IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 10, May 2025
Impact Factor: 7.67

JStar: Jewellery E-commerce App Through Mobile Technologies

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Abstract: *JStar is an innovative jewellery e-commerce application designed to offer a seamless shopping experience. By integrating Augmented Reality (AR) for virtual try-ons, Artificial Intelligence (AI) for chatbot support, and real-time gold rate APIs, Jewellery Customization, virtual try-ons, JStar addresses the challenges traditional jewellery buyers face, such as lack of price transparency and high making charges, no options to customize, lack of try-on options. The app also incorporates Hallmark Unique Identification (HUID) verification for authentication, building trust in online jewellery purchases. This paper details the features, architecture, and technical components of JStar.*

Keywords: Jewellery E-Commerce, Augmented Reality, Real-Time API, Customization, Chatbot, Virtual try-on

I. INTRODUCTION

We live in a world where buying jewellery online should be as personal, secure, and reliable as visiting a store. Introducing JStar – A revolutionary jewellery e-commerce platform that blends cutting-edge technology with customer-first solutions, making shopping seamless, interactive, and completely transparent along with real-time interaction, an immersive jewellery shopping experience and no excessive making charges. JStar is designed to incorporate advanced technologies like customisation options, Augmented Reality (AR), messaging assistance (chatbots), real-time gold rate, secure transactions, along login authentication. JStar's goal is to empower cost-conscious customers with a reliable, immersive shopping experience, especially those looking for authenticated gold jewellery with HUID codes and trusted customer feedback. With JStar, customers don't just shop. They experience jewellery like never before.

I.1.0 Technologies

A. FLUTTER:

Flutter, Google's cross-platform framework introduced in 2016 [2], streamlines mobile app development for Android, iOS, and Fuchsia. Flutter creates visually stunning, high-performance applications for both Android and iOS from a single codebase. It offers a rich set of customizable widgets, allowing developers to build beautiful, responsive UIs that feel native across platforms. Flutter's hot reload feature enables rapid testing and iteration, while its integration with Google Firebase ensures seamless backend functionality, including real-time data syncing, authentication, and cloud storage. [3].

B. DART:

Flutter applications are developed using Dart, the same programming language used for complex web apps like Google AdWords. Dart incorporates modern features from upcoming JavaScript standards, such as the "async" and "await" keywords, to simplify asynchronous programming. What distinguishes Flutter is the ability to refresh the view tree on every frame, offering smooth updates to the user interface. Dart's syntax, being quite similar to JavaScript, makes it easy for developers to learn. Although Flutter's design creates many temporary objects during runtime, Dart efficiently handles memory management using generational garbage collection.

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C. FIREBASE:

Firebase, a Google platform, offers authentication, real-time databases, cloud storage, and hosting for app development. It enables quick app development with features like secure user access and synchronized data across devices. Firebase Guides provide detailed documentation and tutorials for seamless integration into projects [5]. A powerful Backend-as-a-Service (BaaS) platform developed by Google that enables fast and secure mobile and web application development. It provides a suite of cloud-based tools that simplify backend infrastructure, allowing developers to focus on building engaging user experiences.

- Authentication: Supports secure user login via email, phone, Google, and other providers.
- Realtime Database & Firestore: Enables real-time data syncing across devices, ideal for chat apps, order updates, and dynamic product listings.
- Cloud Storage: Allows safe and scalable file storage (e.g., images of jewellery products).
- Hosting: Offers fast and secure web hosting.
- Firebase Analytics: Helps track user behaviour and engagement.
- Crashlytics: Monitors app stability and logs real-time errors.

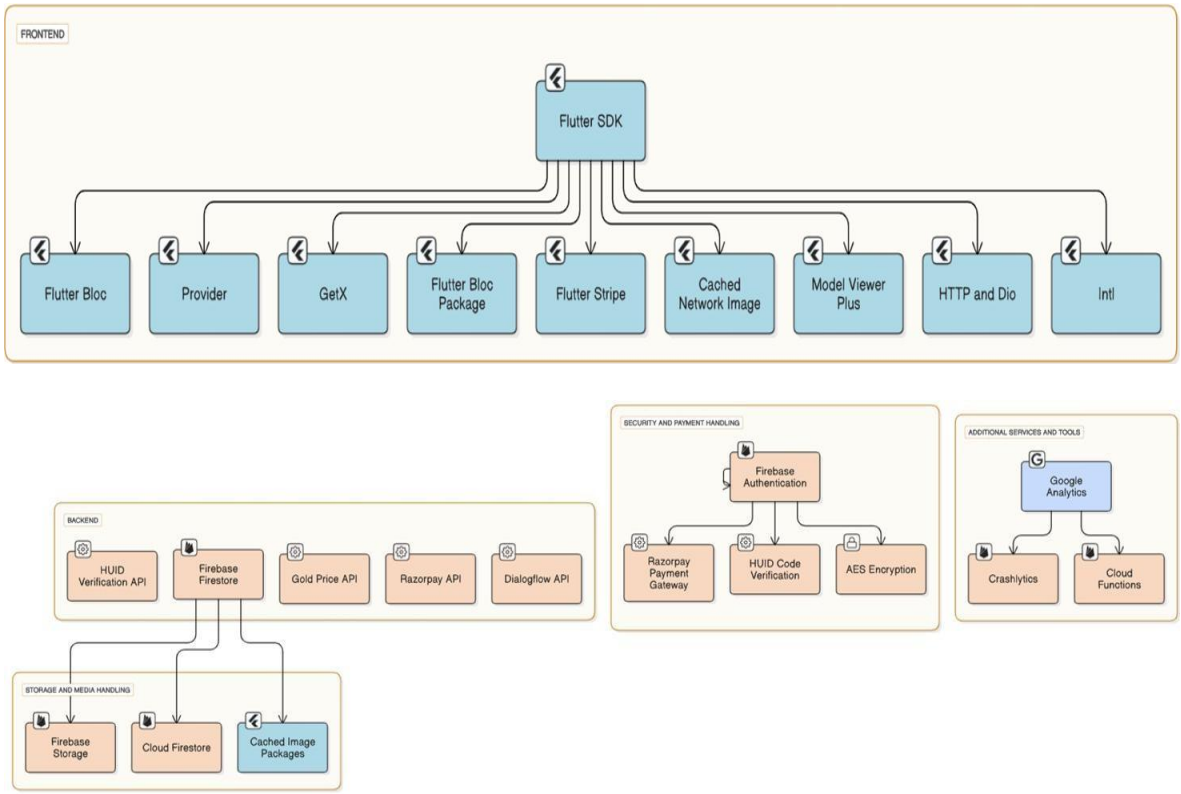

Figure 1: Technology Stack of Jstar

II. LITERATURE SURVEY

1. C. V. Kalyan et al. – "Lokart: Empowering Local Artisans through Mobile E-commerce" (2024)

- Overview: This paper discusses a mobile commerce platform aimed at promoting local artisans and small-scale jewellers.
- Relevance: Highlights the potential of mobile apps in supporting localized and niche jewellery markets—similar to JStar's vision of personalization and authenticity. Also underlines the importance of affordability and customer connection.

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2. Aakanksha Tahsildar et al. – "Application Development Using Flutter" (2020)
Overview: This section focuses on Flutter's technical strengths in mobile app development, emphasizing rapid UI creation, cross-platform compatibility, and rich widget libraries.
Relevance: This document supports JStar's choice of Flutter as a front-end framework, validating its flexibility and development efficiency.

3. D. Kurien, N. Kshatriya, A. Bardia – "Offline to Online: Understanding Marketing and Consumer Buying Behavior for Purchase of Jewellery"
- Overview: Studies the transformation of jewellery buying habits as they shift from offline to online environments.
- Relevance: Provides context to JStar's approach in addressing buyer hesitation through AR, HUID verification, and chatbot support. Reinforces the need for transparency and personalization.

4. Flutter.dev – "Beautiful Native Apps in Record Time" (Accessed 2023)
- Overview: Official documentation and promotional content from Flutter's website. Explains its architecture, performance benefits, and UI capabilities.
- Relevance: Justifies technical decisions in the JStar app's development, particularly regarding cross-platform deployment and UI consistency.

5. Firebase Guides – Google (Accessed 2023)
- Overview: Comprehensive guide to Firebase services including authentication, database, and storage.
- Relevance: JStar integrates Firebase for secure backend operations, data synchronization, and real-time chat. This resource supports the backend architecture outlined in your methodology.

6. "AI-Powered Suggestions for Retail" – Int. Conf. on AI Trends, 2023
- Overview: Discusses AI-based recommendation systems tailored for retail platforms.
- Relevance: JStar's recommendation engine benefits from insights into AI personalization and behavior analysis, improving customer experience and product discovery.

7. Samiksha Borgave et al. – "SILVESTA – A Mobile App Silver Shopping"
- Overview: Describes a mobile app focused on selling silver jewellery online.
- Relevance: Offers a case study in niche e-commerce app development, similar to JStar but focused on silver.

8. "Augmented and R. Reality – Virtual Try-On for E-Commerce" – Journal of Visual Technology, 2022
- Overview: Explores how AR enables virtual try-ons, enhancing customer interaction and reducing product return rates.
- Relevance: Directly supports the implementation of AR in JStar for jewellery try-ons.

9. Chunnu Khawas & Pritam Shah – "Application of Firebase in Android App Development: A Study" – IJCA, 2018
- Overview: A detailed study of Firebase services and their integration into Android development.
- Relevance: Reinforces JStar's use of Firebase for authentication, real-time database, and hosting. Demonstrates its reliability and performance for production-grade apps.

III. METHODOLOGY

The JStar application is developed using the Flutter framework for the front end and Firebase for the back end. When users access the preview page, they are prompted to either login or sign up using their email, mobile number, or Google account, with verification handled through Firebase. Once logged in, the app displays products. Users can then add items to their cart or favourites for later purchase and view their ordered products in the "My Orders" section. Sellers

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can also utilize the app to post their products by selecting the appropriate category, providing product details, and managing orders received through the app. The buyer's mobile number is shared with the seller upon receiving an order, enabling direct communication for sales. Figure 1 depicts the proposed architecture of the JStar app, highlighting its various functionalities and user flows.

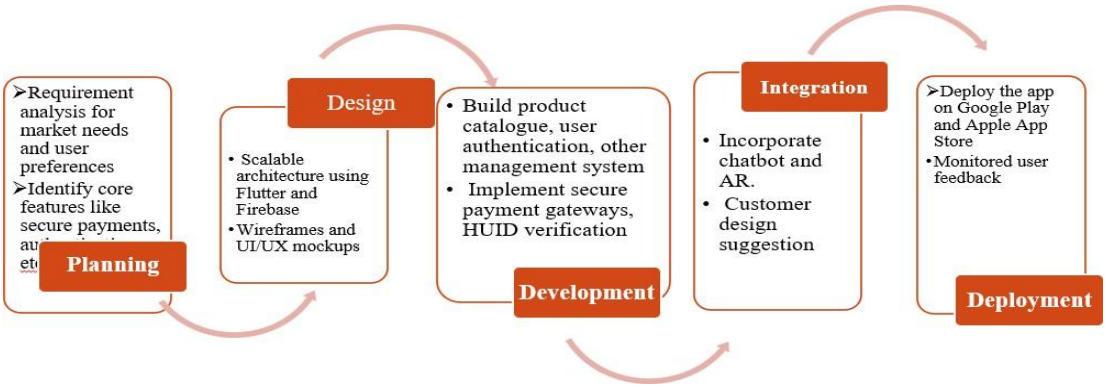

Figure 2 : Methodology of Jstar program flow

IV. MODELLING AND ANALYSIS

Step 1: If the user doesn't have an account, they sign up by providing their name, mobile number, email, password.
Step 2: After signing up, the user enters the UI developed using Dart where their are numerous product categories, options search bar etc for user convenience.
Step 3: To purchase products, the user browses through the different offerings in the app and can add preferred items to their favourites.
Step 4: Customer can customize jewellery to their liking and send it to us when we receive on our server backend and begin developing.
Step 5: User also get real-time assistance via Jstar chatbot
Step 6: The user adds desired products to their cart for purchase and proceeds to place the order.
Step 7: Before finalizing the order, the user provides necessary details such as name, email, and mobile number. Step 8: The user can track their placed orders by accessing the "My Orders" section.

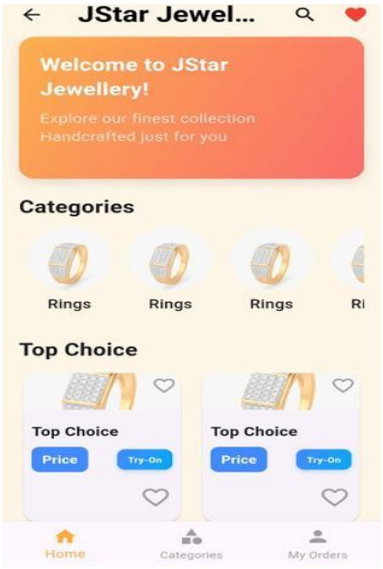

Figure 3: User Interface of Jstar

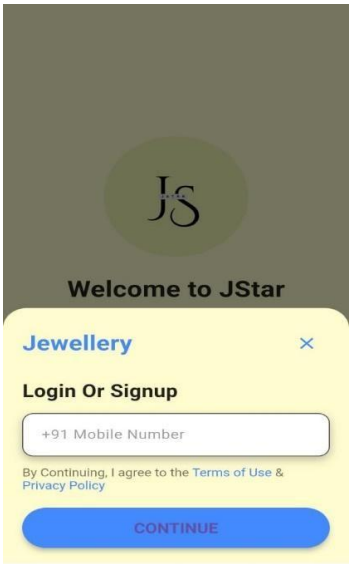

Figure 4: Login page for Jstar

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IV.1.0 Project Estimates:

1. Requirement Gathering and Analysis:

Understand customer pain points, such as high making charges, lack of transparency, and limited personalization options. Gather key requirements for features like competitive pricing, 3D try-on using AR, product customization, HUID code integration, chatbot assistance, and customer review systems. Analyze market trends and customer behavior to refine the recommendation system, gold rate API, secure payment gateway, and opportunities for personalization and expansion.

2. System Design:

Design the architecture of the mobile application using Flutter SDK and Firebase, including database design, front- end and back-end integration, AR module for 3D try-on, customization interface, chatbot integration using Dialogflow, real-time gold price API, and security protocols (especially for HUID verification and future blockchain integration). Design user-friendly UI/UX to ensure seamless navigation, customization workflows, and enhanced user experience.

3. Implementation:

Develop the mobile application, including core features like product catalog with filtering options, 3D try-on with augmented reality, product customization module, recommendation engine, customer review interface, chatbot for user queries, and competitive pricing models. Integrate Razorpay for secure transactions and Firebase Firestore for scalable data storage and real-time synchronization.

4. Testing:

Conduct unit testing, integration testing, and user acceptance testing (UAT) to ensure the application functions smoothly. Test modules including AR try-on, customization interface, chatbot queries, real-time gold rate updates, recommendation system, payment gateway, and HUID code verification. Ensure full responsiveness and compatibility across Android devices.

5. Deployment of System:

Deploy the mobile application on the Google Play Store with complete payment integration via Razorpay. Ensure the app is optimized for performance, security, and user experience. Enable backend monitoring and logging for real- time issue tracking. Prepare the platform for global scalability and future upgrades.

6. Maintenance:

Provide regular updates to the application, addressing bug fixes, performance enhancements, and feature improvements. Continuously collect and evaluate user feedback to enhance the customization options, chatbot interactions, AR functionality, and personalization capabilities. Plan future integration of blockchain-based authentication and expansion to international markets with localized features.

IV.1.1 Calculations:

Example Calculation: Price Breakout:
Current Gold Price: □7000/gram Jewellery Price: 5.50 gm × □7000 = □38,500
Total Weight of Ring: 6.00 gm Making Charges: 5.50 gm × □200 = □1,100
Stone Weight: 0.50 gm Tax (3%): (38,500 + 1,100) × 0.03 = □1,188
Net Weight: 6.00 - 0.50 = 5.50 gm Total Price: □38,500 + □1,100 + □1,188 = □40,788

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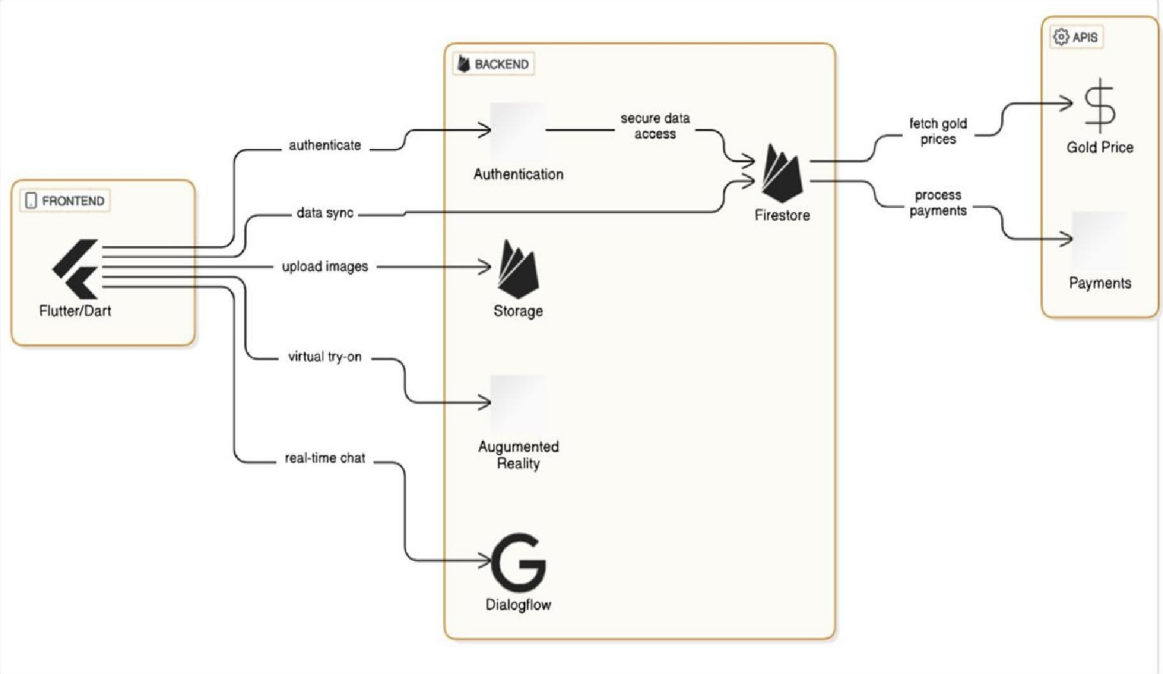

Figure 5: Jstar System Architecture Using Project Estimation

V. RESULT AND DISCUSSION

ature / Me	JStar	CaratLane	Bluestone	Melorra
App Launc	2.1	3.2	2.8	3
Home Pag	1.5	2	1.8	2.2
Widget Re	95	90	92	88
Time to Lo	1.8	2.3	2.1	2.4
AR Try-On	2	3.5	3.2	3.8
Chatbot R	1.2	2	1.7	2.3
Crash Rate	0.5	1.2	0.9	1.4
App Size (	45	60	55	70
Avg. RAM	150	200	180	210

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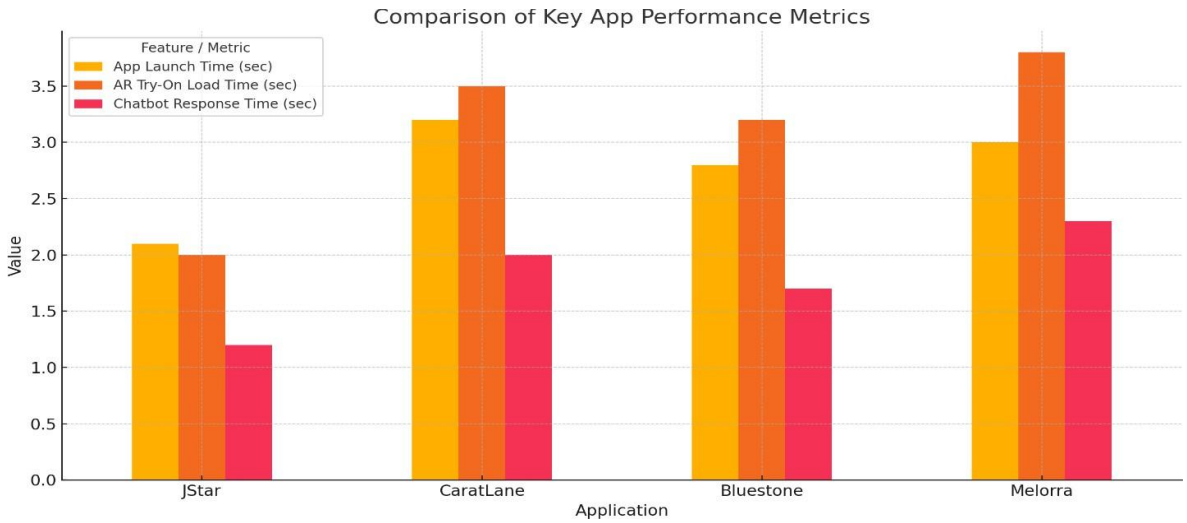

Figure 6: Comparison of key App performances

JStar delivers a responsive and user-centric jewellery shopping experience by integrating Flutter for seamless UI, Firebase for real-time backend, and Augmented Reality for interactive try-ons. As shown in the comparison chart and Excel analysis, JStar outperforms leading apps like CaratLane and Bluestone in metrics such as app launch time, AR load speed, and chatbot responsiveness.

Supporting literature confirms the benefits of using Flutter and Firebase for efficient mobile app development and highlights the growing importance of AR and AI in retail personalization. The low crash rate, optimized performance, and secure architecture position JStar as a competitive, future-ready solution in the online jewellery space.

Overall, JStar meets the core needs of today's digital jewellery buyers—speed, customization, transparency, and trust.

VI. CONCLUSION

JStar transforms the traditional jewellery shopping model through an interactive and intelligent digital solution. The combination of AR, AI, and real-time APIs not only provides convenience but also fosters trust among users. The platform aims to enhance transparency, affordability, and customer satisfaction in the gold jewellery market. JStar mobile application introduces a transformative approach to online jewellery shopping by combining affordability, transparency, and cutting-edge technologies like augmented reality, customization, chatbot support, and real-time pricing. By directly addressing customer pain points such as hidden charges and lack of personalization, JStar creates a user-centric platform that redefines the online jewellery experience. With a future-ready architecture incorporating AI and blockchain potential, JStar is not only a solution for today's digital buyers but also a scalable model for future innovation in the jewellery retail sector.

VII. ACKNOWLEDGMENT

We extend our sincere gratitude to the project guide and the Department of Computer Engineering at NBNSTIC, Pune, for their support and guidance throughout the development of the JStar application. We also thank our teammates for their collaborative efforts and valuable contributions. Special thanks to the users and stakeholders whose feedback played a vital role in shaping the features and functionalities of the JStar application. Lastly, we appreciate the resources and tools like Flutter, Firebase, Razorpay, and Dialogflow that empowered us to bring our vision to life.

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