

Credit Card Transaction System Using Secured Software

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Abstract

The Credit Card Transaction System, is developed using the XAMPP server-a combination of Apache, MySQL, Perl, and PHP-is a dependable and secure financial software solution. For seamless credit card transactions, this system places a strong emphasis on functionality and security. The Apache web server ensures user accessibility by enabling the online application to be hosted on a stable platform. MySQL, a relational database management system, securely stores and manages sensitive data, protecting its security and integrity. The program integrates PHP and Perl scripts to process payments, which is one of its primary features. PHP is a programming language on the server side that handles the dynamic aspects of the website, ensuring efficient data exchange between the database and user interface. Perl scripts offer a range of server-side functions that enhance system functionality, making transaction processing more comprehensive and responsive. The NodeMCU, acting as the backend system's central processing unit, manages communication with the RFID Module RC522. The RFID Module RC522, which enables customers to initiate with their respective RFID cards resembles a credit card in this prototype. Each RFID card has a unique identification number that paves the way to diverse customer access and usage. This reliable hardware configuration makes very little effort required to process the payments. The main objective of developing this prototype is to enhance the safety and security environment of the

existing credit card system by adding personal questions that have to be answered by the payment maker to complete the transaction. It is almost impossible to crack the personal questions stage with advanced algorithms, mathematical techniques etc, because it is only known to the authorized user of the card. Although the frauds and thefts involving credit cards occur only in small percentages around 1%-3%, the volume of payments involved is huge when compared to credit cards. Thus, resulting in a large sum of money that has been misused by the fraudsters. Hence to protect this, the proposed system has suggested a novel method for the implementation of the small and safe system to proceed with payments. This little and effective feature keeps away hackers from accessing others' credit cards and prevents speculation.

Keywords: XAMPP Server, Processing unit, Personal question, NodeMCU, RFID

1. Introduction

As of 2022, it was disclosed that around 9 billion dollars were lost because of fraudsters all over the world. When this data is translated to a percentage, this seems like a smaller percentage of 1%-3% of the overall amount that has been made in transactions using credit cards. Although the percentage seems small, the amount of money lost is huge [5-7]. So, this is a very serious issue to be addressed, and the number of people turned into victims is also large. The existing system of credit card transactions is well built to tackle the vulnerabilities to a good level, but the advancement of technology is taking advantage of hackers as they will implement new malware and algorithms to breach the security levels to steal money. The main reason for the failure of the existing system is that it was safeguarded by PIN number, and OTP in most cases. This PIN number and OTP gate level security can be cracked with special equipment and brilliance, as they can be matched by probability, i.e., a PIN has 9999 possibilities, and the OTP can have 9999 or 999999 possibilities [8-9]. It is very hard to match the PIN and OTP by human effort; instead, hackers tend to use specific software to process and match the correct PIN and OTP for that transaction. Thus, the money can be stolen easily, and the authorized user doesn't even have a clue as to how this happens [10-13]. To identify this kind of fraud transaction, there is a prototype in existence that guesses whether the transaction is legal or fraudulent by providing enough data examples and parameters for overall accuracy. But in reality, what is the benefit and purpose of finding fraud and legitimate transactions after the fraud event has occurred. Due to technological advancement, the approach of attack differs

and requires continuous monitoring and learning of different approaches, and this cost is huge to identify and work on. Though it is practically possible, it won't be that effective as well. Hence, a low-cost and effective system will be a great fit for the problem [14-16].

2. Literature Review

In [1] it states and elaborates on the basic requirements and structure for creating software that is backed by its essential requirement. This study helped us to find an open-source software called 'XAMPP Server' that includes a scripting language, server-side language for communication and a database to store and utilize the data. As separate things such as a database, a scripting language to design the website or software this application comes in all-in-one availability and accessing, configuration was made easy with this application.

In [2] it defines the change in needs and the diversification that is reflected in every application. To work in a credit card transaction system concept it clearly explains, what are all the data that is to be collected from the user, and how to safeguard it using many encryption and security techniques. Further, it explores the existence and the importance of the attributes to be used in credit card transaction systems.

In [3] explores the need for Software as a Service (SaaS). It is a software distribution model where software is hosted by a third-party provider and made available to customers over the Internet. Instead of purchasing and installing software on individual computers or servers, users access the software through a web browser or application interface. Usually, the software uses the subscription model, as the user has to pay to access the software. Here, in this proposed model a free open-source software is used; XAMPP Server is configured and managed by the 'PhpMyAdmin' page.

In [4] the study states about Dynamic software. It refers to programs or applications that exhibit behavior or characteristics that change during execution, often in response to user input, system events, or external stimuli. Dynamic software can adapt, evolve, or respond in real time to varying conditions, allowing for greater flexibility, interactivity, and functionality. In most cases and applications this is achieved by structuring and constructing a complete website using HTML, CSS, JavaScript, etc., to deliver the website with full potential.

3. Proposed System

The proposed work offers an effective system to prevent the fraud in credit card transactions. The proposed model is developed using an XAMPP server application that includes a database, website creation languages, and a server to handle requests. This model introduces a new security layer known as 'Personal Questions,' requiring users to provide the correct answers for successful transactions. To make payments through the developed website or application, it is mandatory to register on the website first and complete the required data before initiating payments. The Figure.1 shows the network layer of the proposed system.

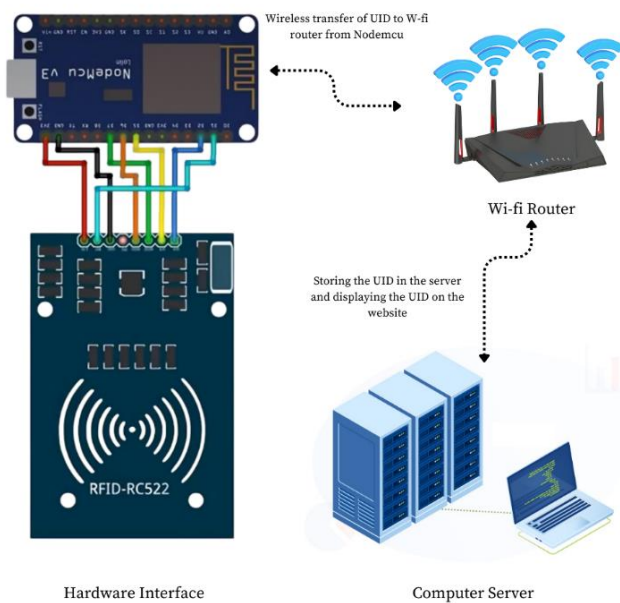


Figure 1. Network Layer

This include several data regarding payment and the personal questions to be asked and respective answers so that it is only known by the respective user of the card and makes impossible for the fraudsters to find a loophole through it. Therefore, enhancing the overall safety and security in credit card payments.

4. Components Used

- NodeMCU ESP8266 Wi-fi Module
- RC522 RFID Module

- XAMPP Server (Software)

We have used NodeMCU ESP8266, which is a microcontroller with integrated Wi-Fi capability that enables wireless communication over devices. Additionally, an RC522 module, serving as an RFID reader, was employed to read the ID of RFID tags inserted in RFID cards, thus identifying each card's unique ID and transmitting it to the developed website. The website itself was constructed using MariaDB, a relational database management system derived from MySQL. Apache serves as the server, responsible for handling client requests and retrieving necessary data from the database. Moreover, PHP and Perl were the languages employed for website development. Collectively, these components form an application known as XAMPP Server, playing a pivotal role in the website creation. The architecture of the proposed is illustrated in the Figure.2

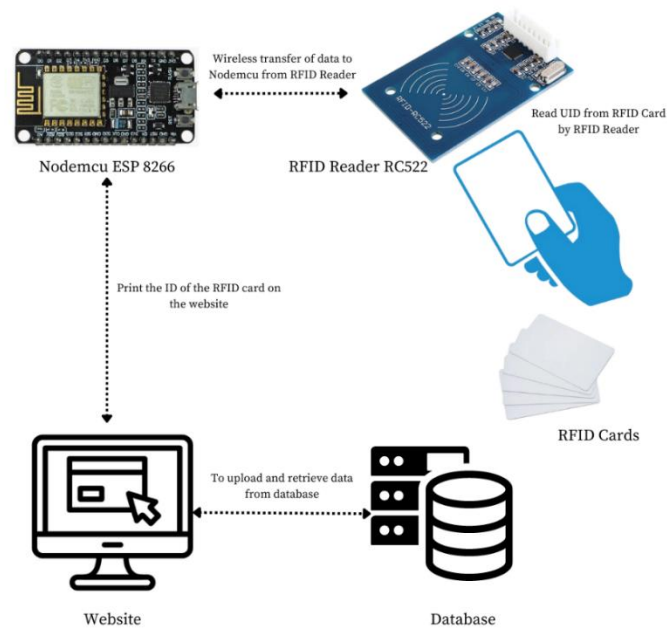


Figure 2. Architecture

Initially, connections are established between the NodeMCU ESP8266 Wi-Fi module and the RFID RC522 module to read data and transmit it to the website. This process involved using the Arduino IDE, deploying necessary libraries and packages to enable communication with the ESP8266 Wi-Fi module, with the resulting ID displayed in the output window of the IDE for human comprehension.

Then, a website is created to bridge as an interface between the application and the user, to make payments with the help of PHP and Perl. Finally, the data is stored in the database to cross-check the accuracy. Apache server is used to interact with the user and the website and handle the necessary tasks.

4.1 Step by Step Explanation

1. The proposed system was initiated by enabling the Apache server that is integrated in the XAMPP Server application. This makes way to NodeMCU to send ID data from RFID RC522 and create PHP files on the server to receive data. The XAMPP Server includes the following,
2. Apache - A web server that connects the website visitor browser (Chrome, Edge, Firefox) and the server.
3. MariaDB - A relational database management system (RDMS).
4. PHP - PHP is an acronym of Hypertext Preprocessor which is a scripting language to create websites and applications.
5. Perl - It is used for the overall controllability of the website.
6. The desired website with a simple UI is created using PHP and Perl based on our requirements for the kind of purpose and application.
7. The necessary data will be uploaded to the database system through the 'PHP MyAdmin' site. This lets us work as an administrator and be able to access database with necessary functions.
8. If any new data is recognized on the website developed, it guides to register first so that the data can be uploaded to the database. This ensures a legitimate RFID card to make payments.
9. Once the RFID card is scanned, it is programmed to automatically print the unique ID in the website created and other necessary details too.

10. Finally, by clearing the personal questions which serves as an extra security layer the user can make payments through the website.

5. Discussion

The proposed system offers enhanced security measures, user authentication protocols, stringent data protection mechanisms, efficient communication channels, and a reliable infrastructure, collectively contributing to the overall safety and security of financial transactions.

The XAMPP server application is used for website development and handling user requests. The additional authentication step of introducing the personal question enhances security by ensuring that only authorized individuals can conduct transactions, effectively preventing potential fraud attempts. Furthermore, users are required to register on the website and complete the necessary data before initiating payments, adding an extra layer of user authentication.

The proposed method performs exceptionally well in terms of data safety since payment details and personal question responses are safely stored inside the database. Sensitive information is protected from unwanted access by this strong security system, guaranteeing data integrity and confidentiality.

Architecture of the system enables effective communication between devices and the website through the use of an RC522 module for RFID tag reading and a NodeMCU ESP8266 for wireless communication. This simplified communication method reduces mistakes and delays while increasing transaction efficiency.

Additionally, the use of MariaDB, which is a MySQL derivative, along with the Apache server, PHP, and Perl for website creation guarantees a dependable framework for managing client requests and obtaining required data. The XAMPP Server application's seamless component integration offers a reliable and strong foundation for safe credit card transactions.

6. Conclusion

The proposed work represents a significant advancement in transaction security, aimed at fortifying the integrity of financial exchanges against potential intruders. By introducing an additional security layer in the form of personalized questions, the system effectively erects a barrier against unauthorized access, thwarting malicious attempts to divert transactions to illegitimate parties. This innovative approach not only bolsters the protection of sensitive data but also instills confidence among users, reassuring them of the reliability of the transaction process.

Ultimately, the proposed enhancements hold the promise of not only safeguarding transactions but also fostering greater trust and confidence in the integrity of digital exchanges. As the system continues to mature and expand its footprint, it will emerge as a cornerstone of secure transactional infrastructure, underpinning the seamless flow of commerce in an increasingly interconnected global economy.

The website development is underway, the future work of the research would focus on the website development including the necessary authentication methods to ensure a safe and secure financial transaction.

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