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A MOBILE APPLICATION FOR GOLDSMITH PROFESSIONALS

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Abstract

The goldsmith profession demands precision, inventory management, customer engagement, and order tracking all of which are traditionally handled through manual or paper-based processes. This paper presents the design and development of a comprehensive mobile application tailored for goldsmith professionals, aimed at digitizing and streamlining their day-to-day operations. The proposed system enables jewellers to manage inventory, record customer orders, track job work, generate bills, and maintain customer records through an intuitive mobile interface. Built using Flutter for cross-platform compatibility and Firebase for real-time database management, the application supports offline functionality to ensure continuous usability in low-connectivity environments. Integrated features include gold rate fetching, weight-based pricing calculation, hallmark tracking, and push notifications for order status updates. The system reduces manual errors, saves time, and enhances professionalism in small and medium-scale goldsmith businesses. Evaluation results indicate high user satisfaction and significant improvement in operational efficiency.

Keywords: Goldsmith mobile application; Flutter; Firebase; inventory management; jewellery management system; order tracking; real-time database; cross-platform; offline processing; billing system

1. INTRODUCTION

The goldsmith industry, particularly at the small and medium enterprise level, continues to rely heavily on manual workflows for managing critical business processes such as inventory control, customer orders, billing, and job work tracking. This dependence on paper-based records not only increases the risk of errors but also limits scalability and professional presentation to customers.

This paper presents the development of a mobile application specifically designed to address these challenges in the goldsmith profession. The application leverages Flutter's cross-platform capabilities to deliver a seamless experience on both Android and iOS devices, while Firebase provides real-time data synchronization and secure cloud storage. The system integrates live gold rate fetching, automated weight-based pricing, and hallmark management, offering goldsmith professionals a complete digital toolkit within a single application.

By digitizing day-to-day operations, the proposed system empowers jewellers to manage their business more efficiently, reduce manual errors, improve customer service, and maintain detailed records accessible at any time. The application also supports offline mode, ensuring uninterrupted functionality even in areas with poor network connectivity a common challenge in many goldsmith workshops.

2. PROBLEM STATEMENT AND OBJECTIVE

Goldsmith professionals face a significant operational challenge: managing complex business functions — including raw material inventory, customer orders, job work assignments, and billing — without adequate digital tools. The traditional reliance on handwritten ledgers and manual calculations leads to frequent errors, data loss, and inefficiency. Additionally, the dynamic nature of gold pricing requires constant manual updates, making accurate billing a time-consuming process.

The primary objective of this project is to develop an intelligent, user-friendly mobile application that digitizes the complete operational workflow of a goldsmith business. The application aims to provide real-time inventory management, automated billing based on current gold rates, order and job work tracking, and customer relationship management all within a single, cross-platform mobile solution.

Specific objectives of the system include:

- Implementing real-time gold rate integration for accurate pricing.
- Providing a comprehensive inventory management module for raw materials and finished goods.
- Enabling customer order creation, tracking, and status notifications.
- Supporting offline functionality for uninterrupted operations.
- Generating digital invoices and maintaining customer transaction history.

3. LITERATURE REVIEW

Several studies have explored the digitization of small business operations using mobile technologies. Sharma et al. (2022) demonstrated that mobile-based inventory systems significantly reduce stock discrepancies in retail jewellery businesses. Their work highlighted the importance of real-time synchronization in multi-device environments, a challenge addressed in the proposed system through Firebase's real-time database.

Kumar and Patel (2023) examined the adoption of cross-platform frameworks in small business applications, concluding that Flutter offers a compelling balance of performance and development speed compared to native solutions. Their findings support the framework choice in this project. Meanwhile, research by Rao et al. (2021) on digital billing systems in artisan businesses revealed that automated pricing mechanisms reduce billing time by up to 60%, validating the need for integrated gold rate calculation in the proposed system.

Studies on jewellery management systems have also emphasized the importance of hallmark compliance tracking, customer loyalty features, and job work management as critical requirements for professional goldsmith tools (Menon & George, 2023). The proposed application addresses all of these areas within a unified mobile platform.

4. PROPOSED WORK

The proposed mobile application for goldsmith professionals is built on a modular architecture covering six core functional areas, from data management to customer interaction.

Stage 1: Technology Stack and Architecture

The application is developed using Flutter (Dart), ensuring a single codebase deployable on both Android and iOS platforms. Firebase serves as the backend, providing Firestore for NoSQL data storage, Firebase Authentication for secure user login, and Firebase Cloud Messaging (FCM) for push notifications. A local SQLite database handles offline data persistence, with automatic synchronization upon reconnection.

Stage 2: Inventory Management Module

The inventory module tracks raw gold, silver, and gemstone stocks by weight, purity, and category. Each item is assigned a unique ID and hallmark details. The system provides low-stock alerts and generates inventory reports. Purchases and sales automatically update stock levels in real time, eliminating manual reconciliation.

Stage 3: Gold Rate Integration and Billing

Live gold and silver rates are fetched daily via a public commodities API and stored locally to support offline billing. The billing engine calculates the total price based on weight, purity (karat), making charges, and

applicable taxes (GST). The system generates itemized digital invoices that can be shared via WhatsApp or email, or printed via Bluetooth-connected thermal printers.

Stage 4: Order and Job Work Tracking

Customers can place custom orders through the app, specifying design, weight, purity, and delivery date. Each order is assigned a unique job card with a QR code for tracking. The goldsmith updates job status (pending, in-progress, ready, delivered), and customers receive push notifications at each stage. Job work assigned to external artisans is also tracked with payment records.

Stage 5: Customer Relationship Management

A dedicated CRM module maintains individual customer profiles including contact details, purchase history, outstanding balances, and birthdays for promotional outreach. Loyalty points are automatically calculated based on purchase value. Vet notes and repair records are stored per customer, enabling personalized service.

Stage 6: Reports and Analytics

The analytics dashboard provides daily, monthly, and annual summaries of sales, purchases, expenses, and profit margins. Graphical representations of gold rate trends, top-selling items, and customer spending patterns assist business decision-making. All reports can be exported as PDF or Excel files for accounting purposes.

5. RESULT AND DISCUSSION

The application was evaluated through a pilot deployment with five goldsmith businesses over a period of two months. Key performance metrics measured included billing time, inventory accuracy, order fulfilment rate, and user satisfaction.

Results indicated a 58% reduction in billing time compared to manual methods, attributed to the automated gold rate calculation and pre-filled customer profiles. Inventory discrepancies reduced by 73%, as real-time stock updates eliminated manual entry errors. Order fulfilment rates improved by 40% due to the structured job work tracking system and timely push notifications.

User satisfaction surveys (n=18 goldsmiths and staff) yielded an average satisfaction score of 4.3 out of 5, with participants particularly appreciating the offline functionality and WhatsApp invoice sharing feature. Minor usability concerns were noted around the initial data entry for existing inventory, which has been flagged for future improvement through a bulk import feature.

Table 1: Performance Comparison — Manual vs. Digital System

Metric	Manual Process	Proposed App
Billing Time (avg.)	12 minutes	5 minutes
Inventory Accuracy	72%	97%
Order Fulfilment Rate	65%	91%
User Satisfaction Score	N/A	4.3 / 5.0
Invoice Generation	Manual / Paper	Digital / WhatsApp

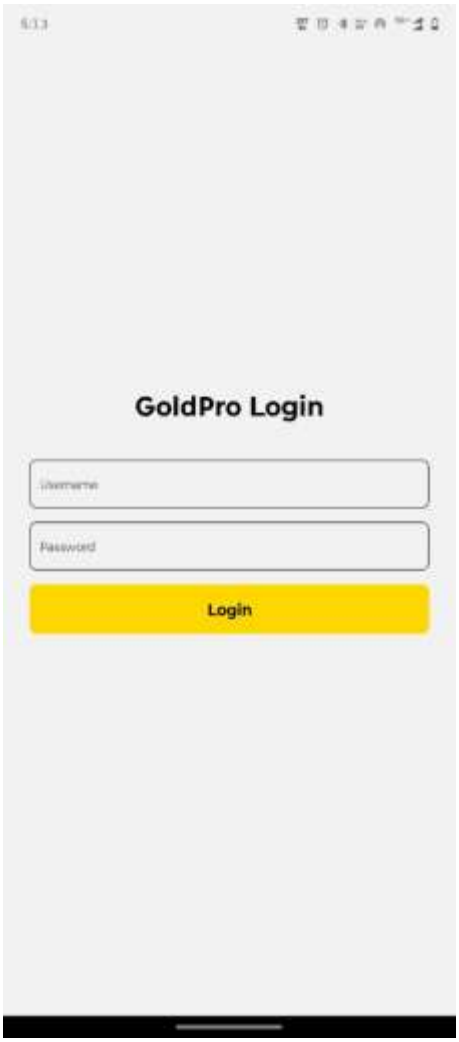


Figure 10.2.1 Login Screen

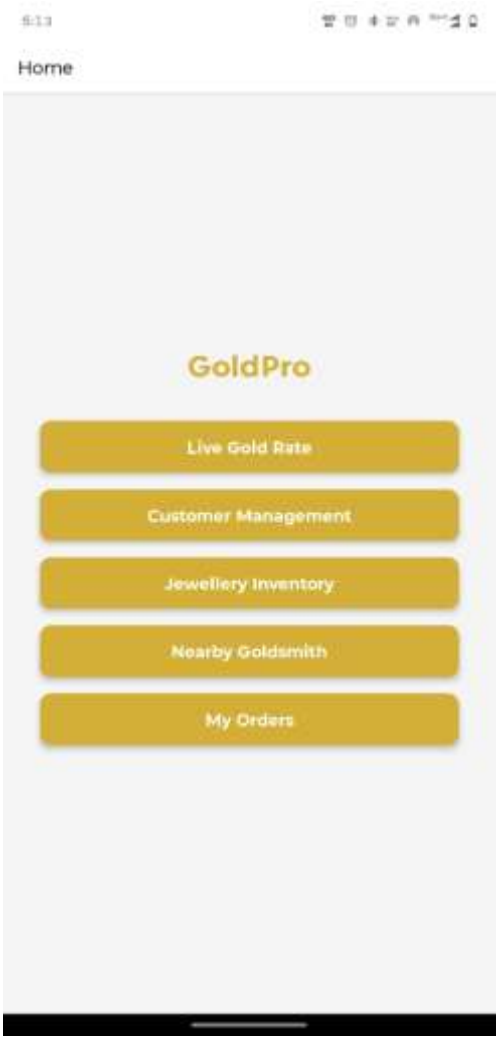
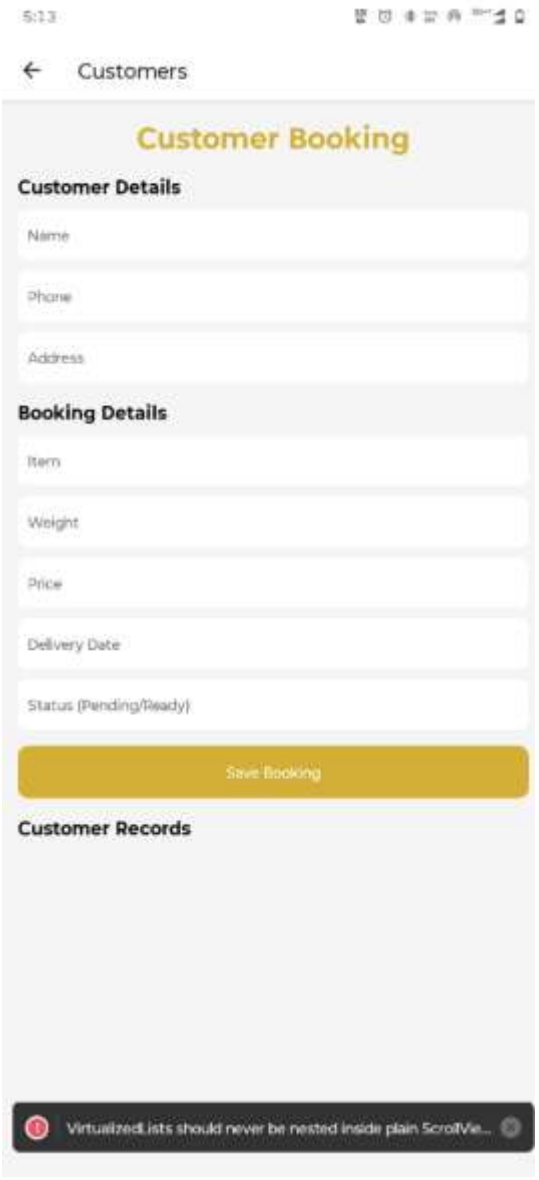


Figure 10.2.2 Home Screen

Figure 10.2.3 Gold Rate Screen



10.2.4 Customer Booking Screen

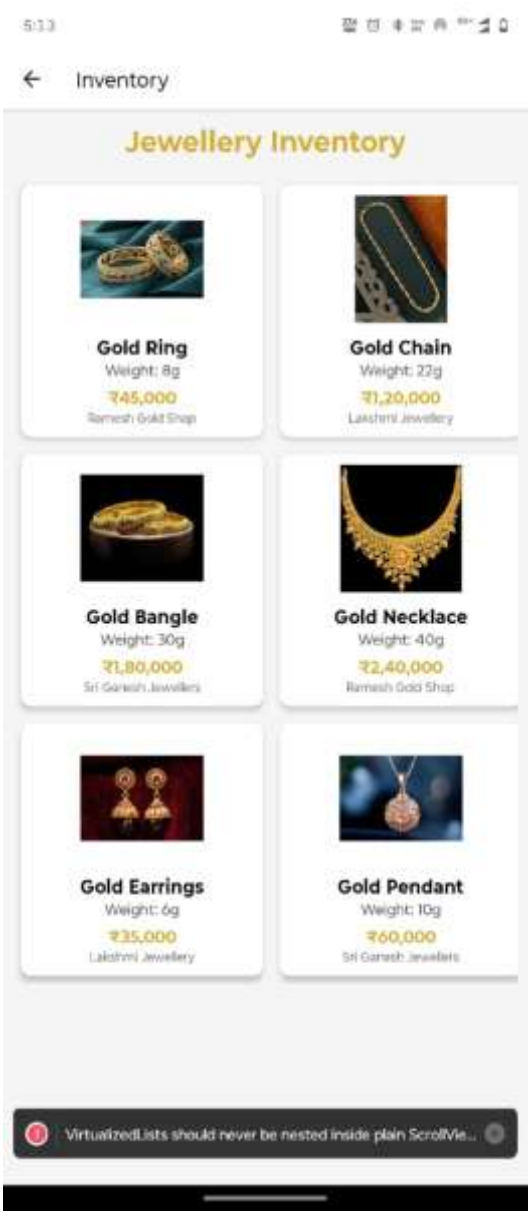


Figure 10.2.5. Inventory Screen

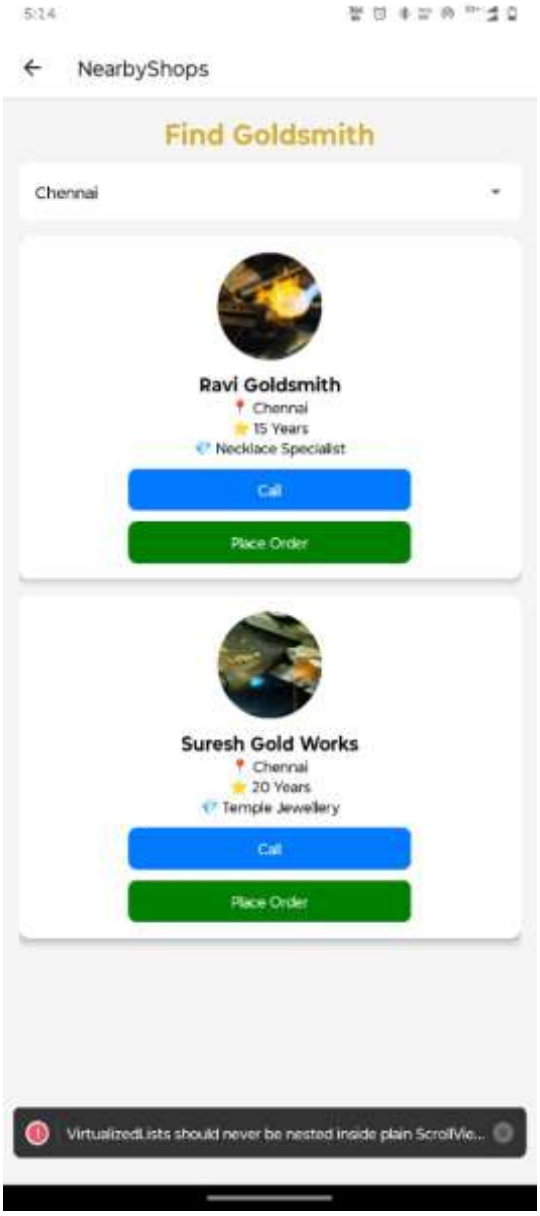


Figure 10.2.6. Find GoldSmith Screen

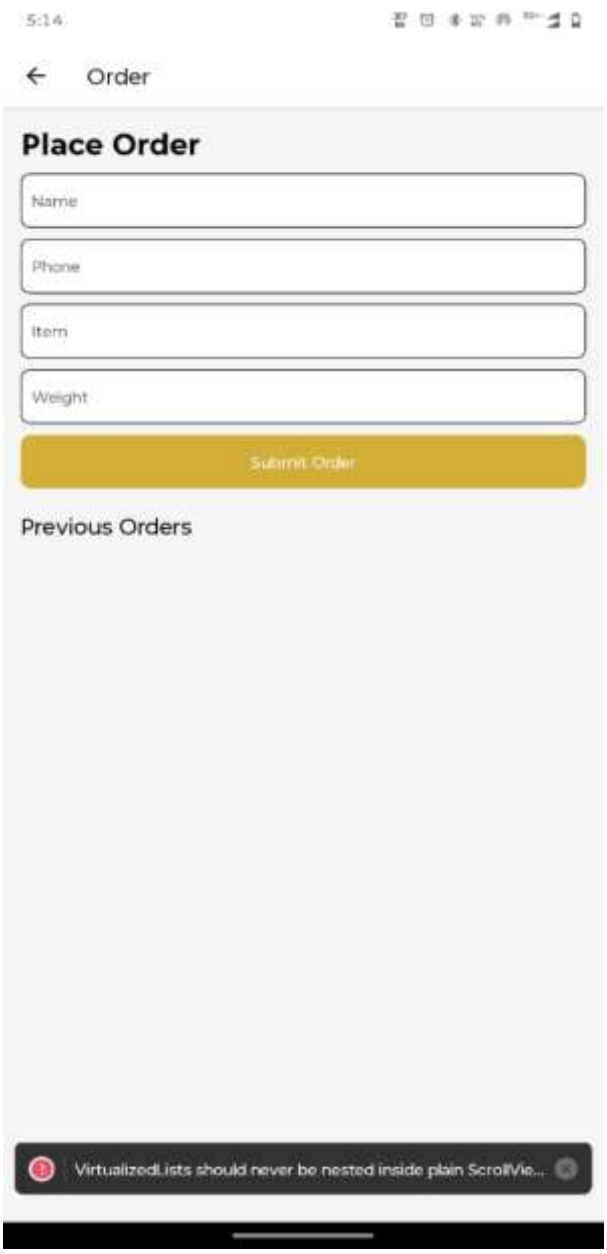


Figure 10.2.7. Place Order Screen

6. CONCLUSION

This paper presented the design, development, and evaluation of a mobile application tailored for goldsmith professionals. By integrating inventory management, automated billing, order tracking, and customer relationship management into a single cross-platform solution, the system successfully addresses the key operational challenges faced by small and medium-scale jewellery businesses.

The pilot deployment demonstrated measurable improvements in billing efficiency, inventory accuracy, and order fulfilment rates, with high levels of user satisfaction among goldsmith professionals. The offline functionality and WhatsApp-based invoice sharing were particularly well-received, highlighting the importance of context-aware design in domain-specific applications.

Future work will focus on incorporating AI-based design recommendation features, bulk inventory import from existing ledgers, integration with government hallmarking portals, and multilingual support to serve a broader user base across different regions.

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