TINKERING PROJECT REPORT

On

KalaSetuGram – A Digital Village for Andhra Pradesh Artisans and Heritage

A report submitted in partial fulfilment of the requirements for the Award of a Degree of

BACHELOR OF TECHNOLOGY

in

COMPUTER SCIENCE AND ENGINEERING

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Submitted by

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Regd. No.: 23A51A05P4, 23A51A05Q1, 23A51A05P8,23A51A05NO

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(An Autonomous Institution)

Approved by AICTE, Permanently Affiliated JNTUGV, Vizianagaram, Accredited by NBA (Tier – 1) and NAAC with Grade 'A+'

K. KOTTURU, TEKKALI-532201, Srikakulam (Dist.), Andhra Pradesh, India

2025-2026

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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TEKKALI

This is to certify that the "Tinkering Project Report" submitted by PENTA ABHIRAM [23A51A05Q1], YOGESH THAKUR [23A51A05P4], ATTADA SAI KOUSHIK [23A51A05P8], M.JASWANTH [23A51A05N0] is work done by them and submitted during the 2025- 2026 academic year, in partial fulfilment of the requirements for the award of the degree of BACHELOR OF TECHNOLOGY in COMPUTER SCIENCE AND ENGINEERING, at Aditya Institute of Technology and Management, Tekkali, Srikakulam.

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ABSTRACT

In the age of digital globalization, traditional artisans and cultural communities of Andhra Pradesh face an increasing risk of being left behind due to limited online visibility and market accessibility. KalaSetuGram addresses this challenge by proposing an AI-powered digital ecosystem that connects artisans, students, tourists, and global consumers through modern technology.

The project envisions a Digital Craft Village that goes beyond conventional e-commerce platforms. It integrates AI-driven recommendation models for personalized product discovery, interactive storytelling interfaces to share artisan journeys, and a social impact dashboard to promote transparent and sustainable engagement. Each artisan receives a dedicated digital space to showcase their skills, products, and cultural stories, turning local craftsmanship into a meaningful and interactive experience.

The system architecture combines machine learning algorithms (Random Forest, KMeans Clustering, and Hybrid Recommenders) with a real-time, responsive interface to tailor suggestions based on user interests, demographics, and behavior. Through this framework, KalaSetuGram enhances craft discoverability and strengthens cultural connections between artisans and modern audiences.

The prototype demonstrates how modern computing can empower cultural sustainability by bridging tradition and technology. It fosters economic inclusion, heritage preservation, and digital empowerment—creating a smart, scalable model for promoting India’s living traditions in the digital era.

OBJECTIVE OF THE PROJECT

India's traditional crafts are a living testimony to its cultural diversity and artistic excellence. However, artisans across Andhra Pradesh face challenges such as limited digital presence, restricted market access, and diminishing intergenerational engagement. KalaSetuGram aims to bridge this cultural and digital divide by building a smart, inclusive, and technology-driven heritage ecosystem.

The primary objectives of the project are as follows:

1. **To preserve and promote traditional craftsmanship** — by creating a unified digital platform that documents, visualizes, and markets Andhra Pradesh's diverse art forms such as Kondapalli toys, Kalamkari, Etikoppaka lacquer work, and Bobbili veena.
2. **To empower artisans through digital inclusion** — by providing them with a personal digital identity, interactive storytelling tools, and direct market access without intermediaries.
3. **To enhance user engagement through intelligent systems** — by integrating AIdriven recommendation models that personalize content and craft suggestions according to user preferences.
4. **To implement AI-based personalization** — by developing a recommender system that curates craft suggestions and cultural stories based on user interests, demographics, and browsing patterns.
5. **To foster cultural education and awareness** — by making heritage interactive and accessible for students, researchers, and tourists through data-driven storytelling and impact analytics.
6. **To promote sustainable livelihoods** — by linking cultural preservation with economic opportunity, ensuring fair income for artisans and long-term viability of traditional art forms.
7. **To build a scalable and replicable digital model** — that can be extended to other states or craft clusters, contributing to India's vision of digital empowerment and smart cultural tourism.

Through these objectives, *KalaSetuGram* demonstrates how innovation and technology can transform cultural preservation into a dynamic, inclusive, and future-ready digital ecosystem.

KEY OUTCOMES OF PROTOTYPE DEVELOPED

The developed prototype of KalaSetuGram demonstrates a functional, user-centered digital ecosystem that bridges artisans and consumers through modern technology and cultural storytelling. It showcases how Artificial Intelligence (AI) and digital innovation can transform traditional handicrafts into interactive, market-ready digital experiences while preserving their authenticity.

The following are the major outcomes of the prototype:

1. **Digital Artisan Village Platform:**
   A unified and interactive web/mobile application that provides artisans with individual digital profiles featuring their stories, craft techniques, and product listings. Each profile acts as a virtual "home" in the KalaSetuGram digital village.
2. **AI-Powered Recommendation Engine:**
   The system uses machine learning models—such as K-Means Clustering and Collaborative Filtering—to suggest crafts, souvenirs, and stories based on user preferences, browsing patterns, and purchase behavior, thereby enhancing personalization.
3. **Impact Dashboard and Analytics:**
   A social impact panel displays metrics such as the number of artisans supported, carbon footprint saved through digital transactions, and revenue generated for heritage clusters, promoting transparency and awareness.
4. **Responsive and Inclusive Design:**
   Built with modern web technologies, the system adapts seamlessly to various devices—desktops, tablets, and smartphones—ensuring accessibility for users across different age groups and geographies.
5. **Empowerment through Technology:**
   The project successfully demonstrates that by merging innovation with culture, traditional artisans can be empowered to reach global audiences, improve their income, and preserve the intangible heritage of Andhra Pradesh.

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1. INTRODUCTION

1.1 Relevance of Tinkering and Innovation in Engineering

Tinkering lies at the heart of engineering innovation. It encourages experimentation, creativity, and problem-solving through hands-on exploration. In the context of modern engineering education, tinkering nurtures curiosity, adaptability, and the confidence to transform abstract ideas into tangible solutions.

The KalaSetuGram project was born out of this spirit of innovation. It originated as an attempt to address a social and technological challenge — the diminishing visibility of traditional artisans in the digital world. By applying the principles of tinkering, the team explored how technology could be used not merely to sell crafts, but to preserve culture, empower artisans, and connect heritage with modern digital users.

This successful venture demonstrates how engineering innovation, rooted in the principles of continuous prototyping and iteration, can deliver impactful solutions that advance both technology and social good by empowering artisans and connecting heritage with contemporary digital users.

Through multiple rounds of brainstorming, prototyping, and iteration, the team combined technologies such as Artificial Intelligence (AI), machine learning, and web-based systems to create an intelligent cultural platform. This approach demonstrates how engineering principles can be applied to design impactful solutions that serve both technological advancement and social good.

1.2 Problem Statement and Motivation Behind the Project

India’s cultural heritage is deeply rooted in its traditional crafts and artisan communities. The state of Andhra Pradesh is home to numerous unique art forms such as Kondapalli toys, Kalamkari paintings, Etikoppaka wooden crafts, and Bobbili veenas. However, these crafts are increasingly at risk due to modernization, declining artisan incomes, and limited access to digital markets.

Most existing online platforms focus primarily on product sales, offering little space for cultural storytelling or artisan visibility. As a result, artisans often remain economically marginalized and disconnected from contemporary audiences who value authenticity and tradition. Students and younger generations, too, lack accessible platforms to explore and appreciate this living heritage.

The KalaSetuGram project aims that system leverages AI-driven recommendation and personalization, story-based digital profiles, and data analytics to provide an engaging experience for users while improving market reach and income opportunities for artisans.

Thus, the project is motivated by two key objectives:

1. To digitally empower local artisans through technology-driven inclusion and visibility.
2. To preserve and promote cultural heritage by presenting crafts through meaningful storytelling, education, and interactive user engagement.

Problem Statement

Traditional artisans in Andhra Pradesh lack a centralized, intelligent, and interactive digital platform that promotes their crafts, connects them to a global audience, and supports sustainable livelihoods. The absence of such a system leads to limited awareness, reduced market reach, and gradual loss of cultural heritage.Culturally, the economic decline translates directly into the risk of a gradual, irreversible loss of cultural heritage, as the viability of passing down centuries-old skills and knowledge to the next generation diminishes, threatening the very essence of Andhra Pradesh's traditional arts.

KalaSetuGram addresses this problem by designing an AI-enabled digital village that links artisans, students, and consumers through cultural storytelling, personalized recommendations, and transparent impact measurement—ensuring that technology serves as a bridge between tradition and modernity.Through the use of advanced technologies, the platform integrates cultural storytelling to add emotional and historical context to the crafts, utilizes personalized recommendations driven by Artificial Intelligence to match buyers with perfect products, and ensures full transparent impact measurement to show consumers the direct benefit of their purchase on the artisans' lives. In essence,
KalaSetuGram leverages the power of technology not merely for commerce, but as a robust tool for cultural preservation and economic empowerment.

2. LITERATURE SURVEY — INSIGHTS

The literature on digital heritage, artisan empowerment, and personalized e-commerce highlights three consistent trends that directly inform the design and priorities of KalaSetuGram:

- digital technologies — especially AI and machine learning — are increasingly used to preserve and make cultural content accessible;
- niche e-commerce and storytelling add measurable value for artisans by improving market reach and buyer trust;
- recommender and personalization techniques are effective at increasing engagement with cultural products, but must be implemented responsibly to avoid bias and loss of authenticity.

1. Tagbin (2025) — AI, AR, VR, and Interactive Storytelling

Tagbin's work highlights how India's traditional arts and crafts are under threat due to modernization and limited digital presence. Their study shows that immersive tools—such as AI-powered interactive learning, AR, VR, and digital avatars—play a crucial role in preserving cultural identity and engaging younger audiences. Advanced technologies like 3D digital replicas and virtual museum experiences are presented as essential methods for safeguarding cultural assets in modern contexts. [1]

2. ToI (2025) — AR/VR Accessibility in Indian Heritage Sites

The Times of India report examines early-stage implementations of AR/VR in cultural sites such as the Ajanta and Ellora caves. Findings highlight that immersive technologies democratize access by allowing users to experience heritage virtually. However, adoption in India is still limited, indicating a need for scalable systems that merge authenticity with educational value. [2]

3. Plutus IAS (2025) — AI, 3D Scanning, and GIS

Plutus IAS documents the rapid integration of advanced tools like AI, 3D scanning, and GIS mapping in national heritage preservation efforts. With a database of over two lakh antiquities, the report emphasizes how these technologies enable efficient documentation, risk prediction, and modernization of preservation practices. [3]

4. Rana (2024) — 3D Scanning and VR for Traditional Crafts

Rana focuses on the digital preservation of India's traditional crafts using high-fidelity 3D scanning and VR modeling. The study stresses that digital replicas not only prevent the disappearance of endangered crafts but also make them accessible for educational and cultural experiences. [4]

5. IndieHaat (2025) — Hyper-local Storytelling in E-commerce

IndieHaat presents an e-commerce model where cultural products are supported by narratives about artisans, villages, and traditional techniques. Their findings show that hyper-local storytelling builds consumer trust, sets platforms apart from mass-market competitors, and ensures fair compensation for artisans by eliminating intermediaries. [5]

6. Shaumya et al. (2025) — AR Applications in Cultural Education

Shaumya and colleagues conducted a systematic review of AR in cultural learning environments, analyzing 309 student evaluations. Results show that AR enhances challenge, engagement, and knowledge acquisition. The study suggests that future cultural heritage platforms should combine immersive experiences with clear educational outcomes. [6]

7. TITO et al. (2025) — Direct E-commerce Links for Artisans

TITO and collaborators built a MERN-based e-commerce platform designed to connect artisans directly with customers. By removing middlemen and using modern digital interfaces, the platform promotes fair compensation and strengthens the cultural and economic sustainability of artisan communities. [7]

8. Sharma & Rao (2022) — Cloud-Based Marketplaces for Artisan Empowerment

Sharma and Rao analyze how cloud-based digital marketplaces can empower Indian artisans by expanding their market reach, improving visibility, and reducing dependence on traditional intermediaries. Their findings show that cloud platforms enable real-time inventory management, transparent pricing, and scalable product showcases. The study highlights that digital marketplaces are essential for strengthening artisan livelihoods and integrating traditional crafts into contemporary digital economies. [8]

9. Singh & Mehta (2023) — Digital Age Challenges for Local Cultural Communities

Singh and Mehta examine how digital technologies reshape cultural heritage management, focusing on both opportunities and challenges faced by local communities. They argue that digital tools—such as virtual documentation, online archives, and social platforms—enable broader cultural dissemination. At the same time, they caution that communities must be supported to prevent digital exclusion and ensure cultural authenticity. This reinforces the need for heritage platforms that balance technological advancement with communitycentered approaches. [9]

10. Government of India (2021) — Handicrafts of Andhra Pradesh: A Resource Compendium

This governmental compendium provides an authoritative documentation of diverse crafts across Andhra Pradesh, detailing techniques, artisan clusters, raw materials, and cultural significance. The resource serves as a key reference for understanding regional craft diversity and highlights the urgency of systematic preservation strategies. For digital heritage systems, it underscores the importance of comprehensive databases that accurately represent craft traditions at the state and district levels. [10]

11. UNESCO (2021) — Safeguarding Intangible Cultural Heritage in Digital Settings

UNESCO's report explores global strategies for preserving intangible cultural heritage—such as performing arts, oral traditions, and craftsmanship—in the digital environment. It highlights the need for ethical documentation, community consent, and sustainable digital storage practices. The report demonstrates that digital transformation must protect both cultural expression and cultural rights, reinforcing the need for responsible, inclusive digital preservation models. [11]

12. Mishra (2020) — Sustainable Livelihoods through Digital Transformation

Mishra's study focuses on how digital tools support sustainable livelihood opportunities for artisans in India. By examining digital training, online marketing, and mobile-based financial access, the study shows that digital transformation significantly boosts income stability and market participation. Mishra argues that long-term artisan sustainability depends on integrating digital skills with traditional craft practices, creating hybrid pathways for economic resilience. [12]

Gaps identified (opportunities for KalaSetuGram)

1. **Context-aware personalization for cultural goods** — Few platforms adapt recommendations to user intent (educational vs. souvenir purchase) while preserving cultural variety. KalaSetuGram can prioritize intent-sensitive recommenders.
2. **Ethical, community-led metadata practices** — Many digitization projects lack community involvement in how data and stories are framed. KalaSetuGram should co-create artisan profiles and consented narratives.
3. **Integrated social-impact metrics** — While marketplaces highlight sales, fewer provide transparent impact dashboards (income share, artisans reached). Embedding impact reporting will strengthen trust and differentiation.
4. **Localized discoverability** — Existing platforms often aggregate broadly; KalaSetuGram can focus on fine-grained regional clusters and craft technique taxonomies to improve search and cultural discovery.

Implications for KalaSetuGram design

- Build a hybrid recommender (collaborative + content features) tuned to cultural attributes and user intent.
- Adopt responsible AI practices: transparency, data governance, and community consent mechanisms.
- Emphasize storytelling and provenance in product listings to increase buyer trust and artisan value capture.
- Seek institutional partnerships and standardized metadata workflows to scale digitization sustainably.

3. METHODOLOGY / APPROACH

The development of KalaSetuGram followed the Design Thinking methodology, an iterative, human-centered approach that combines creativity and analytical reasoning to solve real-world problems. This framework ensures that technological solutions are built around genuine user needs — in this case, the artisans, students, and consumers of cultural heritage.

The methodology was divided into five key phases: Empathize, Define, Ideate, Prototype, and Test. Each phase contributed to shaping the project from concept to functional implementation.

1. Empathize

The first stage focused on understanding the real challenges faced by artisans, cultural organizations, and buyers of traditional crafts.

- **Primary Research:** Discussions were held with artisans, local vendors, and cultural enthusiasts to understand barriers in marketing, digital literacy, and access to fair trade opportunities.
- **Secondary Research:** A review of existing platforms such as government portals and commercial craft marketplaces revealed that most lacked personalization, transparency, and direct artisan representation.

Key Insights:

- Artisans require a system that simplifies product uploads, showcases their identity, and connects them directly with buyers.
- Buyers seek authenticity, verified artisan details, and storytelling behind the products they purchase.

This stage ensured that the platform’s design centered around both the artisan and the enduser experience.

2. Define

In this phase, the insights gathered were synthesized into a clear problem definition and a structured set of user requirements.

Problem Statement:

"Artisans and cultural creators in Andhra Pradesh lack a centralized, intelligent, and transparent digital platform that connects them directly with audiences while preserving cultural authenticity."

User Groups Identified:

User Type	Primary Need	Pain Points
Artisans	Fair market access, digital identity, and storytelling space	Lack of digital literacy, dependency on intermediaries
Consumers	Authentic crafts and direct cultural connection	Scattered online presence, limited personalization
Institutions	Visibility of regional crafts and preservation data	Lack of integrated digital archive

Defining these groups clarified the system's dual purpose — promoting cultural continuity and empowering artisans economically.

3. Ideate

The ideation phase involved brainstorming creative and technically feasible solutions that could meet the identified needs.

Multiple ideas were generated and evaluated, with focus on usability, scalability, and cultural sensitivity. The final design combined AI-powered personalization, digital storytelling, and impact tracking features to create an end-to-end digital heritage platform.

Key Concepts Finalized:

- **Digital Artisan Profiles:** Individual pages showcasing artisan stories, skills, and verified product catalogs.
- **Recommendation Engine:** AI models to suggest crafts and content based on user interests and demographics.
- **Impact Dashboard:** A transparent panel displaying artisan reach, sales metrics, and user engagement data.

- **Cloud-Based Database:** Real-time synchronization of artisan and product data with scalable cloud hosting.

This stage established the core architecture and feature set of KalaSetuGram.

4. Prototype

The prototype phase involved translating ideas into a working model through incremental development.

Each iteration added features and refined usability based on feedback from users and mentors. The prototype was built using web technologies (HTML, CSS, JavaScript) for the front-end, and a real-time cloud database (Firebase/Firestore) for secure and scalable data management.

Version-wise Development Summary:

Version	Feature Added	Purpose / Improvement
v1	Basic homepage, artisan listing, and navigation	Established user interface and content layout
v2	User login and registration system	Enabled secure access for artisans and buyers
v3	Recommendation module	Implemented AI-based personalization
v4	Dashboard and analytics	Enabled transparency in artisan engagement
v5	Cloud database integration	Achieved real-time data synchronization

Through this iterative process, the prototype matured into a reliable, scalable digital system capable of supporting real-world artisan communities.

5. Test

The testing phase validated the functionality, performance, and usability of the system.

Testing Procedures Included:

- **Functional Testing:** Verified login, registration, search, and recommendation operations.
- **Performance Testing:** Checked database response times and stability under multiple user sessions.
- **User Feedback:** Collected insights from artisans and students on usability and design clarity.

Key Observations:

- The interface was intuitive even for users with minimal digital experience.
- AI-based recommendations improved engagement and user satisfaction.
- Cloud synchronization ensured that data remained consistent and easily accessible.

Testing confirmed that KalaSetuGram fulfilled its primary objectives — improving visibility, ensuring fair digital participation, and promoting cultural sustainability through intelligent technology.

4. PROTOTYPE DEVELOPMENT

4.1 Iterations Made (Initial Design and Modifications)

The KalaSetuGram prototype was developed through a series of structured iterations, with each version introducing new functionality and refining the overall user experience based on continuous feedback. The goal was to design a system that is simple for artisans to use, intelligent in its recommendations, and transparent in its impact tracking.

Version-wise Development Summary:

Version	Features Added	Purpose / Improvement
v1	Basic homepage and navigation with artisan listings	Established the foundational layout and design flow
v2	User login and registration system for artisans and buyers	Enabled verified access and secure user management
v3	Product upload and storytelling module	Allowed artisans to share craft details and cultural narratives
v4	AI-based recommendation system	Introduced personalized content delivery for users
v5	Dashboard and analytics panel	Provided engagement metrics and social impact data
v6	Cloud database integration using Firebase/Firestore	Ensured real-time data synchronization and scalability
v7	Mobile-friendly responsive design	Enhanced accessibility and usability across all devices

Each version was tested for usability, performance, and consistency. Feedback from mentors and test users helped identify design gaps, optimize database efficiency, and improve navigation flow. These iterative enhancements led to a robust, user-friendly, and scalable prototype.

4.2 Description of the Final Prototype Built

The final prototype of KalaSetuGram is a web-based application that connects artisans, consumers, and cultural enthusiasts through an AI-driven digital ecosystem. It serves as a platform for artisans to showcase their products, share their craft stories, and reach buyers directly without intermediaries.

Key Functional Modules:

1. Artisan Registration and Profile Management:

   Each artisan can create a verified account and upload personal details, craft information, and contact data. The profile includes their craft story, materials used, and photographs of their products.

2. Product and Story Upload Module:

   Artisans can upload products with metadata (type, material, region, price range, and cultural background). This content feeds the storytelling and recommendation modules.

3. AI-Based Recommendation Engine:

   A hybrid model combining Collaborative Filtering and Content-Based Filtering was implemented. The system analyzes user behavior, search history, and preferences to recommend crafts and stories most relevant to their interests.

4. User Interaction and Search Features:

   The system provides advanced search and filtering based on category, region, craft type, and artisan name. This enhances discoverability and ensures that users can quickly access culturally relevant content.

5. Impact Dashboard and Analytics:

   A visual dashboard presents data such as the number of artisans onboarded, user visits, and craft engagement metrics. It also tracks social impact indicators, helping institutions and policymakers understand the platform's cultural and economic contribution.

6. Cloud Integration and Data Management:

   The backend uses Firebase Firestore for storing artisan and product data securely. Cloud hosting ensures real-time synchronization, low maintenance, and high scalability for future expansion.

7. Responsive Design:

   The system interface automatically adjusts to different screen sizes and devices. The responsive layout ensures accessibility for artisans and users across rural and urban areas.

4.3 Tools and Technologies Used

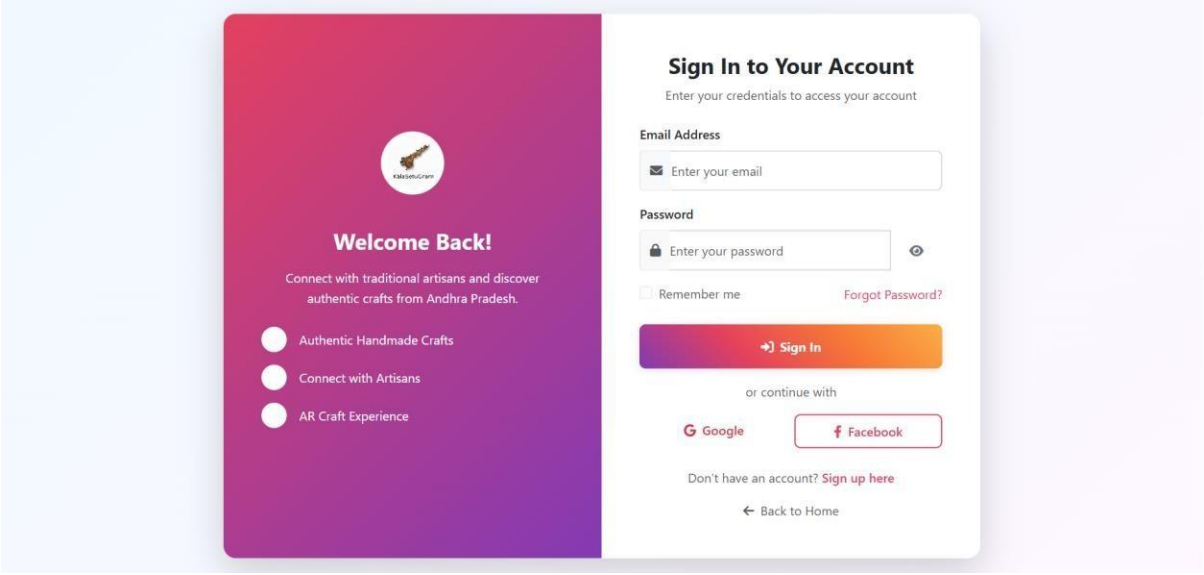
Component / Stage	Tool / Technology Used	Purpose / Justification
Frontend Development	HTML5, CSS3, JavaScript (ES6)	To build an interactive, responsive, and userfriendly web interface
Backend & Database	Firebase Firestore	For real-time cloud data storage and synchronization
Authentication	Firebase Authentication	To manage secure login for artisans and users
Hosting & Deployment	Netlify / Firebase Hosting	For scalable and fast web deployment
Prototyping & Design	Figma / Canva	For UI design consistency and layout planning
Development Environment	Visual Studio Code	For writing, debugging, and managing the codebase efficiently
Version Control	GitHub	To track changes and maintain collaborative versioning
Analytics Module	JavaScript DOM + Firebase Triggers	For collecting and displaying live engagement and usage data

The selection of these tools was guided by their reliability, cost-effectiveness, and ease of integration, ensuring that the project remains accessible for future student teams or institutional adoption.

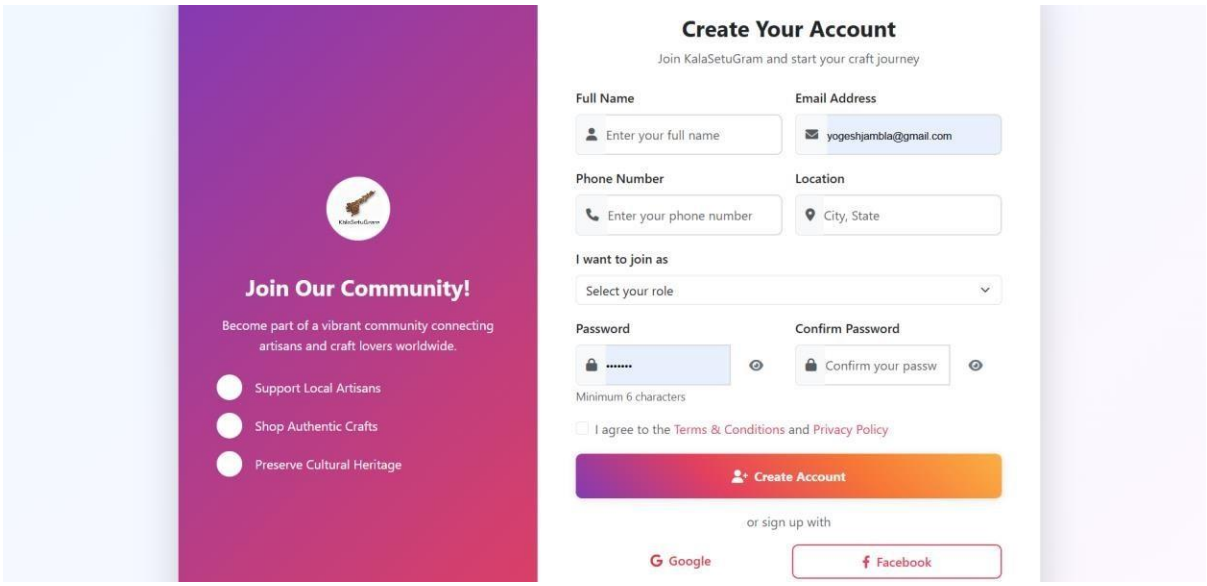
Summary

Through successive iterations and continuous refinement, KalaSetuGram evolved into a fully functional, scalable, and user-centric prototype. The system successfully bridges artisans and audiences through intelligent technology and storytelling. It demonstrates how an AI-enabled digital platform can preserve cultural heritage, strengthen artisan livelihoods, and modernize the presentation of traditional crafts in a global digital context.

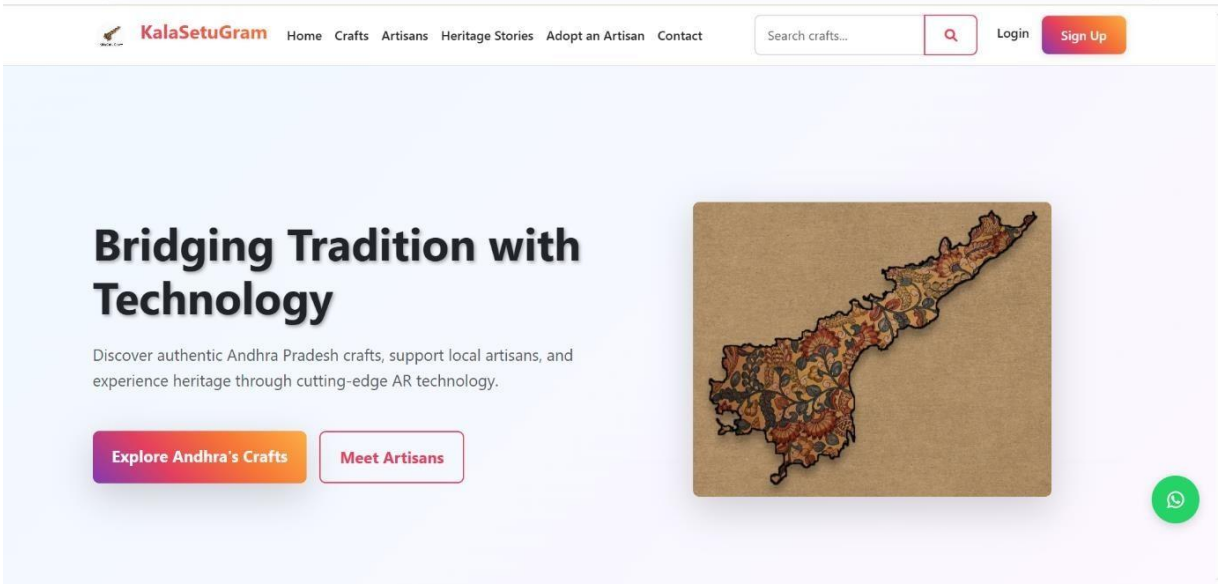
LOGIN PAGE:

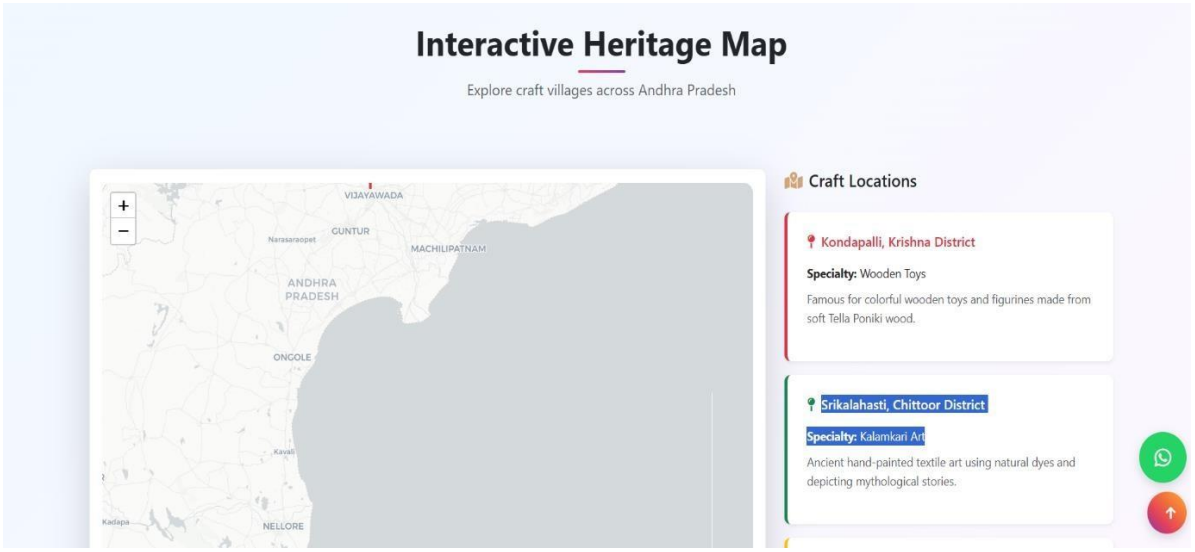


REGISTER PAGE:



HOME /LANDING PAGE :





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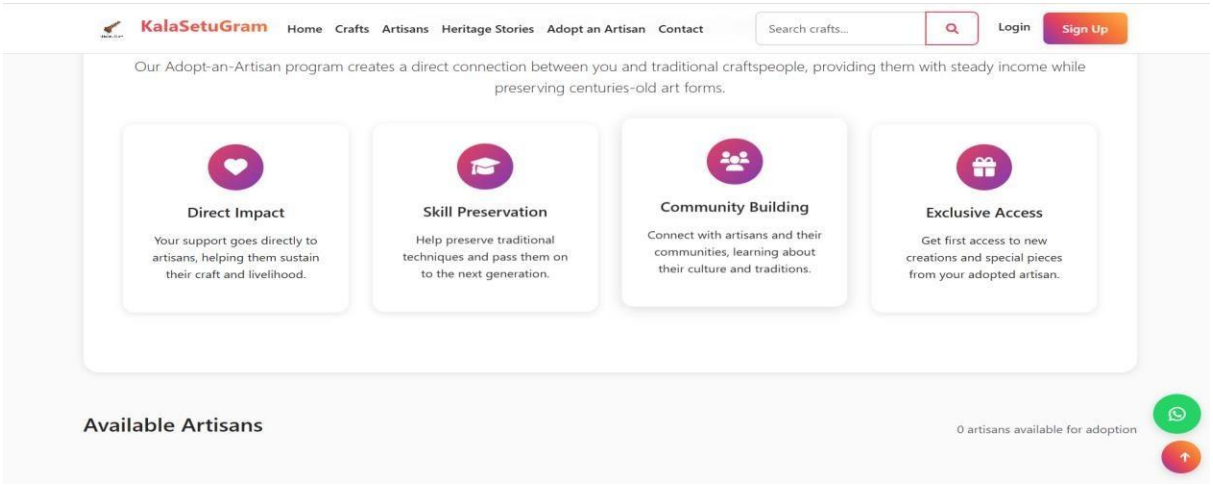
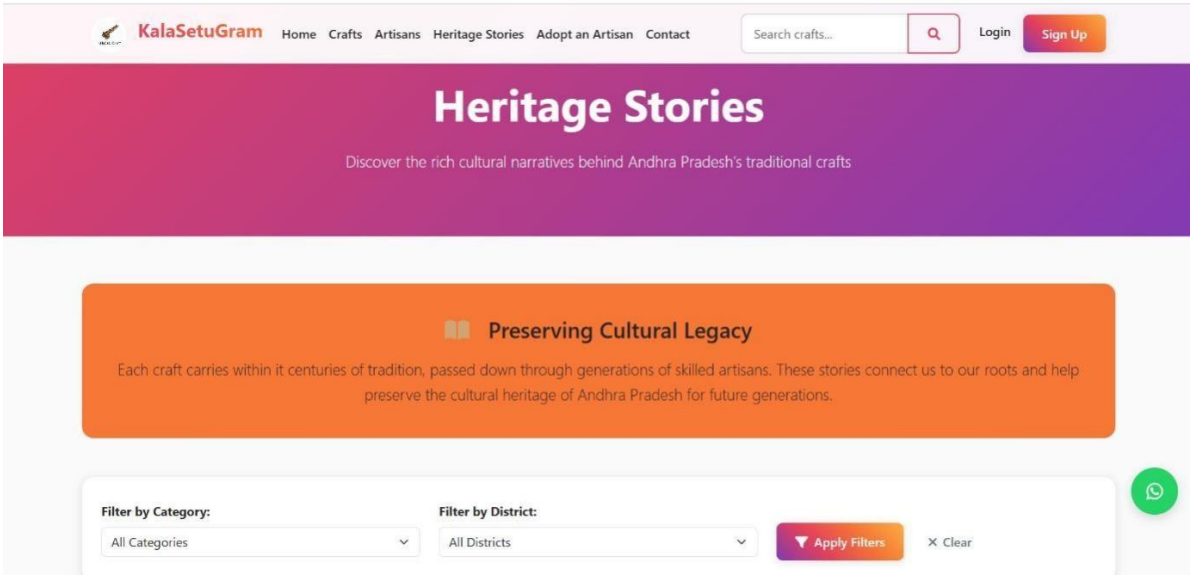
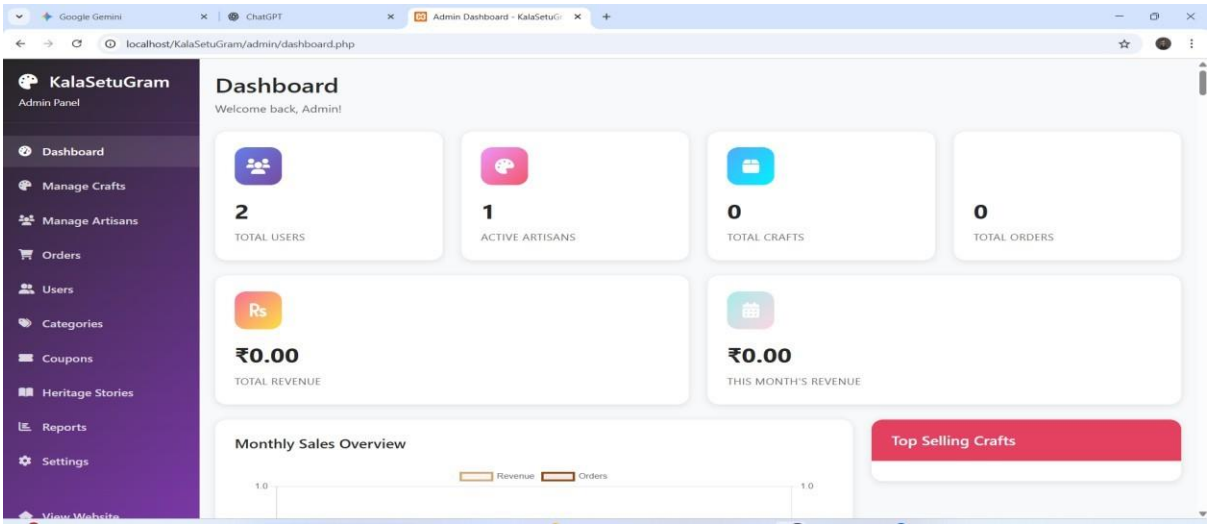
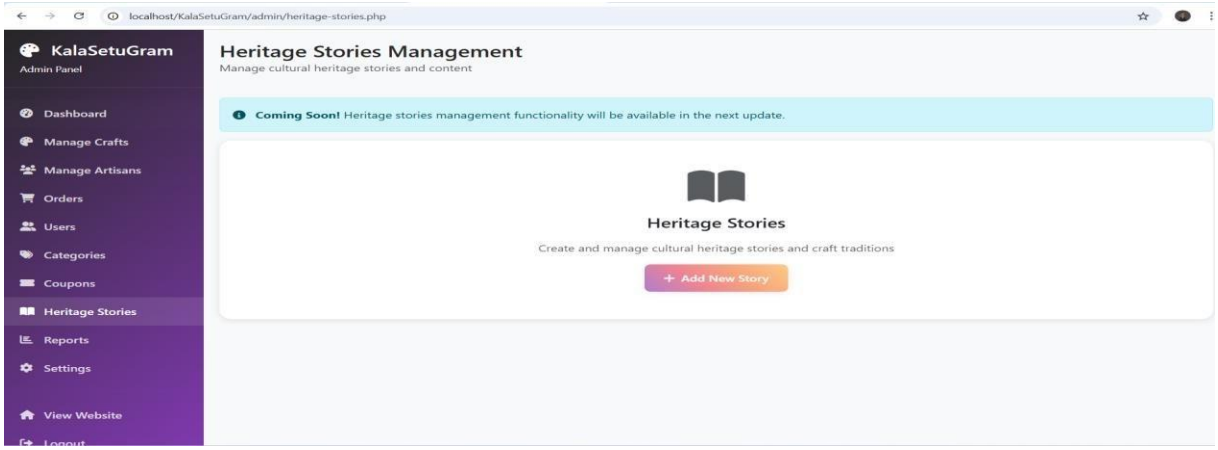


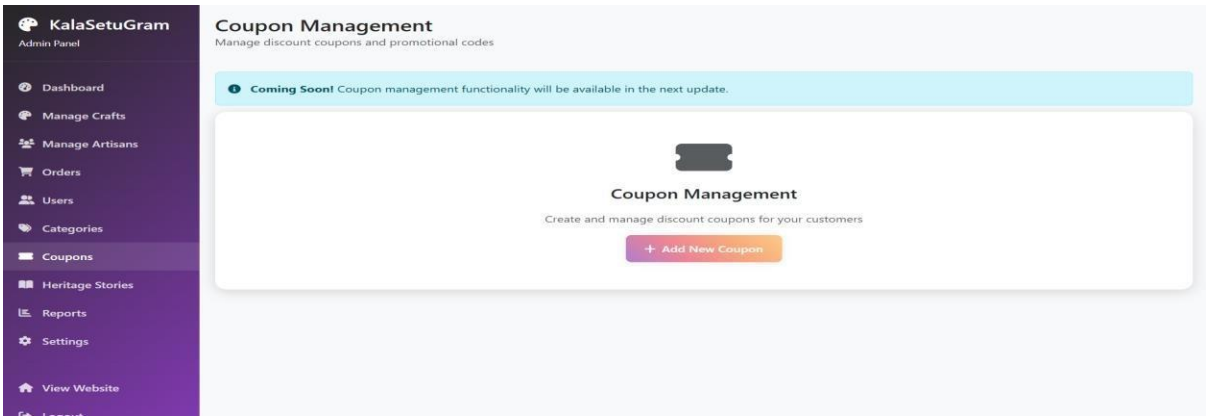
Heritage Stories:

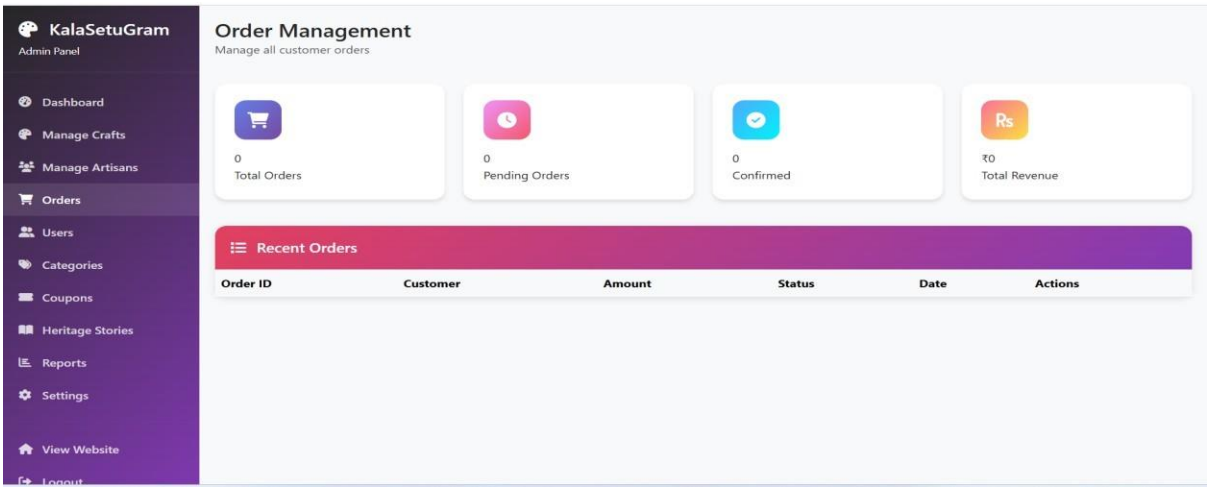


Admin Portal:








KalaSetuGram
Admin Panel
Dashboard
Manage Crafts
Manage Artisans
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View Website
Logout
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Manage all customer orders
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Recent Orders
Order ID
Customer
Amount
Status
Date
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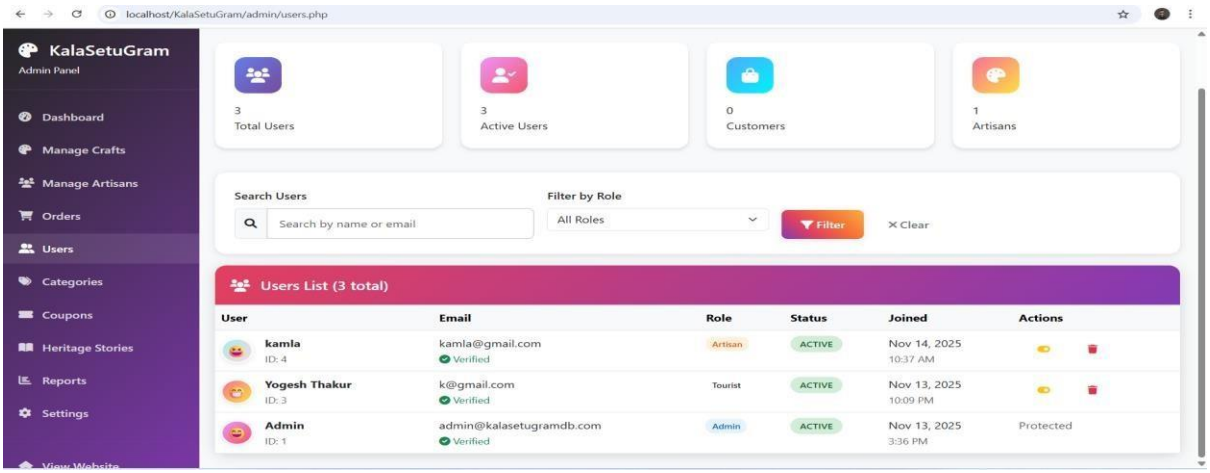
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KalaSetuGram
Admin Panel
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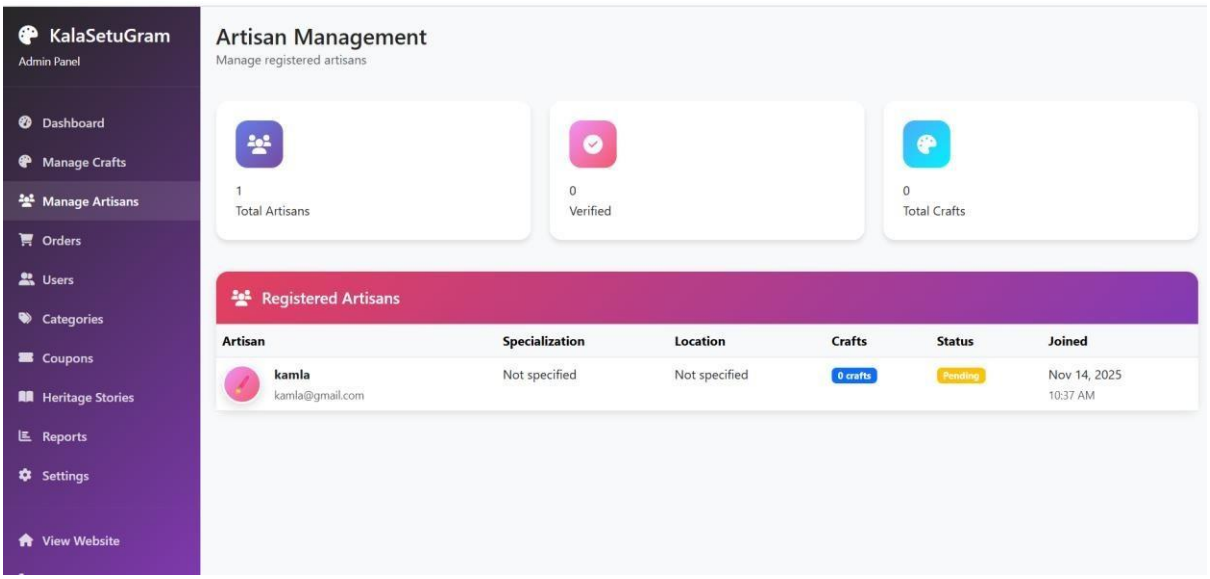
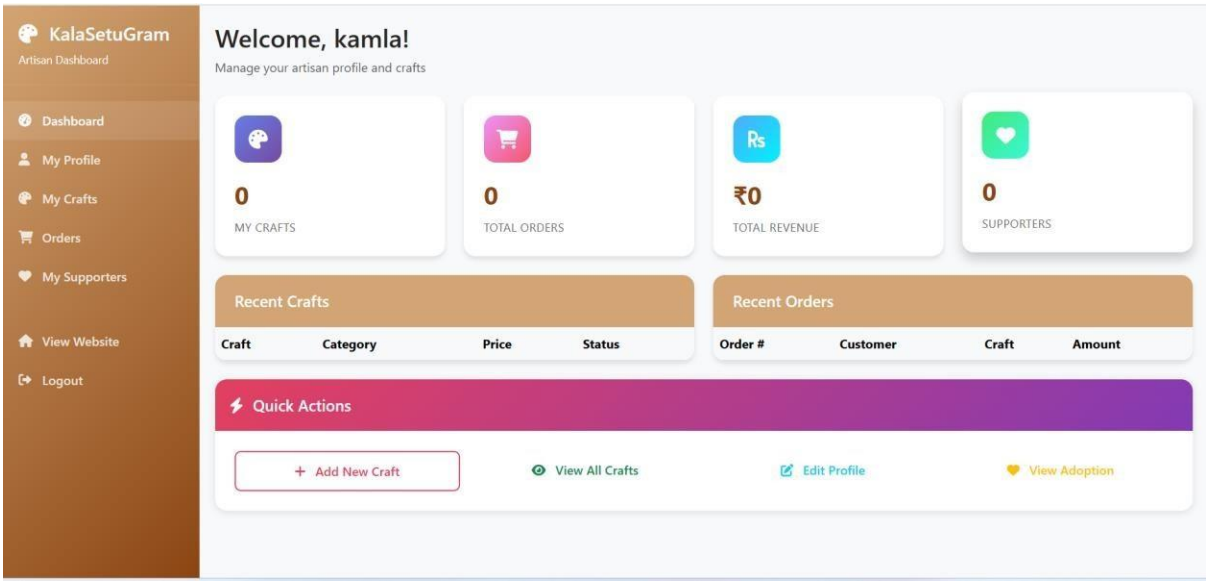
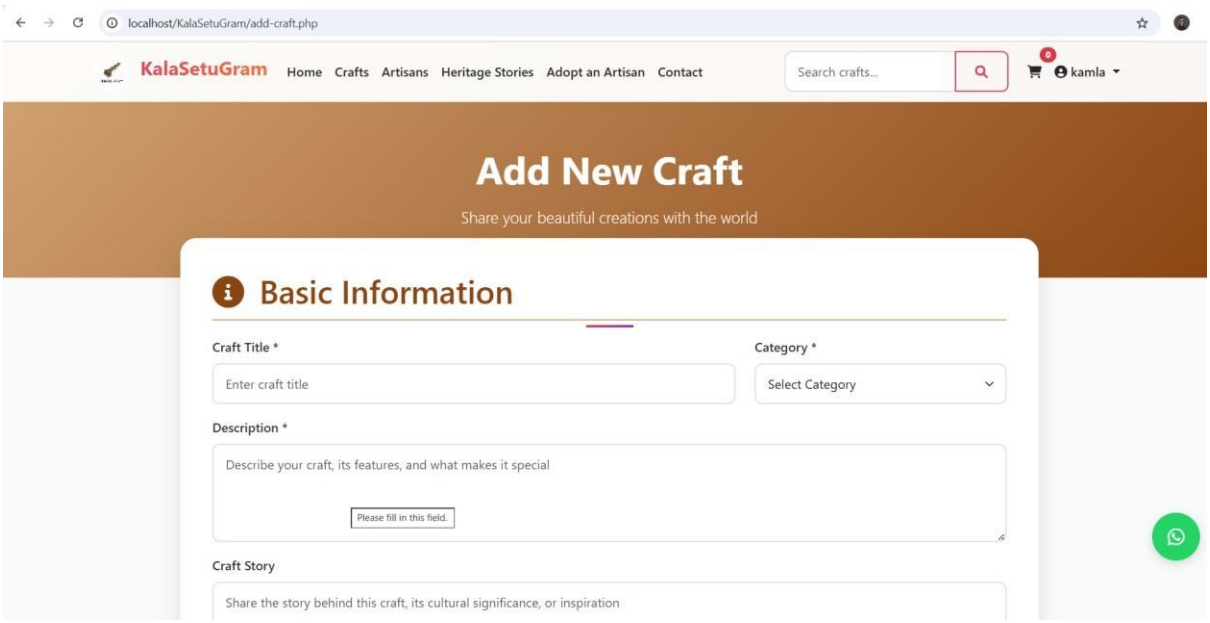
Total Users
3
Active Users
0
Customers
1
Artisans
Search Users
Search by name or email
Filter by Role
All Roles
Filter
Clear
Users List (3 total)
User
Email
Role
Status
Joined
Actions
kamla
ID: 4
kamla@gmail.com
Verified
Artisan
ACTIVE
Nov 14, 2025
10:37 AM
Yogesh Thakur
ID: 3
k@gmail.com
Verified
Tourist
ACTIVE
Nov 13, 2025
10:09 PM
Admin
ID: 1
admin@kalasetugramdb.com
Verified
Admin
ACTIVE
Nov 13, 2025
3:36 PM
Protected


KalaSetuGram
Admin Panel
Dashboard
Manage Crafts
Manage Artisans
Orders
Users
Categories
Coupons
Heritage Stories
Reports
Settings
View Website
Artisan Management
Manage registered artisans
1
Total Artisans
0
Verified
0
Total Crafts
Registered Artisans
Artisan
Specialization
Location
Crafts
Status
Joined
kamla
kamla@gmail.com
Not specified
Not specified
0 crafts
Pending
Nov 14, 2025
10:37 AM

Artisan Portal:





5. RESULTS AND TESTING

5.1 Functionality Achieved

The final prototype of KalaSetuGram successfully meets the goals set during the design and development stages. It provides an intelligent, inclusive, and transparent platform that connects artisans directly to consumers through storytelling and personalized recommendations.

The system achieved the following core functionalities:

1. **Centralized Artisan Platform:**
   A unified interface where verified artisans can create digital profiles, upload craft details, and share their cultural narratives.
2. **AI-Powered Recommendation System:**
   Implemented hybrid machine learning models (Collaborative and Content-Based Filtering) to personalize recommendations of crafts and artisan stories based on user interests and interactions.
3. **Secure User Authentication:**
   Firebase Authentication ensures secure and role-based access for artisans, consumers, and administrators.
4. **Real-Time Data Synchronization:**
   Using Firebase Firestore, all updates (new product uploads, story edits, user feedback) are reflected instantly across devices.
5. **Advanced Search and Filtering:**
   The system allows users to search by craft type, region, artisan, or keyword, making exploration efficient and meaningful.
6. **Impact Dashboard and Analytics:**
   Tracks artisan engagement, user visits, and platform growth. It also displays statistics such as total artisans onboarded and products listed, providing transparency for institutions and users.
7. **Responsive and Accessible Interface:**
   The layout automatically adjusts across screens and devices, ensuring equal accessibility for rural artisans, students, and general users.

8. **Scalable Cloud-Based Infrastructure:**
   Hosted on Firebase and Netlify, the system offers reliable performance, easy maintenance, and scalability for future expansion.

These functionalities collectively validate the project's aim — to use technology for cultural preservation, artisan empowerment, and economic inclusivity.

5.2 Testing Procedure and Outcomes

Testing was conducted to ensure that the KalaSetuGram system operates efficiently, accurately, and consistently under various user scenarios

Testing Procedures

Test Type	Description	Outcome
Unit Testing	Individual modules (login, product upload, search, recommendation) were tested independently.	All modules executed correctly with valid inputs and handled errors gracefully.
Functional Testing	End-to-end workflows — including artisan registration, product posting, and recommendation generation — were tested.	All functional flows performed as expected with correct data display.
Database Validation	Verified that user and product data were stored and retrieved correctly in Firestore.	Data integrity maintained with no duplication or loss.
Performance Testing	Evaluated response time and synchronization under different user loads.	Real-time data updates performed within acceptable limits, even under multiple concurrent users.

5.3 Observations, Challenges, and Solutions

During testing and evaluation, several challenges were encountered. Each was analyzed and addressed with practical solutions to ensure system stability and performance.

Challenge	Cause	Solution Implemented
Difficulty uploading large images	Limited free-tier cloud storage capacity	Optimized image compression before upload to reduce file size without quality loss.
Slow loading for rural users	Weak internet connectivity in remote areas	Added lightweight data-fetching techniques and caching to improve load speed.
Occasional data overwrite during concurrent updates	Multiple simultaneous database writes	Implemented real-time update locks and timestamp-based version control.

These refinements improved reliability, ensured data consistency, and enhanced overall user experience.

5.4 Summary of Results

Testing confirmed that KalaSetuGram operates efficiently, providing a seamless experience for artisans and consumers alike. The system:

- Ensures accurate, real-time data management.
- Provides relevant and dynamic recommendations using AI.
- Offers transparency through analytics and impact tracking.
- Maintains scalability and low operational cost through cloud deployment.

Overall, the prototype demonstrates a successful blend of technology, culture, and usability, proving that intelligent systems can play a vital role in sustaining and promoting traditional craftsmanship in the modern digital era

6. DISCUSSION AND LEARNINGS

6.1 Project Significance

The KalaSetuGram project represents a meaningful step toward integrating technology with cultural preservation. It highlights how engineering innovation can be directed toward solving social and economic challenges faced by traditional communities. By combining Artificial Intelligence, storytelling, and cloud technology, the project successfully demonstrates how digital systems can support artisans and ensure that their heritage remains relevant in the modern era.

The platform bridges the digital divide between artisans and global audiences by giving creators a direct voice and digital identity. It shifts the focus from mere product selling to cultural storytelling and data-driven empowerment, offering a model that other heritage sectors can replicate across India.

6.2 Key Learnings

Throughout the development and testing of KalaSetuGram, several important technical, managerial, and social lessons were learned.

Technical Learnings

1. **System Design and Scalability:**
   Building the system on a cloud platform like Firebase made it clear how scalability and real-time synchronization can be achieved efficiently without complex backend setups.
2. **AI Implementation:**
   Implementing a hybrid recommendation engine required understanding user behavior, preference clustering, and content filtering — a valuable exercise in applied machine learning.
3. **Database Optimization:**
   Managing structured and semi-structured artisan data emphasized the importance of clean data models and query efficiency for performance stability.

4. **User Interface Design:**
   Creating a responsive, inclusive design taught the importance of accessibility and simplicity, especially for users with limited digital literacy.

Project Management Learnings

1. **Iterative Development:**
   Regular testing and user feedback helped refine the prototype and guided incremental improvement — showing that iterative design leads to better user satisfaction.
2. **Time and Resource Management:** Balancing academic timelines with technical development improved the team's ability to plan, delegate, and prioritize tasks efficiently.
3. **Collaborative Problem-Solving:**
   The project enhanced team communication skills, as members coordinated technical, design, and research responsibilities to deliver a unified system.

Social and Ethical Learnings

1. **Empathy-Centered Design:**
   Interacting with artisans reinforced the importance of designing technology around the user's real needs rather than assumptions.
2. **Ethical Data Usage:**
   The team learned that cultural data should be handled with care — respecting ownership, consent, and community values.
3. **Digital Inclusivity:**
   Exposure to rural user challenges highlighted that successful technology must be accessible, lightweight, and simple to use.

6.3 Impact and Outcomes

The KalaSetuGram prototype achieved its intended objectives by creating a practical, working solution that empowers artisans through technology. The results show that:

- Artisans can easily register and represent themselves online.
- AI-driven recommendations enhance user engagement and craft visibility.

- Storytelling elements strengthen the connection between buyers and makers.
- Cloud-based hosting ensures scalability and sustainability of the platform.

Beyond technical achievements, the project demonstrated the transformative potential of engineering education — applying computational thinking and innovation to real social causes.

6.4 Future Enhancements

While the prototype successfully met its primary goals, there are opportunities for further improvement and expansion:

1. **Mobile Application Development:**
   A dedicated Android and iOS app can improve accessibility for rural artisans with limited desktop usage.
2. **Multi-Language Interface:**
   Incorporating Telugu and other regional languages will ensure inclusivity and better user engagement.
3. **E-Commerce Integration:**
   Adding secure payment and logistics tracking can turn the prototype into a complete commercial platform.
4. **Advanced Analytics:**
   Incorporating data visualization for tracking cultural impact and economic growth can support policymakers and NGOs.
5. **Community and Learning Modules:**
   Developing tutorial sections for artisans on digital marketing, photography, and pricing could enhance their digital literacy and market readiness.

7. CONCLUSION

The KalaSetuGram project successfully demonstrates how technology, when guided by empathy and innovation, can be used to preserve culture and empower communities. It bridges the gap between traditional artisans and the digital world through an intelligent, userfriendly, and accessible platform. By integrating Artificial Intelligence (AI), cloud computing, and data-driven storytelling, the system provides a sustainable solution for artisans to gain visibility, connect with buyers, and sustain their craft-based livelihoods.

Through every stage — from ideation to prototype testing — the project remained focused on three core principles: inclusivity, authenticity, and innovation. The digital platform not only helps artisans promote their products but also ensures that the cultural narratives behind these crafts are shared with the world, preserving the intangible heritage of Andhra Pradesh for future generations.

The development process reinforced key engineering competencies such as problem-solving, system design, and teamwork while instilling a deeper appreciation for the social impact of technology. Testing outcomes confirmed that the system performs efficiently, scales well, and fulfills its goal of providing a fair and transparent digital ecosystem for artisans.

In essence, KalaSetuGram stands as a proof of concept that modern computing can serve both technological advancement and cultural preservation. It shows how thoughtful engineering can transform local talent into global opportunities while protecting the identity and integrity of traditional arts.

The project concludes with a strong belief that the fusion of technology and tradition can create meaningful change — building a future where innovation uplifts communities, sustains culture, and strengthens the digital fabric of India.

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