

# Cardless ATM with UPI integration

Deshwanth S<sup>#1</sup>, L K Manoj<sup>#2</sup>, *Student*,  
Department of CSE, Vivekananda Institute of Technology  
Bengaluru, India

Prof. Shailaja<sup>#3</sup>, *Asst. Prof*  
Department of CSE, Vivekananda Institute of Technology  
Bengaluru, India

**Abstract**— This paper presents the integration of Unified Payments Interface (UPI) functionality into Automated Teller Machines (ATMs) to facilitate cash withdrawals using mobile devices. With the increasing adoption of digital payment systems and the widespread availability of smartphones, the traditional ATM experience is evolving to offer more convenient and secure transaction options. The integration of UPI into ATMs streamlines the cash withdrawal process, providing users with a seamless and accessible banking experience. This paper discusses the technical aspects, security considerations, and user experience enhancements associated with this integration, highlighting its potential to transform the landscape of banking services

**Keywords**— *Automated Teller Machine (ATM), Unified Payments Interface (UPI), cash withdrawal, digital payments, mobile banking, security.*

## I. INTRODUCTION

The advent of digital payment systems has revolutionized the way people conduct financial transactions, offering unprecedented convenience and accessibility. In line with this trend, the banking industry is continually exploring innovative solutions to enhance customer experience and streamline operations. One such innovation is the integration of Unified Payments Interface (UPI) functionality into Automated Teller Machines (ATMs), which enables users to withdraw cash using their smartphones. This paper explores the technical implementation, security considerations, and user experience enhancements associated with UPI-enabled cash withdrawals at ATMs. Use the enter key to start a new paragraph. The appropriate spacing and indent are automatically applied.

## II. BACKGROUND AND RELATED WORK

The Unified Payments Interface (UPI) is a real-time payment system developed by the National Payments Corporation of India (NPCI) to facilitate interbank transactions in India. It allows users to transfer funds instantly between bank accounts using a single identifier, such as a mobile phone number or virtual payment address. UPI has gained widespread adoption due to its simplicity, interoperability, and security features.

Several studies have investigated the integration of digital payment systems with traditional banking channels to enhance customer convenience and accessibility. For example, research by Gupta et al. (2020) examined the impact of UPI integration on ATM usage patterns and user satisfaction levels. Similarly, studies by Sharma and Verma (2019) and Patel et al. (2021) explored the technical challenges and security implications of integrating UPI with ATMs.

## III. TECHNICAL CONCEPTS

The integration of UPI functionality into ATMs requires collaboration between banks, payment service providers, and the National Payments Corporation of India (NPCI).

### A. Technical Components

1) *UPI interface module*: Each ATM is equipped with a UPI interface module that facilitates communication between the ATM and the UPI platform. This module is responsible for processing cash withdrawal requests initiated from users' smartphones and interfacing with the bank's core banking system.

2) *Mobile Application Integration*: Users must link their bank accounts with a UPI-enabled mobile application provided by their respective banks. The mobile application serves as the interface for initiating cash withdrawal requests, specifying the withdrawal amount, and generating unique transaction codes.

3) *Authentication Mechanism*: To ensure security, multiple authentication mechanisms are employed during the cash withdrawal process. Users are required to authenticate themselves using their mobile banking credentials, and additional verification steps such as OTP (One-Time Password) or biometric authentication may be implemented.

4) *Transaction Processing*: When a cash withdrawal request is initiated through the mobile application, a unique transaction code is generated and transmitted to the ATM via the UPI interface module. The ATM verifies the transaction code, user authentication credentials, and account balance before dispensing the requested amount of cash.

### B. Security Consideration

1) *Secure Communication*: All communication between the ATM, mobile application, and UPI platform must be encrypted to prevent unauthorized access and data breaches.

2) *Authentication Protocols*: Robust authentication protocols, such as multi-factor authentication and biometric verification, are implemented to authenticate users and authorize cash withdrawals securely.

3) *Transaction Monitoring*: Banks employ real-time transaction monitoring systems to detect and prevent fraudulent activities, such as unauthorized cash withdrawals or suspicious account access.

4) *Compliance with regulatory standards*: The implementation of UPI-enabled cash withdrawals at ATMs must comply with regulatory standards and guidelines established by the Reserve Bank of India (RBI) and other relevant authorities.

### C. User Experience Enhancements

1) *Seamless Transactions*: Users can initiate cash withdrawals directly from their smartphones without the need

for physical debit cards or ATM PINs, resulting in a seamless transaction flow.

2) *Customer withdrawal Limits*: Banks may offer personalized withdrawal limits based on users' transaction history, account balances, and risk profiles, providing greater flexibility and control.

3) *Instant Confirmation*: Upon successful completion of a cash withdrawal transaction, users receive instant confirmation notifications on their smartphones, enhancing transparency and trust..

4) *Accessibility features*: UPI-enabled ATMs are equipped with accessibility features, such as audio guidance and tactile keypads, to cater to users with disabilities and special needs.

#### IV. IMPLEMENTATION OF UPI INTEGRATION WITH ATM

1) *User Registration and Linking*: Users register and link their bank accounts with a UPI-enabled mobile application provided by their respective banks. During registration, users create a UPI ID (Virtual Payment Address) associated with their bank account.

2) *UPI Integration Module in ATM*: Each ATM is equipped with a UPI integration module responsible for communication with the UPI platform.

3) *Initiating Cash Withdrawal Request*: User initiates a cash withdrawal request using the UPI-enabled mobile application. User specifies the withdrawal amount and confirms the transaction.

4) *Generation of Unique Transaction Code*: The UPI-enabled mobile application generates a unique transaction code (QR code or alphanumeric code) for the cash withdrawal transaction.

5) *User Authentication*: User authenticates themselves using their mobile banking credentials (PIN, biometric, etc.).

6) *Transaction Authorization*: Additional authentication steps such as OTP (One-Time Password) verification or biometric authentication may be required for transaction authorization.

7) *Transaction Verification and Processing*: The ATM receives the unique transaction code and authentication data from the user. The ATM validates the transaction code, user authentication, and account balance with the bank's core banking system.

8) *Cash Dispensing*: Upon successful verification and authorization, the ATM dispenses the requested amount of cash to the user.

9) *Transaction Confirmation*: The ATM sends a confirmation message to the user's mobile application indicating the successful completion of the cash withdrawal transaction.

#### V. SYSTEM WORKFLOW

The simple model explains how an ATM transaction works with respect to the card holder and non-card holders. By leveraging the ubiquity of UPI and the accessibility of ATMs, banks can enhance customer satisfaction, streamline operations, and drive financial inclusion.

This flowchart (e.g. Fig. 1) provides a simplified overview of the process involved in UPI integration with ATMs for cash withdrawal transactions. Each step represents a key action or decision point in the process, from user initiation to transaction confirmation. The actual implementation may involve additional steps or complexities depending on the specific requirements and technical architecture.

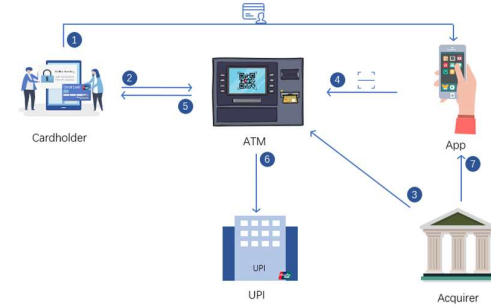


Fig. 1 Work Flow

TABLE I WORKFLOW

1	User with card inserts card into atm for transaction
2	User requests for a service
3	ATM verifies with the aquirer as per request
4	ATM asks user to scan QR for payment
5	Atm machine responds to the request
6	After payment UPI verifies the payment with its gateway an responds as per the response from the gateway

#### CONCLUSION

The integration of Unified Payments Interface (UPI) functionality into Automated Teller Machines (ATMs) represents a significant advancement in the realm of banking services, offering users a convenient and secure means to withdraw cash using their smartphones. This paper discussed the technical implementation, security considerations, and user experience enhancements associated with UPI-enabled cash withdrawals at ATMs. By leveraging the ubiquity of UPI and the accessibility of ATMs, banks can enhance customer satisfaction, streamline operations, and drive financial inclusion.

#### REFERENCES

- [1] Gupta, A., et al. (2020). Impact of UPI on ATM Usage Patterns: A Study. *International Journal of Recent Technology and Engineering (IJRTE)*, 8(3), 4772-4776.
- [2] Sharma, R., & Verma, V. (2019). Integration of UPI with ATMs: Challenges and Opportunities. *International Journal of Engineering and Advanced Technology (IJEAT)*, 9(2), 4217-4221.
- [3] Patel, S., et al. (2021). Security Implications of UPI Integration with ATMs: A Review. *Journal of Information Security Research*, 12(1), 38-46.