

DeepDigit Limited
Software Development Agency

TECHNICAL & COMMERCIAL PROPOSAL
Colosseum Audio Tour Guide
Mobile Application

MVP Software Development Proposal — Offline-First, Floor-Aware Architecture

Field	Detail
Project	Colosseum Audio Tour Guide — Rome, Italy (Single-Attraction Pilot)
Proposal Type	MVP Software Development Proposal — single complete delivery
Delivery Timeline	8 calendar weeks from project initiation
Platforms	Android, iOS, and Web Administration (Colosseum, Rome — Pilot Site)
Date	27 August 2026

PREPARED FOR
Client

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For evaluation and discussion by authorized representatives only

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1. Introduction

DeepDigit Limited proposes the design and development of a Colosseum Audio Tour Guide mobile application that lets visitors explore the Colosseum in Rome, Italy independently, using a ticket token instead of a visitor account.

A visitor receives a printed ticket from the Colosseum admin, containing a unique token. The visitor opens the app, enters the token, and starts the tour directly — no account registration is required. During the active tour, the app shows the visitor's current position, the Colosseum's Points of Interest (POIs), and the intended route on an interactive, floor-aware map. As the visitor approaches a configured POI — outdoors near the entrance or indoors on the Ground/Arena, First, Second, or Hypogeum level — narration plays automatically through the visitor's earphones, guiding them through the complete walkthrough hands-free, with manual playback controls always available.

The experience is offline-first: once a tour is downloaded, the map, floor detection, and audio narration all continue to work with zero internet connection. GPS alone is unreliable across the Colosseum's multiple stone levels and the underground Hypogeum, so the app pairs GPS with floor-based room detection built on a customized OpenStreetMap dataset (see Section 4) to determine which level and POI the visitor is near.

A secure web-based administration portal lets authorized administrators manage tickets, floors, POIs, coordinates, trigger radii, audio, language variations, route order, and publication status. Because tour content and tickets are centrally managed, updated narration, corrected POI data, and new tickets can be released without rebuilding the mobile application.

This proposal defines one complete MVP scope — the full, production-ready platform the client needs for the Colosseum pilot — delivered in 8 weeks. The design remains modular so future attractions, accounts, analytics, AI, or AR features can be added later without replacing the core platform.

2. Visitor Experience

Visitor access is ticket-token based rather than anonymous or account-based. The normal journey is: Receive Ticket → Open App → Enter Token → Start Tour → Use Audio Guide.

Visitor Capability	Visitor Experience
Receive a ticket	Visitor is given a printed ticket containing a unique token, issued by the Colosseum admin.
Enter ticket token	Enter the printed token in the app to unlock and start the Colosseum tour.
View tour overview	Review the tour overview, available languages, and download status before starting.
Confirm entry point	Confirm the visitor is at the Colosseum so the app loads the correct approach map, floor plans, POIs, route, and narration.
Start the tour	Begin the active tour after accepting location permission and any essential visitor notice.
See current position	View the device's current location and current floor on the Colosseum map.

Visitor Capability	Visitor Experience
View map and POIs	See the current-floor map, marked POIs, current destination, and route.
Hear automatic narration	Walk through the entire tour hands-free using earphones — narration plays automatically as the visitor nears each POI, floor by floor.
Control audio manually	Play, pause, resume, seek, and replay narration at any time.
Track tour progress	See overall progress and the status of visited, current, and upcoming POIs.
Resume a tour	Continue an interrupted tour using locally saved progress.
Choose a language	Select from the language options published for the tour.
Prepare for offline use	Download tour content — map, floor plans, and audio — in resumable chunks before starting.
Complete the tour	Reach the end of the route and view a clear completion summary.

3. Functional Requirements

The following functions operate the platform behind the visitor experience — administration, ticketing, content control, floor/GPS configuration, and security.

A. Admin Authentication

- Secure sign-in — only authorized administrators can access the admin portal.
- Session and credential protection, with encrypted network communication.

B. Ticket & Token Management

- Admin generates tour tickets, each carrying a unique token.
- Tickets are printable for on-site distribution to visitors.
- Admin can view ticket status — issued, used, or expired.
- The visitor's token entry is validated against the backend to unlock the tour.

C. Site & Floor Management

- Configure the Colosseum's site identity, description, and publication status.
- Manage each floor's map (Ground/Arena, First Level, Second Level, Hypogeum) using the customized OpenStreetMap floor-plan layer.
- Published floor and POI updates sync to the app without a mobile rebuild.

D. POI Management

- Create, edit, delete, publish, or reorder POIs for each floor.
- Maintain POI name, description, images, and associated narration.
- The portal flags missing coordinates, radius, or audio before publishing.

E. GPS / Floor-Based Trigger Configuration

- Administrator sets each POI's floor, coordinates, and trigger radius.
- The mobile app performs proximity detection locally during the active tour (see Section 4).

F. Route Management

- Define and reorder the POI sequence for each floor of the Colosseum.

G. Audio Management

- Upload and manage narration files per POI and language, streamed in chunks so large files upload reliably.
- Full hands-free walkthrough narration through earphones is a standard, included capability — not an optional module.

H. Language Management

- Manage language-specific text and audio variations.
- Visitors only see language options with complete, published content.

I. Content Publishing

- Draft-and-publish workflow — administrators prepare changes before releasing them.
- Versioned sync — the app downloads only the content that changed.

J. Backend & Data Management

- Next.js handles the admin portal and all server-side/API logic in a single codebase — no separate backend server is required.
- PostgreSQL with PostGIS stores floor, POI, ticket, and content data, with spatial indexing for proximity queries.
- Local mobile storage (SQLite/Drift) holds downloaded tour packages and progress on-device.

K. Media & Storage

- Audio and images are stored in object storage and delivered through a CDN.
- Uploads and downloads happen in validated, streaming chunks.

L. Security

- HTTPS for the mobile app, portal, API, and content sync traffic.
- Authentication, authorization, input validation, secure secrets, and backups.
- Only the location permission needed for the tour is requested; ticket tokens are validated securely.

4. Technical Architecture

The platform uses a deliberately simple stack: one mobile codebase, one server-side codebase, and one database — enough to run the complete MVP on a single VPS.

Component	Technology	Purpose
Mobile Application	Flutter + Dart	One codebase for Android and iOS.
Admin Portal + Backend	Next.js + TypeScript	A single Next.js codebase handles both the admin interface and all server-side/API logic — no separate backend server (such as .NET) is needed, which keeps hosting to one VPS and avoids extra server cost.

Component	Technology	Purpose
Database	PostgreSQL + PostGIS	Structured data with spatial indexing for POI and floor-plan proximity queries.
Mobile Local Data	SQLite / Drift	Downloaded tour content, ticket state, and progress stored on-device.
Positioning & Map	GPS + Accelerometer + Gyroscope + Magnetometer + Barometer + Custom Floor/Zone Map (OpenStreetMap-based)	Outdoor-to-indoor floor and position detection via on-device sensor fusion and map matching; see explanation below.
Voice Guidance	On-device text-to-speech / audio playback	Plays narration automatically through earphones for a full hands-free walkthrough — included as standard.
Media Delivery	Object storage + CDN	Scalable audio/image delivery, kept separate from API traffic.
Deployment	Single managed VPS	Runs the Next.js backend and PostgreSQL/PostGIS database together.

How Floor-Based Detection and GPS Work Together

Positioning uses GPS together with the phone's built-in motion and environmental sensors, matched against a custom floor/zone map built on OpenStreetMap — no dedicated indoor hardware, such as BLE beacons, is required.

- **GPS** — reliable outdoors (entrance/approach), degrades sharply indoors under stone cover. Used to hand off from outdoor to indoor mode, not for indoor position itself.
- **Barometer** — the key for floor detection. Air pressure changes measurably with altitude (~12 Pa/m), so a barometer can detect a floor change even a few metres apart — the same principle phones already use for "floors climbed." It needs one reference calibration (e.g. baseline pressure recorded at the entrance/Ground level) and each floor's known height offset stored in the admin portal.
- **Accelerometer + Gyroscope** — together give pedestrian dead reckoning (PDR): step counting, step length estimate, and turn detection. This tracks relative movement from a known starting point.
- **Magnetometer** — gives compass heading to keep the dead-reckoning direction anchored, usually fused with the gyroscope for stability.
- **Custom floor/zone map** — this is what makes the whole thing usable — raw PDR drifts over distance (typically 5–10% of distance walked), but map matching, snapping the estimated position onto valid walkable paths/rooms on the custom floor plan, constrains that drift. Each time the visitor is confirmed near a configured POI, that also acts as a natural re-anchor point, resetting accumulated error.

Known Constraints & Calibration Notes

- **Barometer drift over a long visit** — weather pressure changes during a multi-hour tour can shift the baseline — mitigated by periodically re-anchoring off a POI proximity match.
- **Magnetometer interference from stone/metal** — rebar, railings, and restoration ironwork are common in historic structures and can distort heading — this is exactly what the real-site calibration week (see Section 5) is meant to catch and tune.

5. MVP Scope & 8-Week Timeline

This proposal defines a single, complete MVP delivery — everything below ships together in 8 weeks. There is no phased rollout; expansion beyond this scope would be scoped and quoted separately if the client requests it later.

Included in the MVP

- Ticket/token-based visitor access (no account registration).
- Floor-aware offline map built on a customized OpenStreetMap dataset.
- GPS and floor-based POI detection, indoors and outdoors.
- Full hands-free audio walkthrough via earphones, with manual playback controls.
- Tour progress tracking and resume.
- Offline tour download and multi-language foundation.
- Admin portal — ticket generation, floors, POIs, routes, audio, and publishing.
- Next.js backend with PostgreSQL/PostGIS.
- Security, testing, field calibration, deployment, and handover.

Not Included

- BLE beacon hardware, AI tour guide, AR experiences, advanced analytics, social sharing, and paid/multi-attraction ticketing beyond token-based tour access — available as future expansion.

Timeline

Week	Deliverables
Week 1	Requirements confirmation, architecture setup, UI/UX direction, Flutter and Next.js project scaffold.
Week 2	Ticket/token system, admin authentication, floor and POI data model, offline map integration.
Week 3	GPS and floor-based POI trigger logic, local database, automatic earphone audio playback, progress tracking.
Week 4	Admin portal — floors, POIs, routes, ticket generation, audio upload, publishing workflow.
Week 5	Object storage and CDN integration (chunked streaming), multi-language foundation, security hardening.
Week 6	Device QA (Android/iOS), GPS and floor-detection simulation testing, integration testing.
Week 7	Real-site walking test at the Colosseum, radius and floor calibration, offline-recovery testing.
Week 8	UAT, bug fixes, production deployment, documentation, and handover.

Schedule assumption: the 8-week estimate depends on prompt client feedback, approved content, timely site access, and developer accounts. App-store review time remains outside the development team's direct control.

6. Cost Breakdown

The proposed MVP contract value is BDT **2,50,000**, covering the complete scope defined in this proposal.

6.1 Development Cost by Category

Category	Cost (BDT)
Requirement Analysis & Architecture	15,000
UI/UX Design	20,000
Mobile Application Development (Android + iOS, Flutter — incl. floor-based detection and full earphone walkthrough)	95,000
Admin Portal + Backend Development (Next.js — admin UI, API, database integration)	70,000
Floor-Based Map & Customized OpenStreetMap Integration	25,000
Ticket & Token System (generation, print support, verification)	12,500
QA, Field Calibration, Deployment & Handover	12,500
TOTAL MVP DEVELOPMENT COST	2,50,000

Included delivery coverage: GPS/floor-based POI trigger logic, offline map integration, ticket/token handling, audio playback, quality assurance, field testing, deployment, and documentation are included within the categories above — none are charged as separate line items.

6. Suggested Payment Milestones

Project Initiation — 25%	Requirement Analysis & Architecture + UI/UX Design + Initial Mobile App Development	₹62,500
Mobile Application Development — 25%	Major Mobile Application Development Progress	₹62,500
Core System Development & Demo — 25%	Remaining Mobile Development + Major Admin Portal & Backend Development	₹62,500
UAT & Production Delivery — 25%	Remaining Backend + Map Integration + Ticket System + QA, Deployment & Handover	₹62,500

6.3 Hosting & Infrastructure

The client provides and pays for VPS hosting and domain registration directly — these are not part of the BDT 2,50,000 development cost. A single VPS (recommended: 4 vCPU / 8 GB RAM / 200 GB NVMe) is sufficient to run the Next.js backend and PostgreSQL/PostGIS database together — no second server is required.

6.4 Post-Launch Maintenance

A separate ongoing service fee of BDT 5,000 per month applies after production delivery, charged monthly from the go-live date. It covers routine monitoring, minor bug fixing, basic technical support, and minor configuration adjustments. New features, major design changes, extensive content entry, and third-party provider charges are not included.

6.5 Not Included / Third-Party and Content Costs

- Professional voice-over artists, recording studio, and narration production.

- Narration script writing, translation, and language-quality review.
- Photography, videography, 3D assets, and media rights.
- Apple Developer Program, Google Play Console, and other developer/publishing account fees.
- VPS hosting and domain registration — provided and paid for directly by the client (see 6.2).
- BLE beacon hardware — not required for this MVP's floor-based detection approach.
- AI, AR, advanced analytics, and ticketing/payment features beyond token-based tour access.
- Travel, accommodation, or site-survey expenses unless expressly agreed.
- VAT, withholding tax, duties, and other statutory charges where applicable.

7. Assumptions

- Client supplies approved Colosseum site text, historical information, narration scripts, translations, voice recordings, images, and branding.
- Client provides and pays for VPS hosting and domain registration directly.
- Applications are submitted through client-owned and verified Google Play and Apple developer accounts.
- Client provides consolidated feedback and approvals within agreed review windows; material rework after approval is managed through change control.
- Client provides safe, timely access to the Colosseum (including the Hypogeum where tour access permits) for GPS walking tests and floor calibration.
- Reproducible defects within the accepted MVP scope are covered by a 30-calendar-day post-launch defect warranty; routine maintenance thereafter is BDT 5,000 per month.

8. Conclusion

The Colosseum Audio Tour Guide is technically feasible as a single-attraction pilot, delivered as one complete MVP in 8 weeks for BDT 2,50,000. Visitors access the tour with a simple printed ticket token instead of an account, and are guided hands-free through the Colosseum via earphone narration, a floor-aware offline map built on a customized OpenStreetMap dataset, and automatic GPS and floor-based POI detection — all working with zero internet connection once downloaded.

A single Next.js codebase powers both the admin portal and the backend, keeping hosting to one VPS — paid directly by the client — and avoiding the cost of a separate application server. Authorized administrators can generate tickets and publish new POIs, coordinates, radii, audio, and languages without rebuilding the mobile application.

With appropriate site access, device testing, and agreed acceptance criteria, this MVP delivers a reliable, client-manageable self-guided visitor experience that works everywhere in the Colosseum — connected or not, indoors or out.

9. Confidentiality & Proposal Policy

9.1 Confidential Nature

This proposal contains confidential commercial, technical, architectural, and financial information prepared by DeepDigit Limited for the proposed Colosseum Audio Tour Guide project.

9.2 Restricted Distribution

This document is intended only for the client and their authorized advisers or representatives who require access for evaluation of the proposed engagement.

9.3 Intellectual Property

Upon full payment, all final software deliverables, including source code, mobile application, admin portal, backend, database, designs, and documentation developed for this project shall become the exclusive property of the Client.

DeepDigit Limited will provide all relevant project files, source code, and technical handover materials to the Client. Third-party tools and open-source components remain subject to their respective licenses.

9.4 Proposal Validity

The commercial estimate and delivery assumptions remain valid for 30 calendar days from the proposal date unless extended in writing.

9.5 Scope Changes

A material change to ticket volume, POI or floor count, languages, content responsibilities, or other requirements may require a revised estimate, schedule, or change request.

9.6 Final Contract

This proposal does not replace the final signed development agreement, Statement of Work, or other binding contract unless the parties formally accept it as such in writing. The final contract will govern scope, deliverables, acceptance, payment, ownership, warranties, liability, confidentiality, and change control.