

Development of Mobile App for Bank Account Number Verification

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Abstract

Bank account number verification is a crucial step in ensuring the accuracy of financial transactions. As financial transactions move from paper-based methods to digital platforms, the growing complexity of digital transactions require that businesses implement comprehensive fraud prevention and security mechanisms. Customers now expect immediate and error free financial transactions which requires that bank account numbers are verified and which can be achieved with the use of mobile apps. In this paper, a mobile app for bank account number verification is designed and developed. The methodology adopted is the agile software development methodology which offers the freedom of going back and forth throughout the development process. The front end of the app was developed with HTML, JavaScript and CSS while the bank end was developed with PHP and cURL. The hardware requirements include a smartphone with enough storage space to accommodate app and an internet connection.

Keywords: Mobile App, Account Number, Verification

1.0 Background Information

Bank account number verification is a crucial step in ensuring the accuracy of financial transactions. Bank accounts are financial accounts provided by banks or financial institutions to individuals or businesses for storing money, making transactions and accessing various banking services. According to Ataeva (2019), bank account is an account held by a person with a bank, with the help of which the account holder can deposit, safeguard his money, earn interest and also make check payments. As advances in digital technology bring more businesses online, thereby increasing the scale and variety of financial transactions, payment fraud becomes more and more widespread and sophisticated. As financial transactions move from paper-based methods to digital platforms, the growing complexity of digital transactions also necessitates robust security protocols. Businesses need to implement more comprehensive fraud prevention and security mechanisms. At the same time, customers now expect immediate and error free financial transactions. Meeting these expectations requires implementing thoughtful, interlocking payment solutions that enable quick, precise, secure transactions. One of the solutions is bank account verification and this can be achieved with the use of mobile apps.

An app is software with a specific function and able to assist us in certain tasks (Geraldo & Luiz, 2024). Recent development in the mobile app industry has resulted in various types of mobile apps, each targeting a different need and a specific audience. Consequently, users access distinct apps to complete their information need tasks (Mohammed et al., 2012). Shivkumar (2015) gives the definitions for each type of app as follows: native apps created for one specific platform or operating system, web apps are responsive versions of websites that can work on any mobile device or operating system because they are delivered using a web browser while hybrid apps are combinations of both native and web apps, but wrapped within a native app, giving it the ability to have its own icon or be downloaded from an app store.

Mobile apps have revolutionized the way people manage their finance, offering convenience, accessibility and efficiency (Lana, 2024). Mobile apps are enabled by the convergence between information technologies and telecommunication technologies. They represent a new application model introduced to information systems and a new area of research (Rupnik & Krisper, 2009). Mobile app development is the act or process by which a mobile app is developed for one or more mobile devices which can include Personal Digital Assistants (PDA), Enterprise Digital Assistants (EDA) or mobile phones. Such software applications are specifically designed to run on mobile devices, taking numerous hardware constraints into considerations.

In the finance industry, mobile apps have become essential tools for both consumers and business, providing a range of services from banking to investment management. Bank account number verification authenticates the ownership and validity of a specific bank account. It is often a prerequisite for online transactions especially electronic funds transfer and Automated Clearing Payment (ACH) and various other financial activities. The goal is to confirm key details such as account holder's name, the account number and the account type. It helps to avoid errors, reduce fraud and protect the accuracy of electronic transactions.

1.1 Statement of the Problem

Despite the increasing demand for online/mobile banking, there is a lack of user friendly and efficient independent mobile application that enables individuals look up account details of other individuals/organizations before transferring or paying cash into such accounts. Existing mobile apps are bank-dependent; meaning that usage will depend solely on having an account with the bank for which such app is developed. As a result, individuals who choose not to run accounts with a certain bank may not be able to use the bank's mobile app.

Therefore there is need to develop a mobile app that seamlessly connects with all bank databases and enables any individual to verify bank accounts without needing to own a bank account. The app should offer features such as real-time verification and a very user-friendly interface. By addressing these problems, the app aims to revolutionize the online bank account verification system and provide a convenient and effective solution for individuals seeking online verification of bank account anytime and anywhere.

1.2 Aim and Objectives of the Study

The aim of this project study is to develop an independent bank account number verification app so that individuals can reliably and efficiently validate bank account numbers accurately.

The specific objectives are

1. To identify requirements for app development.
2. To evaluate existing bank account number verification apps.

1.3 Significance of the Study

The significance of a bank account number verification app lies in its ability to enhance security, streamline financial transactions, and mitigate the risks of errors and fraud. Other key points include; fraud prevention, error reduction, enhanced trust, compliance, efficiency, convenience, cost savings and global accessibility. The project is beneficial to those in the banking and finance sector who may be interested in the functionalities, challenges and opportunities inherent in independent mobile apps for bank account verification other than those apps that are bespoke (customized) for their customers only. This innovative study is also useful to students and experts of programming who would want to be kept abreast with the latest technology in mobile app development.

1.4 Scope of the study

This innovative research project covers only Nigerian banks and will only work for Nigerian bank account numbers.

2.1 Theoretical Framework

The theoretical framework is the structure that can hold or support a theory of a research study. The theoretical framework encompasses not just the theory, but the narrative explanation about how the researcher engages in using the theory and its underlying assumptions to investigate the research problem. Certain theories form the basis of mobile application development. Within an educational study, a theoretical framework helps to explain a phenomenon through a particular lens and extends existing knowledge within the limitations of that lens (Luft et al., 2022). These theories include user-centered design theory, software development methodology, UI/UX design principles, security considerations, testing and quality assurance and so on.

User centered design (UCD) is a design philosophy that puts the user of the product, application or experience at the center of the design process. In UCD, a designer strives for a detailed understanding of the needs, wants and limitations of people who will use the end product and then make design choices that incorporate these understandings (Pratt & Nunes, 2012). UCD requires that designers not only analyze and foresee how users can engage with a product, but they also test their design in the real world with actual users.

User design principles are the guidelines that need to be followed when designing user interfaces. These principles help ensure a consistent and intuitive experience for users and make sure that the interface is easy to use. In his book “designing the user interface; strategies for effective human-computer interaction in 1986, a renowned computer scientist and professor, Ben Schneiderman

published the 8 golden rules for designing user interfaces: *strive for consistency, enable frequent users to use short cuts, offer informative feedback, design dialogue to yield closure, offer error prevention and simple error handling, permit easy reversal of actions, support internal local control and reduce short term memory*. User-centered approaches to design can guide teams towards an understanding of users and aid them in better posing design problems (Lai et al., 2010).

Software development methodologies are a combination of both practices and values. The practices will help guide the developers on what they need to accomplish and when they need to accomplish it. The values serve as a simple ethical code that software engineers should follow (Risener, 2022).

Methodologies used for developing software include procedures, techniques, tools and documentation to help every stage of the development process. A number of software development methodologies exist with their own characteristics, features, advantages and disadvantages. These methodologies includes waterfall, agile, scrum, RAD and so on (Semir, (2018). Software development revolves around a lifecycle called the software development lifecycle (SDLC) (Mahanti & Jiju, (2005). SDLC is a framework that defines all the tasks and steps performed in software development. Generally, it consists of 5 different phases (Kaur, 2015):

1. Requirement gathering
2. Designing
3. Coding
4. Testing
5. Maintenance and support.

2.2 Conceptual framework

The theoretical and conceptual framework explains the path of a research and grounds it firmly in theoretical constructs. The overall aim of the two frameworks is to make research findings more meaningful, acceptable to the theoretical constructs in the research field and ensures generalization (Adom et al., 2018). According to Imenda, (2014), both theoretical and conceptual framework gives life to a research.

Conceptual framework is a network “or a plane” of interlinked concepts that together provide a comprehensive understanding of a phenomenon or phenomena (Jabareen, 2009). A strong conceptual framework underpins a good research. A conceptual framework in research is used to understand a research problem and guide the development and analysis of research. It serves as a roadmap to conceptualize and structure the work by providing an outline that connects different ideas, concepts and theories within the field of study. A conceptual framework verbally or pictorially depicts presumed relationships among the study variables (Sing, 2023).

The researchers recognize that developing an account number verification app requires a robust conceptual framework to ensure the apps functionality, security and user experience. Thus, in this work the following concepts constitute the framework components for the account number verification app development:

1. Purpose and scope
2. User requirement and analysis
3. Algorithm development
4. API integration
5. Testing and quality assurance,

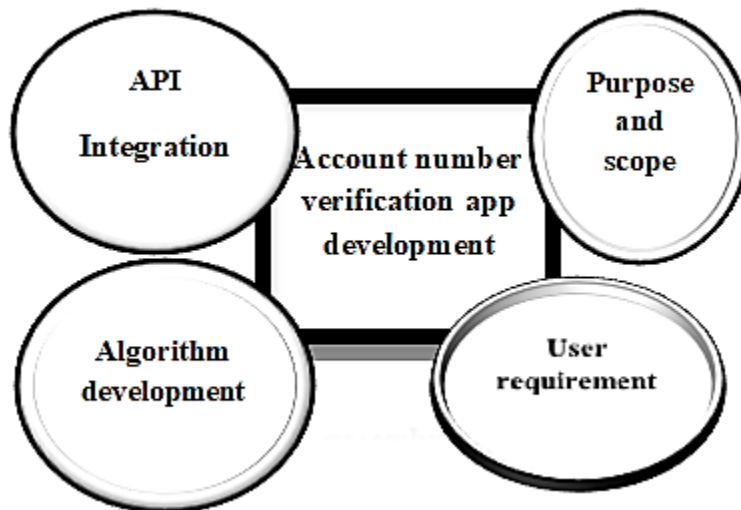


Figure 2.1: Conceptual framework

The purpose and scope of the app is clearly defined; verifying bank account numbers for transactions and identity verification. The scope of the app includes the type of accounts such as savings and current accounts.

2.3 Review of Related Works

Not many scholarly works have focused on the development of an independent online bank account verification mobile app. While bank account verification using software is not novel, the existing apps are bespoke (customized) transaction apps which require that a user has an account with the bank. However, much of scholarly attempts have surfaced in the literatures surrounding related areas such as Bank verification Number (BVN), safety and security of mobile app usage, mobile and electronic banking and financial apps.

In a study, Carlin et al. (2023) investigated how access to a mobile financial app affects customer financial decision making. They exploited the release of a mobile app for a financial aggregation platform to analyze how technology adoption changes consumer financial decision making. The app reduced the cost of accessing personal financial information which led to a drop in non-sufficient fund fees.

French et al. (2020) assessed whether smartphone apps can be utilized to improve financially capable behaviour. In the study, four smart phone apps, packaged together under the title “money

matters” were provided to working age members (16-65 years) of the largest credit union in Northern Ireland. Improvements were found which translated into better financially capable behaviors.

In their work, Haebnar & Frey, (2018) illustrated how different aspects of mobile apps affect their ratings, how it varies across sub-categories and also discussed the role of privacy, user interfaces, sign up experiences, notifications, when the use of location services may be appropriate and other aspects of mobile finance apps to provide detailed insights into user’s expectations and perception of finance apps.

Opeyemi et al. (2017) developed a new method to replace traditional method of generating BVN number using linear congruential algorithm. According to the study, the already existing bank verification number (BVN) software does not generate the 10 digit BVN immediately it goes through a number of sources for allocation of BVN to customer.

Nadire et al. (2023) carried out a study to examine the influence of safety and security issues and user authentication challenges on m-banking expansion and customers continued commitment from extant literature with the view to identify missing gaps and propose an AI based user verification method which may reduce and/or solve the problems.

In a study carried out by Alheji et al. (2022), several m-banking apps for android and iOS based on satisfaction, effectiveness and efficiency were evaluated and compared. The research identified several usability issues and recommended some useful solutions.

3.0 Methodology adopted

The study adopts the Agile Software Development Methodology. According to Risener, (2002) agile was developed to enable software engineering teams to regularly deliver high quality executables within budget and on time. Agile is more of a mindset. It does not give hard and fast rules about how one should develop software. Despite this, there are a few general suggestions that official agile documentation outlines.

The agile or incremental method is based on an incremental delivery of software function i.e the software is built step by step, whereby at each of the subsequent stages of the project implementation, the outcome of the process is assessed against a feedback received also from the users (Saeedi et al., 2024). In other words, unlike in waterfall methodology, feedback is fed into the process instantly and incrementally rather than only at the very end of the process (Sommerville, 2016). As a result, there is a flexibility to go back and forth to address likely errors, inaccuracies and so on in the software under development (Fowler et al., 2001).

3.1 Analysis of Existing system

There are several bank account verification methods. These methods include algorithms to check account number structure according to country or banking institution protocols, direct micro-deposits to verify account status or multifactor authentication techniques to confirm customer

identity. Regardless of the verification method, the main objective is to assess the legitimacy of an account and reduce the risk of financial missteps or potentially fraudulent activities.

When it comes to mobile apps for bank account verification, the available apps are bespoke (customized) for use by a particular bank and her customers. The major weakness was that a user must own an account with the said bank to be able to access the said application. In this study, the mobile transaction apps for Opay, zenith and Access Banks are examined.

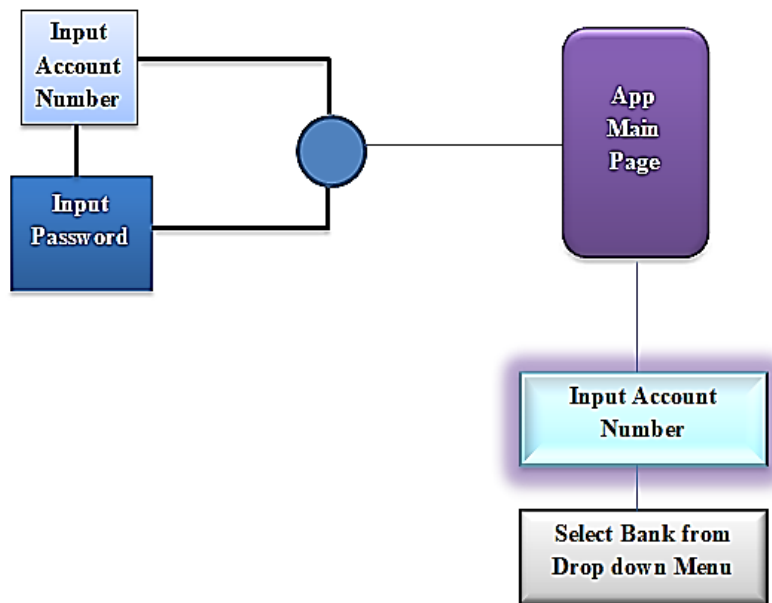


Figure 3.1 Architecture of existing system

3.1.1 Weaknesses of existing system

1. App is tied to a particular bank and cannot be accessed by non-customers.
2. App requires that user has an account number with bank.
3. Installation and use requires assistance and input from bank admin.

4.0 System Design and Implementation

4.1 Proposed System

The proposed mobile app in this study is an independent app. It is capable of offering real-time account number verification whether or not the user has an account with any Nigeria bank. It is however strictly for academic purpose and may not be used any other purpose outside those intended by the inventors. The app simply confirms key details such as the account holder's name. it helps avoid errors, reduce fraud and protect the accuracy of electronic transactions

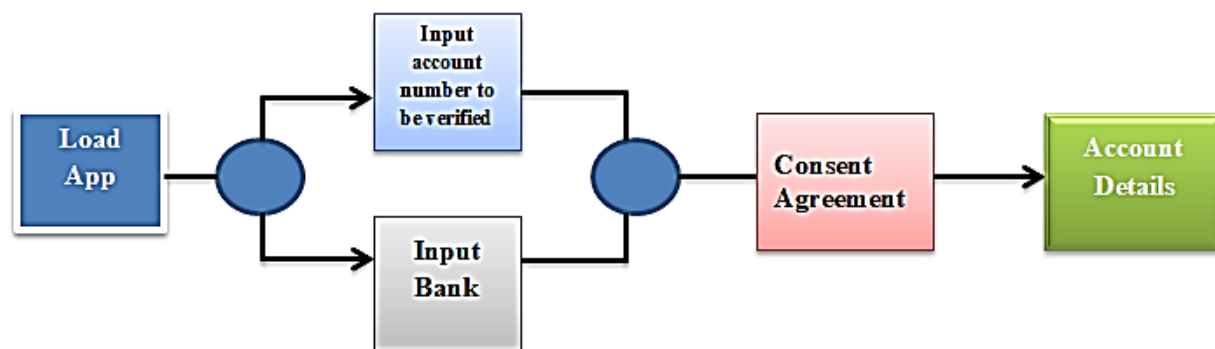


Figure 4.1: Architecture of Proposed System

4.2 Objective of the Design

The design objective for the proposed bank account verification app is basically centered around the following:

1. Accuracy
2. Efficiency
3. User experience
4. Reliability

By focusing on these objectives, the bank account number verification app effectively serve its purpose of verifying bank account numbers with accuracy, efficiency and reliability.

4.3 Input/Output Form

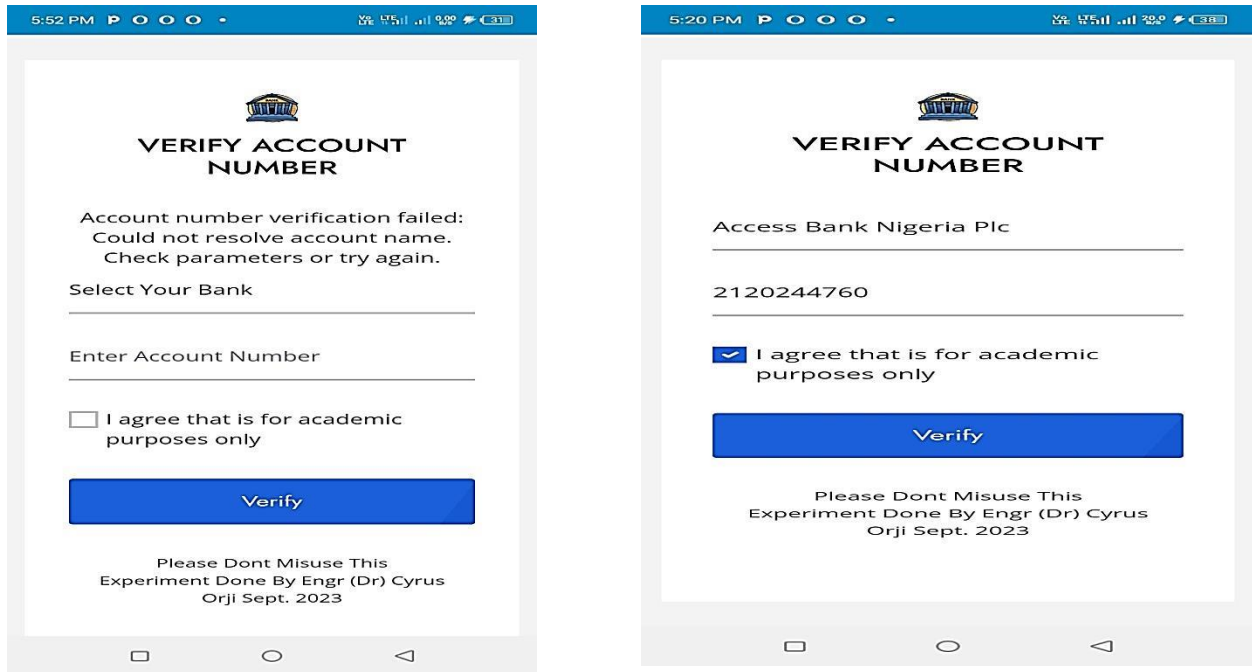


Figure 4.2 screenshot of input form

5:53 PM P O O O - 5G 55% 48° 31

VERIFY ACCOUNT NUMBER

Name Account
IKE UCHE KINGSLEY 3095337187

Select Your Bank

Enter Account Number

I agree that is for academic purposes only

Verify

Please Dont Misuse This
Experiment Done By Engr (Dr) Cyrus
Orji Sept. 2023

4.3 output form

4.4 Algorithm

An algorithm is a step-by-step procedure or set of instructions designed to perform a specific task or solve a problem. An algorithm is a set of programs that implement or express that algorithm (Noson, 2006). (// journal of logic and computation 21(2)). The algorithm for the proposed bank account verification app is represented using the English form and flow chart and use case diagram;

1. Input account number
2. Select Bank
3. Select consent agreement
4. Display account details

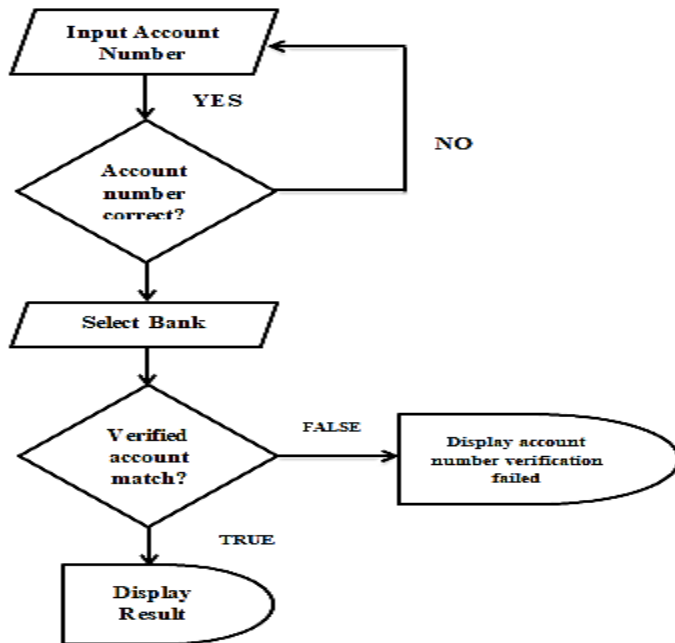


Figure 4.4 Flowchart

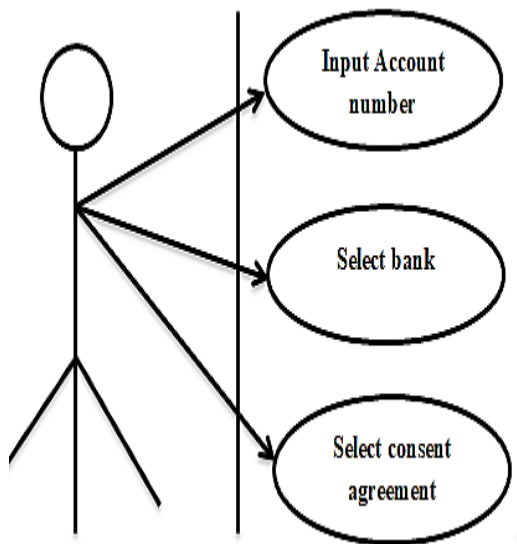


Figure 4.5 Use Case Diagram

4.5 Programming Environment and Hardware Requirements

The front end of the bank account verification app was developed with HTML, Javascript and CSS while the bank end was developed with PHP and Curl. The hardware requirements include a smartphone with enough storage space to accommodate app and internet connection.

5.0 Conclusion

Mobile app development remains an important domain in information technology and its deployment could be described as pervasive. In this paper, the researchers designed and developed an independent mobile app for bank account number verification. Bank account number verification helps establish trust in accuracy of payment processing systems by supporting the safety, efficiency and legality of financial transactions.

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