Student Smart Card Technology

Abhishek Singh[1], Ashish Chopra[2], Mohammad Imran[3],Rahul Singh[4]
[1, 2, 3, 4] Dept of Computer Application
[1, 2, 3, 4]National Institute of Technology Kurukshetra, India

Abstract- *Digitization is the process of converting information into a digital (i.e. computer-readable) format, in which the information is organized into bits. The economy that is based on digital computing technologies is known as Digital Economy. Now a days, in most of the countries, we can see inside the people's wallet, they normally have a couple of credit cards, an identification card, automatic teller machine cards (ATM card) and maybe a few other plastic cards. These plastic cards have become an essential part of their life. Currently smart cards can be seen in the marketting, transportation and telecommunication sectors. In this paper we are providing the combination of digitization and digital economy and aim to propose student smart card technology that will be used for higher educational institutes. Smart cards technology improve the convenience and security of any transaction. We will use Bar coded Smart card for this 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

Smart cards can be used for different purposes in every stage in our society like "Smart cards can be used for a wide variety of general purposes, e.g. authentication, data storage and data processing. There are many specific applications of the generic functions within particular industry sectors such as financial services and health insurance''. Malaysia is the first country in the world to introduce a multipurpose smart card known as MyKad or Malaysian Card that is used as ID (Identification) and DL (Driving License). 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. The idea of smart card is widely used in different educational sector for multipurpose reasons. The University sector is one important field which has been active in pursuing multifunctional cards because of the number of factors involved in managing students life. 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 Smart 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. 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

Barcoded Smart card is a unique card that is assigned to the user and is capable of storing data which can be either value or alphaebet or both. A barcode is an optical, machine-readable, representation of data the data usually describes something about the object that carries the barcode. Barcode is a series of alternating wide and narrow strips that can be read by an optical scanner. It is an automatic identification technology. Barcodes are the most common type of encoding, a feature available in almost all ID card software. They are quick and affordable to print because they do not require special ribbons, cards, encoding modules, or advanced software. Barcodes work by creating a pattern of black and white areas (the lines, and the spaces between them), which

can be scanned and read to decode the data. Unlike magnetic stripe encoding or smart code encoding, the data stored in barcodes is static and can't be re-written. There are many different types of barcodes, the most common is the Code 39. 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. 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).

Types of Barcodes

When adding barcodes to our cards, there are two general types we can choose from:

- 1D barcodes (one dimensional) are a series of vertical lines and spaces
- 2D barcodes (2 dimensional) are more complex and can store more information

1D barcodes can only be read in one direction, giving them limited space to store information. While there are many types of 1D barcodes, with varying limits on character length, 1D barcodes in general can only store small amounts of data like a member ID number or product number.

2D barcodes were created to hold more data, because their complex shapes are larger and can store information both vertically and horizontally. The most common type of 2D barcodes is a QR code, but there are several different types. These codes can hold 10 to 100 times more data than a 1D barcode, making them useful for storing more complex information such as a website page URL.

1D barcode encoding is found in almost all ID card software, including the most basic versions. 2D barcodes are sometimes included in more advanced versions.

Bar coded smart card is best because of the following 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. IMPORTANCE OF STUDY

If we look in our wallet and what do we 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 our 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]. With the help of smart card technology we can use only one card for all [4]. In an 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 be benefitial for the 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. PROPOSED MODEL

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 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 like stationary and canteen. Currently there are a few programming language that can be used to design the interface and application of student smart card system , they are:

- *Html with Css (Using Bootstrap)*
- *PHP*
- *Java Script*
- *MY SQL*
- *JQuery*

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, But in order to design an interactive interface we can use html with css for making an 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 SMART CARD

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.

(a.) 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.

V. DESIGN FLOW
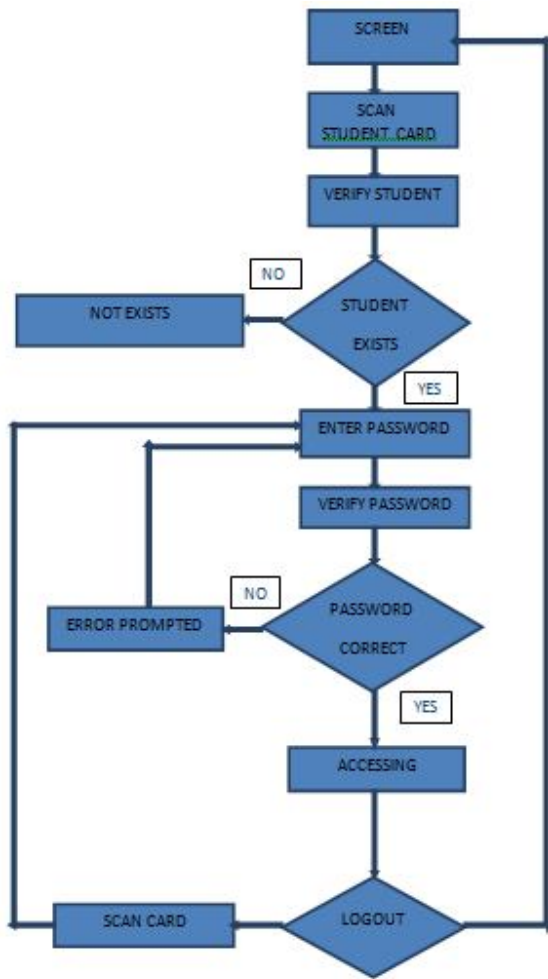
STUDENT CARD AUTHENTICATION

Fig. 2. Flow chart for Login Application
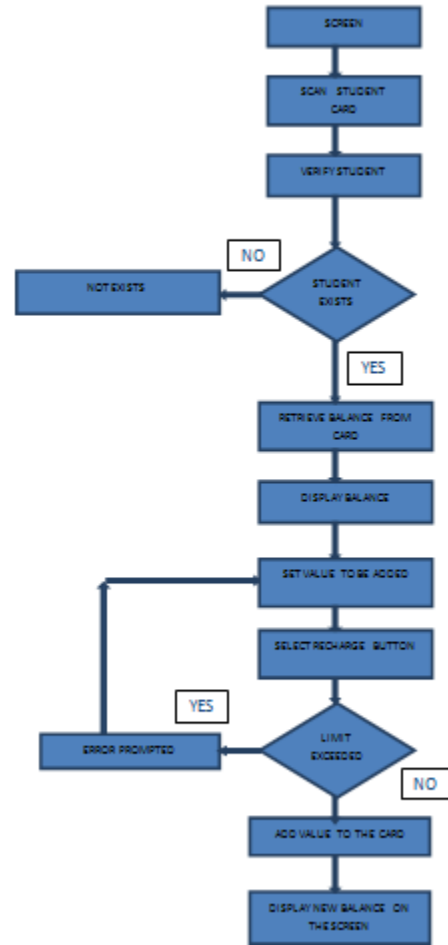
RECHARGE STUDENT CARD

Fig. 3. Flow chart for Recharge Application

IV. 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.

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