

EEY4189- SOFTWARE DESIGN IN GROUP

FINAL PROJECT REPORT

GemNest Mobile App

Team: HY_2

Mentor: Mr. Hasitha Jagoda

Submission date: 20.01.2026

Prepared By:

A.M.P. Welipitiya	123607097
B.M.M.Y. Sandaruwan	223606341
D.P.P. Pradeeptha	721426969
P.V. Thamara	622512849
R.U. Gonalagoda	621429318

Supervisor's Approval

1. Introduction and Background

1.1 Introduction

The gemstone industry is a multi-billion-dollar global market involving trading, collecting, and investment of high-value stones such as sapphires, rubies, and diamonds. Traditional gemstone trading is heavily dependent on physical markets, brokers, and auction houses, which introduce information asymmetrical and high intermediary costs. Sellers struggle to reach an international audience, while buyers find it difficult to access verified stones with transparent pricing and trustworthy documentation.

Recent advances in mobile platforms, cloud services, and digital authentication provide an opportunity to digitalize this domain by connecting verified gem owners directly with global buyers. GemNest is a mobile-first marketplace designed to support secure listing, authentication, auctioning, and purchasing of gemstones through a single integrated application. The system enables sellers to publish detailed listings with high-resolution images and certificates, buyers to participate in live and timed auctions, and administrators to maintain platform security and quality standards. By combining real-time auctions, digital certificate verification, and escrow-based payment handling, GemNest aims to improve transparency, trust, and efficiency in gemstone trading.

1.2 Background

In current practice, gemstone owners usually depend on local dealers, middlemen, or traditional auction houses, which reduces their bargaining power and overall profit margin. Localized physical markets limit exposure to a narrow buyer base, making it difficult to discover fair international market prices for rare or premium stones. At the same time, buyers face high risk due to counterfeit or misrepresented gemstones, limited access to original certification, and lack of standardized digital verification processes.

Existing online platforms partially address these issues but often focus on web-only experiences, provide limited auction features, or offer basic certificate uploads without strong verification workflows. Many solutions do not fully integrate mobile-optimized interfaces, digital certificates,

and secure high-value transactions in a unified ecosystem. GemNest is proposed to fill this gap by providing a mobile-centric, authentication-driven marketplace with structured user roles (seller, buyer, administrator), real-time auction mechanisms, and secure payment and notification flows tailored specifically for gemstone trading.

2. Problem Statement and Project Objectives

2.1 Problem Statement

Gemstone traders, collectors, and investors face four major pain points in existing trading environments: limited market reach, weak pricing transparency, unreliable authentication, and insecure high-value transactions. Sellers must rely on multiple intermediaries, which increases transaction costs, slows down sales cycles, and reduces net revenue. Buyers, in contrast, often lack trustworthy information on gemstone origin, grading, and certification, and have minimal tools to compare prices across markets in real time.

Moreover, most existing platforms are not optimized for mobile usage, provide only basic listing functionality, and do not support robust auction formats or escrow-based safeguards for both parties. These limitations prevent efficient price discovery, reduce confidence in cross-border transactions, and discourage new participants from entering the gemstone market. Therefore, there is a need for a secure, mobile-first solution that offers verified user onboarding, structured gem listing, digital certificate handling, live auction capabilities, and protected payment workflows in a single platform.

2.2 Objectives

- **Centralize:** Create a comprehensive digital platform for gem owners to list, auction, and sell precious stones internationally, ensuring transparent pricing, competitive bidding, and authenticated transactions.
- **Empower:** Enhance user experience through intuitive mobile interfaces, real-time auction participation, digital certificate verification, secure payment processing, and comprehensive market intelligence for informed trading decisions.
- **Authenticate:** Implement robust digital authentication systems for gemstone certification verification, maintaining transaction integrity and buyer confidence through blockchain-

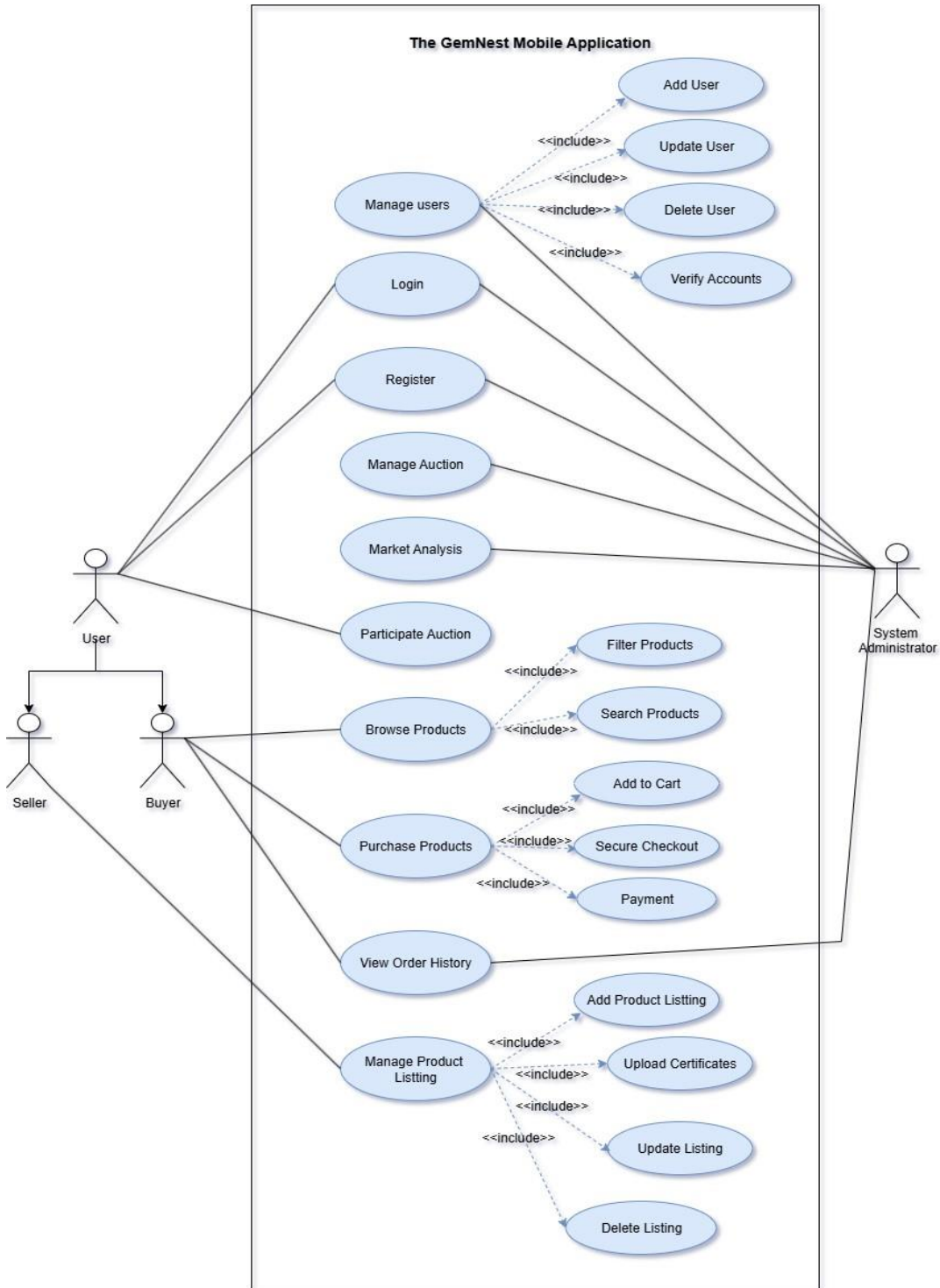
based documentation and professional gemological standards.

3. Introduction to Similar Type of Systems

Feature	GemRock Auctions	Prestige Gems Online	Ceylon Gem Hub	GemNest (Proposed)
Target Users	Collectors, investors, dealers	High-end buyers, collectors	Sri Lankan gem traders	Global gem traders, collectors, investors
Core Functionality	Online gem auctions	Direct sales with authentication	Regional gem marketplace	Comprehensive trading with live auctions
Unique Selling Points	Established auction platform	Premium authentication services	Local market expertise	Mobile-first design, digital authentication, live auctions
User Interface	Web-based traditional	Professional but complex	Simple regional focus	Intuitive mobile-optimized
Authentication	Basic certificates	Professional appraisal	Limited verification	Advanced digital certificate verification
Auction Features	Standard online auctions	Limited auction options	No auction system	Live auctions, multiple formats, real-time bidding
Mobile Accessibility	Limited mobile support	Basic mobile version	No dedicated mobile app	Comprehensive mobile application
Global Reach	International platform	Limited geographic focus	Regional only	Global marketplace with multi-currency

4. Project Solution

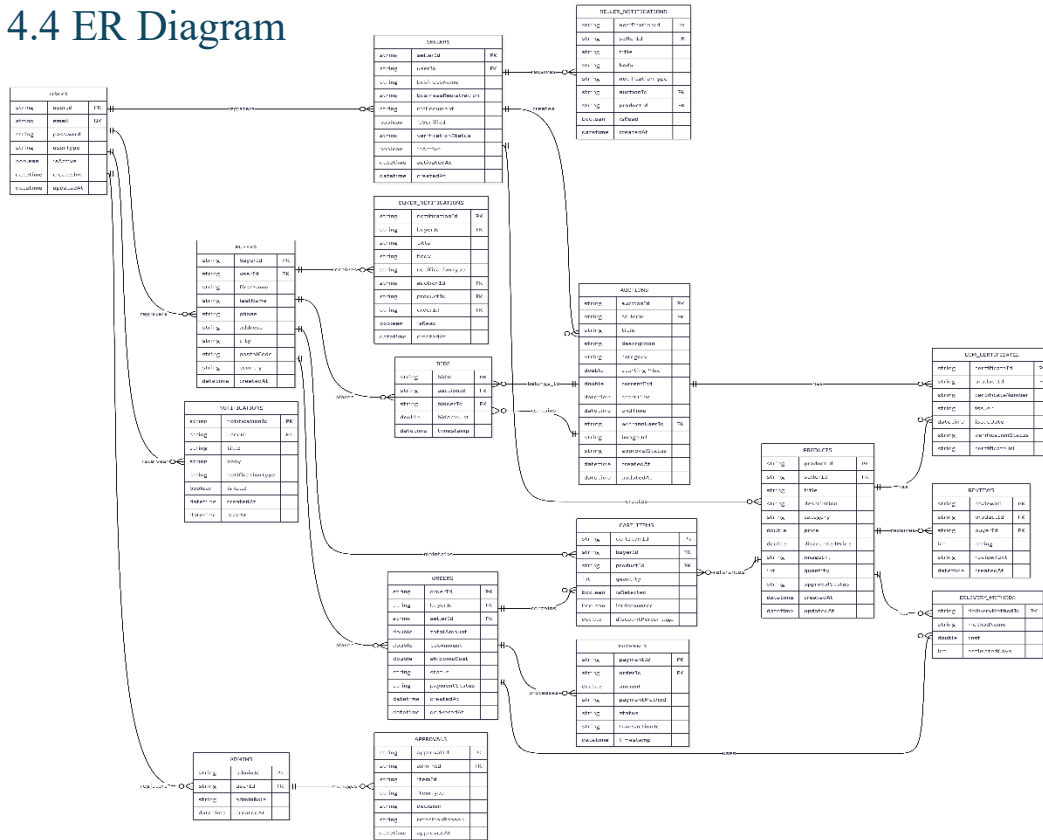
4.1 High-Level Use Case Diagram



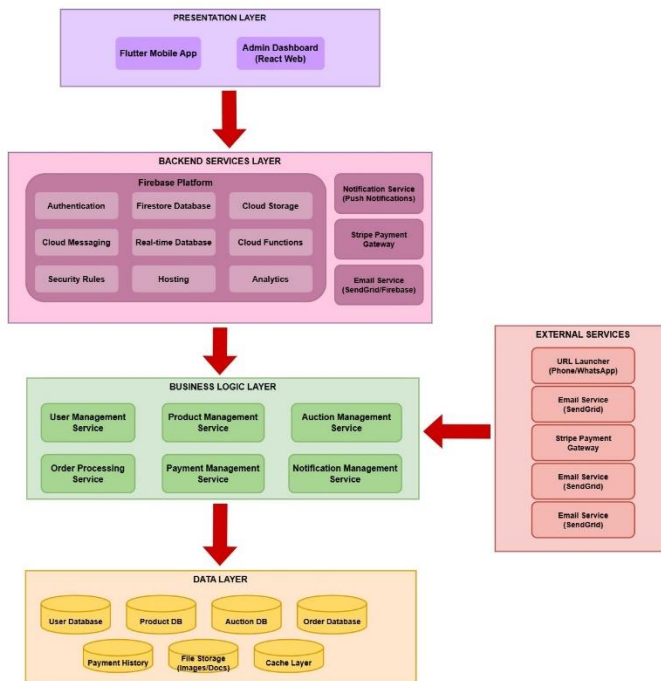
4.3 Activity Diagram



4.4 ER Diagram



4.5 Overall Architecture Block Diagram



5. Technology Planning to Use

- **SDK:** Flutter
- **Programming Languages:** Dart
- **Integrated Development Environment (IDE):** Visual Studio Code
- **Database:** Firebase Firestore, Firebase Realtime Database, SQLite
- **Authentication:** Firebase Authentication with multi-factor verification
- **Cloud Storage:** Firebase Storage for images and certificates
- **Version Control System:** GitHub
- **Project Management Tool:** Trello
- **Design Tools:** Figma for UI/UX design and prototyping
- **Testing Framework:** Flutter Test, Firebase Test Lab

6. Testing and Implementation

<https://docs.google.com/spreadsheets/d/15PZYyiGcB22No93EpT879bvcoIQ0NHujLDx48uiNAGk/edit?usp=sharing>

7. Project Limitations and Conclusions

7.1 Project Limitations

- The system relies on stable internet connectivity for real-time auctions and updates, so users in low-connectivity areas may face reduced performance.
- High-quality image storage, certificate verification, and secure payments increase backend complexity and operational cost, especially when scaling to many users and transactions.
- Integration with external services such as payment gateways and gemological certification bodies may be limited by regional regulations and third-party API constraints.

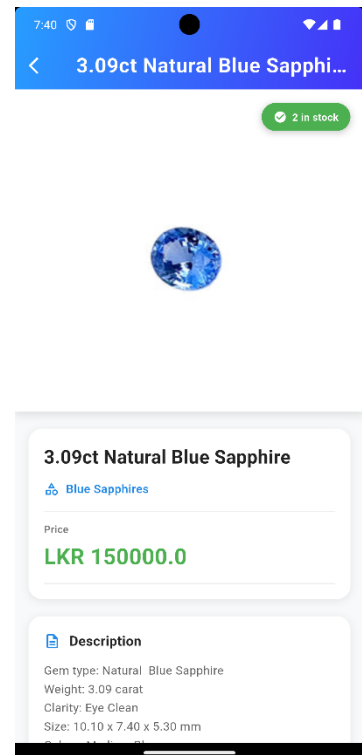
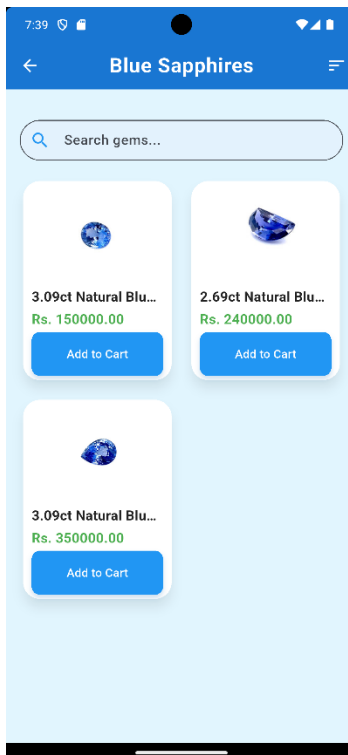
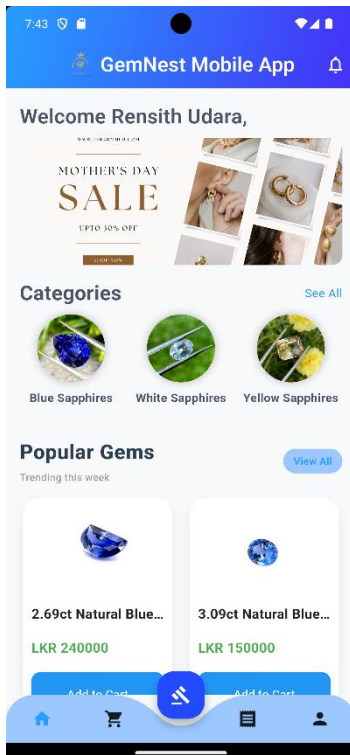
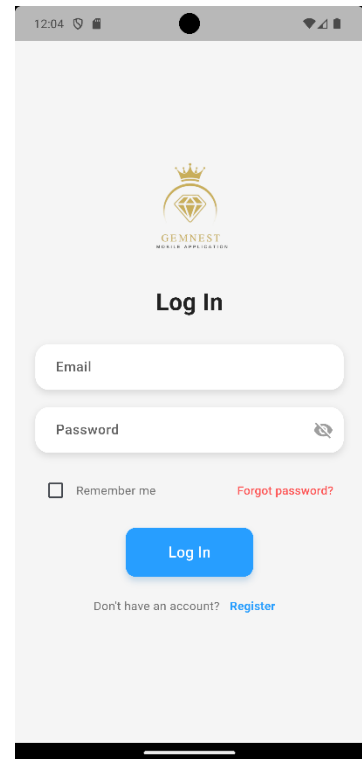
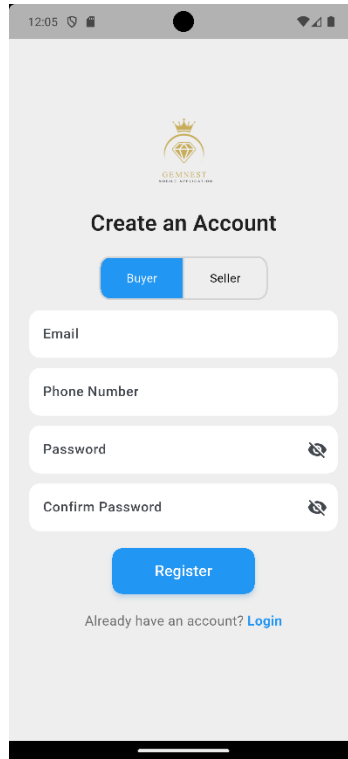
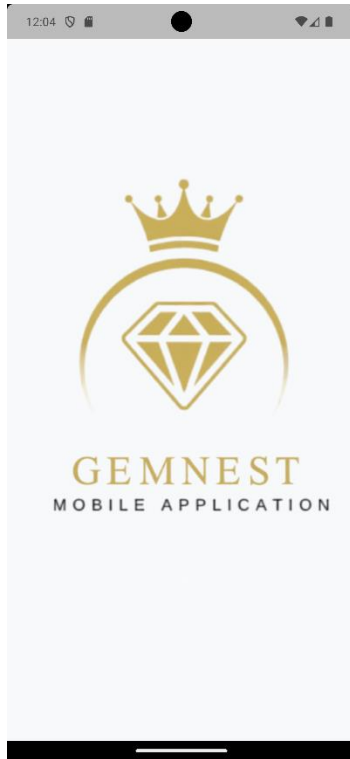
7.2 Conclusion

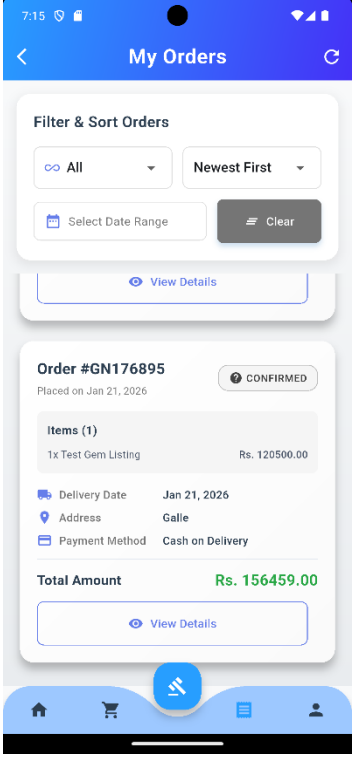
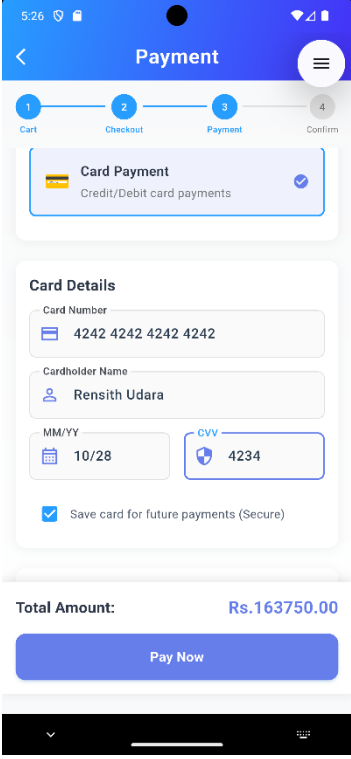
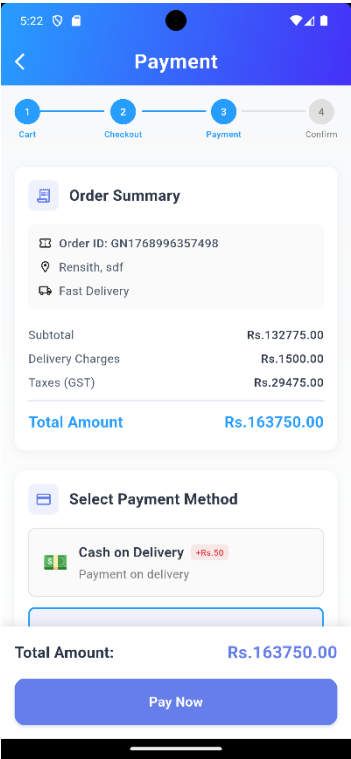
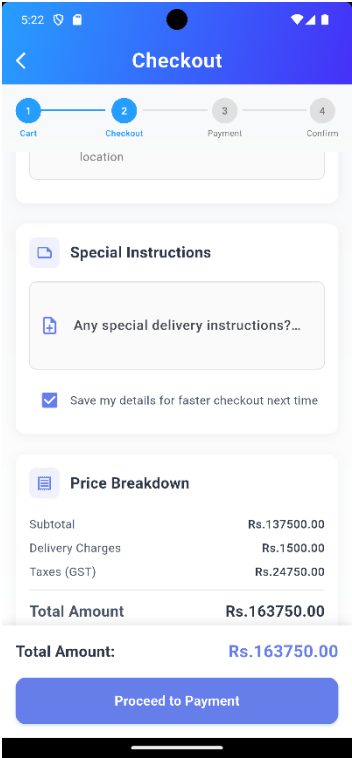
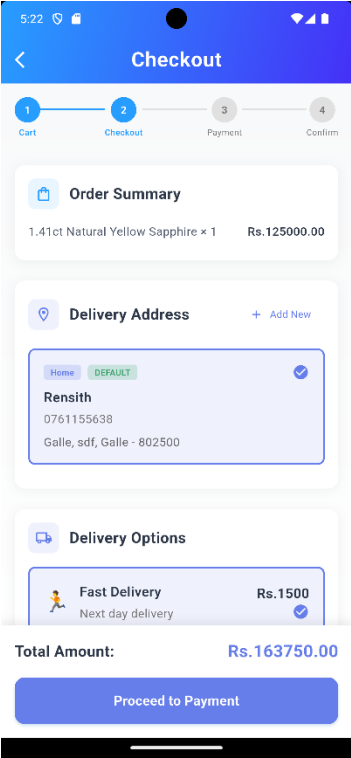
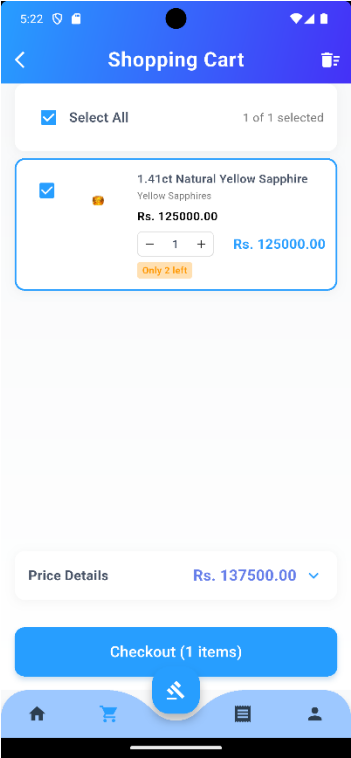
The GemNest mobile application provides a focused digital marketplace for gemstone trading, enabling sellers to reach a wider audience and buyers to access authenticated gemstones through a secure and transparent platform. By combining detailed gem listings, live auction features, and

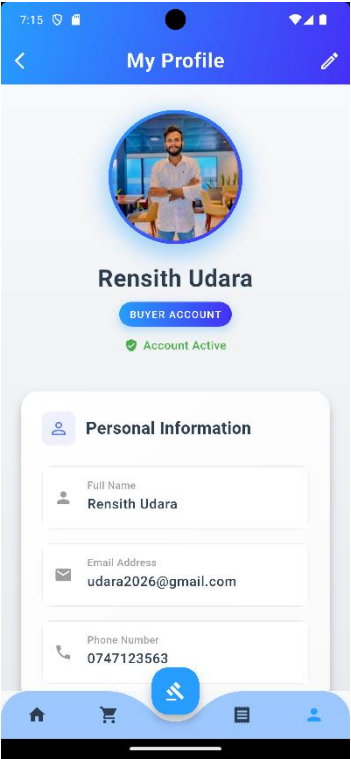
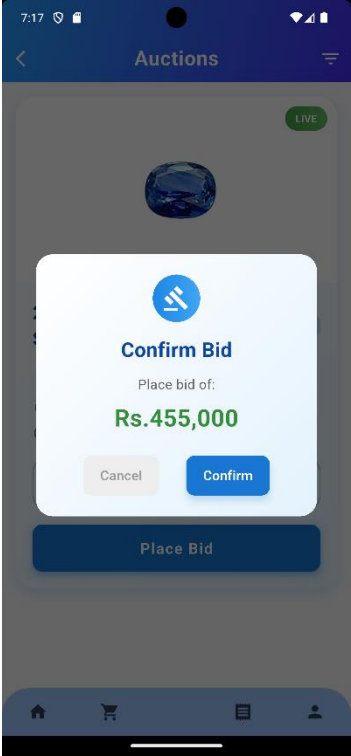
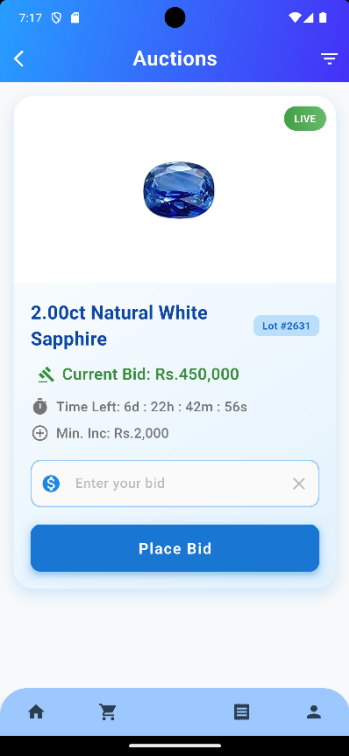
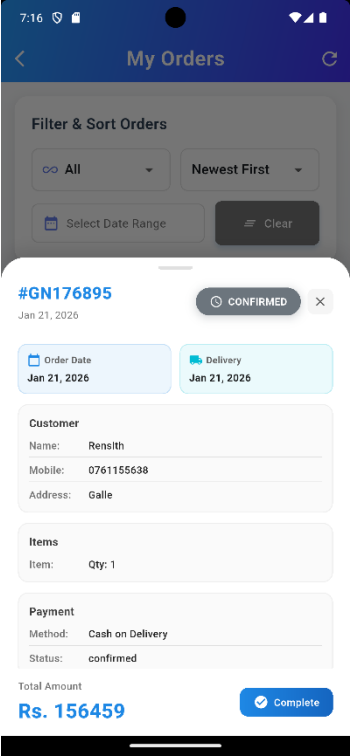
digital certificate verification, the system addresses key issues in traditional gemstone markets such as limited reach, lack of transparency, and weak authentication. With its mobile-first architecture and extensible backend, GemNest can be further enhanced in future work through advanced analytics, AR-based visualization, and deeper integration with global gem certification and payment ecosystems.

8. Project Demonstrations

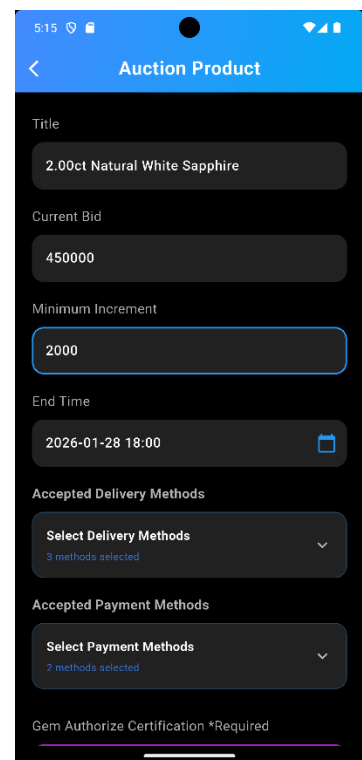
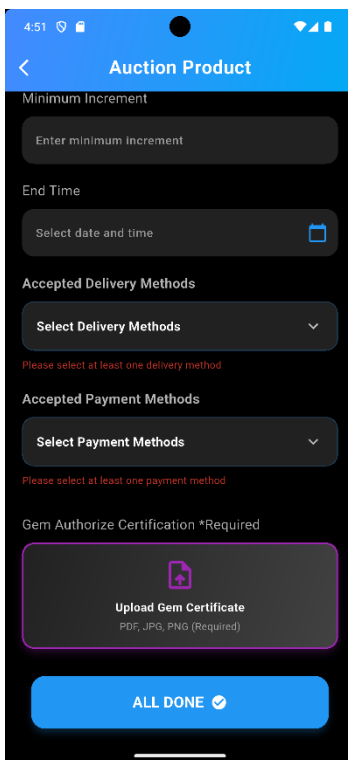
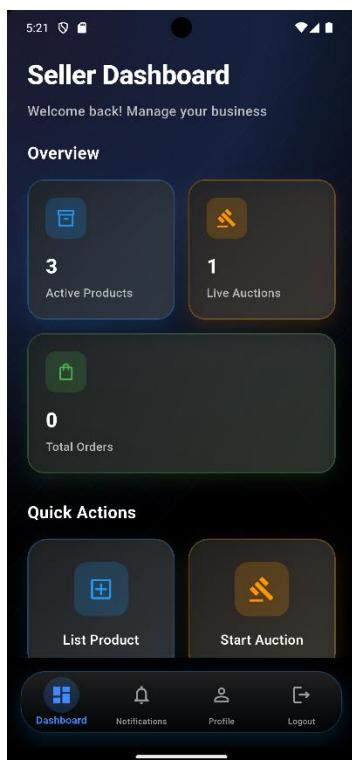
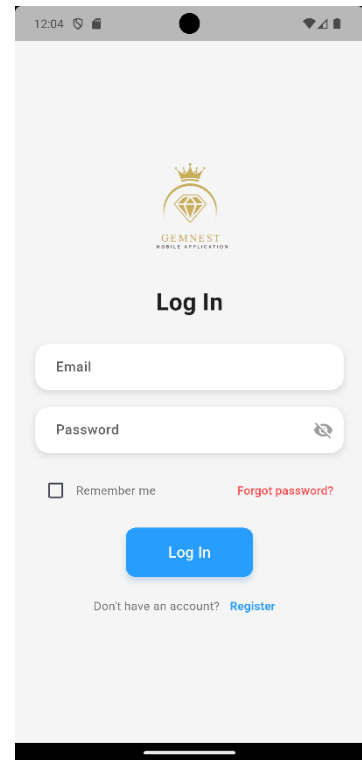
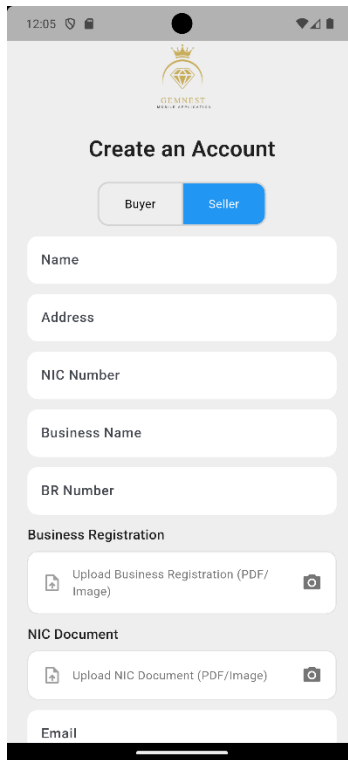
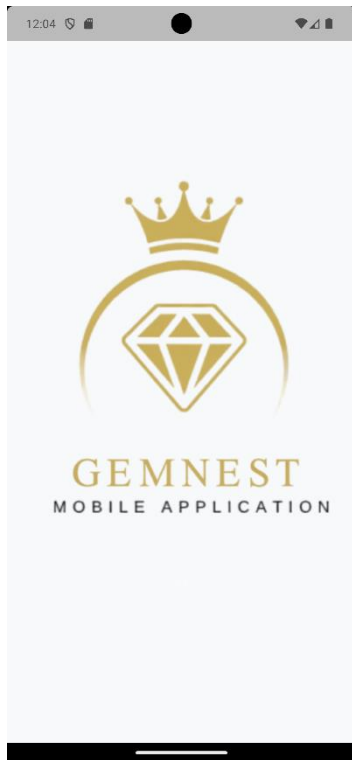
8.1 Buyer Side Mobile App







8.2 Seller Side Mobile App



4:51

Product Listing

Photos (select first image to upload)

Title

Enter product title

Category

Select category

Pricing

Enter price

Product quantity

Enter quantity

Description

Enter product description

5:02

Product Listing

Title

1.41ct Natural Yellow Sapphire

Category

Yellow Sapphires

Pricing

125000

Product quantity

2

Description

Size: 6.8 x 5.7 x 4mm
Colour: Yellow
Shape & Cut: Cushion
Treatment: Heated
Videos are available upon request.

Gem Authorize Certification *Required

Certificates Selected

4:51

Product Listing

Gem Authorize Certification *Required

Upload Gem Certificate
PDF, JPG, PNG (Required)

Accepted Delivery Methods

Select Delivery Methods

Please select at least one delivery method

Accepted Payment Methods

Select Payment Methods

Please select at least one payment method

ALL DONE, SELL IT

BULK PRODUCT LISTING

DOWNLOAD CSV TEMPLATE

2:56

Delivery Configuration

Configure delivery methods and prices for your products. Enable/disable methods and set custom prices.

Pickup

Customer picks up from your location

Price (LKR)

\$ 0.00

Standard Delivery

Delivery within 5-7 business days

Price (LKR)

\$ 1200.00

Express Delivery

Delivery within 2-3 business days

Price (LKR)

\$ 1000.00

Fast Delivery

Next day delivery

Price (LKR)

\$ 1500.00

2:56

Payment Configuration

Configure payment methods accepted by your store. Enable/disable methods and provide bank details if needed.

Card Payment

Credit/Debit card payments

Cash on Delivery

Payment on delivery

Bank Transfer

Direct bank transfer

2:55

My Profile

Rensith

Verified Seller

Personal Information

Full Name
Rensith

Email Address
rensith2027@gmail.com

Phone Number
07611445236

NIC Number

Dashboard

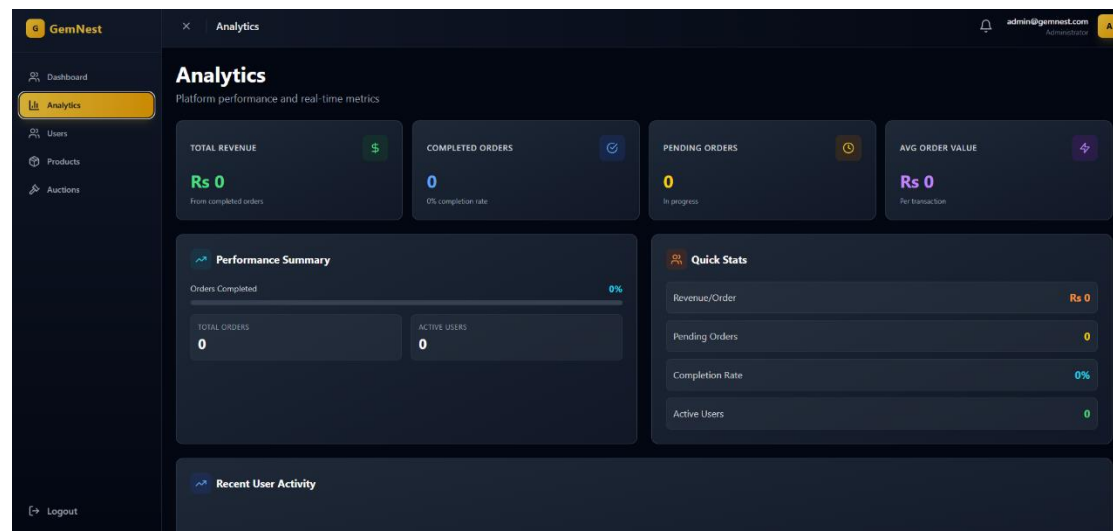
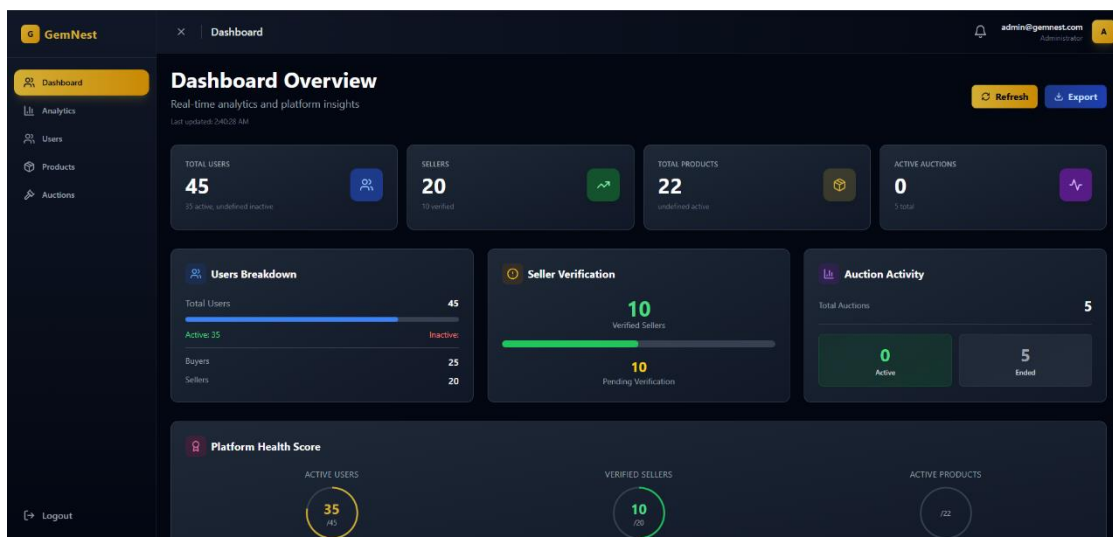
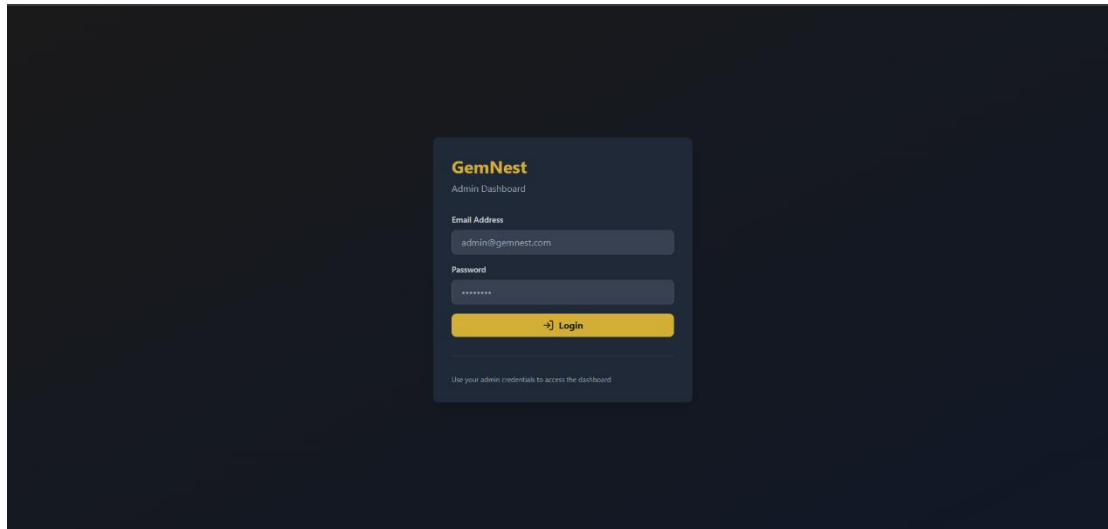
Notifications

Profile

Logout

8.3 Admin Dashboard

URL - <https://gemnnest.store/>



GemNest

Users

admin@gemnest.com

Dashboard

Analytics

Users

Products

Auctions

Logout

User Management

Manage buyers and verify sellers

Sellers (20)Buyers (25)

Search by email or name...

EMAIL	NAME	STATUS	VERIFICATION	ACTIONS
samal@gmail.com	samal	active	Pending	Details Verify Reject
thamara123@gmail.com	Thamara	active	Pending	Details Verify Reject
seller110@gmail.com	seller123	active	Verified	Details Deactivate
vi123@gmail.com	Vinindu	active	Verified	Details Deactivate
seller123@gmail.com	Udara Gonalagoda	active	Pending	Details Verify Reject
parakrama123@gmail.com	parakrama	active	Verified	Details Deactivate
user123@gmail.com	TestUser	inactive	Pending	Details Verify Reject

GemNest

Users

admin@gemnest.com

Dashboard

Analytics

Users

Products

Auctions

Logout

User Management

Manage buyers and verify sellers

Sellers (20)Buyers (25)

Search by email or name...

EMAIL	NAME	STATUS	VERIFICATION	ACTIONS
samal@gmail.com	samal	active	Pending	Details Verify Reject
thamara123@gmail.com	Thamara	active	Pending	Details Verify Reject
seller110@gmail.com	seller123	active	Verified	Details Deactivate
vi123@gmail.com	Vinindu	active	Verified	Details Deactivate
seller123@gmail.com	Udara Gonalagoda	active	Pending	Details Verify Reject
parakrama123@gmail.com	parakrama	active	Verified	Details Deactivate
user123@gmail.com	TestUser	inactive	Pending	Details Verify Reject

Seller Details

Basic Information

Display Name
Thamara

Email
thamara123@gmail.com

Phone Number
1234567892

Freelance UID
6f01bc2ccf8a6627v4m1c15dy32e3

Business Information

Business Name
Gem2

Business Registration (BR) Number
200000

NIC Number
1234567899

Verification Status
Pending

NIC (National Identity Card) Document

NIC Document
PDF or other document format

[View](#) [Download](#)

GemNest

Products

admin@gemnest.com

Dashboard

Analytics

Users

Products


Auctions

Logout

Product Management

Manage listed products and auctions

Search by product name...



5.08ct Natural Blue Sapphire


Gem type: Natural Blue Sapphire Weight: 5.08 carat Clarity: Loupe Clean Size: 13.8 x 8.01 x 4.9mm Colour: Dark Blue Shape & Cut: Fancy Treatment: Heat...

PRICE
Rs N/A

STATUS
Active

Seller: Unknown

Remove



3.75ct Natural Yellow Sapphire


Gem type: Natural Yellow Sapphire Weight: 3.75 carat Clarity: Eye Clean Size: 8.3 x 8 x 8mm Colour: Yellow Shape & Cut: Cushion Treatment: Heated...

PRICE
Rs N/A

STATUS
Active

Seller: Unknown

Remove



1.66ct Natural Blue Sapphire

Gem type: Natural Blue Sapphire Weight: 1.66 carat Clarity: Loupe Clean Size: 7.50 x 6.10mm Colour: Blue Shape & Cut: Cushion/ Step Cut Treatment...

PRICE
Rs N/A

STATUS
Active

Seller: Unknown

Remove

9. Appendix

Project Documentation:

- [SRS Document](#)
- [Progress Reports](#)

Design Prototypes:

- [Low-Fidelity Wireframes](#)
- [High-Fidelity Prototypes](#)

Project Management:

- [Trello Board](#)
- [GitHub Repository](#)

Team Communication:

- [CMMI Meeting Minutes](#)