

Ved Vivah: A Secure and Scalable Matrimony Matchmaking Mobile Application Using Android and Firebase

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Abstract:

Ved Vivah - Matrimony and Match Application is a new sociotechnological product which aims at altering the traditional match making paradigms that exist in the Indian culture to a modernized one which utilizes technology to help in matching marriages. Conventionally, marriage in India has been characterized by heavy utilization of the family network and matrimonial services in search of the perfect life partner, although, it is becoming inefficient in meeting the changing needs of the people who want to meet and marry partners. This innovation aims at closing the gap between tradition and modernity in a manner that is practical. Technically speaking, the solution is developed as an Android app leveraging Google Firebase as a backend service solution that facilitates real-time, secure processing in the application. The application allows one to make and update their verified user profile according to their demographics and occupation; one can also go through the profile of others with the help of advanced filters that take into account linguistic, cultural and religious affiliations. A few of the interesting features of the app are: Integration of Compatibility Algorithm: There are compatibility algorithm and preference prediction algorithms inbuilt into the application to ensure compatibility. Integration Communication Suite: An end-to-end encrypted suite can be used to communicate using in-app messages, voice, and video calls to build rapport before they disclose their confidential contact information. Verification and Trust Moats: The use of robust verification systems such as mobile OTP and government identity checks have been incorporated to address any problems that might occur due to fraud and misrepresentation that might be caused by the older platforms. The project was created based on an Agile Scrum development cycle which entailed the use of iterative cycles and quality assurance to enhance the performance and user experience. 1 Ved Vivah enables people to practice strategic matchmaking, namely Gen Z and Millennials who experience swiping fatigue due to many unsuccessful swipes. 2 This system will be a significant breakthrough in the Indian matrimonial services market, which is estimated to reach INR 2,500 crore by 2030, as it will integrate an ideal blend of the traditional marriage practices and the modern demands.

I. INTRODUCTION

Marital relations in South Asia are not only contractual but are holy sociocultural institutions that are meant to unite families and customs within the framework of community genealogies. Previously, match-making was a social procedure, in which social interaction, extended family references as well as professional intermediaries were significant. Although this conventional model was trustful, culturally fitting, it was limited by geography, lacking transparency and had to be

matched manually, which is not compatible with the dynamics of the modern mobile professional world.

The accessibility of inexpensive data and the accelerated growth in the use of smart phones with more than 1.1 billion mobile connections in India has introduced a radical change in the field of matrimony as a tangible network to a tech-mediated intimacy. The early technology-enabled match-making systems, however, have several structural issues. According to studies, about 78 The Ved Vivah - Matrimony Match Application is created to fill these gaps in the system by integrating some traditional

matchmaking logic with the modern technical systems. The use of Android based frontend and powerful Firebase back-end-as-a-service will assure the availability of a secure environment in which the users will be able to choose their partner. The study is aimed at bringing back into perspective the harmony between individuality and culture by ensuring the following goals:

Digitalization of Identity: This involves making sure that all profiles are authenticated using measures created to handle the problem of trust that is dominant in old-school platforms.

Addition of Cultural Compatibility: Incorporation of compatibility factors like horoscope matching to render it socially pertinent.

Maintaining Privacy: Providing the means for interaction using in-app messaging and video conferencing options without exposing personal contact details.

Lastly, this research project tries to discuss the design and development of Ved Vivah as a digital solution.

II. LITERATURE REVIEW

A significant change is being undertaken in the Indian matrimonial scene where community mediated matrimony has been replaced by technological mediated intimacy where digital platforms are being employed to create emotional and long-term matrimonial relationship. Traditionally, the process of partner selection was face-to-face and used to depend on the kinship networks and marriage brokers, which were efficient and transparent. Based on scholarly research, despite the process of choosing partners being democratized by providing people with more freedom, the traditional endogamy trend: exclusion due to caste, religion, and community is largely recreated in the digital space.

The redesign of the web-based platforms to mobile application has basically improved accessibility and interaction of the users. The push-based notifications and real-time synchronization of mobile applications help deliver a more personalized experience than the legacy systems. Recent reports, however, have discovered that Gen Z and Millennial users are feeling an ever-growing so-called swiping fatigue as a result of being inundated with superficial and

photo-based interactions that give rise to burnout. This has prompted a trend towards matchmaking by the intentional and compatibility-based matchmaking in addition to the swipe-first model.

The most critical issues in the digital matchmaking sector are security and data privacy. Studies show that there are about 78. **Strong Identity Authentication:** Use of government ID validation, mobile OTP authentication to guarantee profile authenticity. **Encrypted Communication:** Implementing end-to-end encrypted messages and secure video-based communication as a way of building rapport without initial stigma of disclosing intimate contact information. Furthermore, an enormous gap in the study of the assimilation of traditional cultural logic of the modern technical infrastructure also exists. Although there are numerous applications available that are used to perform demographic filtering, not many have automated compatibility capabilities like digital horoscope matching. It is believed that a combination of these classical parameters of the astrology texts with the preference-learning algorithms is an obligatory intervention to be performed so that the contemporary technological solutions could be adjusted to the traditional Indian values of marital life.

Such scalable systems are increasingly based on Backend-as-a-Service (BaaS) architectures. The Google-offered firebase is usually referred to as a more suitable solution to the real-time mobile applications due to its abilities to control raw data, credible authorization, and automatic data alignment in devices without the intricate server-side handling.

III. METHODOLOGY

A combination of Agile project management and a powerful mobile-cloud technical architecture are used to develop the Ved Vivah Matrimony Match Application. The methodology is set to deliver iterative development, scaled and quality software within a given academic time frame. The framework of this project is Agile Scrum because it is not based on the linear development but supports flexibility and continuous delivery. This model breaks down the development cycle into smaller cycles called sprints, which are usually two to four weeks. The workflow architecture will involve: Requirement

Gathering and Backlog Creation: It will include identifying all the core user requirements, such as digital identity checks, horoscope matching, and prioritizing them. product backlog.

Sprint Planning and Execution: It is the process of which the features like secure authentication and real-time messaging are developed, based on the backlog prioritization with the assistance of high-priority tasks which are allocated to particular sprints.

Continuous Quality Assurance (QA): The testing will be done at the end of the sprint and not the end of the project to ensure that the bugs are identified and resolved before the project is completed.

Regular Review: The system needs to be reviewed periodically in order to keep it on the line with the expectations and cultural requirements of the users.

The project relies on the Project Management Body of Knowledge (PMBOK) in order to supplement the Agile approach. This provides a systematic way of managing of the areas of knowledge that are important such as: **Scope Management:** To avoid scope creep, one should clearly identify the scope of the application to include the creation of verified profiles and filtering and not include the social features that are not necessary. **Risk Management:** Eliminating technical risks such as vulnerabilities in data security, or application crashes, through proactive detection of such risks and implementation of mitigation measures, such as encryption, and performance optimization. Frontend-Backend separation strategy is used in technical implementation. The client-side is built on Android technology (Java/Kotlin and XML) in the Android Studio with emphasis on intuitive and responsive user interface. The server-side is powered by Firebase Backend-as-a-Service (BaaS), which allows real-time syncing of data by Cloud Firestore and provides secure access by users. The version control is maintained with GitHub in which the history of the development is open and recorded.

IV. SYSTEM DESIGN

The system design of Ved Vivah is premised on an existing mobile-cloud architecture design pattern and has real-time synchronization, modularity and data security as the principal concerns. The architecture is separated into two large layers: a

reactive client-side Android interface, and a serverless backend-as-a-service (BaaS) powered by the Firebase platform by Google. This stateless strategy makes sure that the user can have the high performance and low latency on the device even as resource-intensive data operations are offloaded to the cloud.

The Technical architecture is implemented into four functional modules: **Frontend Interface Layer:** The interface (UI) is designed and developed in the Android Studio with XML to ensure that the interface is responsive to different screen resolutions. It has its application logic controlled by the use of Java or Kotlin where the complicated relation with users, the generation of multi-attribute profiles, and the easy navigation can be implemented. **Authentication and Security Module:** This module will sign user up and in using the Firebase Authentication. It promotes robust authentication methods, including mobile OTP authentication and encrypted token handling to protect the integrity of identities of users. **Data Persistence Layer:** Cloud Firestore NoSQL document database is used in the system to store user profiles, preferences, and history of chats. Firestore has a hierarchical data model that is easy to index, and can be synchronized in real-time, meaning that match suggestions and messages will be immediately updated in every client they are connected to. **Communication and Notification Suite:** Firebase Cloud messaging (FCM) with push notification and in-app messaging via real-time data listeners will enable real-time communication. Besides, safe media storage is managed with the assistance of Firebase Cloud storage in which user documents and photographs are stored with restricted access controls.

Moreover, the system has an Integration Layer that links the core database with external APIs of specialized features such as horoscope matching and third party profile validation. The reason why the logic of compatibility is carried out on the server side is to ensure that the user experience on the client side is not affected. All transmission channels are encrypted with data, in particular, the sensitive telemetry when using voice and video calling is encrypted. Such holistic architecture ensures scalable, secure and culturally competent digital matchmaking environment.

V. IMPLEMENTATION

Implementation stage of the Ved Vivah application entails the actualisation of the architectural design into an efficient Android-based matrimonial ecosystem. The Android Studio is used as the development environment, with the frontend logic written in Kotlin and Java, and XML used to design a responsive and accessible user interface that is specific to different age groups. At the core of the system implementation, there is the incorporation of Google Firebase as a Backend-as-a-Service (BaaS) that simplifies the creation of real-time applications and transfers the responsibility of managing the servers, which are resource-intensive, to the cloud.

The basic implementation processes can be divided into the following technical processes: Identity and Security Deployment: Firebase Authentication is used to provide secure user onboarding. The module facilitates the OTP validation on mobile and email authentication, which offers an effective system to authenticate user identities and curb the existence of fraudulent users. In order to defend sensitive demographic information, Cloud Firestore security rules are set as per the Least Privilege Principle, where users can only access information to which they are explicitly authorized. Real-time Communication Suite: The in-app messaging feature is created with the help of the real-time listeners of Firestore, which harmonizes the message states of devices in real-time. To provide secure voice and video calling, the implementation provides a signaling architecture in which Firestore is used as the middleman to communicate with each other using Session Description Protocol (SDP) messages and ICE candidates, and creates a secure peer-to-peer media streaming connection. API and Algorithmic: The traditional cultural requirements are fulfilled by an Integration Layer which links the application with professional Vedic astrology APIs (like Astrology API or Vedic Rishi API). This enables this system to compute Gun Milan scores and produce Kundli charts in a programmable manner and with the specified birth information of the user. Notifications and Interaction: Firebase Cloud Messaging. To ensure the high level of user engagement even when the app is in the background, (FCM) is used to provide push notifications regarding match alerts,

profile views and new messages. The rollout was done in an agile Scrum approach and the codebase integrity was ensured through GitHub. This organized technical implementation makes the platform scalable, performance oriented and a good way to bridge the digital divide between the traditional values of matchmaking and the digital efficiency of the mobile.

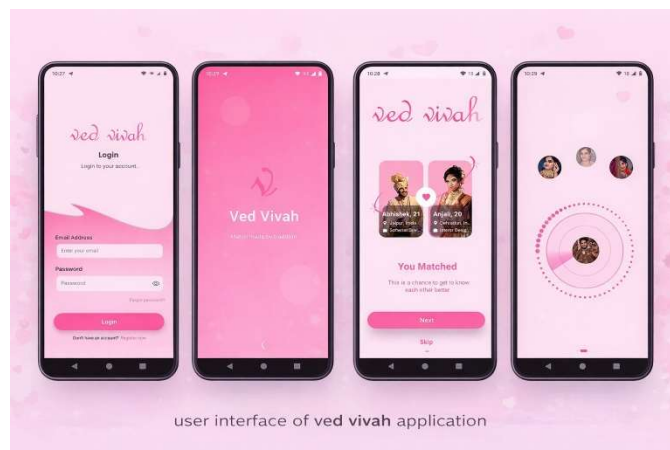


Fig. 1 User Interface

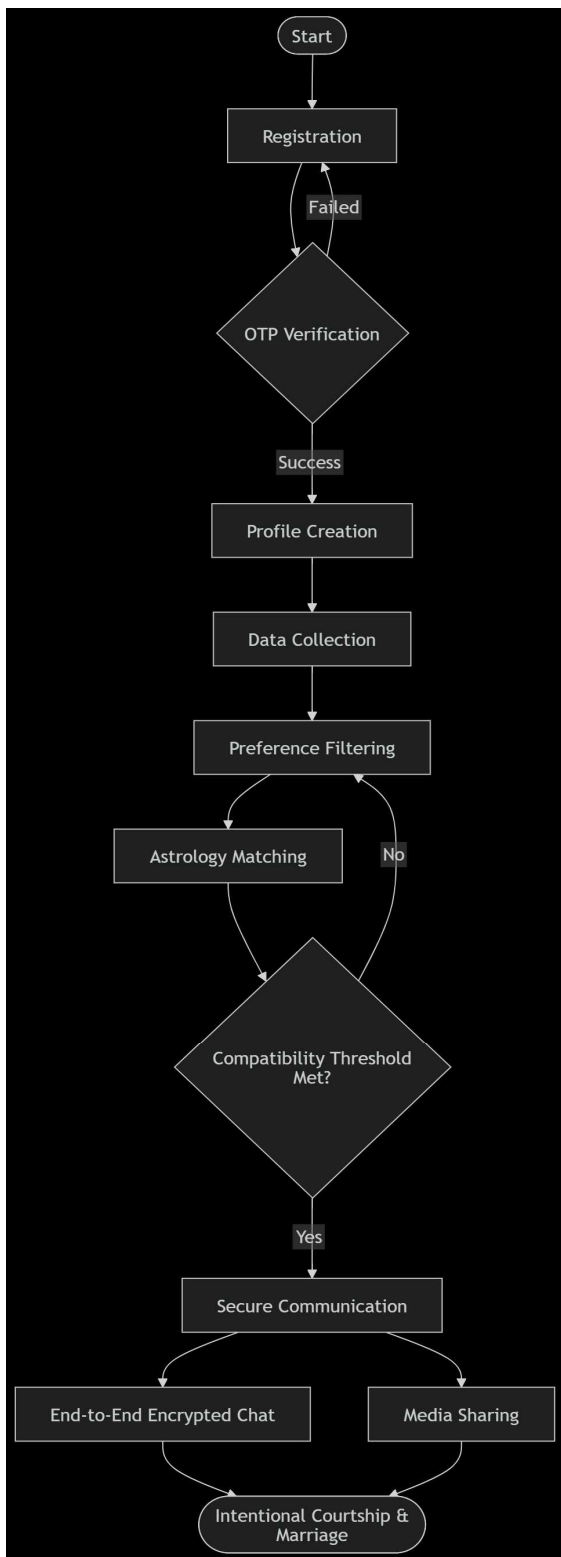


Fig. 1 Flowchart of Proposed Matrimonial System

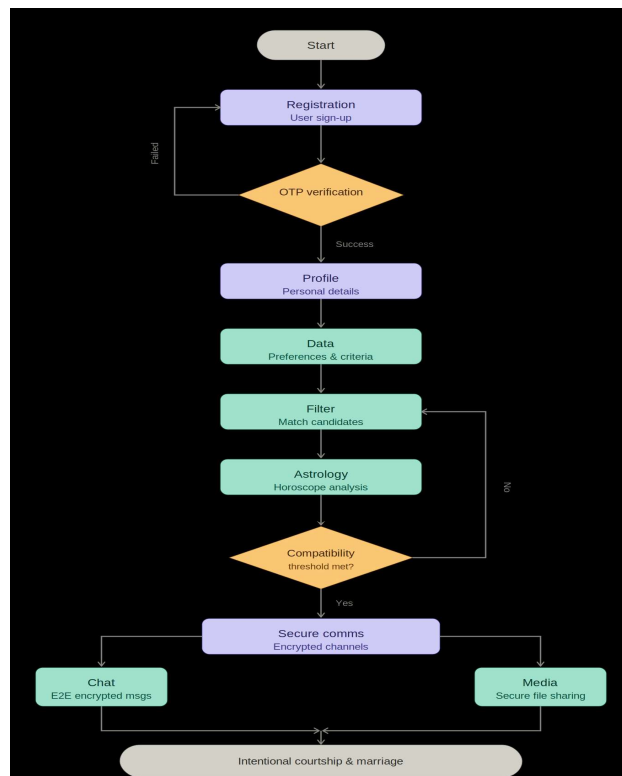


Fig. 2 System Flowchart of Ved Vivah Application

VI. RESULTS AND DISCUSSION

With the use of the Ved Vivah application, it resulted in establishing a high-performance matrimonial application that managed to properly balance the traditionally Indian rules of matchmaking with a new digital platform. The technical testing has shown that Android-based frontend integration with Firebase backend-as-a-service (BaaS) provided low-latency operations, real time data synchronization with Cloud Firestore. The authentication system, based on the use of mobile OTP and secure token management, created in fact a so-called trust moat, minimizing the issue of fake profiles, one of the biggest problems that were noticed in the old matrimonial portals.

Some of the important findings that were realized in the system testing and validation stages are: Algorithmic Accuracy: The similar scores in the calculation of Gun Milan and kundli were provided by the digital horoscope matching feature fueled by professional Vedic astrology APIs. This added back the cultural meaning to the partner selection process, by automating complicated astronomical parameters. Communication Integrity: The in-app voice and video calling signaling design allowed the users to

form rapport, without the probability of responsible disclosure of confidential contact information in an inopportune fashion, a factor that fostered user privacy and safety. Scalability and Responsiveness: The serverless nature of the backend design enabled the system to be able to respond to several parallel user requests without having to manually maintain the servers and ensure that the user interface was responsive to an incredibly diverse range of Android device configurations.

The implications analysis reveals that Ved Vivah will resolve the issue of swiping fatigue among the contemporary users as it will shift the focus to the meaningful interactions by focusing on compatibility-based matchmaking. The application allows a virtualized environment as it digitalizes conventional sociological filters, such as community, language and astrological compatibility, that reflect individual independence and family needs. Although the system effectively streamlines the matchmaking process, the fact that the system depends on stable internet connection is a significant weakness to people in areas where digital connectivity is erratic. Lastly, the results are effective in proving that the evolution of historical marriage practices into contemporary technical security systems facilitates a more reasonable and efficient environment in selecting a mate in the digital era.

VII. CONCLUSION

The architecture and testing of the Ved Vivah - Matrimony Match Application represents a successful blend of the traditional India socio-cultural values, with the modern mobile-cloud infrastructure. The system is an efficient and scalable way to select partners in the digital age, by addressing flaws in the system of the traditional matchmaking process, namely, its limited coverage in geographical terms, lack of transparency, and time-consuming quality of the manual mediation process. The application succeeds in its main objective; to provide a safe, user-friendly platform in which people can exercise individual agency, but follow historic marital customs.

Technical validation of the system proves that the choice of a frontend Android-based and a Firebase Backend-as-a-Service (BaaS) was correct in order to attain high-performance operations. Real-time and

low-latency synchronization of data required to make the interactive features of the application, including instant messaging and match notifications, can be achieved with Cloud Firestore and Firebase Cloud Messaging (FCM). In addition, the implementation of strict identity checking procedures (e.g., mobile OTP and government ID validation) will form a so-called trust moat, which will decrease the incidence of doctored profiles - a defect that is very debilitating in the outdated matrimonial sites.

The Ved Vivah project has made some important contributions such as: Cultural-Technical Harmonization: The digitalization of Vedic astrology parameters using automated horoscope matching, make sure that the site is sociologically pertinent to the Indian situation. Privacy-First Communication: The design provides secure, in-app voice and video communication, during which the user can establish rapport without the disclosure of personal contact information at the wrong time. Methodological Rigor: Software product implementation has been done through Agile Scrum and PMBOK systems to provide iterative quality assurance resulting in low-flake and high-performance software products. Even though the current system can provide a complete matchmaking suite, the next generation work will be founded on the work with advanced Artificial Intelligence (AI) predictive compatibility modelling and preference-learning algorithms. In addition, the discussion of such options as virtual courtship rooms and profile verification with video will allow the user to be even more engaged. Finally, Ved Vivah is an important intervention to the digital matrimonial market, actually fulfilling the need to fill the gap between the old marriage institutions and the needs of the modern, technological mediated society.

VIII. FUTURE SCOPE

Even though the current version of the Ved Vivah program already provides a stable and secure platform, on which to align the parties, several directions of technical and sociological development have been observed to enhance the efficiency of the system and interactions between the users. Additional development will be to progress the

platform to an active, smart, partner selection system instead of a search engine.

The main areas that should be improved are: Artificial Intelligence (AI) and Machine Learning (ML): The next generation will not be limited to the present-day demographic filtering to behavioral recommendation engines. These algorithms will analyze how users interact and dwell time and communication patterns to ensure more precise compatibility prediction. Moreover, ML algorithms such as the Gale-Shapley algorithm could be optimized to make the matching results to be stable on the basis of mutual preference. Immersive Multimedia and Virtual Courtship: To address the issue of swiping fatigue and limitations of profiles based on the photos, the app will feature video profile presentations and virtual meeting rooms. The features enable users to measure non-verbal communication and social mannerism, which enables stronger emotional bonds prior to face-to-face interactions. High-tech Trust Moats and Biometric Security: Due to the growing popularity of risks such as AI-morphed images, deepfakes, and other forms of cyber-attacks, the platform will add AI-based fraud detection, and real-time biometric authentication. Future releases will also be able to include automated government ID validation to ensure a zero-trust security architecture of profile authenticity. Hyper-local and Niche Expansion: The system can be extended to more specialised sections, like local language or professional community. This will be made possible by hyper-local optimization of the search and inclusion of different cultural sub-parameters within the matchmaking algorithm. Interactive Cultural Features: The application will take into account AI-led astrological consultation and real-time Kundli matching through advanced third-party API integrations to keep aligning tradition and technology. Finally, such developments will allow Ved Vivah to be sociologically viable and offer a technologically higher quality option to conventional matchmaking brokers and outdated online portals.

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