iJETRM
International Journal of Engineering Technology Research & Management
Published By:
https://www.ijetrm.com/

AUTOMATED FINANCIAL TRACKING VIA SECURE SMS PARSING FOR YOUNG ADULTS

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ABSTRACT
The FinTrack Automation application addresses the growing financial management needs of young adults aged 18-30, who are often impacted by impulsive spending behaviors facilitated by digital payment methods. Current expense-tracking solutions in the market generally require extensive manual input, direct banking integration, or receipt scanning, all of which present usability or privacy concerns. FinTrack Automation introduces a unique approach by leveraging SMS-based transaction parsing, eliminating the need to link bank accounts. By filtering only bank-related SMS messages containing unique transaction identifiers, FinTrack provides secure, real-time expense tracking while protecting user privacy. This paper delves into the existing literature on personal finance management solutions, highlighting limitations that motivated the design of FinTrack Automation. Additionally, the study discusses the technical implementation, detailing the SMS parsing mechanisms and user data protection strategies. The results demonstrate that FinTrack Automation offers an effective, privacy-centered alternative for young adults seeking to manage their finances more responsibly.
Keywords:
Expense Tracking, SMS Parsing, Financial Privacy, User-Centric Design, FinTrack Automation.

INTRODUCTION

In today's digital age, financial management has become both a necessity and a challenge for young adults. The widespread adoption of online and mobile payment methods, particularly in the 18-30 age group, has made impulsive spending easier than ever. Payment methods such as Unified Payments Interface (UPI), credit, and debit cards allow users to make quick, cashless transactions, making day-to-day financial tracking more complex. As a result, young adults often find themselves losing track of their expenses and facing difficulties in managing their finances. This demographic's ease with technology has driven a demand for effective, user-friendly tools to automate expense tracking and provide financial insights that can assist in responsible budgeting.

Traditional methods of expense tracking, while widely used, are often inadequate in addressing the unique needs of this group. They generally fall into three main categories: **manual data entry**, **bank account integration**, and **receipt scanning**. These methods each have limitations. For example, manual data entry is time-consuming and relies heavily on users' commitment to accurately record every expense. While bank integration provides a more automated approach, it raises significant privacy concerns, as it requires access to sensitive banking details. Receipt scanning is convenient for physical purchases but fails to capture digital transactions, which are increasingly common. This gap in the available tools highlights the need for a solution that not only respects user privacy but also delivers ease of use and convenience in tracking expenses effectively.

AIM

This study presents an SMS-based expense tracking system specifically designed to meet the needs of young adults who value privacy and ease of use in financial applications. By isolating transaction-related SMS notifications, FinTrack Automation provides a streamlined, automated approach to tracking expenses and generating financial insights.

LITERATURE SURVEY

The financial behaviors of young adults have undergone significant changes in recent years, primarily due to the accessibility and convenience of digital payment methods. Research consistently shows that young adults aged 18-30 are more prone to impulsive spending and are less likely to have effective financial management strategies compared to older demographics. Studies such as those by Velmurugan et al. and Balamurugan et al. highlight the unique financial challenges faced by this age group, as well as the demand for digital tools that facilitate effective personal finance management without compromising user privacyinancial Behavior and Challenges of Young Adults.

The transition to adulthood and financial independence presents unique challenges for young adults, especially when it comes to managing expenses. Research shows that young adults often exhibit a tendency toward impulsive spending and struggle with saving behaviors due to a lack of financial literacy and awareness. Studies conducted by organizations like the National Endowment for Financial Education (NEFE) reveal that many young adults are not adequately prepared to make responsible financial decisions, which can lead to overspending, debt accumulation, and other financial difficulties. NEFE's 2020 survey found that nearly 70% of young adults reported financial stress, with a significant portion attributing it to impulsive purchases and a lack of budgeting discipline .

- **Manual Data Entry**: Traditional tracking applications require users to manually input each transaction. This is time-consuming and may discourage consistent use, particularly for users with multiple daily transactions.

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- **Bank Account Integration**: Other applications address this issue by connecting directly to users' bank accounts to track expenses automatically. However, bank integration can raise privacy concerns, as it requires sharing sensitive financial information, which many users may be hesitant to do.
- **Receipt Scanning**: Receipt-based expense tracking, where users scan their physical receipts to log expenses, is also common.

PROBLEM STATEMENT

The financial management challenges faced by young adults in today's digital economy are multifaceted and complex. As this demographic increasingly adopts digital payment methods such as UPI, credit cards, and mobile wallets, they face the risk of losing track of daily expenditures due to the seamless and frictionless nature of cashless transactions. Traditional financial tracking methods, while functional, are not well-suited to address the distinct spending behaviors and preferences of young adults. Specifically, these methods fail to align with the need for convenience, automation, and privacy.

The primary issue is that existing expense-tracking solutions often require users to manually log each transaction, connect directly to bank accounts, or scan receipts, each of which presents unique limitations in terms of usability and privacy. Manual entry is time-consuming and error-prone, bank integration poses data privacy concerns, and receipt scanning cannot capture digital transactions effectively. Young adults, who are frequently active in digital financial ecosystems, require an alternative that offers a seamless and secure method to track spending automatically, without demanding access to sensitive financial information or imposing cumbersome processes.

FinTrack Automation is designed to address these challenges by introducing an SMS-based expense-tracking approach. By utilizing transaction-specific SMS notifications, the system provides real-time tracking and categorization of expenses, allowing young adults to gain control over their finances without compromising their data privacy. This study explores how SMS-based tracking can overcome the limitations of existing methods, creating a more accessible and privacy-conscious financial tool for young adults.

The core challenge facing young adults is maintaining an accurate, up-to-date overview of their spending habits without the need for extensive manual input or the risk of exposing sensitive financial information. Existing expense-tracking tools fail to strike a balance between privacy, usability, and automation. Manual data entry methods are impractical for high-frequency users and suffer from low user engagement over time, while bank account integration solutions often deter users due to privacy concerns. Additionally, receipt scanning cannot capture the many digital transactions that are now common in day-to-day spending, leaving users with an incomplete financial picture.

FinTrack Automation addresses these challenges by providing a seamless solution that does not rely on bank integration or manual entry. Instead, it leverages transaction-related SMS notifications, which are typically sent by banks or financial institutions following each transaction. Through SMS parsing, FinTrack can capture key details, such as the transaction amount and type, allowing users to view their spending in real time and with minimal effort. This approach not only respects users' privacy by avoiding direct access to bank accounts but also offers the convenience of automated tracking without requiring constant user input.

DESIGN COMPONENT

The architecture of FinTrack Automation is designed to prioritize **automation, privacy, and ease of use**. Each component of the system has been carefully crafted to address specific challenges in expense tracking while ensuring a user-friendly experience. This section provides an in-depth look at the primary design components that make FinTrack Automation an innovative solution for expense management.

4.1 SMS Parsing for Transaction Data

One of the core features of FinTrack Automation is its SMS parsing capability, which allows the system to extract financial data directly from SMS notifications sent by banks and financial institutions. This approach leverages the fact that most banks and payment services send transaction notifications via SMS immediately after a transaction occurs. These SMS messages typically include essential transaction details such as the transaction amount**,** type (credit or debit)**,** transaction time, and sometimes the remaining balance**.**

The SMS parsing process involves the following steps:

 Message Identification: The system continuously monitors SMS notifications, specifically identifying messages that originate from verified financial institutions. This is accomplished by filtering messages based on sender IDs commonly associated with banks, credit card companies, and payment services (e.g., "HDFCBANK," "SBIUPI," etc.).

 Keyword Filtering: Within the identified messages, FinTrack Automation uses a keyword-based filter to detect relevant transactions. Keywords such as "credited," "debited," "Rs.," or "INR" help distinguish transaction-related messages from non-transactional ones. This selective filtering ensures that FinTrack captures only messages containing financial information, while ignoring other unrelated notifications.

 Data Extraction and Structuring: Once a transaction-related SMS is identified, FinTrack parses the message content to extract key data points, including the transaction amount**,** transaction type **(credit or debit)**, and timestamp. The extracted data is then structured into a standardized format to be stored in the application's database, allowing for easy access, analysis, and reporting.

 Continuous Monitoring: FinTrack Automation operates with a background service that continuously monitors SMS notifications for real-time tracking. This enables the app to update transaction records immediately upon receiving an SMS, providing users with up-to-date expense information. The continuous monitoring process is optimized to consume minimal device resources, ensuring that the app remains efficient and does not impact overall device performance.

4.2 Privacy Assurance and Message Filtering: FinTrack's SMS parsing process is designed to enhance user privacy by accessing only relevant financial SMS messages. This filtering approach ensures that other private messages

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remain untouched. The application identifies bank-specific keywords and patterns in the message content, ignoring messages that do not match pre-defined criteria. For example, messages from official bank IDs such as "HDFCBANK" or "SBIUPI" are parsed for transaction details, while general or promotional messages are excluded. This targeted parsing method minimizes data access risks and maintains a high standard of privacy, which is particularly important for younger users who may be more privacy-conscious.

4.3 Categorization and Reporting: After parsing the SMS for relevant transaction details, FinTrack categorizes each transaction, providing a clear and structured overview of the user's spending habits. Monthly summaries and insights help users recognize spending trends, enabling them to make informed decisions. The categorization algorithm groups transactions into predefined categories, such as "Food," "Transport," and "Shopping," which are automatically generated based on keywords within the SMS content. These insights provide an at-a-glance view of where users' money is going, encouraging more mindful spending.

4.4 User-Centric Interface: Built using Flutter for cross-platform compatibility, the application prioritizes a clean, user-friendly interface. Designed with young adults in mind, the interface is intuitive and visually engaging, enabling users to view their spending data effortlessly. The interface features a dashboard that summarizes daily, weekly, and monthly expenses, along with charts and insights that simplify financial data interpretation.

IMPLEMENTATION

The implementation of FinTrack Automation is designed to provide seamless, real-time expense tracking through efficient SMS parsing, secure data processing, and user-friendly data storage solutions. Each component in the implementation process—from SMS parsing to backend infrastructure—has been developed to ensure accuracy, privacy, and performance, addressing the unique financial tracking needs of young adults.

5.1 Algorithm for SMS Parsing: The core functionality of FinTrack Automation lies in its SMS parsing algorithm, which is optimized to recognize, extract, and categorize financial data from SMS notifications sent by banks and financial institutions. This process begins with message identification**,** where the system monitors incoming SMS notifications, identifying messages that originate from verified financial senders. This is achieved through a database of sender IDs known to be associated with banks, credit card companies, and mobile payment services. This database is updated periodically to account for new financial institutions and updated sender IDs, ensuring comprehensive coverage of all possible transaction messages.

Once the SMS messages are filtered by sender ID, FinTrack applies keyword filtering to detect transaction-specific messages. Keywords such as "credited," "debited," "payment," "purchase," and currency symbols (e.g., "Rs." or "INR") are used to identify messages that indicate a completed transaction. By relying on these keywords, the system can isolate financial transactions from non-transactional notifications, including promotional or informational messages, ensuring that only relevant data is parsed.

After identifying transaction messages, FinTrack proceeds to data extraction. Using a combination of regular expressions and natural language processing (NLP) techniques, the algorithm extracts critical transaction details from each SMS. These details typically include the transaction amount**,** transaction type (credit or debit), and the timestamp of the transaction. The algorithm is designed to recognize variations in SMS structure across different banks and adapt its parsing techniques accordingly. For example, certain banks may use the phrase "Account Debited" while others may use "You spent," but the algorithm is trained to recognize these variations and extract the necessary information accurately.

Once extracted, the data is then structured into a standardized format. This standardized structure ensures consistency in data representation, which is essential for accurate categorization, reporting, and analysis. The structured data is then stored locally on the user's device in an encrypted format to protect sensitive financial information.

5.2 Backend Infrastructure: The backend infrastructure of FinTrack Automation is implemented using **Node.js** and **Firebase** to provide a reliable, fast, and secure environment for processing transaction data and storing it in real-time. Node.js is used as the primary backend framework due to its lightweight and asynchronous capabilities, which allow the system to handle multiple SMS parsing tasks efficiently without lagging. This setup is particularly beneficial for users with high transaction volumes, as it ensures that the app remains responsive regardless of the number of transactions processed.

- **Firebase for Local Storage**: FinTrack Automation leverages Firebase for local data storage on the user's device. Firebase's offline capabilities allow users to access their transaction history and summaries even without an active internet connection. This local storage also enhances privacy, as sensitive data is kept on the device rather than being uploaded to a central server. Additionally, Firebase offers a secure environment for data storage, with built-in support for data encryption and user authentication.
- **Data Synchronization and Consistency**: To maintain data accuracy, the backend infrastructure includes data synchronization mechanisms that ensure consistency between parsed SMS messages and the stored transaction data. If there are any issues with parsing or data extraction, the system can flag and correct inconsistencies in real time, ensuring that users always have access to accurate financial records.
- **Efficient Data Processing with Node.js**: Node.js handles the parsing and categorization tasks in the backend, allowing FinTrack Automation to process each SMS as soon as it arrives. This rapid data processing minimizes delays in updating the user's financial records, providing real-time tracking and insights. Node.js's event-driven architecture is well-suited for SMS parsing, as it allows the app to handle multiple tasks without waiting for each to complete, thereby optimizing performance and resource usage.

EXPERIMENTAL RESULTS

In initial testing, FinTrack Automation successfully parsed over 95% of transaction-related SMS messages accurately, with minimal false positives for non-transactional messages. User trials with a focus group of 50 young adults

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indicated a strong preference for the privacy-centric SMS parsing approach over traditional expense-tracking methods. Feedback highlighted ease of use, with participants expressing satisfaction over not needing to link bank accounts or manually input expenses.

6.1 Performance Metrics:

Accuracy: The SMS parsing algorithm accurately detected and categorized over 95% of bank-related SMS transactions.

Privacy: 90% of users reported feeling more comfortable using FinTrack due to the absence of direct bank integration.

Usability: Users rated the application's interface 4.8 out of 5, indicating high satisfaction with its design and Functionality.

ADVANTAGES

Privacy-Focused Design: FinTrack Automation avoids direct bank account integration, which is a significant privacy advantage. By only accessing SMS data related to transactions, the app ensures users' sensitive financial information remains private, as it does not require permissions for bank account access.

Real-Time Tracking and Automation: FinTrack Automation avoids direct bank account integration, which is a significant privacy advantage. By only accessing SMS data related to transactions, the app ensures users' sensitive financial information remains private, as it does not require permissions for bank account access. The automation of expense tracking reduces the need for manual entry, making it easy for users to track multiple transactions without extra effort.

Accessible Across Platforms and Devices: Built with Flutter, FinTrack is compatible with both Android and iOS devices, ensuring that users on either platform can benefit from the app's features. The app includes accessibility features, such as dark mode, font adjustments, and voice-over support, broadening its usability for individuals with different needs.

User-Friendly Categorization and Insights: By automatically categorizing expenses and generating summaries, FinTrack simplifies the financial tracking process and offers users a clear view of their spending patterns. Users can customize categories, set budgets, and view weekly or monthly reports, making it easier to make informed financial decisions.

CONCLUSION

The FinTrack Automation application offers an innovative solution to the pressing financial management challenges faced by young adults in the digital age. With a unique approach to expense tracking through SMS parsing, FinTrack enables users to manage their finances without compromising their privacy or requiring extensive manual input. By selectively extracting and processing only transaction-related SMS notifications, FinTrack delivers accurate and timely financial data, encouraging users to monitor their spending patterns and develop healthier financial habits. The emphasis on privacy—without linking to bank accounts—resonates particularly well with younger users who may have concerns about data security in personal finance applications.

This study demonstrates that FinTrack's SMS parsing technology is not only effective but also highly user-friendly. The design and implementation of the app's categorization and reporting features further enhance its utility by offering clear, actionable insights into financial behavior. By targeting the core needs of privacy, usability, and convenience, FinTrack fills an important gap in the personal finance management space and has shown substantial promise in user trials, indicating its potential for widespread adoption.

FUTURE SCOPE

The future direction for FinTrack Automation includes ambitious plans to deepen its functionality, broaden its appeal, and strengthen data security. The following key areas outline the roadmap for FinTrack's development:

- **Cloud-Based Calculation and Processing**: To further optimize performance, FinTrack will transition its expense-tracking and data analysis algorithms to a cloud-based infrastructure. Cloud processing will reduce computational loads on user devices, providing a faster and more efficient user experience, especially for users with limited hardware capabilities. Cloud-based operations also allow for more complex data processing, making FinTrack a viable solution for users who manage multiple income and expense streams.
- **AI-Enhanced Financial Insights**: By incorporating advanced artificial intelligence models, FinTrack can provide deeper insights into users' spending behaviors, automatically generating personalized budgeting advice and spending alerts based on historical patterns. These AI-powered insights will allow users to gain a clearer understanding of their financial health, helping them set realistic savings goals and budget allocations that align with their financial priorities.
- **Personalized Financial Education Resources**: FinTrack plans to integrate educational content related to financial literacy, accessible within the app. By partnering with financial advisors or literacy platforms, FinTrack can provide users with educational modules, articles, and tutorials on topics such as budgeting, investing, and managing debt. This feature will help users make more informed financial decisions and develop stronger financial habits alongside real-time expense tracking.

REFERENCES

[1] Chen, L.;, Wang, Q. User-Centric Design of an Expense Management Mobile Application, 2022, Toronto, Canada

[2] Chukiat Worasucheep. Ensemble classifier for stock trading recommendation. Applied Artificial Intelligence, 36(1):2001178, 2022.

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International Journal of Engineering Technology Research & Management
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https://www.ijetrm.com/

[3] T. SAWANT, A. SATWILKAR, V. SHIRKE and S. V. JADHAV, "Django Based Web Application to Empower Skilled, ISSN: 24568880," IRE Journals, vol. 4, no. 11, MAY 2021.
[4] R. Velmurugan and P. U. Mrs, "Expense Tracker Application," International Journal of Research & Technology(IJRT) ISSN: 23496002, vol. 7, no. 10, March 2021|.
[5] U. P. Singh, A. K. Gupta and Dr Balamurugan.B, "Spending Tracker: A Smart Approach to Track Daily," Turkish Journal of Mathematics Education, vol. 12, no. 6, April 2021.
[6] S. Mehra and P. Parashar , "Daily Expense Tracker," International Journal of Research Engineering and Science (IJRES), ISSN (Online): 2320-9364, ISSN (Print): 2320-9356,vol. 09, no. 12, pp. 70-73, 2021.
[7] A.Kazi , P. S. Kherade, R. S. Vilankar and P. M. Sawant , "Expense Tracker," Iconic Research And Engineering (IRE) Journals ISSN: 2456-8880, vol. 4, no. 11, May-2021.
[8] M. Sharma, A. Bansal, R. R. Dr. and S. Sethi, "A Novel Expense Tracker using Statistical Analysis," International Journal of Innovative Research in Technology (IJIRT) ISSN: 2349-6002, vol. 8, no. 1, 2021.
[9] Smith, J. A.; Johnson, M. R., A Cloud-Based Expense Management System for Small Businesses, 2022, New York, USA.
[10] Manuel B. Garcia; Julius P. Claour Mobile Bookkeeper: Personal Financial Management Application with Receipt Scanner Using Optical Character Recognition, 2021,Spain