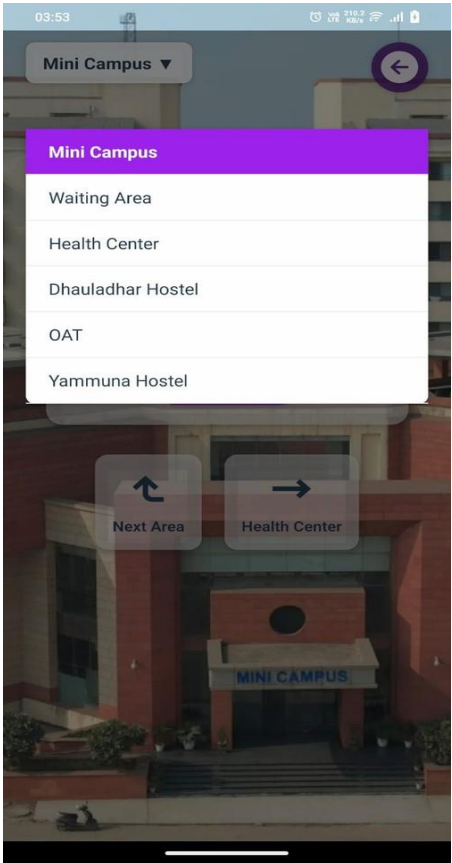
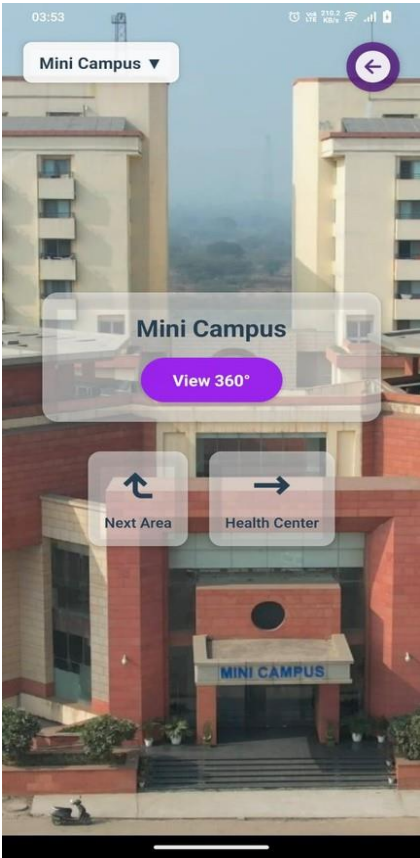
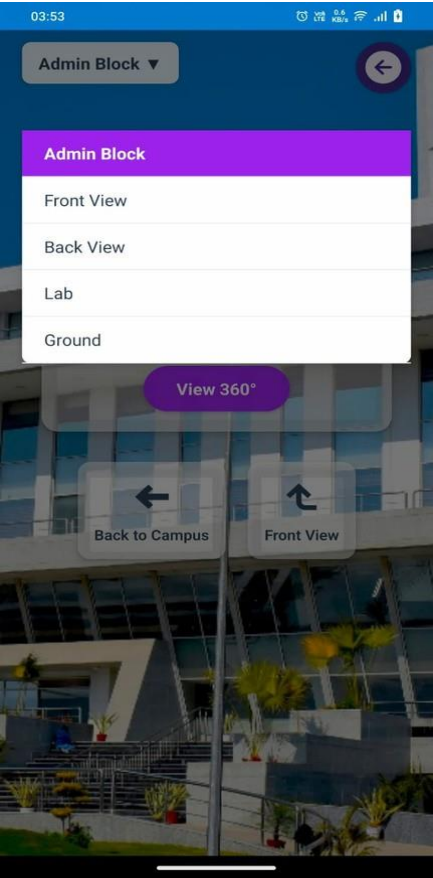
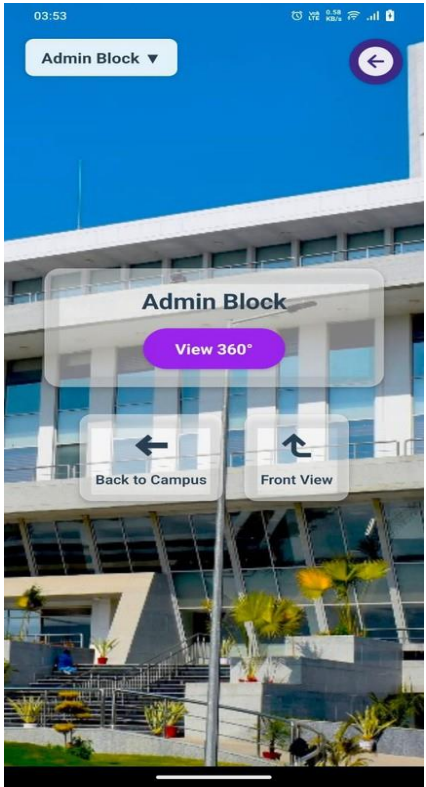
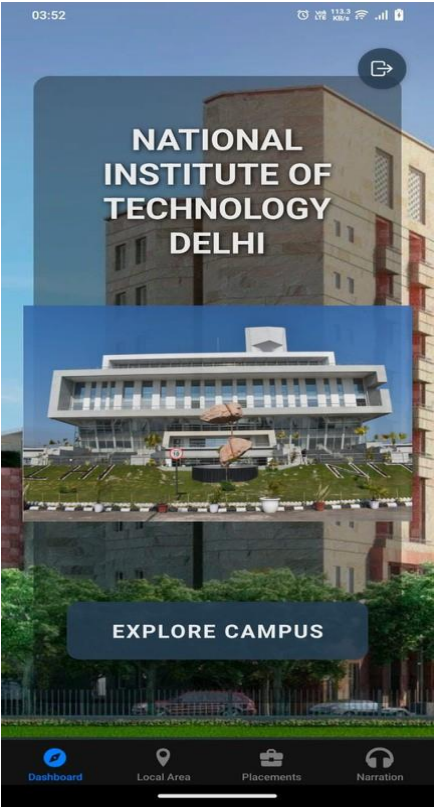
The app's cloud-native design will be regularly reviewed to handle increasing user numbers, additional campuses, and growing multimedia demands. Provisions will be made for horizontal scaling and CDN (Content Delivery Network) enhancements to maintain latency benchmarks globally.

2. APP SCREENS

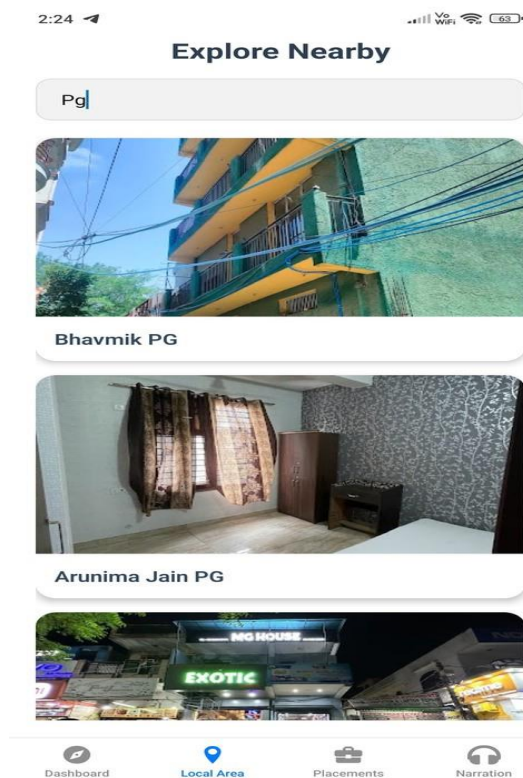
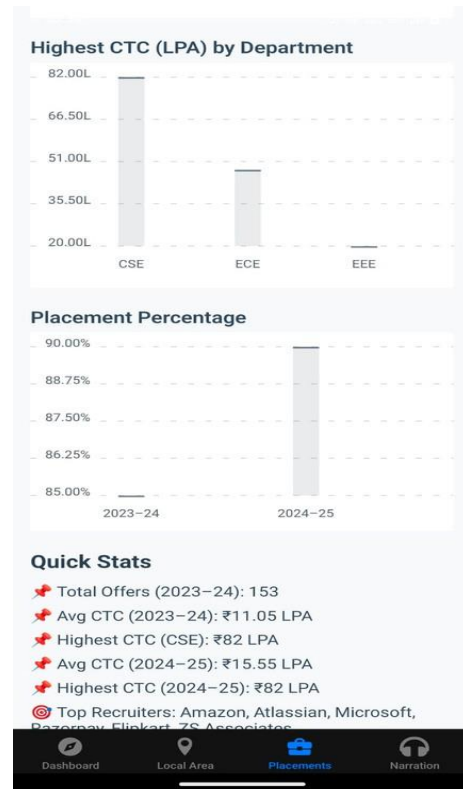
2.1-Welcome and login screen of app -



2.2- 360 degree view option of various locations in campus



2.3- Placement stats and nearby pg, food and other options



CONCLUSION

The development of Campus Darshan represents a transformative step in the domain of virtual campus engagement. By addressing the limitations of traditional college visits and static digital brochures, this app provides an immersive, interactive, and informative platform that empowers students to make informed decisions about their academic futures. Its AI-driven customization, AR integration, and real-time features ensure that users receive a tailored and engaging experience aligned with their interests. The collaborative efforts in design, development, and testing have resulted in a robust, scalable, and user-centric application that serves the needs of diverse stakeholders. Moving forward, the app holds potential for integration with VR hardware, multilingual voice assistants, and institutional analytics tools, further enhancing its utility and outreach. Campus Darshan not only showcases the capabilities of modern mobile app development but also sets a new standard for transparency and accessibility in higher education.

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