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American International University-Bangladesh (AIUB)

Department of Computer Science Faculty of Science & Technology (FST)

Research Methodology Assignment

Submitted By

Semester: Summer_21_22		Section:	
Serial	Student Name	Student ID	Total Marks
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The assignment will be Evaluated for the following Course Outcomes

CO1: Formulate and Compose a Research proposal considering complex research activities, background studies, and following standard guidelines.	Total Marks (20)	
Problem Analysis: Background information of the research area and definition of the key research terms.	[5 Marks]	
Literature Review: Existence research within the problem area (other's work). The comprehensiveness, correctness, and discussion of the related works in relation to the topic and as a background motivation for the study.	[5 Marks]	
Research Objective: Research aim relation with the problem area within existence research. Formulation of Motivation and Research Question	[5 Marks]	
Research Contribution: Impact on the society and make a difference	[5 Marks]	

CO2: Design and compose a Research article after conducting mock research on a given topic by leveraging a research method.	Total Marks (20)	
Abstract: The relevance, completeness, and conciseness of the abstract in relation to the research topic.	[5 Marks]	
Research Method: Discussion on the research method, its appropriateness and detail on data collection, analysis, and synthesis.	[5 Marks]	
Result Analysis: Discussion the research finding and argument on the novelty of the results.	[5 Marks]	
Submission and Formatting: Article Structure, References, Citation, Style, Font size, Alignment, Grammar, Spelling, etc.	[5 Marks]	

Exploring The Human Computer Interaction Problems with Automated Teller Machine (ATM)

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ABSTRACT

A broad variety of system requires a trouble-free interface for flexible usability and dependable personal recognition schemes to determine safety and security. The purpose of such recognition schemes is to make sure that the services are only accessed by a legitimate account owner. Nowadays, the biometric era is advancing at a rapid pace. User needs a valid debit or credit card for withdraw an amount from Automated teller machine. Currently we belong in fifth generation of technology. Biometrics scanners are faster than typing PINs into the ATM interface. If bank uses an enrollment process to save fingerprint data in a database. Transactions will run forward if the fingerprint of user matches with database. with the facility of rapid transaction, biometrics authentication will also eliminate fraud scamming.

Keywords: ATM, Biometrics Technology, Human Computer Interaction, Fraud skimming, Human Machine Interaction, Cash Machine, Automated Teller Machine, Artificial Intelligence, Biometric characteristics, Banking Outlet, Computer-based Communication.

INTRODUCTION

Problem Background

In our life, there are so many things that we have to do using machines. Where Human Computer Interaction (HCI) explain how human behavior and activities influence by Computer technology. ATM stands for Automated Teller Machine. Which is most commonly used for financial services. Automated teller machine is an electronic device of banking outlet which allows customers to complete their basic transactions without the help of a branch representative or teller (Hou and Zhang, 2011). Anyone with a valid credit card or debit card can access to ATM and can withdraw their money from their account. ATM system control by a computer, which perform 24 hours a day and 7 days a week. An automated teller machine puts some simple step-by-step instructions into its interface and customer can easily understand this. To further improve the service quality, there are many things we can focus. User needs to carry their ATM (debit / credit) card for withdraw some amount. which can be lost at any time. User also needs to remember the account PIN. If people are permitted to choose their own PIN/Passwords, they tend to make choices that are easy to guess and predict or relate to their daily lives. (Coventry et al., 2003). Which can be a big headache for us. We need to make sure on two essential vulnerabilities for secure our ATM card data, one in physical security another one is Fraud skimming. If any of these vulnerabilities break the rules then our transactions may be stolen and that's obvious that's might be terrible for us. Reason why we should be aware from all of these.



Fig 1: BIOMETRIC ATM (July 27, 2013 by Sweta Leena Panda)

Related Studies

A bunch of studies have already been carried out regarding ATM's. Although ATMs provide us an extremely useful service to banks customers, at the same times they can be very disappointing to use. Wrongly inserting the ATM card is the most common scenario with new ATM users who are not familiar with their new card and the ATM (Curran and King, 2008). It is worth saying that user's interaction with automated teller machine is not much effective for user at the very beginning but it has to be effective from the very beginning. Authentication is an important characteristic in system control in computer-based communication. Human face recognition is an important biometric verification and which has widely used in many applications such as video monitoring system, human computer interaction, door control system and network security (Kibona, 2005). Regarding this research There will be great advantage to use double authentication for security purpose as one will be required to have both ATM PIN and user's facial representations in order to have access to the transaction. By the side of some advantage there will be some disadvantage too. In case the owner of cards gets accident or get injured in the his/her face, then he/she will be prompted to go to the bank where his/her account details are stored in the database in order to change the image stored to match the current image (Kibona, 2005). In some cases, the user has multiple accounts in different banks then in traditional system the user needs to carry different ATM cards for various banks, but in proposed system there is no such need, as the user does not to carry the ATM card at all. By single authentication user can access multiple accounts, which is advantageous compared to traditional system.(Maniyar et al., 2016). During the transaction a client has to feed his fingerprint, there may be chance of fingerprint damage so in order to add efficiency and to reduce the difficulty of the client, the ten fingerprints are collected along with the spouse fingerprint. This helps the client to perform transaction when they are not available. (Jebaline and Gomathi, 2015) Traditional ATM user interfaces are text heavy and are not designed for use by low and non-literate users. We surveyed 88 randomly selected ATM users, and found a high occurrence of PIN loss, confusion between touch screen and physical buttons, anxiety in case of anomalous machine behavior, and hesitation and fear of using an ATM among low and non-literate users. We then proposed and evaluated an assistive touch voice interface, that at the push of an on-screen "speaker" icon, read out in Urdu(the local language) the text written next to the icon.(Muneeb et al., 2015)

Research Objectives

There are so many existences project that I have going through. According to Kibona (2005) human face recognition is an important biometric verification and which has widely used in many applications such as

video monitoring system, human computer interaction, door control system and network security but there is a limitation for face recognition authentication. One of the examples could be like in case owner of cards gets injured on his/her face, then face recognition authentication will not be able to work out another case could be skimming images. Biometric recognition changes the whole authentication system. Where biometrics recognition provides us particular information for every different person and it can be utilized as a technique for individual identification. According to (Jebaline and Gomathi, 2015) the ten fingerprints are collected along with the spouse fingerprint. This helps the client to perform transaction when they are not available. The most benefited part of biometric technology is quicker authentication, security or data sensitivity, authorization or access control, and complete data accuracy. What is the reason that support using biometrics recognition instead of carrying ATM card? What are the implications of biometric recognition that can simplify in our research? How we can get benefited from implanting those biometrics authentication?

Research Contributions

Most of the ATM users are suffering from some common problems like they have lost their ATM card, for that reason they have wasted their valuable time to get a new ATM card. Currently we belong in fifth generation of technology. In this generation you carry a card for withdraw some amount from your account which does not make meaningful sense even after belong in the fifth generation of technology. For better user's experience, instead of carrying an ATM card to withdraw some money, we can make this process an alternative by doing something more meaningful and logical. we can use some of biometric recognition techniques for withdraw money from our account. User satisfaction will be more reliable by implementing biometric recognition. If we remind our current scenario ATM user suffered for lost their ATM card as a result, they did waste their valuable time to searching their lost ATM card. Another problem might be that they have forgotten their ATM PIN, also they are afraid of fraudulent skimming on their account. By doing my research I think I can contribute something that might be relevant and effective for solve all of this common issue. Account owners does not need to worry about carrying their ATM card also they do not have to remember their ATM PIN number. Fraud skimming will be prevented if we apply biometric recognition to ATMs. As we all know Biometric recognition is less time-consuming process also biometric characteristics cannot be conjectured or stolen. Fifth generation of technology will be pay off with the implementation of better Human computer interaction. A better user experience would be justified.

METHODOLOGY

For preparing and collecting my research data I have selected Systematic literature Review method. I think it is most convenient way to elaborate my research paper along with other related studies on internet. Systematic literature review provides a comprehensive overview of literature related to a research question and synthesizes previous work to build up a particular topic's foundation of knowledge.

Literature Search

I have searched various database to collect my relevant SLR along with google scholar I have search in IEEE Xplore, IGI global and ACM journal. My searching keywords is (HCI Or Human Computer Interaction or Human Machine Interaction or Artificial Intelligence) And (Automated Teller Machine or ATM or Cash Machine). By using forward searching I have collected some cited paper from google scholar and other databases that I mentioned above. After I found some paper by using forward searching, I used backward search into their reference and I found some other related research paper. Also, by using DBLP I have gone through author citation index and found some of relevant existing studies.

Literature Selection

For inclusion criteria I normally look upon which paper is related with my research after I find my desire paper, I include them in my Systematic literature review and also some of paper that I have initially selected were not accomplishable with my research topic also there were some duplicate papers that I found and finally I exclude them from systematic literature review. Out of 28 selected paper I Finally includes 7 papers in my SLR. According to (Curran and King, 2008) we can see our first research question is directly link with this article. Where we can measure the necessity of biometric recognition instead of carrying ATM Card. Most of the related studies that I have selected also shows various kind of implications of biometric recognition that can simplify in our research and how can we get benefits from implementing those biometrics authentication.

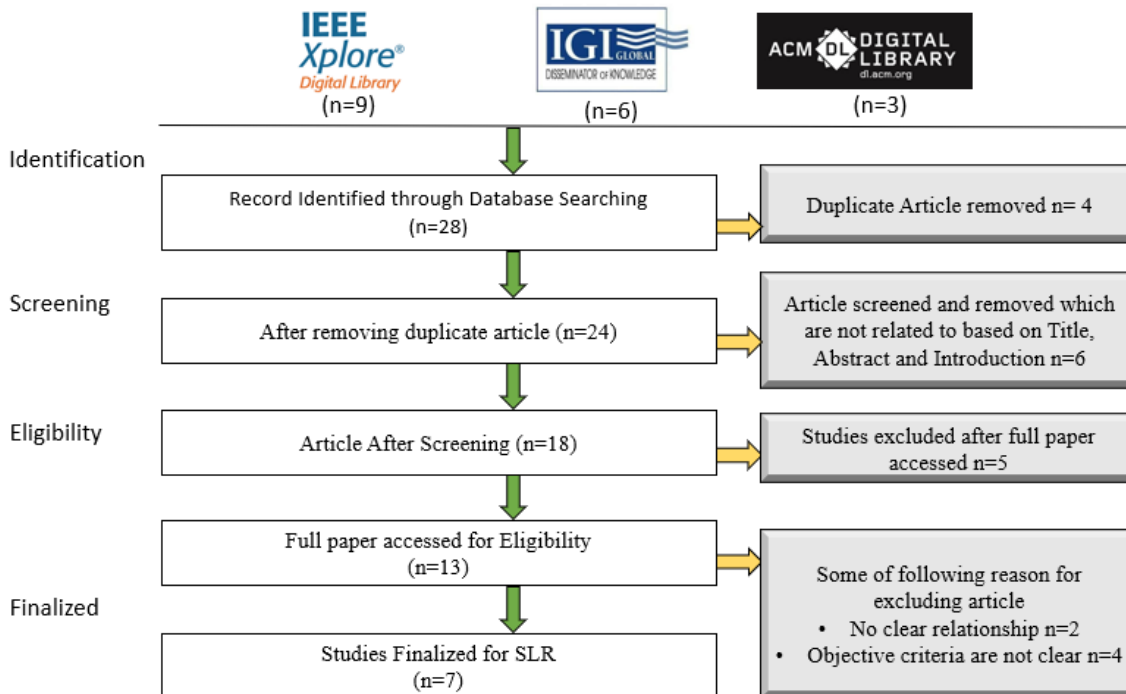


Fig 2: Study Selection Process

RESULTS AND ANALYSIS

Research Data/Results

References	Result of the research
(Curran and King, 2008)	Wrongly inserting the ATM card is the most common scenario with new ATM users who are not familiar with their new card and the ATM . It's all started with the basic problem such as user could not able to insert their card in ATM cash machine, they are not familiar with ATM interface function etc. In this scenario my first research question assesses the necessity of biometric recognition instead of carrying ATM Card.
(Coventry et al., 2003).	User also needs to remember the account PIN. If people are permitted to choose their own PIN/Passwords , they tend to make choices that are easy to guess and predict or relate to their daily lives. Security is a major issue of transaction. A user may be run into trouble if user is not being able to control

	or protect the passcode or a hidden code what gives us the access to go through my transaction process. By this systematic literature we user can measure the necessity of security thorough biometrics authentication.
(Jebaline and Gomathi, 2015)	During the transaction a client has to feed his fingerprint, there may be chance of fingerprint damage so in order to add efficiency and to reduce the difficulty of the client, the ten fingerprints are collected along with the spouse fingerprint. This helps the client to perform transaction when they are not available. In my research objective I have already identified a solution where a user can go through by various kind of biometrics recognition if it has been implemented in ATM cash machine.
(Muneeb et al., 2015)	We then proposed and evaluated an assistive touch voice interface, that at the push of an on-screen “speaker” icon, read out in Urdu (the local language) the text written next to the icon. Various kind of bioscience can give us several solutions to implement. But there is some limitation to implement all these. The reason might come up with cost, efficiency, trustworthiness. But there is always a best solution that we can pick. I have already discussed about several related studies which is directly linked with my research objective.

Analysis and Discussion

My analysis throughout my research can impact in our daily lives. Relationship between a machine and human is complicated when we are not being able to implement such ideas that we needed to implement. By doing my research I think I able to generate some ideas which are needed to implement. My research objectives are general and much needed issues to implement. If I declare my analysis by one word regarding my first query, it will be efficiency. For better user experience we need something more reliable and rapid. Carrying ATM card for basic transaction does not give us any experiences. We can use biometrics instead for better user experience. Another research question concern about various kind of biometrics recognition. By Systematic literature review we were able to see different kind of biometrics recognition that can be implement in ATM cash machine. Where I trying to identify prime option based on security, cost and efficiency. Different types of verification by biometrics authentication have been reviewed in related studies part. There are some restrictions to implement such ideas that given into some systematic literature I found. One of them is voice recognition biometrics system. I would say it is not more convenient way to identify unique user compare to fingerprint biometrics recognition cause the scalability of voice recognition is so restricted.

CONCLUSION

Currently we belong in fifth generation of technology. We need to implement something that is more meaningful and dynamic. We should not rely on something that we need to carry with us. My research objectives carry out some of relevant desire things which can be an appropriate solution for my research background problem. Throughout my research I have tried to implement some biometrics recognition process in ATM cash machines so that users don't have to carry their ATM cards but they will be able to transact their money more rapidly by using biometrics recognition. I have studied many related articles corresponding with my topic and collects some of relevant data by using systematic literature process. After collecting all my necessary data, I compare my proposed solution with existing solution and tried to give a best solution based on user satisfaction. For transact an amount form user's account, users need to carry their ATM card while I proposed to use biometrics technology in ATM cash machine so that user do not need to be worry about ATM card and card PIN number. There are several biometrics technology that we

can implement in our project. But I prefer fingerprints biometric system as human have ten fingers to uniquely identify with fingers ridges. There may be chance of fingerprint damage so in order to add efficiency and to reduce the difficulty of the user, the ten fingerprints are collected along with the spouse fingerprint. There are some limitations I found in my proposed research objective. Biometrics recognition still have some restriction such as physical Disabilities or physical traits which cannot be altered. Another limitation might be software malfunction. Sometimes biometrics system is unreliable because of automatic system that depends on electricity to run all the process. If there is a power shortage, no user can enter or exit. For further research few things can extend by a researcher as I have proposed to implement biometrics recognition (fingerprints) in Automated teller machine. Considering user satisfaction, cost and efficiency in future a researcher can implement several biometrics recognition on ATM machine and modify ATM user interface.

REFERENCES

Coventry. L., Angeli, De. Antonella & Johnson Graham.(2003). *Usability and Biometric Verification at the ATM Interface*. Proceedings of the British Ergonomic Society Conference , Edinburgh.

Curran Kevin and King David.(2008). Investigating the human computer interaction problems with automated teller machine navigation menus, *Interactive Technology and Smart Education*, 5(1), 59-79.

Hou, Y., Jing, Zhang Xi. (2011). The Improved Design for Automated Teller Machine Based on the Theory of User Requirements. *Advanced Materials Research*, 308(310), 41–46.

Kibona Lusekelo.(2015). Face Recognition as a Biometric Security for Secondary Password for ATM Users. A Comprehensive Review. *International Journal of Scientific Research in Science and Technology IJSRST*, 1(2), 2-3.

Muneeb Sara, Nasee Mustafa and Shahid Suleman.(2015). *A Usability Study of an Assistive Touch Voice Interface based Automated Teller Machine* .Proceedings of the 2015 Annual Symposium on Computing for Development - DEV '15, London, United Kingdom.

Maniyar, N., Shahrukh, Adsule, A., Swapnil, Ekkaldevi, A., Purushottam, Bhivare Rahul.(2016). Biometric Recognition Technique for ATM System. *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, 4(3), 7-11

Panda Leena. Sweta(2013). BIOMETRIC ATM.
<https://pandasweta91.wordpress.com/2013/07/27/biomatric-atm/>

Jebaline, G., Renee, Gomathi S.(2015), *A Novel Method to Enhance the Security of ATM using Biometrics*. International Conference on Circuit, Power and Computing Technologies [ICCPCT], Nagercoil, India