Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X
IMPACT FACTOR: 6.017

IJCSMC, Vol. 6, Issue. 1, January 2017, pg.144 – 149

Designing and Implementation of Smart Card Technology for the Students of Higher Education

Abhishek Singh[1], Ashish Chopra[2], Mohammad Imran[3], Rahul Singh[4]

Department of Computer Application, National Institute of Technology Kurukshetra, India

[1] abhi3jan1993@gmail.com; [2] ashishchoprakkr@gmail.com, [3] mohdimran0305@gmail.com; [4] rahulsinghrk10@gmail.com

ABSTRACT: ***Digitization is the process of converting information into a digital format. The economy that is based on digital computing technologies is known as Digital Economy. The digital economy is also sometimes called the Internet Economy or Web Economy. Right now, in most of the countries, inside the people's wallet, they probably have a couple of credit cards, an identification card, automatic teller machine cards (ATM card) and maybe a few other plastic cards. Without realizing it, these plastic cards have become a very important part of their life. Currently smart cards can be seen in the transportation, telecommunication and retail sectors. In this paper we are providing the combination of digitization and digital economy and aim to propose designing and implementation of a Student Card System for higher educational institutes using smart card technology. Smart card is a card which contains a barcode which is nothing but a unique card that is assigned to the student. A barcode is a series of alternating dark and light stripes that are read by an optical scanner. It is an automatic identification technology. A barcode is an optical, machine-readable, representation of data the data usually describes something about the object that carries the barcode. The student smart card can be used to ease the work of students. This card is useful for the students in places like library, canteen, stationary shops and online storage of important documents. From there we can see the potential and power of smart cards their versatility and usability.***

Keywords— Digitization, Digital Economy, Student Smart Card System, Optical Scanner, Automatic Identification Technology

I. INTRODUCTION

We use our wallet for keeping various cards like a library card, an identity card, ATM card, a driver's license, and physical cash. Soon all these cards can be replaced by one or two smart cards. The smart card is used as means for identification, security and cash. Smart cards can be seen in the transportation, telecommunication and retail sectors. Currently smart card implementations can be seen around the world but they are not unified i.e. each developer uses different programming standards and data structures, therefore a variety of smart cards exist in our society today. In this paper we are combining the digitization and digital economy. Our aim is to propose the designing and implementation of a Student Card System for higher educational institutes using smart card technology in other words a card with many uses. This will enhance the current student cards that can be seen in many educational institutes and abolish the current problem of having multiple cards with the same use. Most smart cards resemble the size of a standard credit card. Assume a student at a university may use the university identification card (ID card) as a basic form of identification to gain access to the university's facilities, using university library, purchase meals, purchase materials and supplies from the university store, or use university's vending machines. Additionally, some cards may also be used to access the university's computer systems, network and intranet or internet. In this situation, the contactless reader cannot detect the smart card. The use of multiple technologies or multi applications on a single ID card can reduce card issuance, administrative costs and provide users with the convenience of a single access ID credential. One example of a multi application card is the student campus ID card. The next sections will give the general overview of smart card technology, identify the smart card's benefits, features and characteristics.

II. AN OVERVIEW OF SMART CARD TECHNOLOGY

Smart card is a card which contains a barcode which is nothing but a unique card that is assigned to the user and is capable of storing data which can be either value or information or both. A barcode is a series of alternating dark and light stripes that are read by an optical scanner. It is an automatic identification technology. A barcode is an optical, machine-readable, representation of data the data usually describes something about the object that carries the barcode. Originally barcodes systematically represents data by varying the widths and spacing's of parallel lines. Barcodes originally were scanned by special optical scanners called barcode readers. A Barcode Symbology defines the technical details of a particular type of barcode like the width of the bars, character set, method of encoding etc. we will use Code 39 symbology because, It allows real-time data to be collected accurately and rapidly. Code 39 barcode is the easiest to use of alpha-numeric barcodes. Code 39 was developed by Dr. David Allais and Ray Stevens in 1974. Code 39 is also known as Alpha39, Code 3 of 9, Code 3/9. The Code 39 specification defines 43 characters, consisting of uppercase letters (A through Z), numeric digits (0 through 9) and a number of special characters (-, ., $, /, +, %, and space). Its name originates in the fact that it could only encode 39 characters—though in its most recent version the character set has been increased to 43. Each character is composed of nine elements: five bars and four spaces. Three of the nine elements in each character are wide (binary value 1), and six elements are narrow (binary value 0).

Bar coded smart card have certain advantages like, it is:

- ***More reliable***
- ***capable of storing data which can be either numeric value or characters or both***
- ***secure or higher security***
- ***Multiple functions***
- ***Cheaper than other type of cards***

III. MOTIVATION

Take a look in your wallet and what do you find? Notes, coins, a driver's license, credit cards, an identification card, automatic teller machine cards (ATM card), a library card and other more cards. These cards have become a very important part of your life. Soon all these documents will be replaced by just one or two smart cards [2]. Smart cards are being used in a number of ways around the world, replacing a wallet's content bit by bit [7]. By adopting smart card technology one card can be used for all [4]. This many organizations including educational institutes such as universities currently use bar coded cards as their means for identification and it is not used for any other purpose. The new student card system will give the benefit to students as well as the university and institutes. By using smart card technology the student card will be more powerful, more versatile, and more reliable. As it's unique bar code will be used at every places like for Stationary Payment, Canteen Payment, Library Access, Identification and keeping important documents on the college server. Fig. 1, illustrates some uses of smart cards in an educational institute, as seen below it will have some functionalities.

LIBRARY ACCESS **CANTEEN PAYMENT** **STATIONARY PAYMENT**

IDENTIFICATION **DOCUMENT UPLOAD**

Fig. 1. Overview diagram of the Student Card System

IV. APPROACH

The proposed system can be implemented in many language standards, the prototype created is to illustrate how the system operates and interact with the users so an environment had to be chosen, that environment is a University/College [1]. Designing a smart card system for a university/Institute requires the design of the card itself such as what card it use, what data it should store, finally the applications that works with the card.

(A.) SECURITY

Security is a big issue with smart cards as the cards can be used for manipulation and fraud, there is even a greater risk if the card is to be used to store monetary values. To provide the resources to identified users is quite important. Thus in order to protect these resources from any unauthorized access both user authentication and access control are required for resource protection in distributed computer systems [3]. Different cards have different security features. The features that exist with the cards used for the implementation includes secret codes such as PIN.

(B.) APPLICATION

This section will go through all the applications implemented for the proposed student card system. Some applications such as Login and Upload Document are meant for educational organizations while Shop is designed for the public field. Altogether seven applications were created. Currently there are a few programming standards available for smart cards, they are:

- ***Personal Computer / Smart Cards (PC/SC)***
- ***Java Card***
- ***Html With Css***

PC/SC was created by Microsoft and is a smart card application interface for communicating with some cards from window based platforms but it does not support other's platforms. Building on the same spirit as the original Java, Sun has developed the Java Card API Specification [6], to facilitate the concept of "write once, run on all cards". It allows Java applets to run directly on the card and enables chip independent. We can also use html with css for making an interactive interface for the student card system.

(a.) LOGIN

Login as the name suggest is an interface that allows cardholders to access all the services provided by the college. It requires the cardholder to simply scan their student card from the designated reader after that the system verifies the id if the id exists the cardholder then asked to submit the pin and, then verified. If the pin is correct, access is granted otherwise denied. As a, security feature incorrect pins can be entered only some times, if the limit is exceeded the card will be blocked. Fig 2 shows the algorithm of how the student card will be used initially.

(b.) RECHARGE SMARTCARD

The Recharge Station (i.e. office admin of the college) is used to add money into the account of the card. A limit is created so that a card may not he abused. To start the application the cardholder is required to scan their card. The cardholder then specifies the amount to be inserted if the new balance exceeds the limit, the maximum value an error is prompted else the value will be added. It comes under the Admin Login module.

(c.) STATIONARY/CANTEEN PAYMENT

The student card will not only be used for identification but will be used for payments to the shops present in the college campus. All the transactions takes place electronically [5], therefore it promotes the digital economy and help in making our society cashless. Shop is basically a module present in the interface that will be used in stationary shops and college canteen. The structure is simple all the products being bought must be entered firstly then it will calculate the total and asks the customer to scan their card. The application will firstly check the balance of the card if there is insufficient funds an error is prompted else the total will be deducted from the card. They are having their separate modules named as Stationary Login and Canteen Login.

(d.) DOCUMENT UPLOAD

This module is used for uploading various important documents such as DMC, Migration Certificate etc. Through this, we need not to carry our important document physically every time in our hand. On the server it will be safe and whenever we will have need, we can access it easily. It comes under the Student Login module.

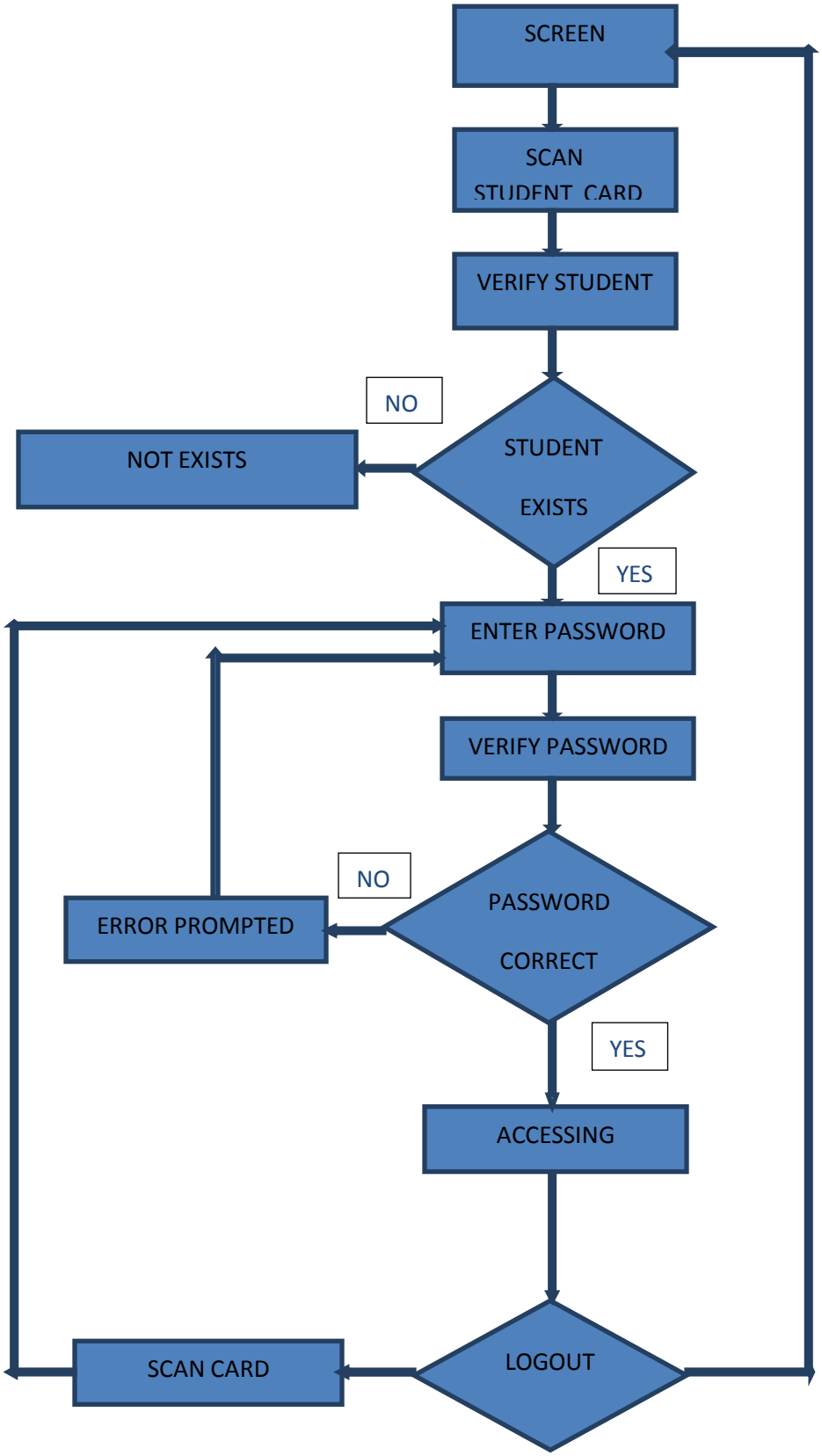

Fig. 2. Flow chart for Login Application

V. CONCLUSION

The implementation is just the beginning of what could be achieved with smart cards. Student smart card can be use to ease the work of students. This card can be refilled as and when required by the student with the help of office admin. This card is useful for the student in places like library, canteen and stationary shops etc. When the card is scanned then, the unique id is stored and accordingly transaction or process will perform. Cash is deducted from the student's account. This card can be used to submit important documents that will be needed by the student for any of its work. This is done by scanning the unique id stored in the card which is sent to the server where the student's document is stored and is directly sent from the server wherever needed. Thus the user doesn't have to carry its documents always. The student can use this card in library to pay fine and the amount of fine will be calculated depending on the information stored which is retrieved with the help of an ID stored in the card. Same way in case of stationary shop where the cash amount is deducted from the student's account and same way in case of canteen. Thus the student just needs to carry the portable card. This card is very beneficial for a student and makes many of its work easy. Smart cards will improve security in general, efficiency caused by a cashless society, data consistency and functionality of the student card. Through the applications we can see how versatile, practical and usable smart cards are and how they can improve the environment. Education is just one sector where smart cards can be adopted others can also take on the adoption to improve their functionality and usability.

REFERENCES

[1] S.Omar, "*Multi-Purpose Student Card System Using Smart Card Technology*", *IEEE,* H**.** Djuhari The University of New South Wales UNSW, Sydney, NSW 2052, Australia

[2] Hamed Taherdoost, Mazdak Zamani, Meysam Namayandeh, "*Study of Smart Card Technology and Probe User Awareness about It: A Case Study of Middle Eastern Students*", 978-1-4244-4520-2/09, 2009 IEEE

[3] Nam-Yih Lee, "*Integrating Access Control with User Authentication Using Smart Cards*", IEEE Transactions on Consumer Electronics, Vol46, No. 4, November 2000

[4] Abdulrahman A. Mirza, Khlaid Alghathbar, "*Acceptance and Applications of Smart Cards Technology in University Setting",* 2009 Eighth IEEE International Conference on Dependable, Autonomic and Secure Computing

[5] D.C. Fowler, P.M.C. Swatman, and J. Welikala "*Issues Affecting the Implementation of Multiple Application Smart Card Systems*", - 4th Collector Conference on Electronic Commerce, Breckenridge, Colorado, USA, April, 2000.

[6] Jean-Louis Lanet, "*Attacks against Smart Cards: Hands On Session*", 2012 7th International Conference on Risks and Security of Internet and Systems (Crisis)

[7] Carol Hovenga Fancher, "*In Your Pocket: Smart Cards*", IEEE Spectrum, February 1997

