**DEVELOPMENT OF SMART PAYMENT SYSTEM**

**FOR USLS – IS CAFETERIA**

A Design Project Presented to

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**Introduction**

Technology is highly essential to the culture today. Even though its changes are fast-paced, the world looks for ways to cope with its evolution and apply it to solve everyday problems. Man has developed hardware devices, software applications and ways to communicate in order to suffice the needs and wants of society, making life easier and more comfortable. The society today wants products and services available anytime and anywhere – in short, have things on-the-go.

The market for children’s products and food is enormous. Parents on the one hand have a hard time raising children the way they want to, while on the other hand, kids are being increasingly influenced by commercialism that often goes against what parents are trying to do. (*Anup Shah, 2010*) Purchasing of food items in a school cafeteria is inevitable, especially for young students like the Lasallians from the University of St. La Salle – Integrated School. This is one reason why it is important for parents to monitor their children’s transactions.

**Background of the Study**

In the University of St. La Salle – Integrated School, the cafeteria is one of the most visited places by the students. Also, majority of purchases are done here. There is a large of number of sellers but the number of employees under one seller is low, thus, making transactions slower and more tedious. This also leads to congestion while buying food items.

Parents, in one hand, also face the problem of being unassured. Since they are not always around their children, they have no means of monitoring what their children are buying or whether the food they eat is safe.

This design project aims to use Radio-frequency Identification (RFID) in making cashless purchases from the cafeteria in the University of St. La Salle – Integrated School. It also makes use of Cloud Computing by keeping track of the vendor’s list of items that are available for buying, along with their prices, the number of purchases made by the students and the total revenue that they have accumulated throughout a certain period. This payment scheme also comes with an application which the parents can download in order to monitor the student’s transactions, see the available balance in the child’s account and control the child’s daily expenditure budget.

**Statement of the Problem**

The main goal of this design project is to monitor the budget of the student and regulate the food they purchase from the cafeteria of the University of St. La Salle – Integrated School. Aside from that, there are other supporting questions for the problem. These questions are as follows:

1. Will the Smart Payment System help in making transactions faster in the USLS-IS cafeteria?
2. What security measures are needed when buying the cafeteria?
3. Is it important to monitor the budget and the food that the student buys?
4. Will the USLS-IS Smart Payment System help in regulating the products sold in the cafeteria?

**Scope and Limitations**

This project is a payment system using Radio-frequency Identification (RFID) that is linked to the student’s Identification card. It is built with a cloud computing system where transactions and data storage are present. An app is provided to the parents so that they can track the things the students buy and limit the child's expenses during the day. The RFID can be loaded anytime via a kiosk machine. The loading machine does not dispense cash and is limited only for paper bills, therefore the exact amount must be deposited. If the RFID is lost, a temporary card, along with the student’s credit information, will be provided. The client is then obliged to return the temporary card as soon as the lost card is replaced.

Every store in the cafeteria has a list of all the products they sell. Product lists are then stored in the cloud, together with the number of purchased items, and monitored by the administrator. The administrator is the only person granted with access to the cloud. The vendors need to surrender to the administrator the product they want to sell and it will be added to the store’s product list in the cloud. The setup in the vendor side is a Barcode scanner, an NFC reader, PN532, and a computer that connects to the cloud.

The transaction method goes this way: first, the student picks a product to buy then the vendor will scan its barcode. The student will proceed to payment by tapping the RFID card on the NFC reader. After that, the transaction is sent to the cloud, the transaction of the student will reflect on the app given to the parents. The administrator monitors every transaction that is done in every store, including their daily income. Every week, the store can retrieve their liquidation reports from the administrator and claim their revenues. In redeeming the money, rents and other utilities are automatically deducted.

**Significance of the Study**

Having businesses in cafeterias filled with children has always been a hard thing to keep up with, especially to their parents, the vendors and as well as the school personnel. Kids tend to be rowdy and quite easy to be influenced, leading to a little inconvenience during transactions. This design project will be of good help to the following:

**To the parents.** The design project will provide a mobile application which the parents can download. In this app, they will be able to see the student’s transactions throughout the day, the daily expenses as well as the remaining balance under the student’s account. This way, the parent will be able to ensure that the student’s purchases are both safe to eat and within budget. Loading kiosks will also be provided so that the parents can reload their children’s account once in a while at their most convenient time.

**To the students.** Purchases will be easier for the students since all they have to do is to order from the vendor and tap to pay. Congestion will be lessened since there will be a decrease on the transaction time. The student does not have to worry about bringing their money because their ID will act as their e-wallet. Also, the possibility of being overcharged and receiving the wrong amount of change will be minimized since the exact amount will be deducted from the student’s account.

**To the vendors**. It has always been a struggle for some vendors to keep up with the amount of students that buys in their store. Some stores have only around 2 employees to accommodate more than 10 students buying. This may result to student congestion and prolongs each transaction time. The study will provide convenience for the vendors since their transaction times will decrease and therefore increase the amount of customers each employee can accommodate at a time. This is because the payment will be automated, with the use of RFID and products have registered barcodes. In every transaction, only the exact amount will be deducted from the students’ remaining balance. This way, there’s no need for the vendors to manually process the money through receiving the payment and returning the change. And since the student pays the exact amount, this can prevent vendors from overcharging the students.

**To the University of St. La Salle – Integrated School.** This project will also help regulate the food items that are being sold in the cafeteria. Since the products sold are registered with barcodes via the Administrator, products sold in the cafeteria can be regulated. Regulated product supply means regulated consumption. This way, the University can ensure the student’s welfare and lessen the amount of products that the students consume which are considered unhealthy.

Technology has been spreading around the world mostly for the purpose of automation. There are facilities and even universities that have implemented automated technology which makes the lives of the people more convenient. Our study aims to help our University to slowly step into Automation not only for convenience, but to introduce advanced systems and technologies to the new students of our University, which in return can make them interested in studying them as well.

**Definition of Terms**

Throughout the study, there are terms that are technical and might need explanations. For the purpose of this study, the following key terms are defined.

**Student.** This refers to a person who is currently enrolled in the University of St. La Salle – Integrated School.

**Parent.** This refers to the legal guardian of a student studying in the University of St. La Salle – Integrated School.

**Vendor.** This refers to the store, the store owners and the employees affiliated to the cafeteria within the University of St. La Salle – Integrated School.

**Radio-frequency Identification (RFID).** According to George Roussos, it is an umbrella term that refers to several information and communication technologies that share the capability to automatically identify objects, locations, and individuals to computing systems without any need for manual intervention.

**Cloud Computing.** Cloud computing refers to both the applications delivered as services over the internet and hardware and systems software in the data centers that provide those services. It is a network of remote servers hosted on the Internet and used to store, manage, and process data in place of local servers or personal computers.

**App.** Mobile Apps can come preloaded on the mobile device as well as can be downloaded by users from mobile App stores or the Internet. Moreover, mobile Apps usually help users by connecting them to Internet services more commonly accessed on desktop or notebook computer, or help them by making it easier to use the Internet on their portable devices. It is a software application downloaded on a device for personal use by a user.

Cloud Computing

https://www.usenix.org/legacy/event/sec11/tech/full\_papers/Mulazzani6-24-11.pdf

Mobile Application

http://www.ccsenet.org/journal/index.php/ijms/article/viewFile/24130/15737