An Efficient and Secure Electronic Payment System for E-Commerce

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Abstract: *E-commerce implies an electronic purchasing and marketing process online by using typical Web browsers. As e-commerce is quickly developing on the planet, particularly in recent years, many areas of life are affected, particularly the improvement in how individuals regulate themselves non-financially and financially in different transactions. In electronic payment or e-commerce payment, the gateway is a major component of the structure to assure that such exchanges occur without disputes, while maintaining the common security over such systems. Most Internet payment gateways in e-commerce provide monetary information to customers using trusted third parties directly to a payment gateway. Nonetheless, it is recognized that the cloud Web server is not considered a protected entity. This article aims to develop an efficient and secure electronic payment protocol for e-commerce where consumers can immediately connect with the merchant properly. Interestingly, the proposed system does not require the customer to input his/her identity in the merchant's website even though the customer can hide his/her identity and make a temporary identity to perform the service. It has been found that our protocol has much improved security effectiveness in terms of confidentiality, integrity, non-repudiation, anonymity availability, authentication, and authorization.*

Keywords: *E-commerce; electronic payments system; payments gateway*

I.   INTRODUCTION

E-commerce was introduced to the consumer and business worlds as a unique

approach in 1990. E-commerce has expanded since then and improved enormously, giving the world's customers and company's incredible benefits. E-commerce history is closely linked to Internet history. When the Internet was open to the public in 1991, online shopping was made possible. E-commerce is characterized as a primary business model by means of the selling process of goods, the purchasing of resources, and the distribution or exchange over the Internet of items, services, and knowledge. E-commerce can be used with mobile payment systems, which allows customers to pay for their shopping by using smart phones. Mobile business is a major e-commerce extension that enables customers with wireless handheld devices, e.g., tablets, smart phones, and laptops, to carry out online commercial transactions. E-commerce is becoming very popular nowadays since the customer can spend from home; solutions are affordable, with items delivered to the home with no hassle. The popularity of e-commerce is mainly because of its online business perspective [1]. It makes it possible to gain and sell goods online, to provide various services and information through the Internet, and to exchange money immediately between businesses. Many individuals are excited about obtaining their own online website for their company, as it is possible to

market items online around the world. Customers are also interested in online shopping since they do not wish to waste valuable time shopping. E-commerce implies an electronic purchasing and marketing process online by using typical Web browsers. It is described as selling and buying of services or goods through wireless technology. Developed nations tend to be more acquainted with systems, whereas Internet shopping is exploding in developing nations. The foremost goals of an electronic payment system are increasing efficiency, improving protection, and improving customer convenience and ease of use. In the electronic payment system, the payment gateway is an essential component of the infrastructure to confirm that such exchanges happen with no concerns and to ensure that the common security over electronic systems is maintained. Such a system will help secure a purchase along with a person's transaction information. A payment gateway defends transaction information by encrypting personal information, such as credit/debit card details, to guarantee that information is transferred securely between a consumer and the transaction processor. Each online exchange should go through a managed transaction gateway. The secure electronic payment structure includes four system segments. The interaction between the segments operates

through protected communication tunnels. Secure communication tunnels offer a protected method for interaction between two or more people, or between segments, such as the buyer to the merchant, on the transaction gateway. The e-payment system must be harmless for online transaction applicants, for instance, fee gateway server, bank account server, and merchant server [2].

In the electronic payment system, the payment gateway is an essential component of the infrastructure to confirm that such exchanges happen with no concerns and to ensure that the common security over electronic systems is maintained [3]. Such a system will help secure a purchase along with a person's transaction information. A payment gateway defends transaction information by encrypting personal information, such as credit/debit card details, to guarantee that information is transferred securely between a consumer and the transaction processor. Each online exchange should go through a managed transaction gateway. The secure electronic payment structure includes four system segments [4]. The interaction between the segments operates through protected communication tunnels. Secure communication tunnels offer a protected method for interaction between two or more people,

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II.   LITERATURE SURVEY

Customer satisfaction in online shopping in growing markets: An empirical study

The aim of this study is to examine the factors affecting customer satisfaction in online shopping. The conceptual model for this study was developed based on the previous research in the online shopping context. In this research, ten hypotheses on factors affecting customer satisfaction in online shopping are outlined with empirical data from 337 respondents. Data was collected through a Google form. The regression results show that customer service, information quality, response time, transaction capability, delivery, merchandise attributes, security/privacy, convenient payment method, and price have significant positive influence on customer satisfaction in online shopping. From a managerial viewpoint, this study results provide support for investment decisions for customer satisfaction from online retailers in Malaysia.

The effect of electronic payments security on e-commerce consumer perception This study investigates the aspects of e-payment security concerning e-commerce consumers' purchase intentions. This study further involves college students in Semarang – Indonesia as representatives of the millennial generation. Structural equation modeling (SEM) using Wrap-PLS is employed to analyze the data. The findings show a fit model to explain e-commerce customers' purchase intentions. The results of this study reveal a better mediating effect of perceived usefulness on e-payment security and customers' purchase intentions. Perceived ease of use also has a significant indirect effect, through e-payment security, on e-commerce customers' purchase intentions. In addition, understanding the ease and usability of the security aspects of the payment affects e-commerce consumers' purchase intentions. The results also give a heightened awareness of security in electronic transactions.

Internet Banking Two-Factor Authentication using Smartphones.

This paper describes a method of implementing two-factor authentication using smart phones as software tokens. The proposed system will use the mobile phone as a software token and generate unique one-time passwords (OTP) that will be used when authenticating to an Internet Banking application. The tokens can also serve as a method of signing online money orders. We will prove in this article the cost efficiency of the proposed architecture for both consumers and companies.

Customer value proposition for E-Commerce: A case study approach.

E-Commerce tools have become a human need everywhere and important not only to customers but to industry players. The intention to use E-Commerce tools among practitioners, especially in the Malaysian retail sector is not comprehensive as there are still many businesses choosing to use expensive traditional marketing. The research applies academic models and frameworks to the real-life situation to develop a value proposition in the practical world by considering 11Street as the company under study and comparing it with Lazada as a leading competitor in the market. The objectives include identification of customers' perception of a value for E-Commerce Businesses, followed by critical evaluation of existing value proposition of 11Street with Lazada to identify gap and finally to propose a new value proposition for 11street. This paper first identifies customer perceived value of E-Commerce followed by critical review of existing value proposition of

11Street and then comparing and contrasting with the leading player Lazada. By the end of this research, a new consumer value proposition proposal for 11Street proposed for consideration in matching with the Malaysian consumers' value criteria.

Security Analysis and Verification of Authenticated Mobile Payment Protocols

M-Commerce is a global phenomenon and is truly in the swing as most of the purchases are through mobile devices. By seeing the frequency of purchases, we can say that people are becoming habitual of it and has gained a stronghold in their lives. As security and privacy are the major concern of the users it is evident to use a reliable, secure and authenticated mobile payment protocol. In this paper, some open network (ECash and NetCash) and mobile payment protocols (SET, iKP, MSET, MPCP2, SLMPP, and LPMP) are studied. These protocols were written in HLPSL language according to the documentation specified in the AVISPA tool and were validated and analyzed. The obtained results are compared based on security attacks and cryptographic operations required and the research validates that LPMP protocol is the fastest among all in terms of search time and is immune to various security attacks.

The Future of the Mobile Payment as Electronic Payment System.

The development of the Internet and the arrival of e-commerce fostered digitalization in the payment processes by providing a variety of electronic payment options including payment cards (credit and debit), digital and mobile wallets, electronic cash, contactless payment methods etc. Mobile payment services with their increasing popularity are presently under the phase of transition, heading towards a promising future of tentative possibilities along with the innovation in technology. In this paper, we will evaluate the current state and growth of mobile payments and other electronic payment systems in markets around the world and take a look at the future of this industry. We analyze various systems of electronic payment services, security issues related to them and the future of the mobile payment mode. This paper will also examines the factors affecting adoption of mobile payment methods by consumers. With all the security and convenience provided by mobile electronic payment method, we can expect further growth of mobile payments worldwide even surpassing payments made by credit and debit cards. However, there are several barriers identified to the adoption of this payment method; so certain measures

should be taken to grant this industry a promising future ahead.

A Survey on E-Payment Systems: Elements, Adoption, Architecture, Challenges and Security Concepts

This paper is aimed at investigating and increasing awareness about various concepts related to Electronic Payment Systems (EPS) including its advantages, challenges and security considerations. The proposed study also evaluates the adoption of e-payment systems and the resulting impact on economy of a nation. Methods/Statistical Analysis: In this paper, a comprehensive survey on all the aspects of electronic payment was conducted after analysis of several research studies on online payment systems. The most recent references and information have been explored in order to gain significant information about electronic payments systems. Findings: From the study conducted, it can be elucidated that despite various issues that usage of electronic payment systems pose, these are identified as a positive step towards the economic development of a nation. Nevertheless, its full potential can be realized only by raising its awareness among people. Applications/Improvements: With the advancement in technology and popularity of Internet, the perception of making online transactions is bound to gain

momentum. In the future, the payment modes currently used and supported shall see a declining trend owing to the numerous benefits offered by electronic payment systems.

Factors Affecting Customers Satisfaction on System Quality For E-Commerce

Online shopping has been experiencing its golden years and becoming one of the potential contributors in E-Commerce. Many countries reported their success in adopting E-Commerce and declared that it contributed to the economic growth. However, there are a lot of factors influencing both the success and the failure of E-Commerce adoption. The past investigations on E-commerce adoption are focused on the service quality on customer satisfaction. Currently many E-commerce sites still commit a number of errors in system usability design and studies focusing on system quality in improving E-Commerce adoption are still missing. System quality as one of influencing variables should be discovered to examine how it affects the customer satisfaction and brings the tips to the designer for future improvement. This study focuses on system quality that aims to combine the four factors affecting the consumer satisfaction in one model. The factors of search function, rating function,

review function and product recommended function are selected as the dimensions of system quality. The objective of this study is to investigate the relationship between these factors on customer satisfaction in buying E-Commerce products. A quantitative research method is adopted for this research.

III. PROPOSED METHODOLOGY

Security is a key concern and vital issue for the success of e-commerce. In previous work, a secure electronic payment gateway for e-commerce was proposed. In this paper, we propose a secure protocol in e-commerce to enhance the security of the e-commerce process, which can also improve the security of existing work. Interestingly, the proposed system does not require the customer to input his/her identity in the merchant website even though the customer can hide his/her identity and make a temporary identity to process a request for the service. The proposed system is made up of five entities: client (C), merchant (M), payment gateway (PG), user bank (B), and merchant bank.

They perform as follows. Each entity, that is, the client, merchant, user banks, and merchant bank, registers with the payment gateway to create its secret key with the gateway. Secret key elements are

necessary to secure communication. Additionally, the user and merchant also create a secret key between themselves. The customer examines the merchant and requests for the product, now with his/her temporary identity created in the merchant website, and the merchant sends the request to the payment gateway. The proposed model of the e-payment system is shown in below Figure.1
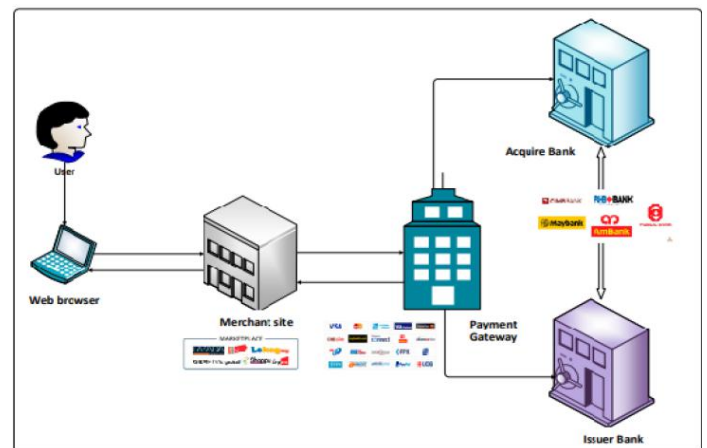
Fig.1 System architecture

An architectural diagram is a visual representation that maps out the physical implementation for components of a software system. It shows the general structure of the software system and the associations, limitations, and boundaries between each element. The following System Architecture design for this projrct consists and represents the associations between user, web browser, merchant site, payment gateway, Acquire Bank and Issuer Bank.

IV. IMPLEMENTATION

Modules:

1. User

2. Merchant

3. Bank

4. Admin

Module description:

1. User

Here user is a module, he should register with the application and after his successful registration he must authorized by the admin and user can login with valid username and password. After successful login he can perform some operations, such as create a bank account, deposit amount in his account, search product, purchase product and view all purchased products and logout.

2. Merchant

Here merchant is a module, he should register by selecting available e-commerce

V.   RESULTS

site and login with username and password, after successful login he can perform some operations, such as create bank account, deposit amount in his account, upload product, and view products which he uploaded and logout.

3. Bank

Here bank is a module, he should register by selecting available bank and login with username and password, after successful login he can perform some operations, such as view all customers details and generate their account numbers and view all request to transfer amount from one bank to other bank and logout.

4. Admin

Here admin is a main module, here admin can directly with the application and then he can view all users and authorize them, add merchants and view all registered merchant details, add banks and view all registered banks details and logout.

Fig.2 Homepage

Fig.3 User login page
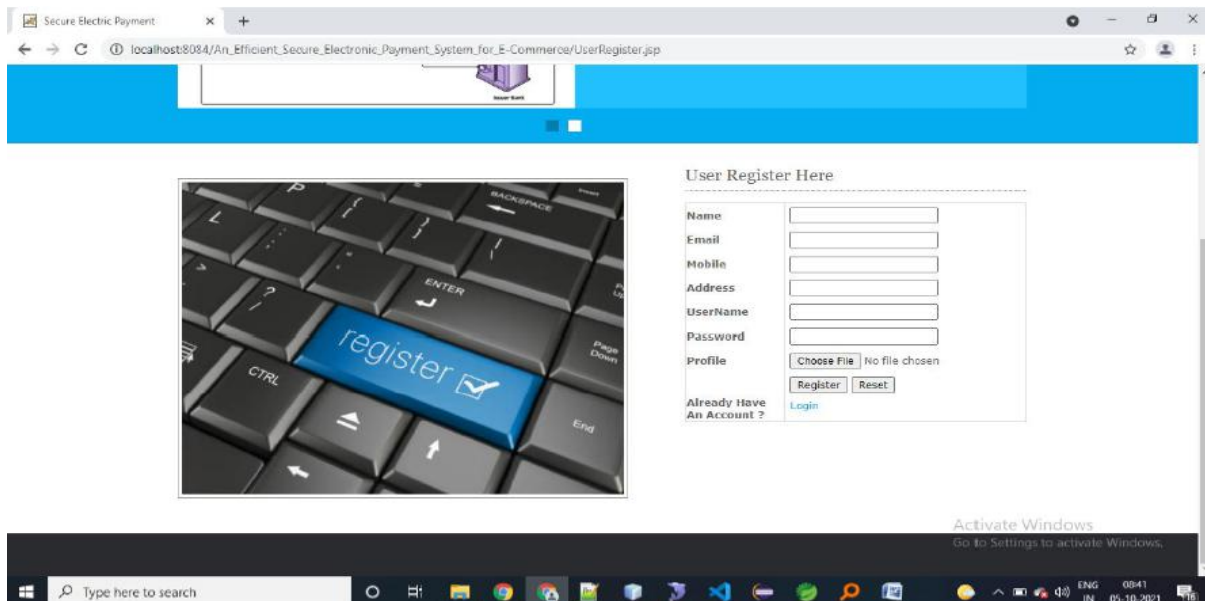
Fig.4 User registration page

Fig.5 User home page
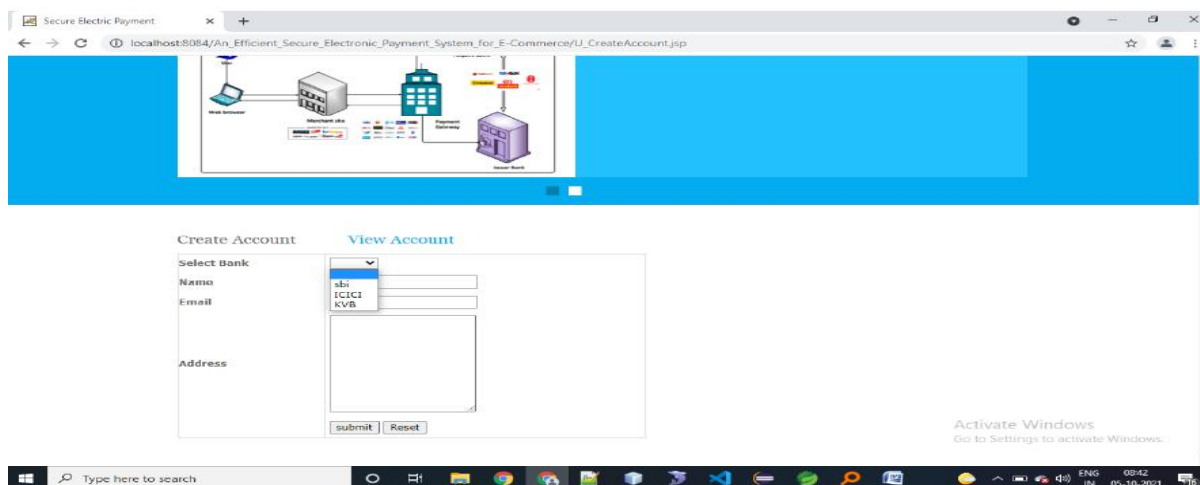
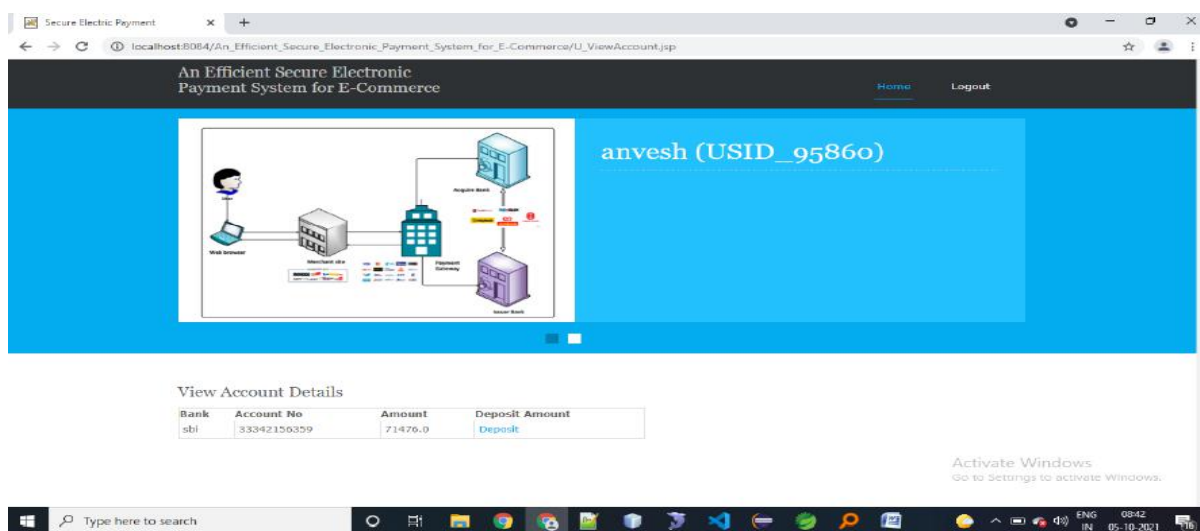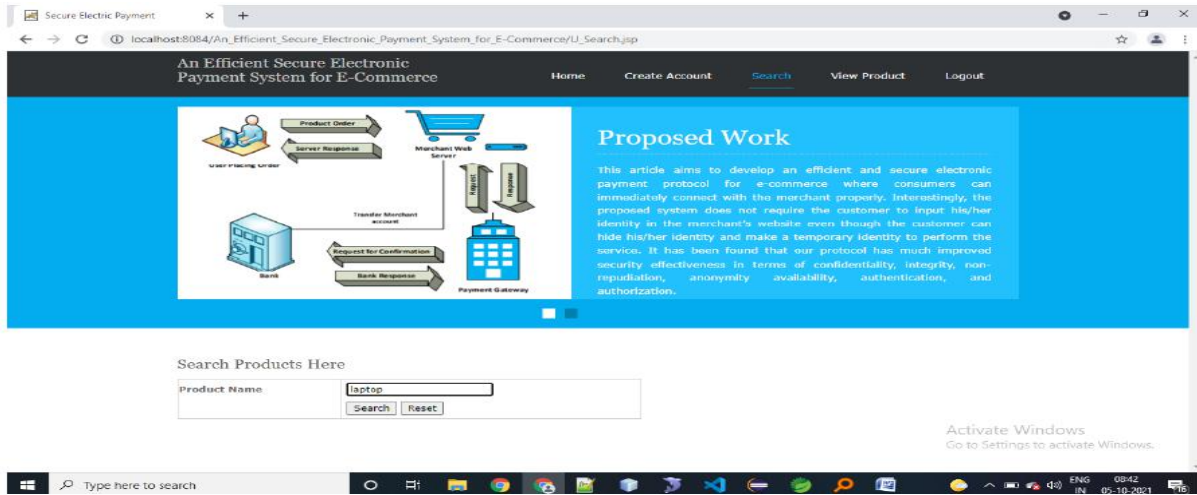

Fig.6 Create account page

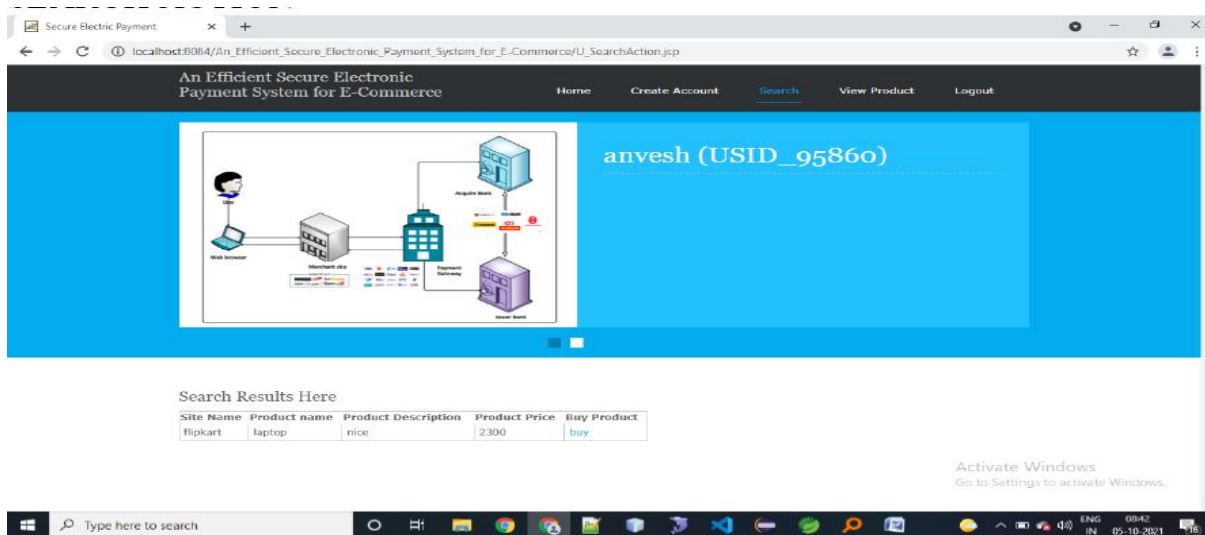
Fig.7 view account

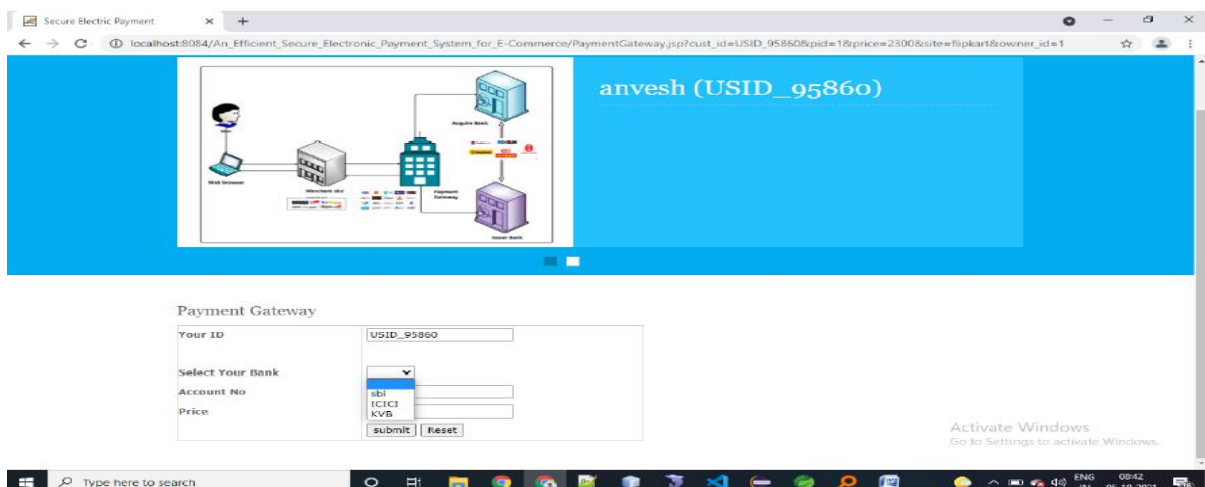Fig.8 Search product

Fig.9 Search action page
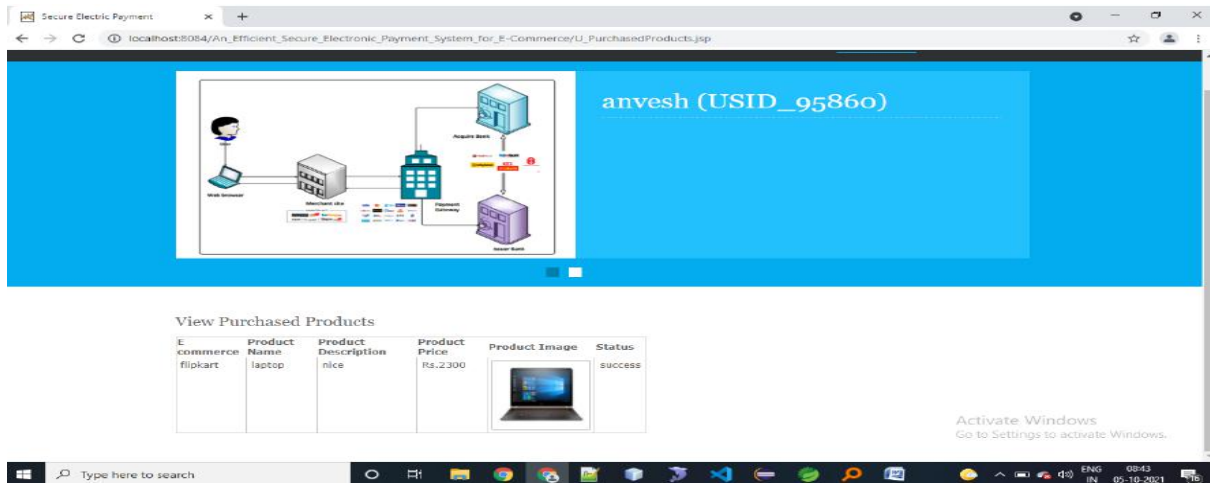

Fig.10 Payment gateway
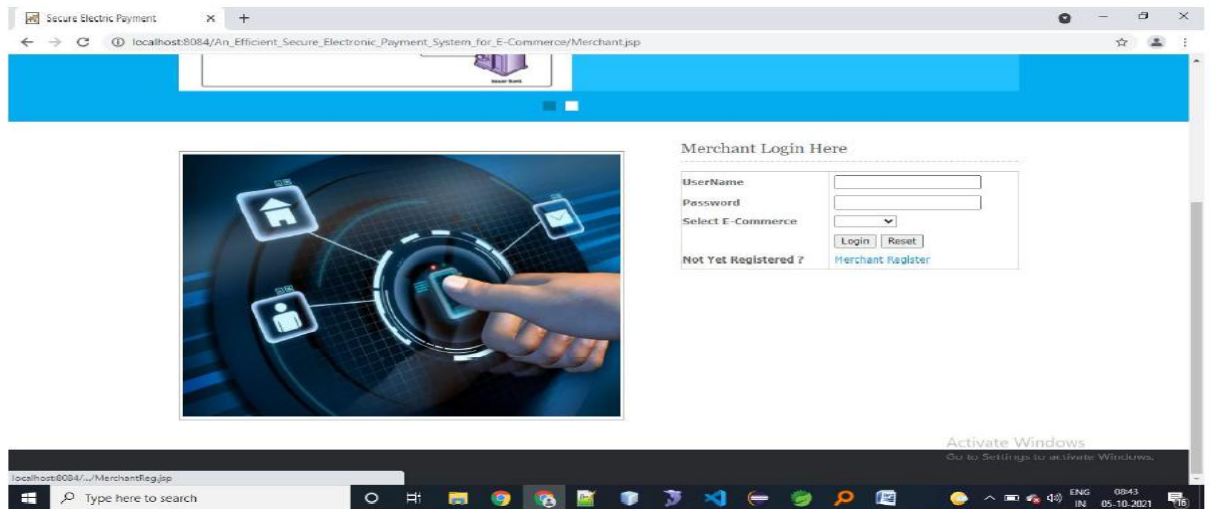
Fig.11 view purchased products
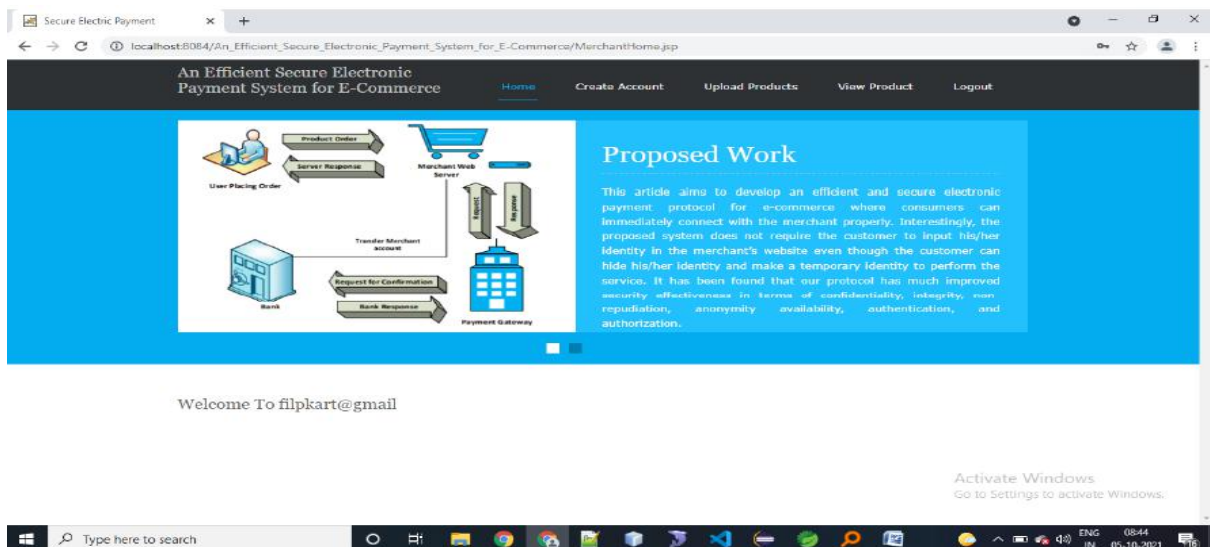

Fig.12 merchant Login
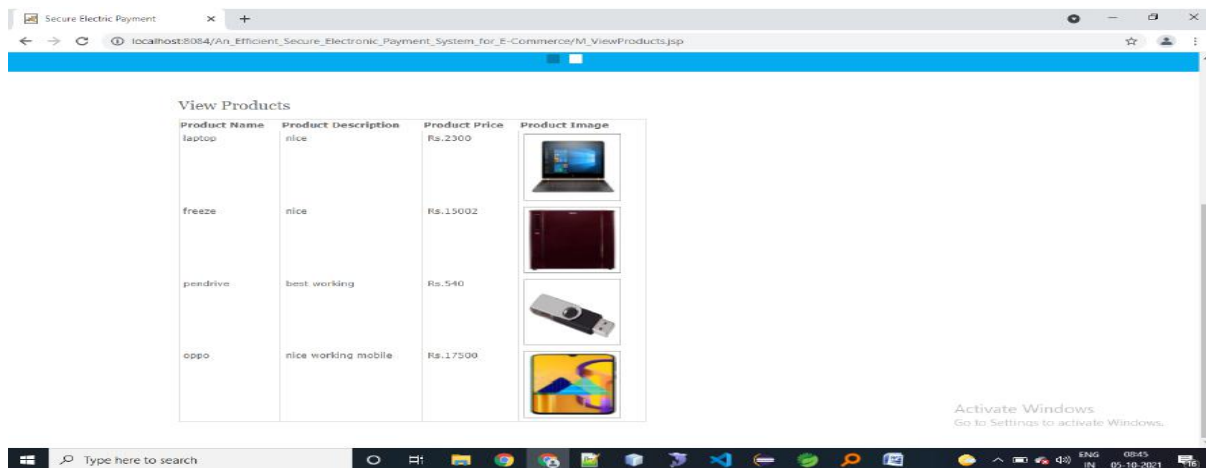

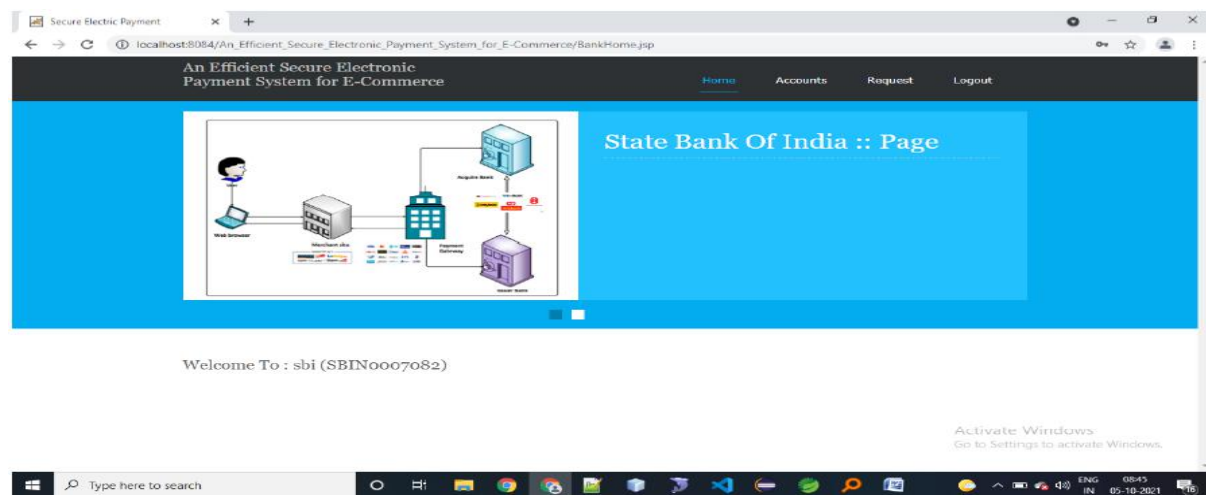Fig.13 Merchant home page

Fig.14 view uploaded images
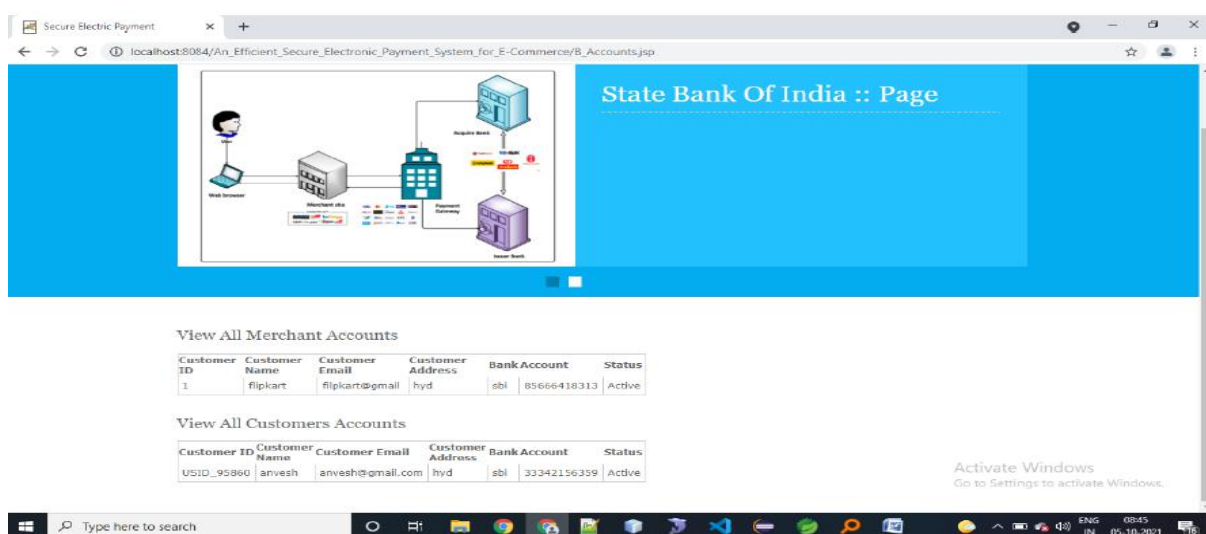

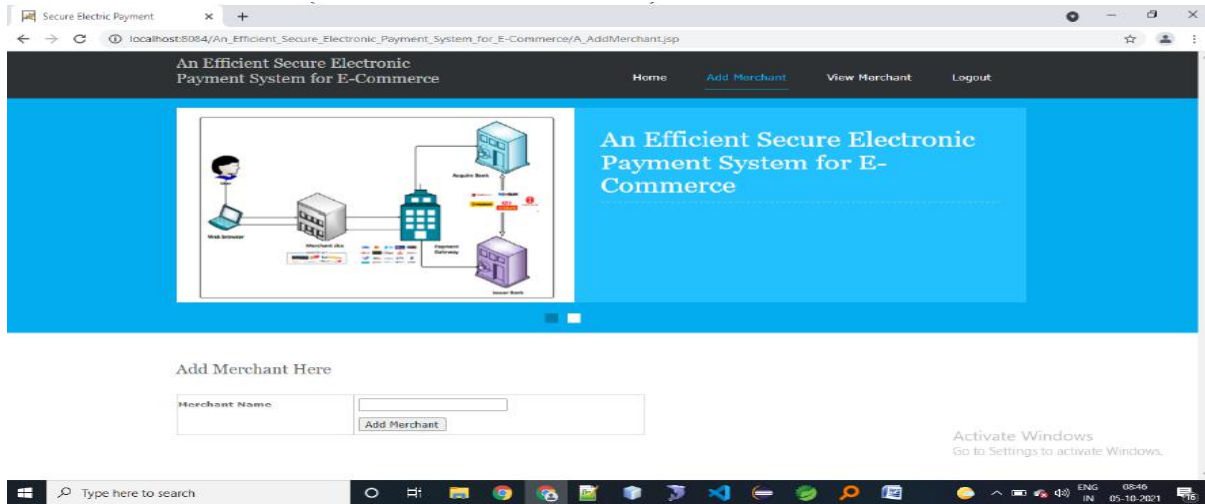Fig.15 Bank home page

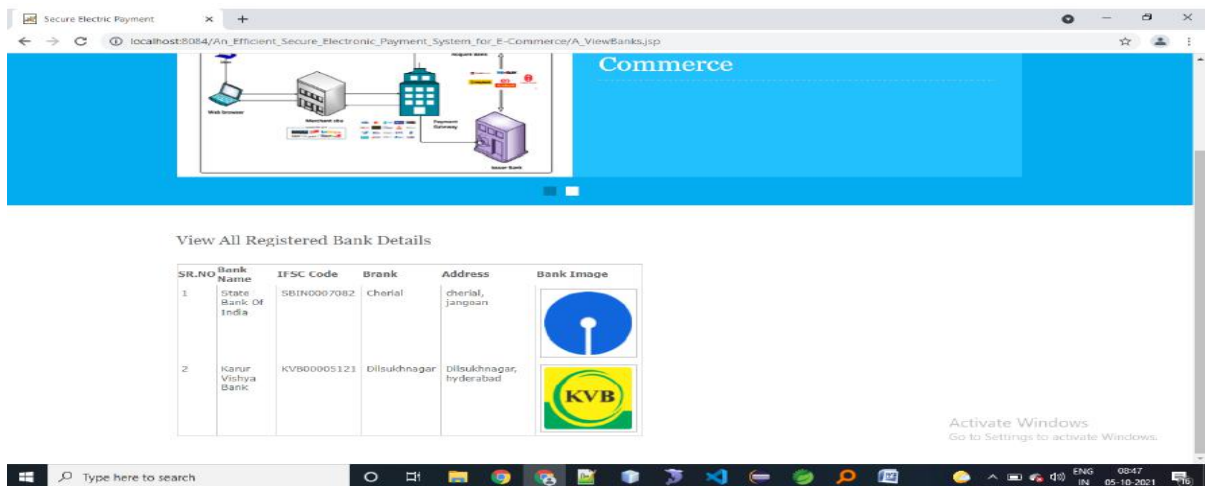Fig.16 Bank accounts page

Fig.17 E-commerce site

Fig.18 All Registered branch

VI.   CONCLUSION

E-commerce has extremely enhanced in popularity over the last decades, and, in methods, it is changing typical payment methods right into online. With the increasing popularity of e-commerce, the market for digital payments has exploded in the last decades, and payment in e-commerce, particularly mobile payment, is currently extremely preferred and plays a growing role. The principal issue is a better requirement for a secure payment system and online authentication on the client side and the Web server side both in growth and in the development of e-commerce. In this research, we suggested an efficient, secure electronic payment system for e-commerce. We introduced a comparison between our suggested framework and the other three existing

systems, which use RSA and DES to secure debit/credit card details and keep them anonymous. Most of the clients want an e-commerce program, as there are many advantages. Clients need such a secure system, because it satisfies all specifications and is a sufficient system. We proposed a secure electronic payment system for e-commerce environments on the basis of these requirements. In our proposed method, the transaction gateway functions as a proxy to communicate between the client/merchant and the bank. The security analysis demonstrated that the proposed plan has better protection effectiveness in terms of confidentiality, non-repudiation, integrity, availability, and anonymity.

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