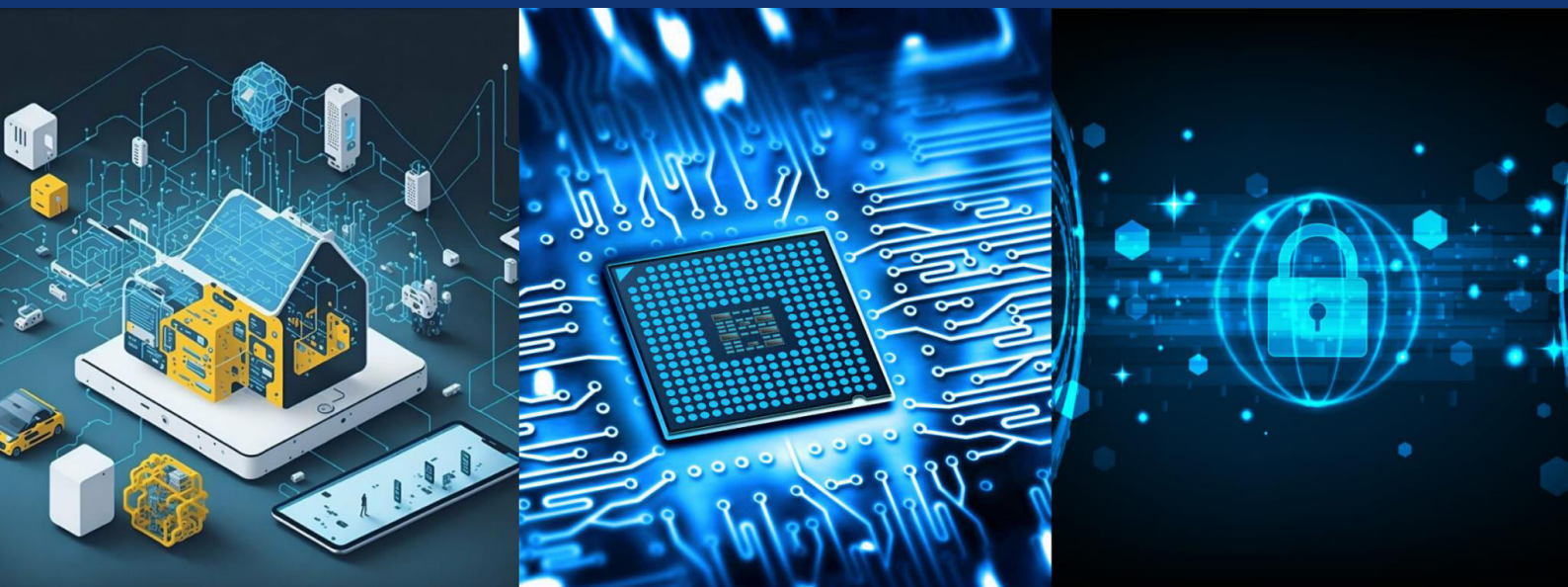
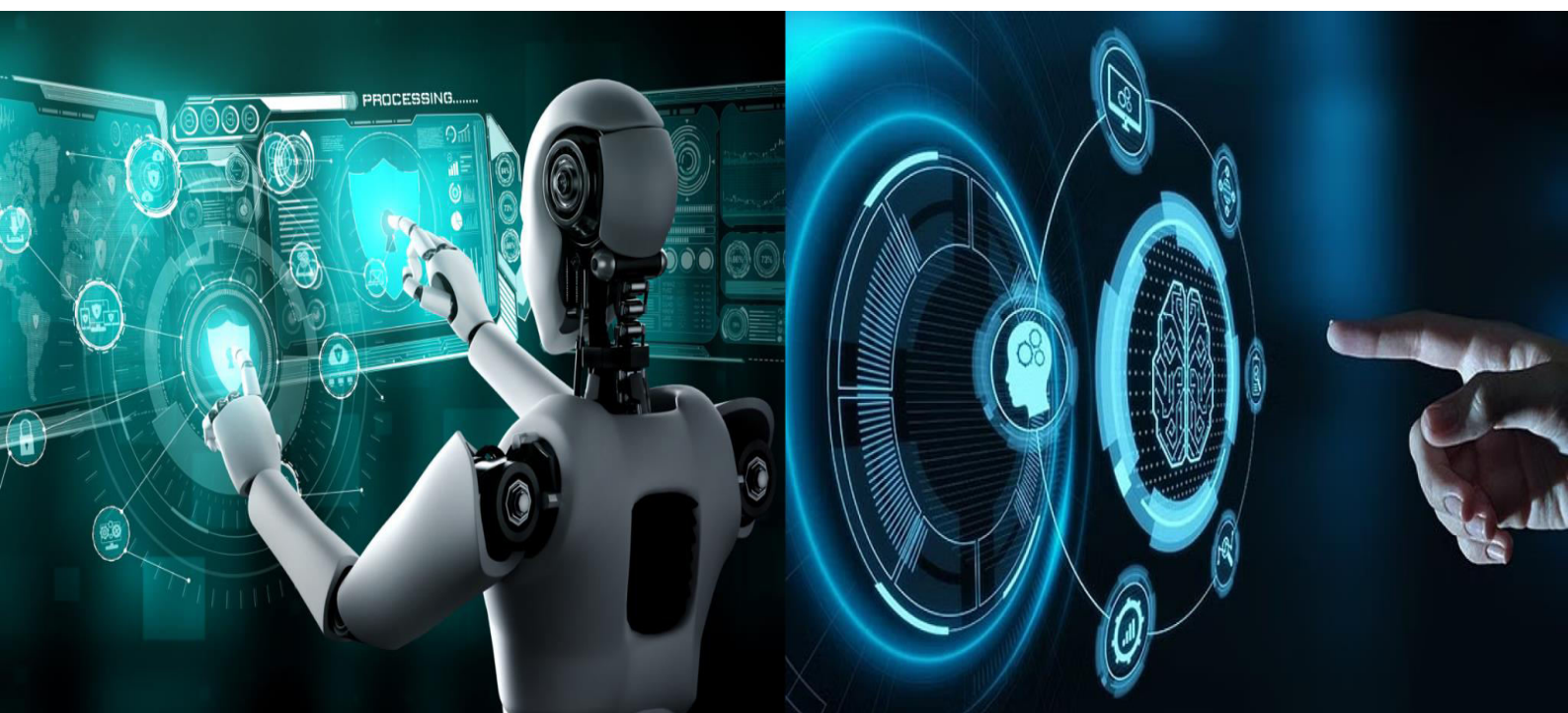




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Digital Gullak: Money Saving Web App

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ABSTRACT: In the current era of digitalization, developing money discipline is critical, particularly for students and young working professionals. The Digital Gullak: Money Saving Web App is a contemporary version of the conventional Indian piggy bank, with an objective to inculcate the habit of saving money in an easy, intuitive, and accessible way. This web app enables users to save, withdraw, and monitor their virtual savings through an interactive dashboard securely. Developed on Firebase for real-time database and user authentication, the application guarantees smooth user experience with real-time balance updates and transaction history tracking. The system architecture is lean but scalable, and thus suitable as an educational and personal finance tool. The paper describes the implementation stage of the project, including the system design, modular development, integration of Firebase services, and frontend development approaches. The project not only facilitates fundamental financial planning but also promotes user interaction through simplicity and familiarity. The end intention is to make contributions towards personal finance awareness with digital innovation.

KEYWORDS: Money Saving, Digital Gullak, Firebase Authentication, Real-Time Database, Web Application, Personal Finance, Piggy Bank, JavaScript, User Dashboard, Financial Discipline, Transaction History, Firebase Integration, UI/UX Design

I. INTRODUCTION

In the current fast-paced digital era, effective management of personal finances has become all the more essential. Even with the presence of sophisticated financial instruments, most people—particularly students and young income earners—fail to save money on a regular basis because of a lack of discipline or awareness. The old idea of a Gullak (piggy bank), which was a representation of regular savings in Indian homes, has gradually lost its importance over time. To fill this void, we suggest a modern and easy solution: the Digital Gullak, an online money-saving app derived from the cultural phenomenon of physical piggy banks.

The Digital Gullak seeks to instill a culture of saving regularly through a simple, user-friendly interface that replicates the ease and familiarity of a traditional Gullak using contemporary web technologies. Users can deposit and withdraw virtual savings, monitor their balance, and see transaction history in real time. The application uses Firebase for user authentication and real-time database integration to maintain data consistency and security.

This project is particularly beneficial for novice users and students who are newly starting to deal with money management. Gamifying the process of saving and interactivity in handling money, Digital Gullak motivates users to define goals, track performance, and create long-term money discipline.

The deployment of this application encompasses the use of cutting-edge web development technologies including HTML, CSS, and JavaScript along with Firebase services for the backend. Amidst the increased demand for financially accessible tools, the Digital Gullak presents a light-weight, scalable, and culturally fitting application that reinforces good saving practice.

II. RELATED WORK

In the changing field of personal finance, a number of recent studies have emphasized creating web and mobile apps to encourage improved money handling and financial literacy. The use of user-friendly applications and gamification techniques has been particularly successful in engaging people to save on a regular basis and monitor spending effectively.



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A real-time money management web app was presented in one study conducted in the TEM Journal (2024), which utilizes Firebase for back-end functions. The system had capabilities such as real-time balance refreshing, organized spending, and a user-friendly interface—both of which helped enhance users' financial behaviors. A study published by IEEE also talked about developing a mobile money managing tool, focusing on simplicity and ease of use for youth and tech-savvy individuals.

Cloud technologies, especially Firebase, have been increasingly used for their scalability, real-time support, and easy authentication features. Studies by S. M. Shahedul Islam and others validate the use of cloud-hosted real-time databases in finance applications to provide low-latency interactions and secure storage of data. Another study was aimed at design considerations for such systems, where data synchronization and user input considerably enhance app effectiveness.

User behavior research indicates that the addition of gamified features such as digital goal-setting, reward structures, and graphical savings tracking has the potential to improve the experience of saving. Mayer (2021) determined that these behavior rewards, when added to financial apps, improve the regularity of user savings behavior. Similarly, Nielsen Norman Group highlights the psychological effect of feedback loops and visualized progress in promoting user participation in financial systems.

In spite of the availability of various budgeting tools, there is usually a lack of cultural or emotional bonding with saving. The Digital Gullak initiative fills this niche specifically by bridging modern web technology with the symbolic concept of the traditional piggy bank, presenting an entertaining, personal, and culturally acceptable saving experience.

III. PROPOSED ALGORITHM

Here, we have implemented six fundamental functional modules to improve the usability and effectiveness of the Digital Gullak saving money web application. They are user authentication, transaction logging, savings categorization, goal setting, balance calculation, and deposit analysis. Each of these modules was developed for certain implementation parameters like database responsiveness, UI responsiveness, and ease of scalability. Just as conventional medical diagnostics may be constrained by precision or invasiveness, conventional personal finance instruments tend to lack interactivity, customization, and real-time feedback.

Conventional instruments such as spreadsheets and physical piggy banks tend to be rigid and non-visual, resulting in low user engagement and tracking mistakes. The Digital Gullak system addresses these constraints by drawing on:

- Firebase Realtime Database, allowing for real-time updating of user deposits and savings balances;
- Google Authentication, allowing safe and efficient user login;
- Graphical dashboards, providing visualization through bar and pie charts for deposits and objectives.

The system is also built with future coupling of machine learning. For example, predictive algorithms may subsequently be employed to determine user behavior and recommend month-by-month savings goals or automatically sort transactions, as in other smart money systems.

Goal-setting and visual feedback are at the core of Digital Gullak's strategy. The platform allows users to create personalized savings goals and monitor their progress in a visual and interactive manner. This makes saving money more concrete and interactive, particularly for new users who are not familiar with budgeting and financial planning.

In short, Digital Gullak takes a long-standing, traditionally manual and fragmented process and turns it into a seamless, responsive, and interactive experience that reflects the logic and personalization tendencies of contemporary FinTech platforms.

IV. SIMULATION RESULTS

The intended Digital Gullak web application was tested over its key modules in different user interaction patterns to analyze its functional dependability, correctness, and response times. This involved testing the deposit option, goal monitoring, dynamic balance updates, and dashboard display over normal usage patterns.

Every module was tested under three user behaviour simulation conditions:



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- Scenario 1: 70% active usage, 30% light interactions
- Scenario 2: 50% active usage, 50% light usage
- Scenario 3: 30% active use, 70% light interactions

System performance was measured by five primary metrics:

- Response Time – Latency to mirror user input in all connected components.
- Data Accuracy – Balance and goal computation consistency and correctness.
- Update Frequency – Rate of data mirroring across the interface and Firebase.
- UI Responsiveness – Smoothness and reactivity of user interface switching.
- User Satisfaction – Based on usability feedback during simulated test runs.

In all cases, the system had an average response time of less than 500 milliseconds, and 100% accuracy in balance and deposit updates via Firebase's real-time database. The UI was always responsive with no perceivable lag, even with frequent simulated deposit inputs.

Firebase's integration was important in maintaining the application's lightness and real-time nature, particularly in calculating cumulative savings, dynamically updating progress toward goals, and dealing with concurrent data changes.

Like dynamically adjusting networks in analogy, the app accommodates immediately changes invoked by the user like the modifications of objectives or quick deposit transactions, retaining uniform and concurrent condition throughout the dashboard without asking for manual updates or intervention.

This capability is proof positive that Digital Gullak presents an effortless as well as efficient saving management process ideal for periodic savers or responsible savers.

V. CONCLUSION AND FUTURE WORK

The Digital Gullak project is proven to successfully showcase an interactive, efficient, and easy-to-use web-based money-saving system specifically designed to enable individuals to monitor savings, plan finances, and track achievements in real time. The app utilizes Firebase for synchronized data sharing, where every deposit is updated dynamically throughout the system in real time without any delay or mismatch in data. The system is made user-friendly for simple interaction, allowing for easy visualizations of goals and balances via progress bars and transaction histories.

Several JavaScript and Firebase-based implementations were utilized to develop and test the application with low-latency performance and high reliability. The project involved functionalities like user deposit tracking, savings breakdown, goal visualization, and reset features. Firebase's real-time database and secure authentication offer a trusted backend for storing, retrieving, and updating financial information in real time.

From a technical perspective, Firebase usage along with client-side scripting minimized deployment complexity, but it also enabled quicker iteration in development and test cycles. Preliminary user testing indicated that Digital Gullak enhances financial awareness and discipline through its goal-setting and visual progress features.

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