

# **EEY4189- SOFTWARE DESIGN IN GROUP**

## **FINAL PROJECT REPORT**

### **GemNest Mobile App**

**Team:** HY\_2

**Mentor:** Mr. Hasitha Jagoda

**Submission date:** 20.01.2026

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## 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-

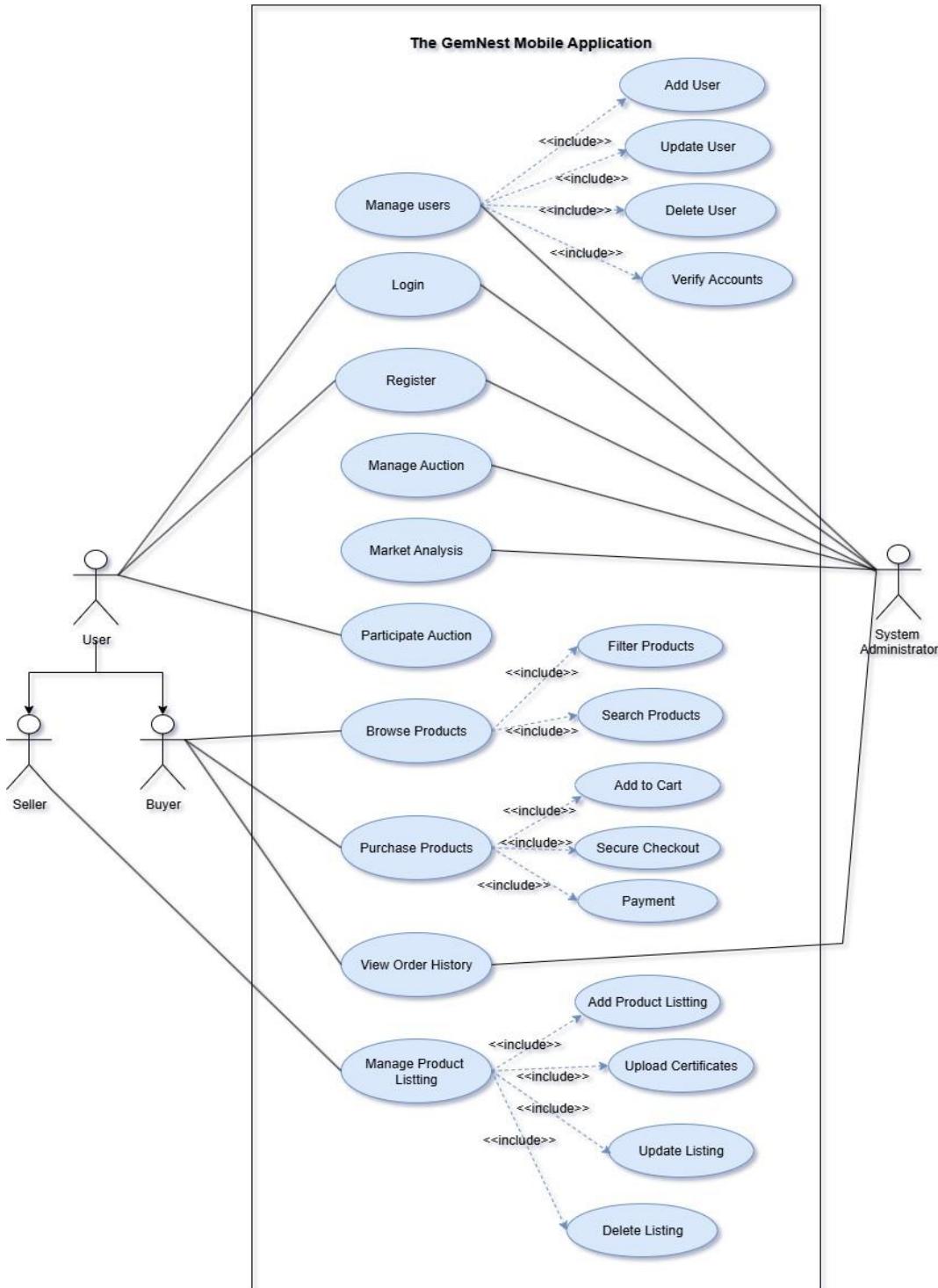
based documentation and professional gemological standards.

### 3. Introduction to Similar Type of Systems

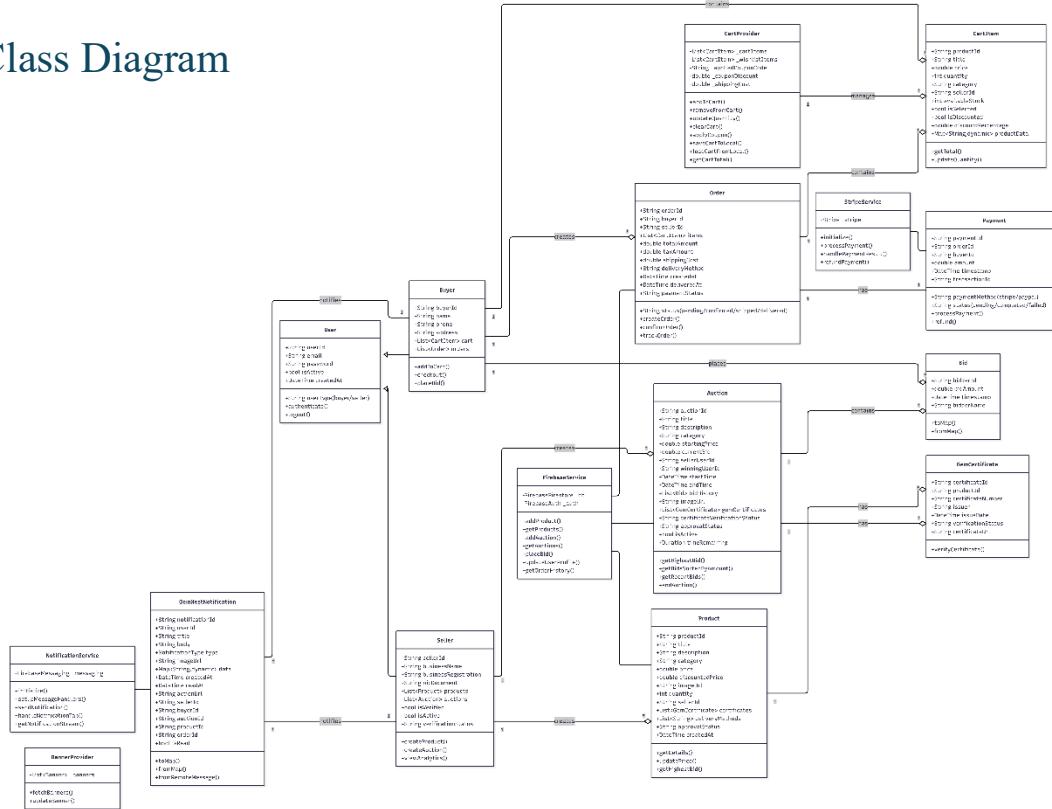
Feature	GemRock Auctions	Prestige Gems Online	Ceylon Gem Hub	GemNest (Proposed)
<b>Target Users</b>	Collectors, investors, dealers	High-end buyers, collectors	Sri Lankan gem traders	Global gem traders, collectors, investors
<b>Core Functionality</b>	Online gem auctions	Direct sales with authentication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

## 4. Project Solution

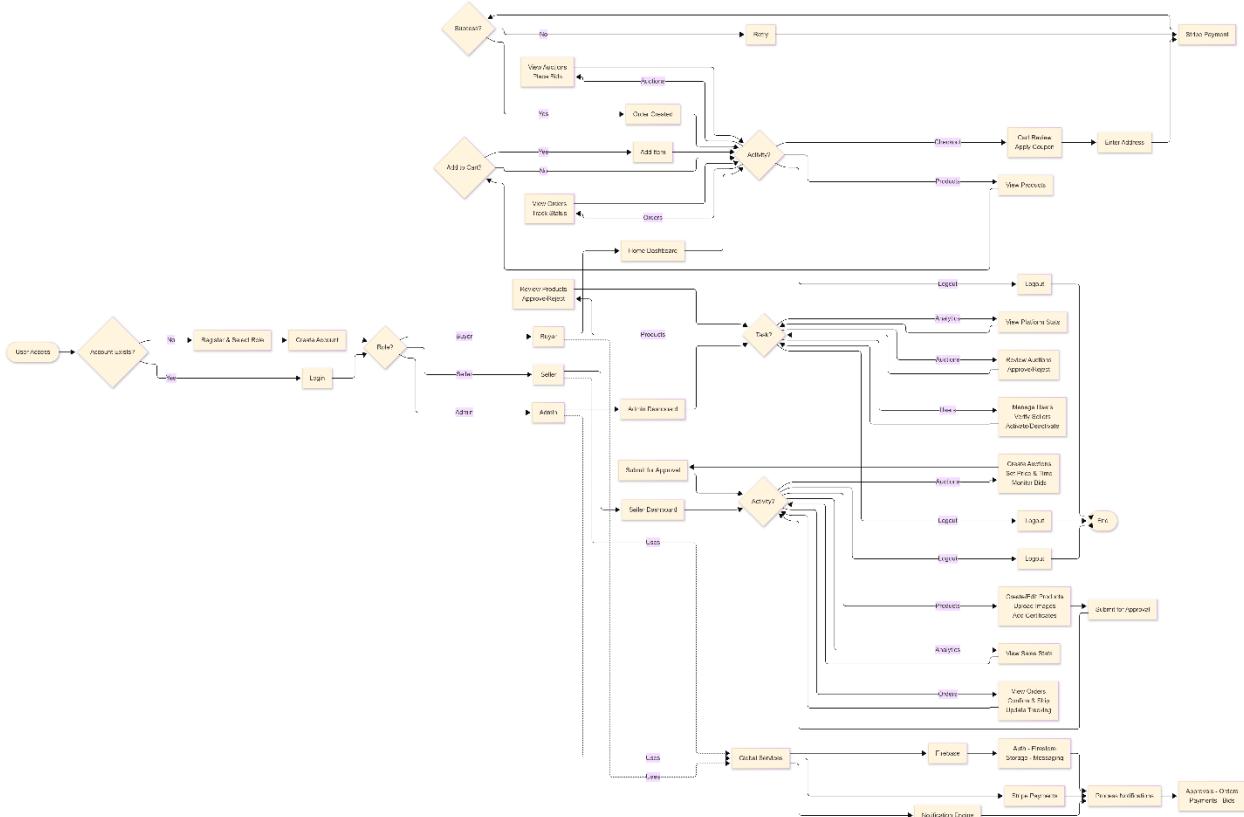
### 4.1 High-Level Use Case Diagram



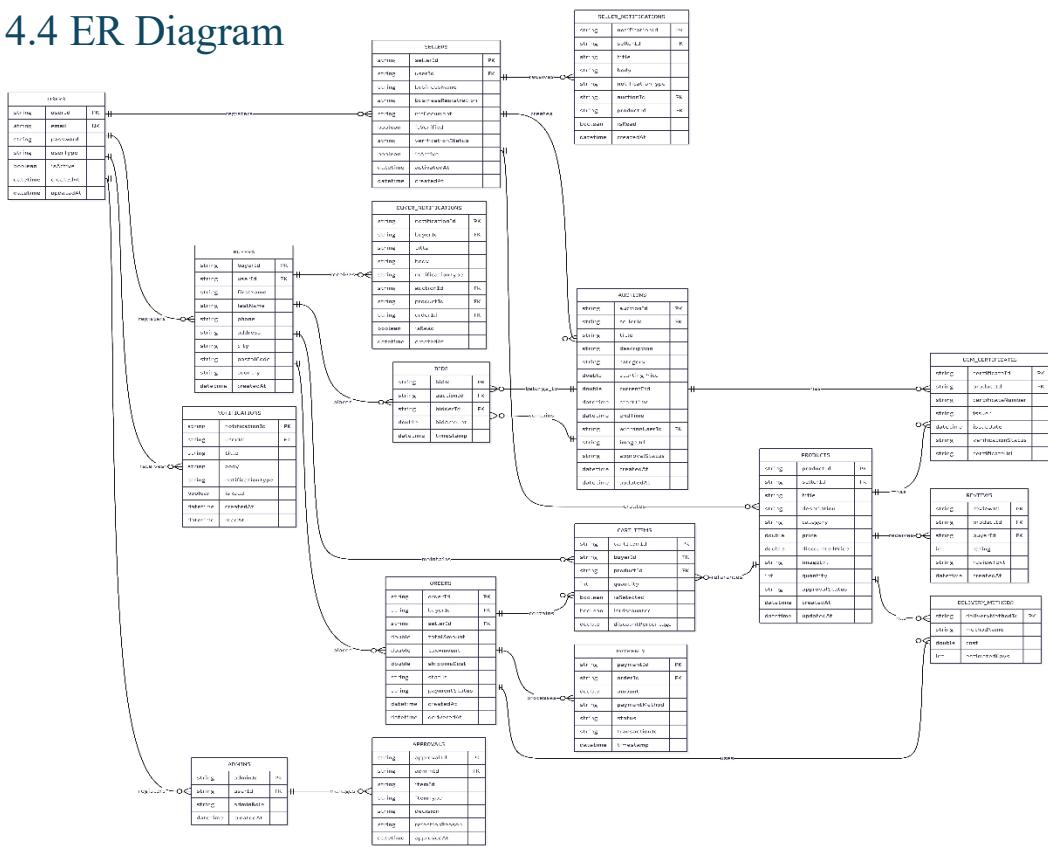
## 4.2 Class Diagram



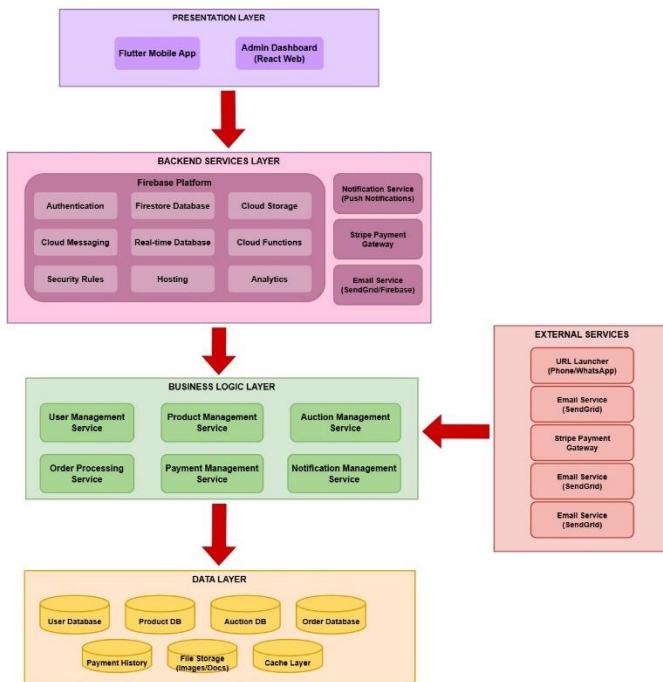
## 4.3 Activity Diagram



## 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/15PZYyiGcB22No93EpT879bvco1Q0NHujLDx48uiNAGk/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

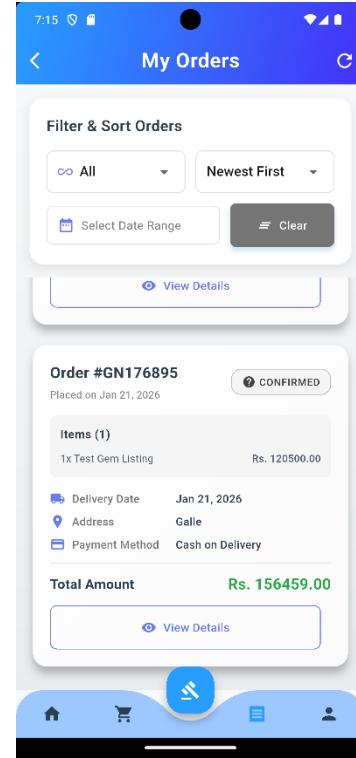
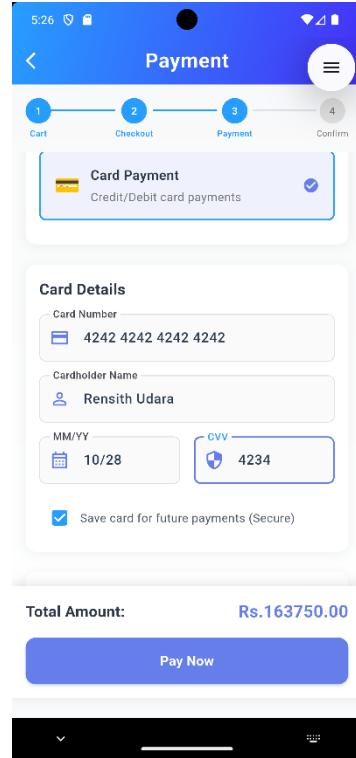
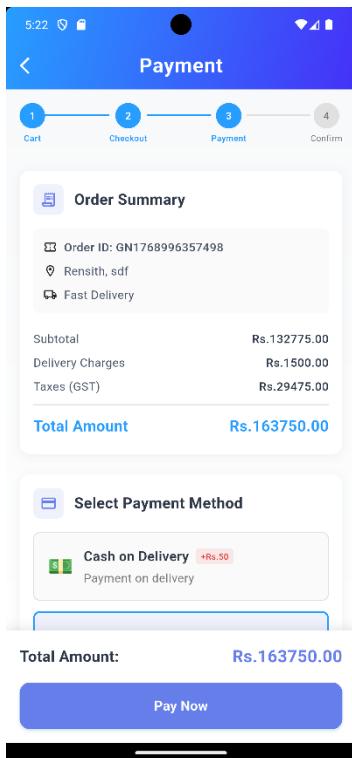
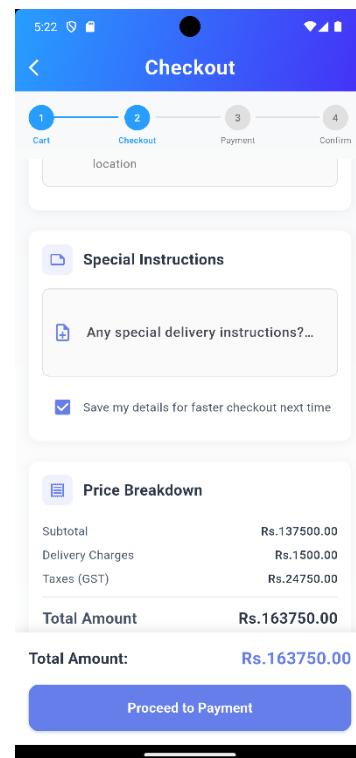
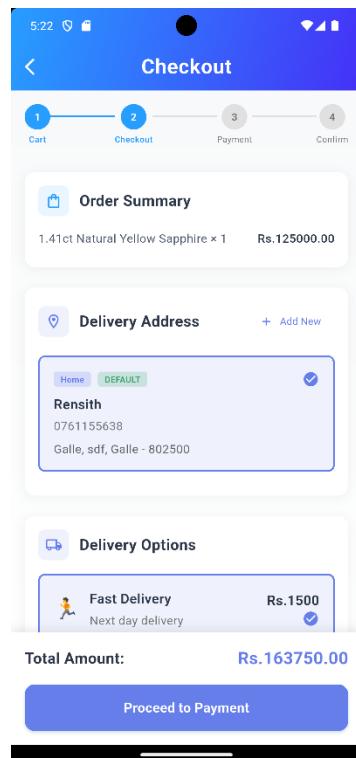
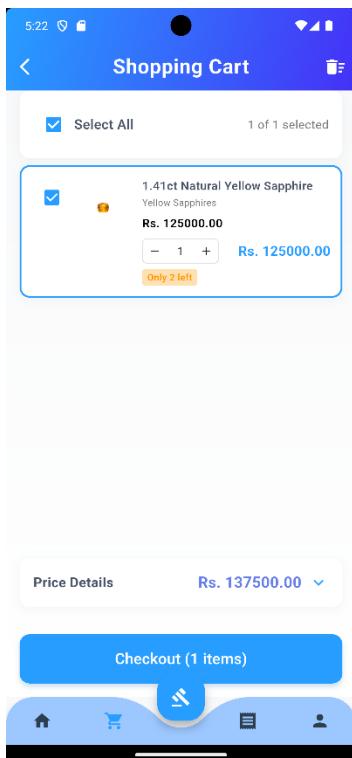
digital certificate verification, the system addresses key issues in traditional gemstone markets such as limited reach, lack of transparency, and weak authentication. With its mobile-first architecture and extensible backend, GemNest can be further enhanced in future work through advanced analytics,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

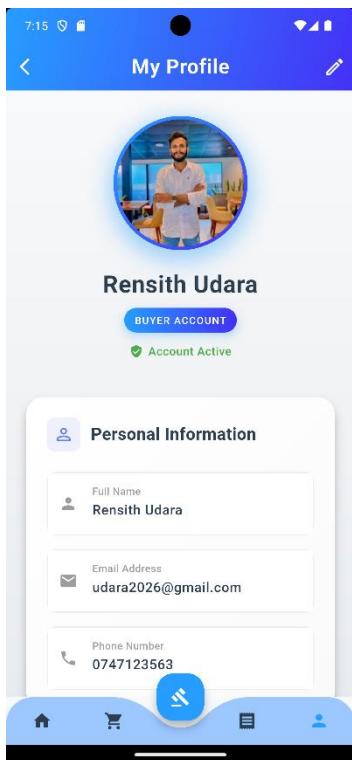
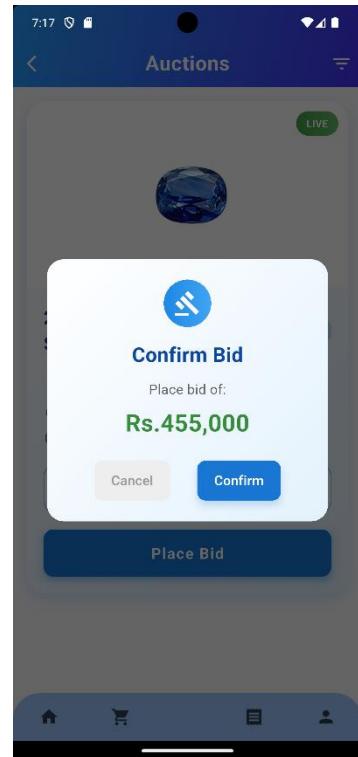
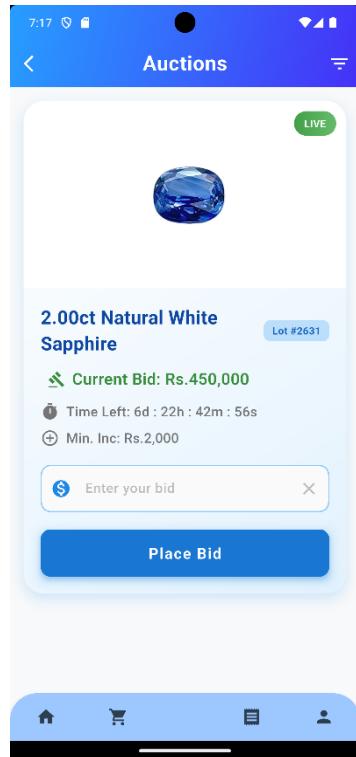
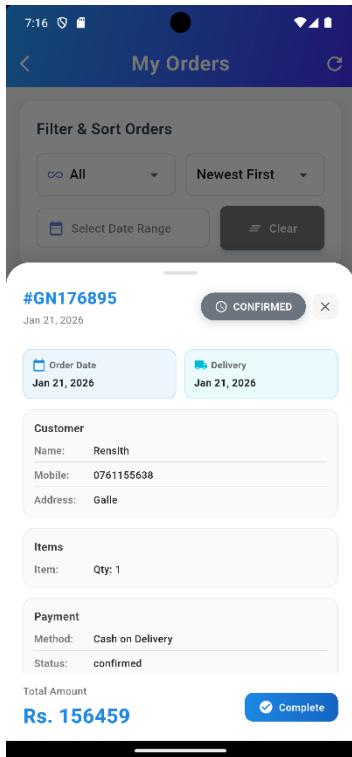
## 8. Project Demonstrations

### 8.1 Buyer Side Mobile App

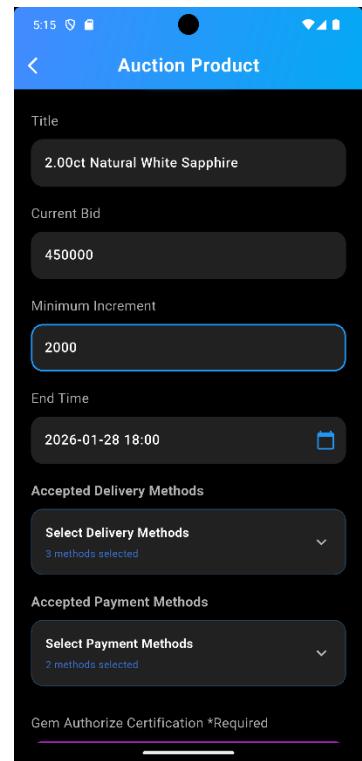
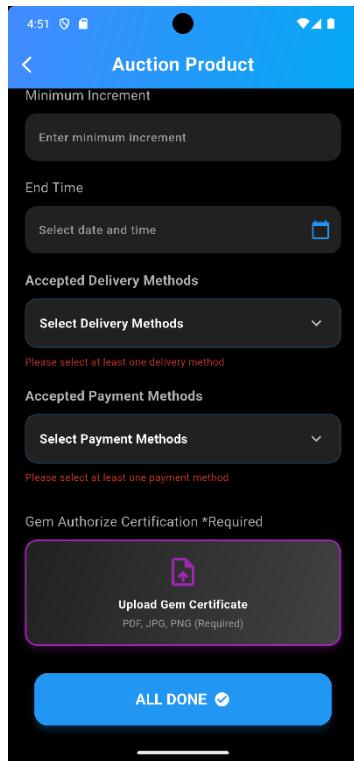
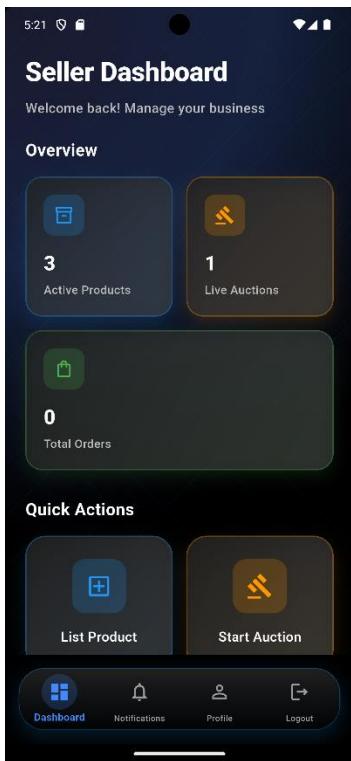
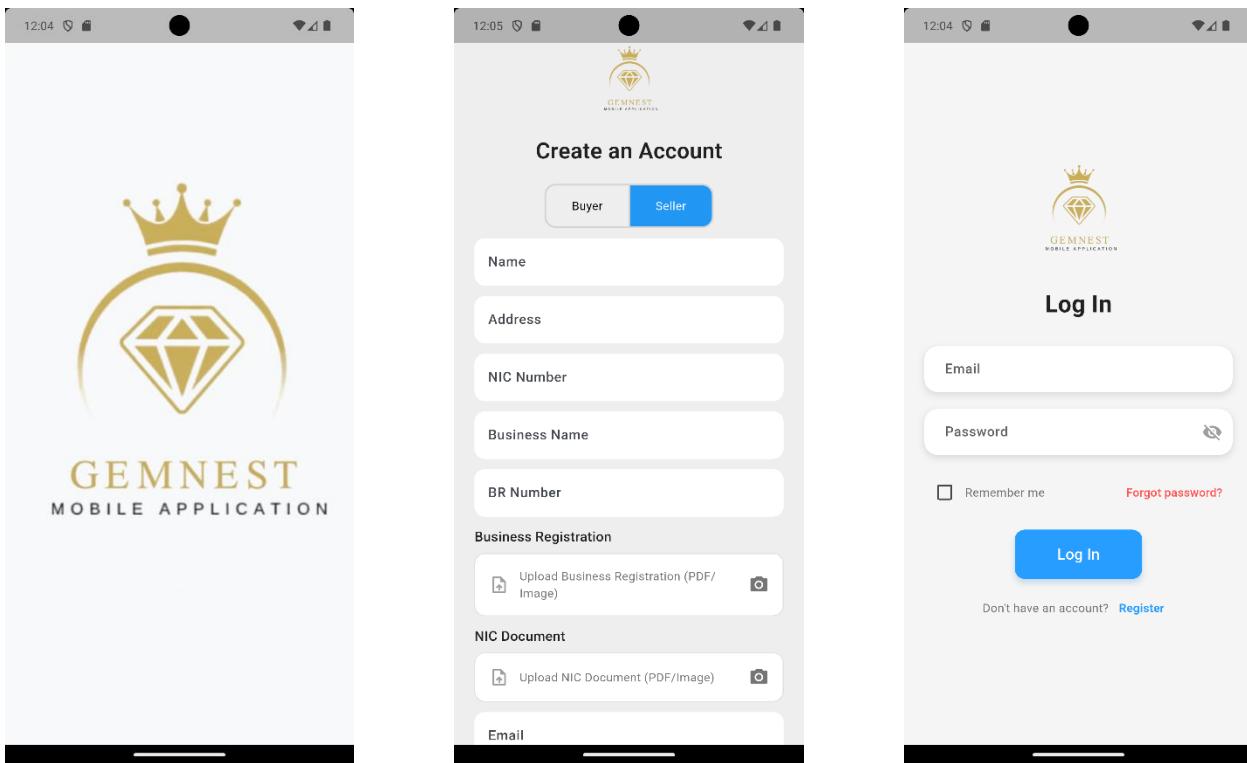
The image displays six screenshots of the Gemnest mobile application, illustrating its user interface and functionality.

- Screenshot 1:** Home screen featuring the Gemnest logo (a crown with a diamond) and the text "GEMNEST MOBILE APPLICATION".
- Screenshot 2:** "Create an Account" screen. It shows fields for Email, Phone Number, Password, and Confirm Password. There are "Buyer" and "Seller" tabs at the top, and a "Register" button at the bottom. A link "Already have an account? [Login](#)" is visible.
- Screenshot 3:** "Log In" screen. It has fields for Email and Password, a "Remember me" checkbox, a "Forgot password?" link, and a "Log In" button. A link "Don't have an account? [Register](#)" is also present.
- Screenshot 4:** Home screen with a banner for "MOTHER'S DAY SALE" (UPTO 50% OFF). It shows categories: Blue Sapphires, White Sapphires, and Yellow Sapphires. A "Popular Gems" section displays two items: "2.69ct Natural Blue..." (LKR 240000) and "3.09ct Natural Blue..." (LKR 150000).
- Screenshot 5:** Product listing screen for "Blue Sapphires". It shows three items: "3.09ct Natural Blu...", "2.69ct Natural Blu...", and "3.09ct Natural Blu...". Each item card includes a price (Rs. 150000.00, Rs. 240000.00, and Rs. 350000.00 respectively), an "Add to Cart" button, and a "2 in stock" indicator.
- Screenshot 6:** Product details screen for "3.09ct Natural Blue Sapphire". It shows a large image of the sapphire, the product name, price (LKR 150000.00), a "Description" section, and detailed gemstone information: Gem type: Natural Blue Sapphire, Weight: 3.09 carat, Clarity: Eye Clean, Size: 10.10 x 7.40 x 5.30 mm.





## 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

Select 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  
Enabled

**Cash on Delivery**  
Payment on delivery  
Enabled

**Bank Transfer**  
Direct bank transfer  
Enabled

2:55

### My Profile

Rensith  
Verified Seller

**Personal Information**

Full Name  
Rensith

Email Address  
rensinth2027@gmail.com

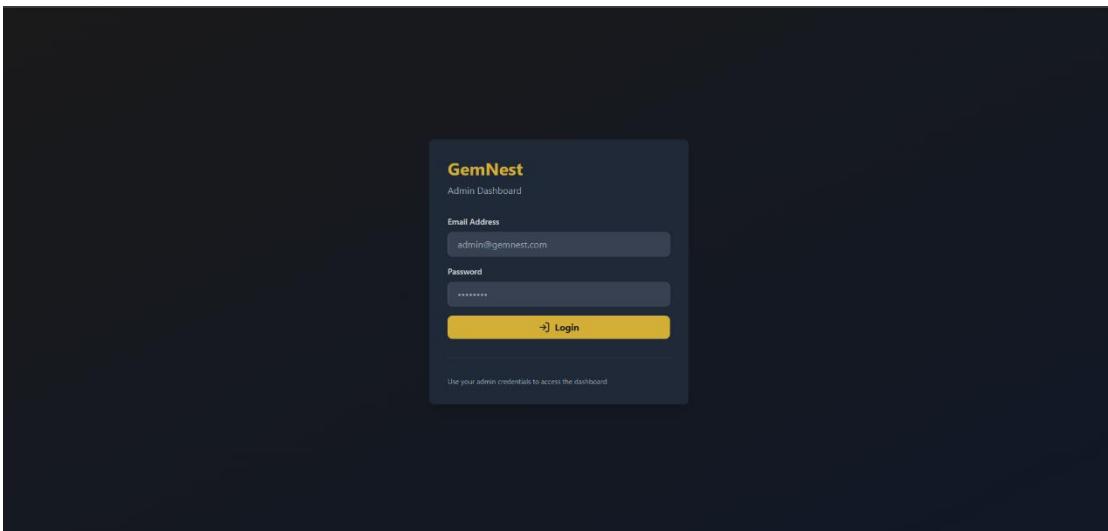
Phone Number  
07611445236

NIC Number

**Dashboard** **Notifications** **Profile** **Logout**

## 8.3 Admin Dashboard

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



A screenshot of the "Dashboard Overview" section of the GemNest Admin Dashboard. The top navigation bar shows "Dashboard" and "Administrator". The main area displays real-time analytics and platform insights. Key metrics include: TOTAL USERS (45), SELLERS (20), TOTAL PRODUCTS (22), and ACTIVE AUCTIONS (0). Below these are three cards: "Users Breakdown" (Total Users 45, Active 35, Inactive 10, Buyers 25, Sellers 20), "Seller Verification" (10 Verified Sellers, 10 Pending Verification), and "Auction Activity" (Total Auctions 5, Active 0, Ended 5). A "Logout" button is at the bottom left.

A screenshot of the "Analytics" section of the GemNest Admin Dashboard. The top navigation bar shows "Analytics" and "Administrator". The main area displays platform performance and real-time metrics. Key metrics include: TOTAL REVENUE (Rs 0), COMPLETED ORDERS (0), PENDING ORDERS (0), and AVG ORDER VALUE (Rs 0). Below these are two cards: "Performance Summary" (Orders Completed 0%, Total Orders 0, Active Users 0) and "Quick Stats" (Revenue/Order Rs 0, Pending Orders 0, Completion Rate 0%, Active Users 0). A "Recent User Activity" card is also partially visible at the bottom. A "Logout" button is at the bottom left.

**GemNest**

**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	<a href="#">Details</a> <a href="#">Verify</a> <a href="#">Reject</a>
thamara123@gmail.com	Thamara	active	Pending	<a href="#">Details</a> <a href="#">Verify</a> <a href="#">Reject</a>
seller10@gmail.com	seller123	active	Verified	<a href="#">Details</a> <a href="#">Deactivate</a>
vi123@gmail.com	Vinindu	active	Verified	<a href="#">Details</a> <a href="#">Deactivate</a>
seller123@gmail.com	Udara Gonalgoda	active	Pending	<a href="#">Details</a> <a href="#">Verify</a> <a href="#">Reject</a>
parakrama123@gmail.com	parakrama	active	Verified	<a href="#">Details</a> <a href="#">Deactivate</a>
user123@gmail.com	TestUser	inactive	Pending	<a href="#">Details</a> <a href="#">Verify</a> <a href="#">Reject</a>

[Logout](#)

**GemNest**

**User Management**  
Manage buyers and verify sellers

**Sellers (20)** **Buyers (25)**

Search by email or name...

**Seller Details**

**Basic Information**

Display Name: **Thamara**, Email: **thamara123@gmail.com**, Phone Number: **1234567892**, Firebase UID: **6f01NCzcfmaM2rvM15Ry32E3**

**Business Information**

Business Name: **Gem2**, Business Registration (BR) Number: **20000**, NIC Number: **1234567899**, Verification Status: **Pending**

**NIC (National Identity Card) Document**

**NIC Document** (PDF or other document format)

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

**ACTIONS**

[Details](#) [Verify](#) [Reject](#)

[Details](#) [Verify](#) [Reject](#)

[Details](#) [Deactivate](#)

[Details](#) [Deactivate](#)

[Details](#) [Verify](#) [Reject](#)

[Details](#) [Deactivate](#)

[Details](#) [Verify](#) [Reject](#)

[Logout](#)

**GemNest**

**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: 15.9 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: 8.5 x 6.8 mm 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](#)

[Logout](#)

## 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](#)