

## AI-POWERED SECURITY IN INDIA'S UPI TRANSACTIONS: EVALUATING TRANSACTION VOLUMES, FRAUD INCIDENTS, AND MITIGATION STRATEGIES

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### ABSTRACT

The method of payments has evolved so much that once they were so manual and had to be made through cashiers or tellers. The modern payment methods are so easy and efficient that they could be done with just a tap of a phone. In this study we would be looking at two such innovative methods of payment and evaluate them on the basis of their adaptability in preferentially diverse markets. The study has made a humble attempt to incorporate the role played by AI in such payment methods and the impact caused by the role on the users. NFC, which is short for near-field communication, is a technology that allows devices like phones and smartwatches to exchange small bits of data with other devices and read NFC-equipped cards over relatively short distances. The technology behind NFC is very similar to Radio-Frequency Identification (RFID) commonly used in the security cards and keychain fobs, popularly experienced at offices, hotels, gyms, etc.. Unified Payments Interface (UPI) is a system that powers multiple bank accounts into a single mobile application (of any participating bank), merging several banking features, seamless fund routing & merchant payments into one hood. It also caters to the “Peer to Peer” collect request which can be scheduled and paid as per requirement and convenience. Each Bank provides its own UPI App for Android, Windows and iOS mobile platform(s). The paper is based partially on secondary data and partially on primary data to assess the factors influencing the adoption of the payment systems by Indian users, to analyse the impact of AI technology and banking services and finally suggest certain policy measures to provide secured and inclusive digital transformation in banking transactions.

**Key words:** NFC, UPI, RFID, AI technology, digital transformation, banking transaction, inclusivity, security

## INTRODUCTION

The system of exchange that existed in ancient times was known as the barter system which involved the exchange of a commodity in return for the other. This system was in practice until the invention of coins as a medium of exchange. This medium replaced the barter system. Money evolved over time and took various forms such as coins and currency notes and now has taken its latest form digital currency. Two such methods of payments would constitute the field of study namely UPI (Unified Payments Interface) and NFC (Near Field Communication).

**The Unified Payments Interface (UPI)** (National Payments Corporation, 2020) is a mobile application designed for smartphones that enables users to easily transfer money between bank accounts. Developed by the National Payments Corporation of India (NPCI), UPI serves as a convenient and secure single-window payment system. The Unified Payments Interface (UPI) is a payment system that allows real-time peer-to-peer transfers between banks. It simplifies the process with a single two-click authentication method. Regulated by the Reserve Bank of India, UPI facilitates money transfers between two bank accounts using a mobile platform. The system is considered a secure and reliable way to transfer money between two parties, removing the need for physical cash or traditional banking methods. The pilot system was introduced in India on April 11, 2016, with banks across the country implementing their interfaces starting from August 2016. UPI utilizes existing systems like Immediate Payment Service (IMPS) and Aadhaar Enabled Payment System (AEPS) to ensure smooth and convenient fund settlement between accounts. It enables both push (pay) and pull (receive) transactions, making it suitable for various payment scenarios, including over-the-counter or barcode payments. Furthermore, UPI supports multiple recurring payments such as utility bills, school fees, and subscriptions.

**NFC mobile payments** (NFC Forum, 2021) are contactless digital payment methods that allow a phone, tablet, or credit card to communicate with an NFC-enabled reader. NFC technology allows businesses to quickly and easily accept customer payments without the need for staff to handle them or use a card. NFC mobile payments are the best payment processing option for a variety of businesses including retailers, restaurants and service providers. Companies that accept NFC payments should expect to pay a fee that is consistent with typical credit card processing fees (a few cents per transaction, plus a percentage of the value of the transaction a small amount). When initiated through a point-of-sale (POS) system, these readers send a signal looking for an NFC-enabled payment device. When the reader detects an NFC-enabled device, such as the antenna of a telephone or credit card with NFC, the payment device sends payment information to the reader and the payment is processed. Benefits of NFC payments Provides improved payment security Using a mobile wallet with NFC is a safer option than carrying a physical card. This is because digital wallet applications like Apple Pay store all your banking information into tokens that fraudsters can't access or tamper with. So, even if your mobile phone is stolen, all your credit

cards and other valuable information will remain safe. Furthermore, as these tokens change with each NFC transaction, they become almost inexplicable. These apps also feature fingerprint technology that adds extra security to NFC payments to protect the user from fraud. Quick and easy payment Compared to paying with cash, chip, PIN card, or other digital payment solutions.

**AI (Artificial Intelligence)** (Economic Times, 2021) has a significant impact on UPI and NFC payments in several ways:

- AI algorithms are used to detect and prevent fraudulent activities in UPI and NFC transactions. They analyze patterns of user behavior and transaction history to identify suspicious activity, providing an extra layer of security.
- AI can assess the risk associated with a transaction in real-time. It evaluates various factors like transaction amount, location, and user behavior to determine if a transaction is likely to be legitimate or potentially fraudulent.
- AI-powered chatbots can provide instant customer support for UPI and NFC payment-related queries. They can assist with common issues, such as transaction inquiries, password resets, and account balance checks.
- AI-powered algorithms can be used to assess creditworthiness based on a variety of factors, potentially expanding access to credit for individuals and businesses.
- AI-driven biometric authentication methods, such as voice and face recognition, can enhance the security of UPI and NFC payments, providing a more convenient and secure user experience.

## NEED FOR THE STUDY

UPI and NFC represent a significant shift in payment methods, moving from traditional cash transactions to digital, contactless methods. Understanding the implications of this transition is important for various stakeholders, including policymakers, businesses, and consumers. Investigating how UPI and NFC, bolstered by AI, contribute to financial inclusion in India is crucial. These technologies have the potential to bring a wider population into the formal financial system. Investigating how UPI and NFC, bolstered by AI, contribute to financial inclusion in India is crucial. These technologies have the potential to bring a wider population into the formal financial system.

## OBJECTIVES

- To study the value and volume of transactions that have happened in India via UPI transactions.
- To analyse cases of hacking, phishing and financial frauds
- To check the role of AI in mitigating loss due to hacking, phishing, and other financial frauds

## RESEARCH METHODOLOGY

The study is proposed to be based on primary and secondary data. Primary data is collected from 150 respondents, who were users of banking technology. A structured questionnaire in Google Forms, with precise questions, was circulated among the respondents.

The secondary data was collected from articles and web sources. The secondary data was collected so as to discuss and display some cases related to payment systems and the role of AI in such systems. Case study analysis and use of statistical tools is the methodology undertaken in this research paper.

## REVIEW OF RELATED LITERATURE

**Gagandeep Singh Salhan (2020)** found that UPI is the most popular digital payment method in India, accounting for over 50% of all digital payments. The study also found that UPI users are generally satisfied with the experience, but they have expressed concerns about the lack of awareness about UPI and the difficulty in on boarding new users.

**Patil S., et.al., (2020)** discusses the role of trust and security in the adoption of cashless payments. The paper argues that trust and security are essential prerequisites for the adoption of cashless payments. The paper also discusses the different factors that influence trust and security in cashless payments, and it provides suggestions for how to improve trust and security in cashless payments.

**Hsiao-Tien Chu, et. al.,(2020)** have found that the main factors driving adoption are convenience, security, and perceived usefulness. The review also found that users are generally satisfied with the NFC payment experience, but they have expressed concerns about the limited availability of NFC terminals and the lack of awareness about NFC payments.

**Nuryyev, F. et. al., (2021)** presents a review of the factors influencing the adoption of cashless payments. The paper identifies and discusses the different factors that have been found to influence the adoption of cashless payments, including individual, social, and technological factors. The paper also highlights the gaps in the existing literature and provides suggestions for future research.

**Vedran Tomić and Danijela Stojanović (2021)** state that UPI adoption in India is driven by factors such as convenience, speed, security, and affordability. The study also found that users are generally satisfied with the UPI experience, but there is still some room for improvement in terms of awareness and onboarding.

**Yingying Zhang, et.al., (2021)** has explored that the main factors driving NFC-based mobile payments adoption are convenience, security, and perceived usefulness. The review also found that users are generally satisfied with the NFC payment experience, but they have expressed concerns about the limited availability of NFC terminals and the lack of awareness about NFC payments.

**Chawla and Joshi (2022)** provides a comprehensive review of the factors affecting the adoption of cashless transactions. It identifies and discusses the different factors that have been found to influence the adoption of cashless payments, both at the individual and societal levels. The paper also proposes a unified view of the factors affecting cashless payment adoption, which takes into account the complex interplay of individual, social, and technological factors.

**Gupta and Singh (2023)** provide a comprehensive review of the role of artificial intelligence (AI) in the Unified Payments Interface (UPI). It discusses how AI is being used to improve UPI transactions in terms of speed, security, and convenience. It also highlights the challenges and opportunities of using AI in UPI.

**Kumar and Sharma (2023)** discuss the role of AI in detecting and preventing UPI-based fraud. It highlights the different types of UPI-based fraud and how AI can be used to detect them. It also discusses the challenges and opportunities of using AI for UPI-based fraud detection.

**Patel and Patel (2023)** explain the role of AI-powered chatbots in providing customer support for UPI users. It highlights the benefits of using AI-powered chatbots for UPI customer support, such as 24/7 availability, instant response, and personalized support. It also discusses the challenges and opportunities of using AI-powered chatbots for UPI customer support.

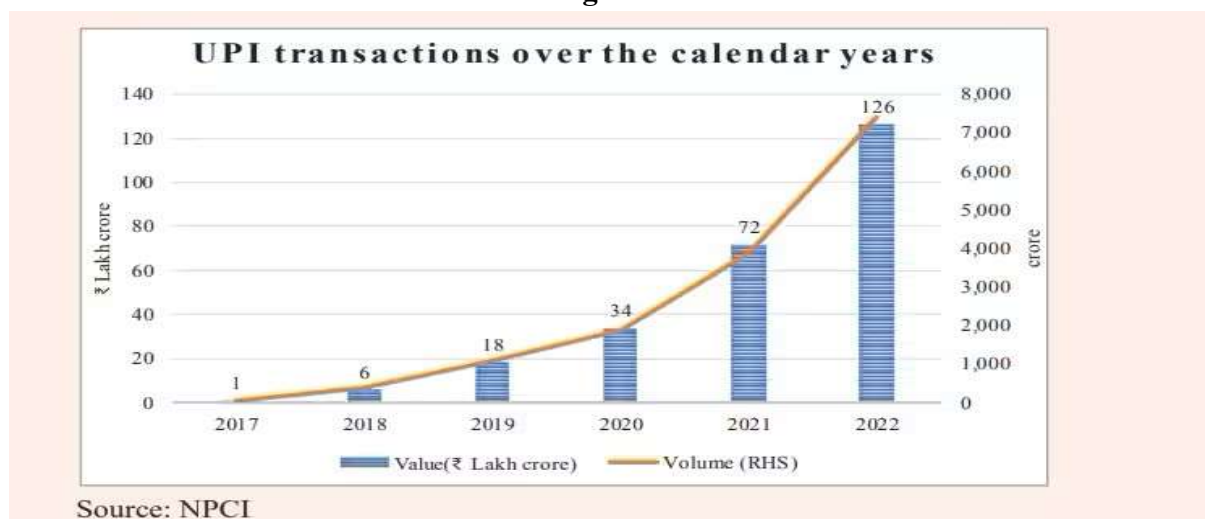
**Kaur, A., & Singh, S. (2023)** provides a comprehensive review of the factors influencing the adoption of cashless payments in India. The paper identifies and discusses the different factors that have been found to influence the adoption of cashless payments in India, both at the individual and societal levels. The paper also highlights the gaps in the existing literature and provides suggestions for future research.

**Gholami, R., et.al., (2023)** examine the factors affecting the adoption of cashless payments in Nigeria, using the state of Lagos as a case study. The study uses a survey of 500 respondents to collect data on the different factors that are influencing the adoption of cashless payments in Lagos. The study finds that perceived benefits, effort expectancy, social influence, trust, awareness, and demographic variables affect individuals' intention to adopt cashless payments.

## RESULTS AND DISCUSSIONS

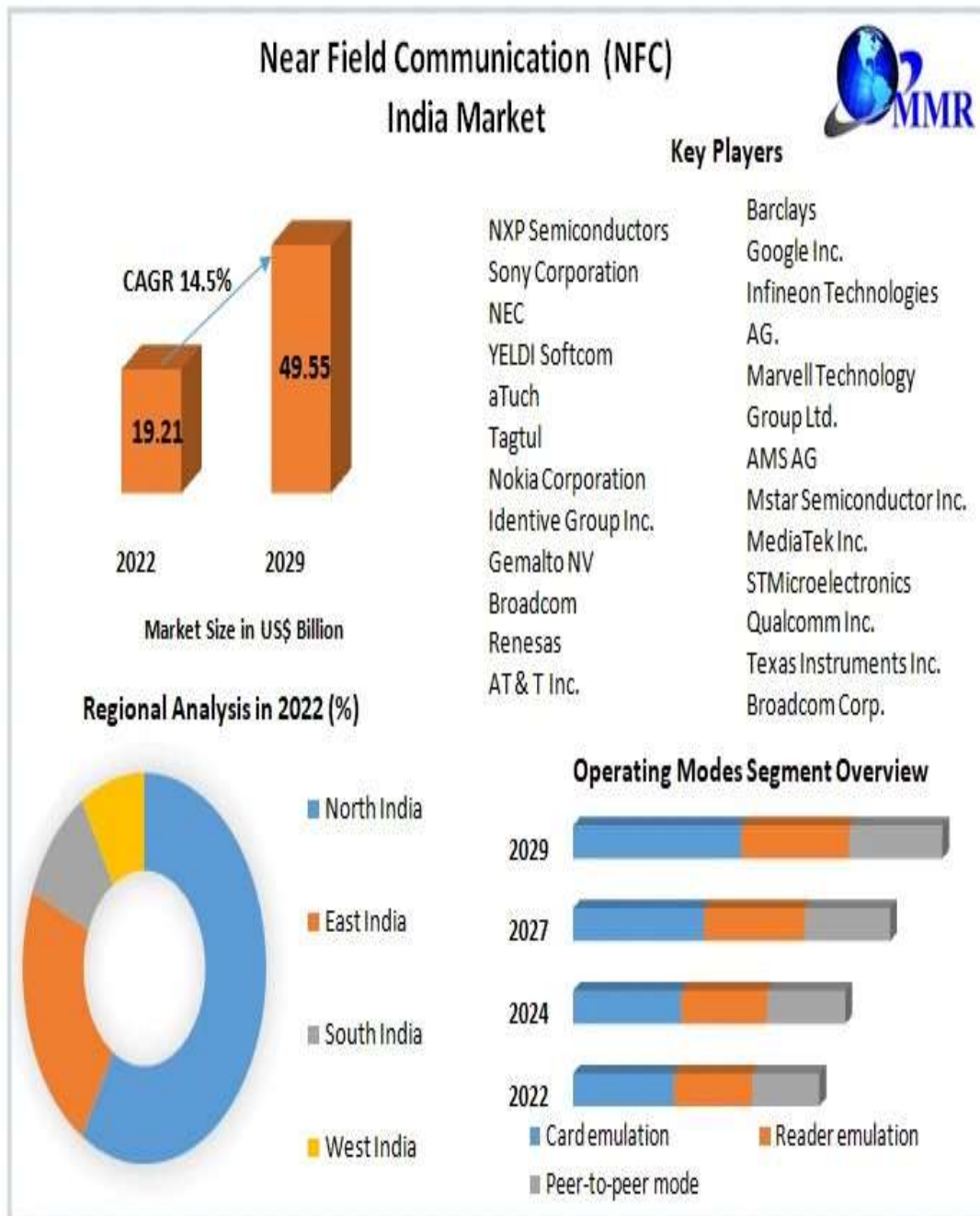
### Discussions based on Secondary data

Figure 1



The chart is an explanation of the value and volume of transactions that have happened in India via UPI transactions. The data states that there is an increase in UPI transactions in the last years, from 2017 to 2022. The Value of transactions have increased from Rs.1 lakh in 2017 to Rs.34 lakhs in 2020 with a double increase to Rs.72 lakhs. This drastic increase is the result of the break of Covid-19, when cashless payments(Vinayak, 2020) had increased. In the 2022, the value of UPI transactions has been recorded to be Rs.126 lakhs. The figure also clearly explains that the volume of transactions from 2017 to 2022 have increased eight-fold. This is evident that in 2017 the volume was only Rs.1,000 crores, which has increased to Rs.8,000 crores in 2022.

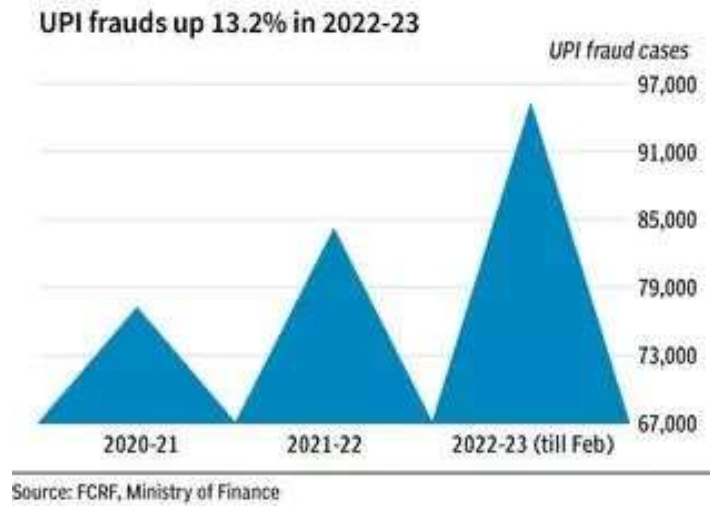
Figure 2



The figure showing the adoption of NFC in the Indian Financial Market has explained various aspects of the approach of NFC. There is an estimation that the Compounded Annual Growth Rate (CAGR) would increase from 19.21% in 2022 to 49.55% in 2029. There are some key players which support the application of NFC. The pie-chart reveals the region-wise analysis of the usage of NFC payments. This clearly states that the Northern part of India is the major user of NFC system of payments.

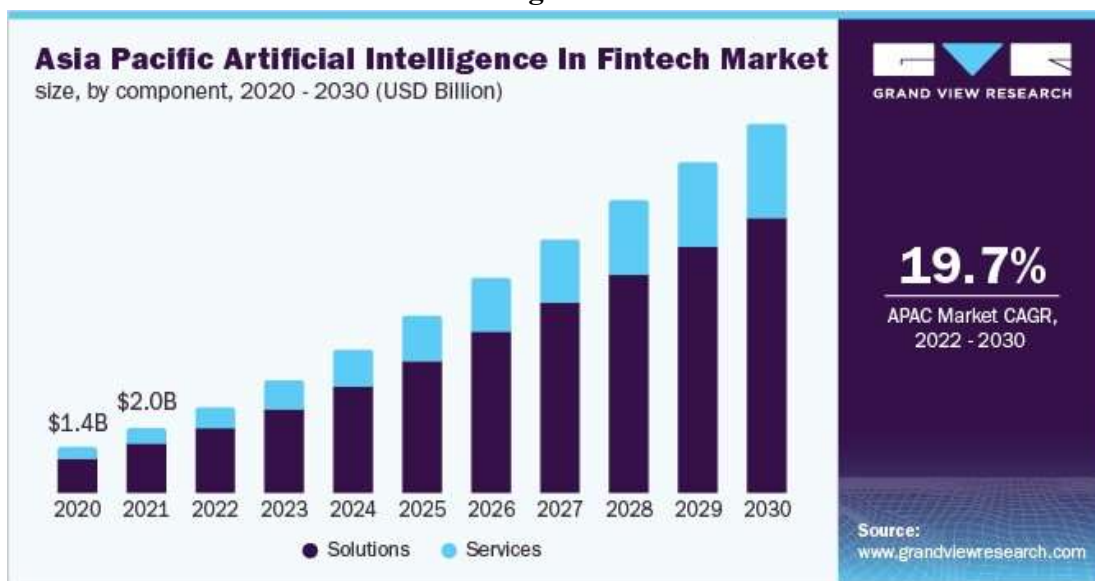
Figure 3





The figure shows the number of UPI fraud cases in the United Kingdom from 2020 to 2023. The figure shows that the number of UPI fraud cases has increased steadily over the past three years, rising from 67,000 in 2020-21 to 97,000 in 2022-23 (till Feb). This represents an increase of 45% over the period. The figure also shows that the number of UPI fraud cases increased significantly in 2022-23. This increase is likely due to a number of factors, including the growing popularity of UPI payments in the UK and the increasing sophistication of fraudsters. UPI payments are becoming increasingly popular in the UK, with the number of UPI transactions increasing by over 200% in 2022. This increase in UPI transactions is creating new opportunities for fraudsters.

Figure 4



Studies (Karthik Nandakumar, 2023) have proved that AI is prevalent in cashless payments. The figure you sent shows the size of the Asia Pacific artificial intelligence in fintech market, by component, 2020-2030. The figure shows that the market is expected to grow from

USD 2.0 billion in 2020 to USD 9.7 billion in 2030, at a CAGR of 19.7%. The figure also shows that the solutions segment is the larger of the two components, accounting for over 75% of the market in 2020. The solutions segment includes AI-powered software and hardware solutions that are used by fintech companies to improve their products and services. The services segment is the smaller of the two components, accounting for less than 25% of the market in 2020. The services segment includes AI-powered consulting and implementation services that are offered by fintech companies to their clients. The figure shows that both the solutions and services segments are expected to grow at a significant rate over the next few years. However, the solutions segment is expected to continue to be the larger of the two components throughout the forecast period.

## ANALYSIS OF CASES OF HACKING, PHISHING AND FINANCIAL FRAUDS

Here are some cases which were reported regarding hacking, phishing and other financial frauds:

- UTI Bank was a victim of a phishing attack in February 2017. Phishing emails were sent to customers asking for their personal information, such as login IDs and passwords. The emails appeared to be from UTI Bank, but they were actually from a fraudulent website. UTI Bank IT officials discovered the phishing attack and confirmed that they had informed the Monetary Office Wing of the Delhi Police. The bank also engaged the services of Extortion Watch Worldwide, a Melbourne-based company that specializes in combating phishing attacks.
- In 2018, Cosmos Bank in Pune, India, was the target of a cyber attack in which hackers stole Rs. 94.42 crores. The hackers gained access to the bank's ATM server and stole the personal information of debit and credit cardholders. They then withdrew the funds from ATMs in 28 countries. This attack rattled the entire banking industry in India and highlighted the need for stronger surveillance measures and better customer support.
- In 2018, Canara Bank's ATM servers were targeted in a cyber attack. Hackers used skimming devices to steal the ATM information of over 300 users, resulting in 50 victims. The hackers then used the stolen information to withdraw money from bank accounts, ranging in amounts from Rs. 10,000 to Rs. 40,000.
- The Reserve Bank of India (RBI) was targeted by a phishing attack in which fraudsters promised the recipient prize money of Rs. 10 lakhs if they clicked on a link that took them to a fake RBI website. The website looked exactly like the official RBI website, complete with the same logo and web address. Once the user clicked on the link, they were asked to disclose personal details such as their password, PIN, and savings account number. The RBI issued an alert about the fake phishing email on its official website, warning users not to click on any links in emails that appear to come from the RBI and to never disclose personal details to anyone.



## ROLE OF AI IN MITIGATING LOSS DUE TO HACKING, PHISHING AND OTHER FINANCIAL FRAUDS

Artificial intelligence (AI) can play a significant role in mitigating hacks and ATM frauds. AI-powered fraud detection systems can analyze large amounts of data to identify suspicious patterns and transactions (Dua & Du, 2022; Thakare & Patil, 2022). This can help to detect fraudulent activity before it causes any financial losses. AI can also be used to assess the risk of fraud associated with individual customers and transactions (Singh & Sharma, 2022; Chowdhury & Hasan, 2023), to harden security in ATM systems and other software (Sharma & Saxena, 2022; Kumar & Singh, 2023), and to analyze cyber threat intelligence data to identify new and emerging threats (Sharma & Singh, 2022; Gupta & Jain, 2023). This information can be used to update fraud detection systems and security measures. Specifically, banks are using AI to develop fraud detection systems that can identify fraudulent transactions in real time (Dua & Du, 2022). This can help to prevent fraudulent transactions from being completed, which can save customers money and reduce the bank's losses. Additionally, ATM manufacturers are using AI to develop new security features for ATMs, such as facial recognition and fingerprint authentication (Kumar & Singh, 2023). This can help to prevent unauthorized access to ATMs and protect customers' financial information. Finally, law enforcement agencies are using AI to investigate cyber attacks and track down hackers (Sharma & Singh, 2022). This can help to bring hackers to justice and deter future attacks.

Overall, AI is a powerful tool that can be used to mitigate hacks and ATM frauds in a variety of ways. As AI technology continues to develop, we can expect to see even more innovative and effective ways to use AI to protect our financial systems and our financial information.

### SUGGESTIONS

The analysis of the secondary data, analysis of certain cases and the analysis of the primary data has brought the researcher to the phase of providing some valuable suggestions so that cashless payments are strengthened and also NFC could be an alternate and popular method of cashless payments.

- UPI should be made more accessible to people of all income levels and educational backgrounds. This can be done by offering UPI services in multiple languages, by making it easy to open UPI accounts, and by reducing the cost of UPI transactions.
- UPI is a secure payment system, but it is important to continue to improve its security and reliability. This can be done by using the latest security technologies and by working with financial institutions to prevent fraud.
- UPI should be made more convenient to use for both merchants and customers. This can be done by developing new UPI features, such as one-click payments and offline payments. It can also be done by working with merchants to make it easier for them to accept UPI payments.

- UPI users should have access to better customer support in case they encounter any problems. This can be done by providing 24/7 customer support through multiple channels, such as phone, email, and social media.
- Make UPI more interoperable with other payment systems. This would allow UPI users to make payments to merchants and individuals who do not use UPI.
- Develop new UPI features that are tailored to the needs of different users. For example, UPI could be integrated with social media platforms to make it easier to send money to friends and family. Or, UPI could be used to pay for utilities and other bills.
- Providing subsidies for NFC-enabled devices would make it more affordable for small traders to purchase NFC-enabled devices, such as smartphones and point-of-sale (POS) systems.
- Tax breaks shall be offered to small traders who accept NFC payments: This would incentivize small traders to start accepting NFC payments.
- Educational workshops and seminars can be conducted to teach small traders about NFC: This would help small traders to understand the benefits of NFC and how to use it to accept payments.
- Government can partner with banks and financial institutions to develop NFC-based payment solutions that are tailored to the needs of small traders. For example, banks could develop NFC-based payment solutions that allow small traders to accept payments without having to invest in expensive POS systems.
- The Government can develop a national NFC payment infrastructure: This would make it easier for small traders to accept NFC payments and for consumers to make NFC payments.
- The Government shall create a regulatory framework for NFC payments: This would help to protect consumers and merchants from fraud and other risks.
- The government can promote the adoption of NFC payments through public awareness campaigns and other initiatives.

## CONCLUSION

The transition from cash to code, represented by the rise of UPI and NFC payments in India, is being reshaped by AI in a number of ways. AI is being used to develop more secure and efficient payment systems. For example, AI-powered fraud detection systems can help to identify and prevent fraudulent transactions. AI can also be used to develop risk assessment models that can help banks to make more informed lending decisions. AI is being used to personalize the payment experience for individual users. For example, AI can be used to develop recommendations for merchants and products that are relevant to each user's individual spending habits. AI can also be

used to develop customized payment solutions that meet the specific needs of different users. Finally, AI is being used to make payment systems more inclusive. For example, AI-powered voice assistants can help people with disabilities to make payments without having to use their hands. AI can also be used to develop payment solutions that do not require internet access or a smartphone.

Overall, AI is playing a significant role in reshaping the payment landscape in India. By making payment systems more secure, efficient, personalized, and inclusive, AI is helping to make payments more accessible and affordable for everyone. In addition to the above, the rise of UPI and NFC payments in India is a testament to the country's growing digital infrastructure and the increasing adoption of digital technologies by Indian consumers. The role of AI in reshaping payment paradigms in India is a further indication of the country's commitment to innovation and its drive to become a global leader in the digital economy.

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