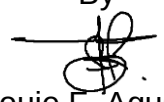
SELINUS UNIVERSITY
OF SCIENCES AND LITERATURE

Enhancing the Students' Monitoring System Using RFID Through Internet of Things (IoT)

I do hereby attest that I am the sole author of this Project / Thesis and that its contents are only the result of the readings and research I have done.

By



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ABSTRACT

Description of the Study

Radio Frequency Identification is the way in tracking the student's time – in and time out. With the help of the system RFID and the Internet of Things, the students monitoring will be easy to access; through the accuracy and reliability of the data, the system gives accurate information to the parents.

IOT describes the world where just about anything can be linked and interconnected intelligently. In other words, with the Internet of Things, the total environment is becoming one huge information system throughout the worl. Utilizing device that can capture student time-in and time-out through passive Radio frequency identification Technology and send messages through the SMS technology will be a real help knowing that the child is already inside the campus. The admin part of the system will manage the RFID registrations, administer the Parents' account creation, monitor the Time-in Time-out Data and generates a time-in time out reports. The registrar of the school will handle the SMS notifications of cancellation of classes while the Accounting will be in-charge to address the SMS notification of school payments. The project focuses only on monitoring Senior High School students.

The provided information through SMS applying the internet of things will create a very convenient method of communication through the maximized used of technology. Parents and students communicative process will now be a brilliant fashion of communication. With the used of the RFID students monitoring system, the time-in and time out of the students will be quickly sent to parents. The implementation of RFID and GSM technology will enhance the manipulation of modern technology world.

Reason in Fulfilling the Study

The reason in pushing this study was to prove that RFID and Internet of Things can go along with each other and that it can benefit different individual especially school administration, teachers and parents who has experience difficulty in tracking the progress and attendance of students.

Since message is a form of communication and originated with verbal gesture pertaining to language, the unique ability which has made possible that started the development of human civilization. With the etymological way of message, no matter how difficult it can be transported to people over a restricted distance - within a room or place of meeting, or across a short open space. The message reads only within reading range; its recipients must travel to accept it.

The structure is completely more well-organized and effective if it is the message which travels. SMS stands for Short Message Service. It is a technology that allows the transferring and accepting of messages between mobile phones. It was during early 1980's that adding of text messaging functionality to mobile devices began. Also it was in December 1982 when the first action plan of the CEPT Group GSM was approved. It was then that the SMS theory was established in the Franco-German GSM cooperation in 1984 by Friedhelm Hillebrand and Bernard Ghillebaert. (Namrata A. Kale, S.M. Karande (November 2014) International Journal of Advance Research in Computer Science and Management Studies; Volume 2, Issue 11,)

Lack of enrolment system in schools can lead to pandemonium and difficulties as stated by Ace Adrain (2011). The school use data scheme or procedure in the way to make the enrolment system in the school easier to the students; and also to the management itself. Enrolment process should be cleared and organized; the transformation of the modern technology should be applied in every institution. Ezhrihm Cradan, (November 9, 2013)

Another thing the enrollment process is a difficult problem every institution has faced. To achieve and improve the process a solution must be discovered and should have a solution on it. Based on the study conducted by Mentonen (2010), she found out that making a data base on enrollment process will ease

the problem. This will give the management and school admin on how to manage the enrollment process.

The Research Results and Expectations

The research results and expectations will provide easier task in the part of the school admin and teachers in providing students' information to the parents; the easiest way that in just seconds' information will be disseminated via SMS. The modernization of the messages brought the generation into the different world of communication. People can easily access to various places in the world with just a short period, unlike before that the travel of messages took time before it reaches the destinations. The use of RFID today is mainly used to improve internal efficiencies. The radar systems have evolved and today's hottest supply chains use RFID technology. Vasilia P. Peppa & Socrates J. Moschuris, (2013). Volume 15, Number 1.

Nowadays, that modern technology is overcoming the generation, SMS have different ways and forms to detect and identify the whereabouts of the individual, it is now associated with RFID as what is stated, is a universal or general term for experts and technologies that use radio waves to repeatedly recognize people or objects.

It is expected that the results of the study will be useful to the benifitted school and will be benchmark to other neighbouring school as best practice in tracking the students attendance and progress the easiest and quick way.

The Research Usability

It can be recommended to other researcher for future reference and to other school to use and adopt. It will evaluate the five characteristics that describe software quality:

(1) Functionality- The software features will be checked if they are all working correctly.

(2) Reliability- The software's fault tolerance and recoverability are high; it will not crash.

(3) Usability- The application can easily be understood and navigated by the end-users. The design and images to be used are easy to recognize.

(4) Efficiency- The system responds precisely and efficiently to the commands. It uses resources such as memory, the CPU, and the network.

(5) Maintainability- The software is easy to maintain, and it is stable.

(6) Portability- The software can be used and run in different web browsers' versions and screen resolutions. It does not require vital programs that are hard to install.

ACKNOWLEDMENT

I am grateful to Almighty God for being so faithful through the duration of this endeavor; and to my family who supported me all the way, thank you for the love and understanding.

DEDICATION

I dedicate this project / thesis to God Almighty my strong pillar, my creator, my savior, my foundation of encouragement, wisdom, knowledge, and understanding. He has been the basis of my fortress throughout this program and on His wings only have I glided high. I also bestow this work to my wife; Liberty Agustin who has cheered and motivated me all the way and whose encouragement have made sure that I give it all it takes to finish that which I have started. To my children Liberlois, Lois Teasdale and Lois Jane who have been affected in every way possible by this journey; my source of inspiration and joy. Thank you. My love for you all is immeasurable. God bless.

CHAPTER 1

1.1 INTRODUCTION

The welfare and interest of all the students is the number one concern of the school management. Once the students have entered in the school premises, the school has all the responsibilities and liabilities on the student's safety and parents as stakeholders have all the rights to question the school administration regarding the progress, status and safety of their children. Nowadays, every school has their own way of communicating on their stakeholders (parents) in providing reports and information on the student's status as to attendance, performance, school billings and other school records. The use of Radio Frequency Identification or the RFID is now in demand in tracking the student's records and information which can be accessed directly to inform parents. The information being sent to parents are secured and private, no information can be leaked to other users. According to Choi, Sung Hee (2015), RFID, Radio Frequency Identification, is one of the advantageous documentation technologies, which tests or reviews the individuality or distinctiveness of a person or an object without uninterrupted contact using radio waves and keeps track of the data on the object with an RFID tag in real-time. It provides and enables a more accurate data and information the easiest way. The monitoring process on tracking the students information to parents is through sending

emails, short message service (SMS) and through the web application, it will be done through the application of Internet of Things (IoT), this can be defined as a way of joining and linking everyday objects like smart-phones, Internet TVs, sensors and actuators to the World Wide Web where the devices are cleverly interconnected together allowing new forms of communication amongst things and people, and concerning things themselves. It is an organizational structure that interconnects computing devices, mechanical and digital machines, objects, animals or people that have unique identifiers and the capacity to convey data over a network without wanting them or human-to-computer interaction.

This concept is in consonance to the IOT which describes the world where just about anything can be linked and coupled logically. In other words, with the Internet of Things, the total physical environment is becoming one great and vast information system, because these IOTs as a calculating model defines a world where physical objects are to be found every day will be attached and associated to the Internet and be able to recognize themselves to other devices. The word is generally synonymous with RFID as the communication platform, though other tracker technologies, wireless technologies, or QR codes may also be included.

Today, teachers as the foot soldiers in the four corners of the classroom are facing a very crucial teaching-learning process because of the huge number of students enrolled, where each classroom ranges from 50 to 60 students,

arranged heterogenous; checking them one by one consumed too much time and less time are being left for the teaching learning process. The traditional way of calling names will prevent the teacher from beginning the lesson; announcements and reminders will also eat the time for class discussion, so the left time for learning will not be enough for the learners to catch the lesson proper. It will cause disruption of classes. Many of the school management have difficulties in monitoring the students' time-in and time-out, cancellation of classes, and even payments details due to its traditional way of putting records of lists this will impact on the learners progress and performance.

Therefore, the move towards to more advanced information dissemination and smarter way of communication is through the internet of things. In order for the teachers and school management effectively track the learners, each school needs to develop a project that will utilize the technology of RFID and SMS that provides information processing and resources of data to computers and other devices on demand. Thus, the researcher has come up with this study.

It is with these insights and concepts that the researcher would like to enhance the Students' Monitoring System Using RFID through Internet of Things (IoT) in the selected private schools in the Schools Division of Binan City, Laguna (Philippines) preferably TRIMEX Colleges - Senior High School Department in

order to contribute to a quicker and easier way of tracking student's progress and records in the school environment.

1.2 Background of the Study

TRIMEX Computer School (Biñan) started as a Datamex Computer franchise in February 1994 to serve as a reputable technical vocational training center in the area of CALABARZON. It is the contribution of Laguna to the rapid industrialization movement.

In June 1994, Ms. Fleurdeliz A. Constantino, the founder of TRIMEX, spearheaded the operations of Ms. Rachel C. Cruz with the passion to reach out and make a difference through education. Operation consists of five (5) separate departments, namely the Administration, the Registrar, Accounting, Information Technology and the Secretariat. The school began accepting students on a monthly basis and offered the following courses: two-year hardware technology; two-year software technology; two-year secretarial training. A total of seventy-four (74) students enrolled between June and August.

Currently, Trimex Colleges, with a total population of 2,600 students in the academic year 2019-2020, specializes in providing education not only in the field

of technical vocational education but also in the Bachelor's degree programs and the Senior High School Tract.

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Figures 1.0 Trimex Colleges

The growing number of student population in the school provided a slow movement in the administration side especially in tracking the students status.

Parents, as one big stakeholders are counting on the teachers' perpective in providing them the best and easy information of their children's whereabouts. But due to its huge number of population, the administration neglected to inform the parents directly, as a result, parents got disappointed since they were also busy on their works and cannot go and visit the school administration or teachers personnaly.

It is with great passion and positive intention of the researcher to fulfill his study in order to lessen the work load of the teachers and the school admin. Tracking the students attendance (in and out) and other information through the manipulation of the modern technologies will directly inform the parents regarding their children attendance and other information with regards to their school performance and responsibilities.

The researcher is certain and expecting that the results will be benifitted to the school, to the students, teachers, parents and even other researchers who will conduct the same study. The usability of the project will be the best practice of the school.

1.3 Objectives of the Study

The main purpose of this study is to inform the parents through SMS, emails and web application regarding monitoring of the students time-in and time-out, Specifically, the study endeavors to answer the following:

1. To utilize a device that can capture student's time-in and time-out through passive Radio frequency identification Technology.
2. To design an application that will notify users via Short Message Service Technology and email on the following.
    a. Class cancellation,
    b. Student time-in and time-Out, and
    c. Payment notification based on payment selected scheme or tuition fee amount
3. To generate monitoring reports through such as:
    a. Student Time-in and time –out, and
    b. SMS Messages History

1.3 Significance of the Study

The program designed on Enhancing Students' Monitoring System Using RFID through Internet of Things (IoT) will be beneficial to the following:

Students: The students will be issued an RFID card to be used upon entrance on the school premise, once tap on the RFID device which is installed at the gate entrance, their record of time in will be sent to their parents' mobile phone. This will help the students to be more aware on their school records of attendance, and they will be more equipped with the use of modern technology.

Teachers: The teachers will have an accurate record of student's attendance upon print out of records from RFID

School Administration: School records will be more intact, a quicker and easy access in tracking students records.

Parents: The parents will not need to travel to school to know the records of their children's attendance since notification will be sent on their smart phone once the student has enter the school via RFID.

Future Researchers: To the future researchers, this program designed software and hardware will serve as an effective tool and reference who would intend to make any further relevant study particularly the RFID or the internet of things.

1.4 Scope and Delimitations

The researcher involves the broad range of the use of RFID and SMS system implementing the internet of things from which devices are intertwined, linked and designed altogether enabling new forms of communication and messages that access to inform and notify the things, incidences, and issues. The researcher was responsible for making the program for the institution.

The proposed project shall automatically generate information using the following modules:

- RFID Module
- SMS Module
- Time in and Time Out Module
- Administrator Web Module

- Parent Web Module
- Accounting and Registrar Module

System Boundary

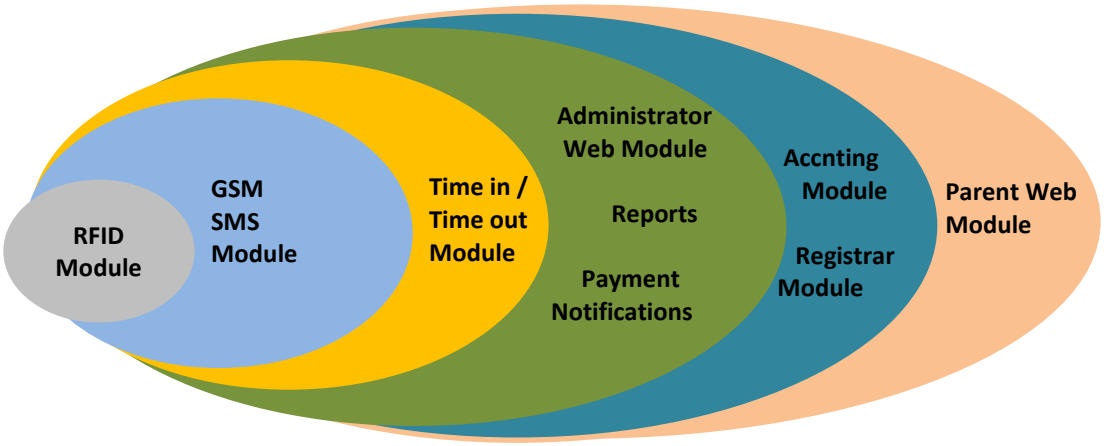


Figure 2.0 – System Boundary Using RFID

Figure 1 shows the system boundary of the RFID application that contains four modules which are the RFID Module, the SMS Module, Time in Time out Module and Administrator Web Module. The RFID Module is intended for the management of RFID card tapping. The SMS Module handle the sending of SMS to the parents, the Time in Time out Module records the time in and time out of the students upon entry on the school campus and the Administrator Web Module is for the Administrations of Student RFID Registrations, Student Reports Time in and Time out and the Payment Notifications.

CHAPTER 2

2.1 Review of Related Literature and Studies

Short Message Service (SMS)

A message or a response which is in a mode of communication that starts with words, text and vocabulary; the special skill that has made in the development of human civilization inevitable.. With language any type of communication, no matter how difficult, can be carried and transported to people over a limited expanse - within an area or place of gathering, or across a short open space. The message or information can be read only within reading range; its receivers must travel to have it. The process or model is altogether more organized if it is the message which travels. SMS stands for Short Message Service.

It is a technology that allows the transporting and receiving of messages between mobile phones. In early 1980's mobile devices began thru adding text messaging functionality and it was in December 1982 when the first action plan of the CEPT Group GSM was approved. The SMS idea was technologically established in the Franco-German GSM cooperation in 1984 by Friedhelm Hillebrand and Bernard Ghillebaert. (Namrata *A. Kale, S.M. Karande (November 2014*) *International Journal of Advance Research in Computer Science and Management Studies; Volume 2, Issue 11,)*

Texting or SMS (short message service) is a process or procedure of communication that transmits or spreads text to a mobile phone or from a Laptop or handheld. The shortened part is from the standard text response size: 160 letters (texts, figures, or logos in the Latin alphabet) Christine Erickson (Sept. 21, 2012).

There is an unlimited benefit to a ruler who can transfer or receive a message faster than his foes. In the approximation of the earliest time, the most efficient postal service is that of the Persians. In about 540 BC, to control his new empire, Cyrus put the the largest yet known kind of communication among the community. As time passed by, the communication process was then improved by Darius on his generation. The kind of messages during those times travels the full distance of the road in a maximum of ten days, at a speed of about 200 miles a day. Until transformation and innovation arrived in early 1980's, the adding of text messaging functionality to mobile devices began. The first action plan which was approved in December 1982 was a requested services and facilities accessible to the public and was conducted by the CEPT Group GSM, it substituted and converted telephone networks and public data networks to be available in the mobile system.

The key knowledge for SMS was to practice this telephone-optimized system and to convey messages on the signaling routes desirable to control the

telephone traffic during periods when no indicating traffic existed. In this way, unused resources in the system could be used to transfer messages at minimal cost.

In 1992, the first text message was sent although it had to be from a PC because it was the following year before Nokia presented the first SMS-enabled phone. In 1997 the Finnish company produced the 9000i Communicator, the first mobile phone to feature a full keyboard. Ian Barker (July 16, 2015).

It was engineer Neil Papworth who sent the first SMS communication to Richard Jarvis of Vodafone. It simply read "Merry Christmas," and Jarvis had no idea or way of replying. The first ever commercial SMS was launched in Sweden through Telia. In 1993, the impression of sending short messages via mobile phone only became a focus for telecoms companies in UK. Chris Gayomali. (December 2012).

In 1994, most companies capitalizing heavily in pagers, but consumers' interest for texts, which did not involve the intermediary of an operator, meant a change of tack from the mid-1990s onwards. As the modern world of technology arises, the medium increased prompt admiration among students, who soon began shortening words into "texts speak." Mobile phones now had number pads

with letters on them as part of digital GSM product qualifications so that people could enter names in their phonebooks. Jennifer O'Mahony, (December 2012).

SMS could be implemented in every mobile station by updating its software. Hence, a huge base of SMS-capable terminals and networks occurred when people began to use SMS. A different linkage system element required was a specified short message service center, and developments and improvements were essential to the radio power and system connectivity framework for rising SMS traffic. The text message has become such an important part of our up-to-date lives that it is hard to consider that the perception behind dates back 31 years. Email to SMS doorway service Neon SMS has created an info graphic tracking how SMS has developed and grown rapidly that is easily been accepted in the society. Borisloukanov, (July 22, 2015)

Today, SMS is the most widely-used data application in the world, with 81% of mobile phone subscribers using it. Moreover, SMS has become more than just a way to text with friends — it also lets us receive updates and alerts, keep track of our finances, send email, and much more. Sierra Middleton, (Feb.17, 2016)

RFID - Radio-Frequency Identification

It all started decades ago. In 1930's during the World War II, when radars or locators were established, it was the military aviation who organized the technology in larger scale. They used this in tracking the signals and whereabouts of their opponents. Also, in 1948, Harry Stockman, set the backscattering radios with the used of communication in reflected power which was predominantly used to recognize friendly aircraft by controlling backscattered radar signal. The millitary way of communicating was maximized through this method or technology which was first used to monitor cows that were on medication, but the usage soon expanded. These applications utilized low frequencies at around 125 kHz that suitably allowed small tag size. On the commercial side, Texas Instruments launched the TIRIS system that is still in use today. Juho Partanen, (February 2015)

During the World War II, between the years of 1935, a Scottish physicist Sir Robert Alexander Watson-Wat learned that the messages were observed through radar; it was anticipated to be the roots of radio frequency identification technology that can be drawn back to warn of approaching planes while they were still miles away. It was also in 1935 that radar have been discovered by Germans, Japanese, Americans, and British people. Germans found that it would modify the radio signal echoed back if pilots rotated their aircraft when they went back to base. This logical approach warned the tracker crew on the surface that

they were German aircraft rather than Allied aircraft (the first passive RFID device, essentially).

A gesture or sign is directed to a transponder, which stirs up and either returns back a signal (passive system) or broadcasts a signal (active system). Herman Casier, Michiel Steyaert, Arthur H.M. van Roermund – (2011) - Technology & Engineering

On January 23, 1973, it was Mario W. Cardullo's assertion that he obtained the first U.S. copyright for an active RFID tag with flash drives memory. A card with an integrated transmitter transmitted a message to a reader close to the entrance. Selwyn Piramuthu, Weibiao Zhou (2016)

The beginnings of RFID to form the communication were identifiable used during the past time even without the modern technology; as a matter of fact, the U.S. government was also working on RFID systems. It was in the mid 1980's when the system was commercialized through the effort of the Los Alamos scientists who driven on the project and left it to form a company to improve automated toll payment systems. And these have become widely used on roads, bridges, and tunnels around the world. James C. Jones and Christopher A. Chung (April 19, 2016)

RFID technology has been applied for many years in transport, access control cards, event ticketing and logistics for goods distribution. More recently, it was also implemented in government identity cards and passports and extensively applied in manufacturing, tracking of people and mobile objects, and positioning. RFID applications today are expanding to include wider and wider areas such as emergency, health, safety, security, and convenience, entertainment, traveling, shopping and asset tracking. Governments, enterprises, research institutes and consumers are all involved in the diverse RFID applications and playing different roles according to their specific purposes. Yuntian Brian Bai, Suqin Wu, Hongren Wu, Kefei Zhang (Dec. 12, 2012).

The implementation of RFID is through the use of radio waves by means of information dissimination between a unique item and a system. It is consisting of a RFID reader, tags (chips), and at least one antenna. The RFID system can be both active or passive. Active RFID tags comprises of a battery and it periodically transfer information with much greater range than passive tags. Once the tag is power-driven, it responds by conveying its unique powered by electromagnetic induction via the RFID reader. James Thrasher, (April 29, 2013)

Nowadays, a general term for modern technologies is overcoming the generation that use radio waves to automatically recognize people or objects, SMS have different ways and forms to detect and identify the whereabouts of the

individual, it is now associated with RFID as what is stated, is. There are various ways or measures to identify, but the most common is to store a serial number that classifies a person or entity, and probably other details, on a microchip connected to an antenna (the chip and the antenna together are called antenna). (the chip and the antenna together are called a RFID transponder or a RFID tag). The antenna helps the chip to forward a reader with the identity content. The reader translates the radio waves and mirrored back from the RFID tag into digital information that can be used and distributed to computers.

The modernization of the messages brought the generation into the different world of communication. People can easily access to various places in the world with just a short period, unlike before that the travel of messages took time before it reaches the destinations. The use of RFID today is mainly used to improve internal efficiencies. The radar systems have evolved and today's hottest supply chains use RFID technology. Vasilia P. Peppa & Socrates J. Moschuris, (2013). Volume 15, Number 1.

RFID is indeed a high technology to track products and people. They are very beneficial These RFID tags have the information on the products that can be accessed and read easily. These devices also help in reducing man-force, human errors and saves time spent in checking products. By using this

technology for communication and transportation, the Army can fix the problem in a faster way. Nidhiam (December 13, 2013).

IoT - Internet of Things

Through the thorough analysis and experimentation of the technical analyst, the Internet of Things became possible in expecting that radio-frequency identification (RFID) would soon change the world because of the modern day devices in connecting people. While RFID eventually became a useful tool in retail, logistics, healthcare and a handful of other enterprise sectors, the technology largely prowled in the mistiness of darkness while other truly became a transformative ideas and perceptions on technology based education, such as social media and streaming entertainment, seized the spotlight. Today, with RFID in second period of adoption, the technology's advocates are busily prepping for a second act. Like an aging actor who no longer finds himself in demand for leading man roles, RFID is now changing itself into a supporting player by becoming a significant part of the next gigantic thing—the Internet of Things (IoT). John Edwards (June 1, 2015)

It was 16 years ago when the Internet of Things was discovered. However, it was in 1970's that the idea of connecting to other devices had been practiced. It was Kevin Ashton in 1999 created the idea called "embedded internet" or "pervasive computing" during his service in Procter and Gamble. His

idea of attracting the management to an exciting technology of RFID worked in the optimization in supply chain. During that time internet was already boomed and made sense in the public he named his presentation Internet of Things. Knud Lasse Lueth (Dec. 19, 2014).

In 1999, the MIT Auto-ID Laboratory in Masachussets Institute of Technology created an IOT using RFID and Wireless Sensor Networks from which the IoT served as the basis for connecting things, sensors, actuators and other intelligent technologies allowed contact between people and objects. The connections have multiplied and created a whole dynamic link of networks. Yong Tze Lin, Tan Yong Xiang (May 23, 2015)

As the technology went by and evolved from the complex world of internet, the increasing sophistication of network and linkages of devices and machines have been embraced by the whole world in easing works and communication through the Fitbit internet connections activity that monitors home lightning systems to industrial machines and aircraft which continously grow bigger and wider. It was the Cisco Systems that estimates an approximately 12.1 billion Internet-connected devices used in April 2014, and that number is expected to increase to above 50 billion by 2020. The networking firm also records that about 100 things presently link to the Internet every second, and the number is

projected to reach 250 per second by 2020. The development of the technology will likely be faster than the Internet. Samuel Greenguard (Sept. 24, 2014)

The IoT is a forceful and vital needs in the whole world, and the technology is likely to improve quicker than the parameter of the in a real sense that is moving forward and working it out as it goes. This means that the growing accessibility of high-quality data collected and transferred in real-time through cheap, pervasive hardware and networks will undeniably lead to scientific, technical, and commercial innovation. Jeremy Crump (Feb. 14, 2014)

There are approximately billion sites on the Internet connect web sites and workstations resulted to a large denomination that has delivered from which Internet have transformed into how people converse and work together. It also accompanied in a new era of free information for everyone, changing life in any means that were hard to visualize in its early stages. However, the next wave of the Internet is not about people, it is about intelligent and connected devices. Stan Schneider (Oct. 9, 2013).

Today, many of the queries regarding rapid transmit of messaging, and obstacles to the internet world were satisfied. It would be unpredictable of when would be replaced, repaired or recalled whether they are different from the past. Everyone is empowered in gathering information through the extent of computers

manipulation that will see, ear or smell what it wanted to convey to others as long as it benefits people. RFID and sensor technology allow computers to detect and discern identify and understand the world—without the limitations of human-entered data. Lopez, (November 2013).

Enrollment Process

The enrollment process is a difficult problem every institution has faced. To achieve and improve the process a solution must be discovered and should have a solution on it. Based on the study conducted by Mentonen (2010), she found out that making a data base on enrollment process will ease the problem. This will give the management and school admin on how to manage the enrollment process.

Absence of enrollment system in schools can lead to disorder and dilemmas as stated by Ace Adrain (2011). The school use data scheme or procedure in the way to make the enrollment system in the school easier to the students; not only to the students but also to the management itself. Enrollment process should be cleared and organized; the transformation of the modern technology should be applied in every institution. Ezhrihm Cradan, (November 9, 2013)

The use of technology has been an effective tool in improving such kind of enrollment system. The development of enrollment process in every institution nowadays becomes easier; the information needed is easily accessed through the application of modern technology. The accesses to the students' information are determined by the management from attendance to grades and from the computation payments and tuitions. Rentaw123, (March 13, 2015)

School Policy Entering and Exiting of School

Sound school policy development plays an essential role as a violence prevention and control tool. By anticipating safety problems and actively addressing them, schools increase their ability to avoid or respond to a crisis. The existing rules and policies of the school that has been established and implemented will provide a firm foundation for a more inclusive school safety learning environment. Kirk A. Bailey, (September 2002).

Schools Policies and Legal Issues Supporting Safe Schools.

The back door is to be used for entry to the school by students only during instructional hours (8:45- 10:15, 10:30-12:15, 1:00-3:00). It is not to be used during noninstructional hours; i.e. before school, during recess/lunch recess or after school. The parent supervisors are the only individuals who can use the back door during noninstructional hours to set up/removing the cones in the parking lot.

Upon entering the school premises, volunteering parents and guests are required to report to the Administration Office to “Sign In”. This system was devised for the welfare of the students at every school. It is also a requirement that upon leaving the school grounds that all visitors “Sign Out”. In the case of an emergency and evacuations, it is important for the Administration to know how many extra people are on the campus.

2.2 Concept of the Study

Conceptual Framework

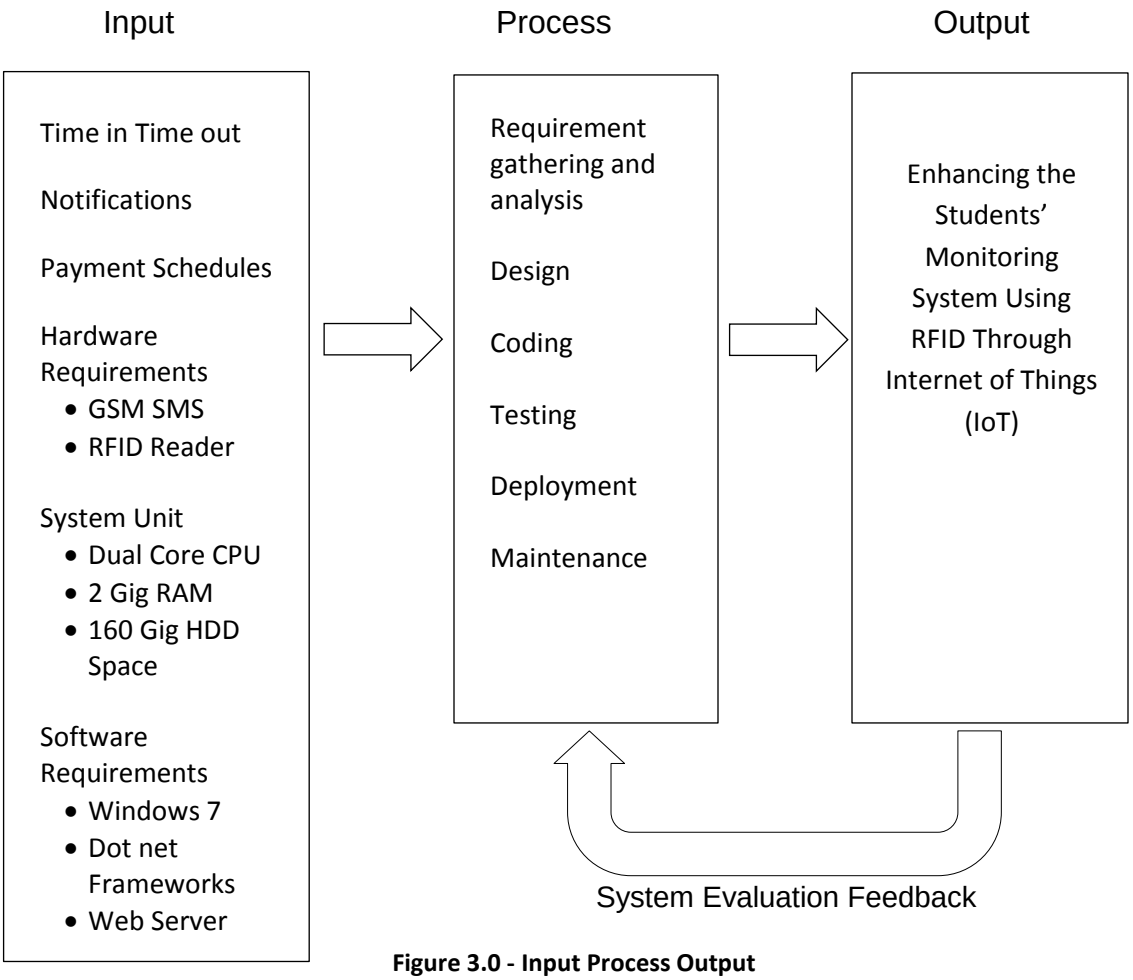


Figure 3.0 - Input Process Output

The Input Process Output of the diagram of the e-Notify: Student Service Monitoring Implementing IOT is shown in Figure 2. To conceptualize the idea of this project, the researcher makes use of the related studies and literature for further knowledge, reliability, consistency and proper functioning about the study.

2.3 Definition of Terms

Administrator is the one that can modify and enhance the learning and assessment module.

Accuracy The degree of correctness of which the results are produced.

Adaptability The competence of the software to acquaint to changes in its working environment.

Attractiveness is the technical know-how of the software product to be noticeable to the user.

Analyzability is the ability of the software product to be identified for insufficiencies or causes of disappointments in the software, or for the parts to be improved and to be recognized.

Availability The extent to which a system can continue to work when a significant component or set of components goes down.

Consistency Producing the same behavior every time.

Changeability It how the software product enable to change to a specific modification.

Cancellation the act or an instance of stopping or widrawing.

Deployment	This means that the product is capable to be used and applied in a real environment.
Functionality	An aspect of what a software application can do for a user.
GSM	Global System for Mobile, is the primary type of technology used for cell phones in the rest of the world.
Hardware	is the physical parts or components of a computer, such as a monitor, keyboard and another device such as RFID and GSM.
IOT	Internet of Things a proposed development of the Internet in which everyday objects have network connectivity, which allows to send and receive data.
Learn ability	It enable the user to learn the software product application.
Maintainability	It how the software product is capable of modification which may include corrections, improvements or adaptation of the software to changes in environment, requirements and functional specifications. There are sub-characteristics of the maintainability that is being used and applied:
Module	a separate unit or structure in the system that is combined in a program.
Operability	a structure that enables the user to operate and control the system.

Portability	A collection of attributes that bear on the ability of software to move from one location to another.
RFID	Radio-Frequency Identification (RFID) is the use of radio waves for reading and storing data recorded on an object linked tag. A tag can be perceived from a range of up to several miles, and must not be within the reader's direct line of sight.
Reliability	A collection of attributes that bear on the software's ability to sustain its performance level for a given time under defined conditions..
Security	Safety is the software product's ability to protect information and data in such a way that unauthorized user.
SMS	stands for SMS and is often generally referred to as a "text message."**SMS** stands for Short Message Service and is also commonly referred to as a "text message."
Stability	Stability is the software product's ability to prevent unanticipated effects from program modifications
Time-in	a period of time recorded when you enter the school premises.

Time-out a period of time recorded when you exit the school premises.

Usability is the software product's capacity to be understood, experienced, used and appealing to the user when used under a specified condition.

Understandability is the software product's ability to allow the user to understand how the program to become acceptable, and whether it can be used for different duties and conditions of use.

PHPMyAdmin. It is a free and open source application written in PHP designed to manage MySQL administration using a web browser, which can execute various tasks such as building, updating or deleting databases, tables, fields or rows; executing SQL statements; or managing users which permissions. MySQL: MySQL.

MySQL. Popular database option for use in web applications and is a central component of the commonly used LAMP open source software platform for web application. The acronym LAMP stands for "Unix, Apache, MySQL, Perl / PHP / Python. PHP Is PHP

PHP PHP Today stands for PHP: Hypertext Preprocessor(PHP) A server-side scripting language built for web creation but often used as a general purpose programming language and originally derived from Personal Home Page Tools.

CHAPTER 3
OPERATIONAL FRAMEWORK

3.1 Materials

3.1.1 Software

The proponent used the following software base in windows 7 Operating System. Mysql is used as the storage of all the data, browser such as Chrome, Mozilla and Internet Explorer is a tool used to see the output of the program, and for the Web Server, the Apache is more appropriate for the PHP coding.

3.1.2 Hardware

To develop the system, some hardware requirements are needed. A desktop or laptop with at least i3 processor is required with 2Gigabytes of RAM. A GSM is needed also for sending SMS the same with the RFID that will manage to capture the RFID cards.

3.1.3 Data

125Khz USB RFID Proximity Sensor Smart ID Card Reader is used that support EM4001, 4100, or its compatible RFID, ID card with a frequency of 125Khz. Power: DC 5V Reading distance: 5-8cm Interface:

USB. Size: 10.5cm x 7cm x 1.5cm (4.13inch x 2.76inch x 0.59inch) Weight: 90g. with USB Cable: 100g Color: Black

3.2 Methods

3.2.1 Developmental design

The proponent used developmental research method since the study focuses on designing, developing and evaluating instructional programs, processes, and products.

The researcher followed the System Development Life Cycles which has six (6) phases that play dynamic roles which define the task to be completed at each step in the software development process.

Figure 2 illustrates the steps carried out in the SDLC model. These steps are listed below.

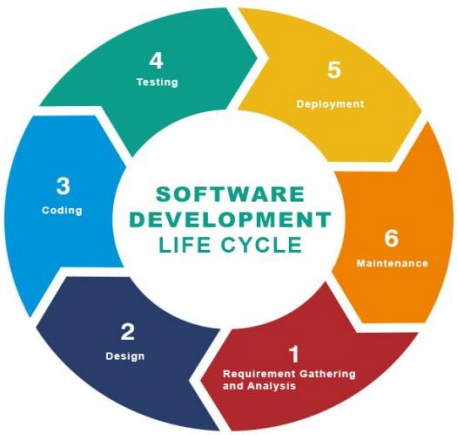


Figure 4.0 - SDLC Model

3.2.2 Procedure for the different phases

Requirement Gathering and Analysis Phase

The researcher gathered data from an interview, Ms. Winefreda Miranda, as the School Administrator of TRIMEX Colleges-Senior High School Department, other stakeholders and users were also interviewed to determine the requirements such as: Who will be the users of the system? How will they use the system? What are the data to be used as an input into the system? What will be the output by the system? These are general queries that were addressed during gathering phase requirements. The researcher defined the requirements as to software and hardware technology.

Table 1 Interview Questionnaire

INTERVIEW QUESTION	ANSWER
1. How do you track student's time in and time out of school?	
2. How fast do information of time in and time out of students disseminated to the parents?	
3. Some students are asking money from their parents regarding school expenses which are not true, as the school administrator, how do you deal with this problem especially when parents asked about it?	
4. What system do you use or apply in tracking students' time in time out and payment scheme dissemination of information to the parents?	
5. Do you want an easy access to tracking your	

students' time in time out and payment scheme? Why?	

Design Phase

In the second stage**,** when requirements are already known, design for the system is created. It's not a comprehensive design it included just the system's important features, which gives the user an idea of the framework. The design will help in developing the system faster and better.

In table 2 and table 3, are hardware and software specifications of the proposed project.

Table 2 - Hardware Specifications

Item Name	Description
Desktop computers/ Laptop	At least i3 processor
Memory	2GB
Keyboard	USB, optical mouse
Mouse	USB, optical
Monitor	LED, at least 15'
Modem	GSM Modem
Reader	RFID Reader

Table 3 - Software Specifications

Item Name	Description
Operating System	Windows (7 or 8)
Web Server	Apache
Database Server	MySql
Browser	Chrome/Mozilla/IE

Design of the Study

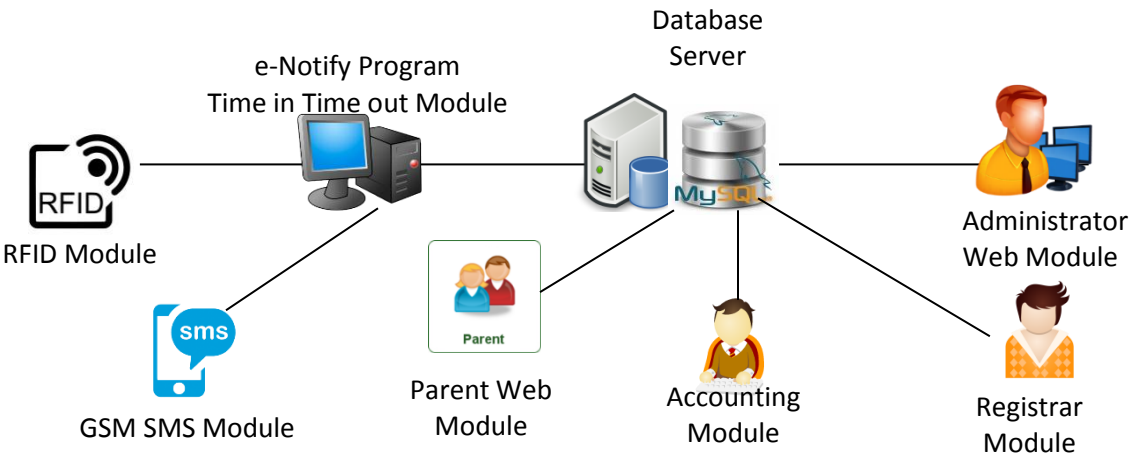


Figure 5.0 System Architecture

The figure above shows the different components of the RFID via IoT. There will be users like the Administrator, who administer users account and reports, accounting who will manage the sending of SMS for payment advisories, Registrar who will administer the cancellation of classes, the parent module will

handle the inquiries of their children time-in time-out records. SMS module handles all the SMS notifications, and the RFID modules handle the validity of the identifications cards.

Network Design Infrastructure

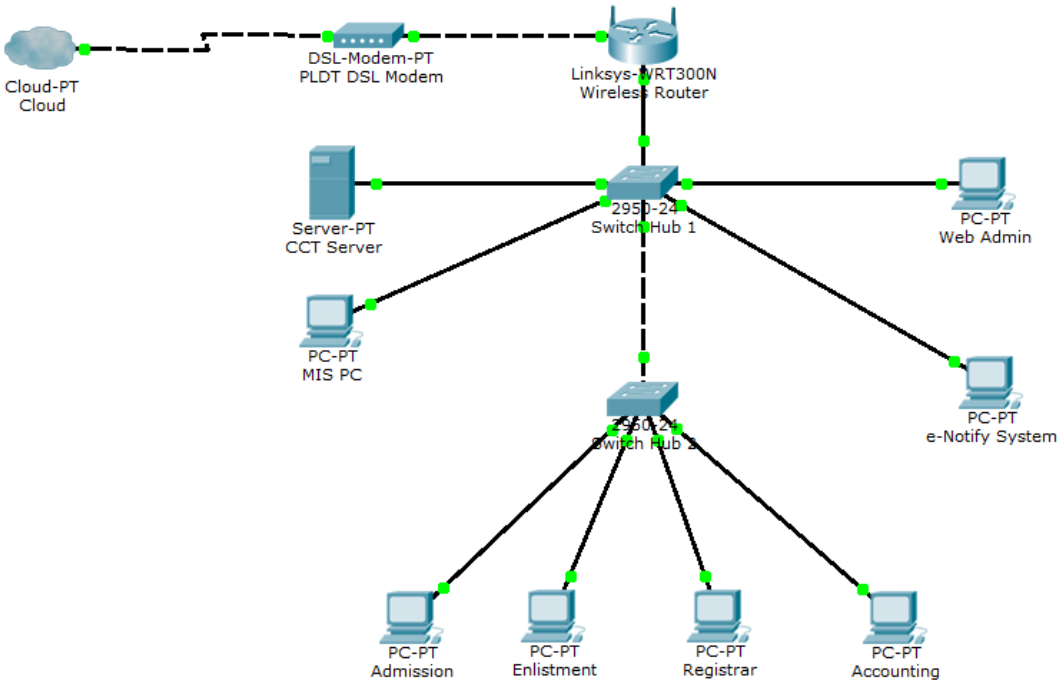


Figure 6.0 Network Design Infrastructure

The figure above shows the network connectivity of each department. There is only one server that caters all the system of the school such as enrollment system and grading system. This server will also cater the RFID device system which will be used for monitoring the time-in and time-out of the students. Most of the employees of the TRIMEX Colleges in Biñan use Google

Chrome and Mozilla Firefox as their Windows 7, Windows XP and Windows 8 internet browsers. Dual Core System Units and I5 versions are most hardware components used.

Database Schema

This figure shows the database design of the proposed system. The database name is cctdb and is consists of 9 tables.

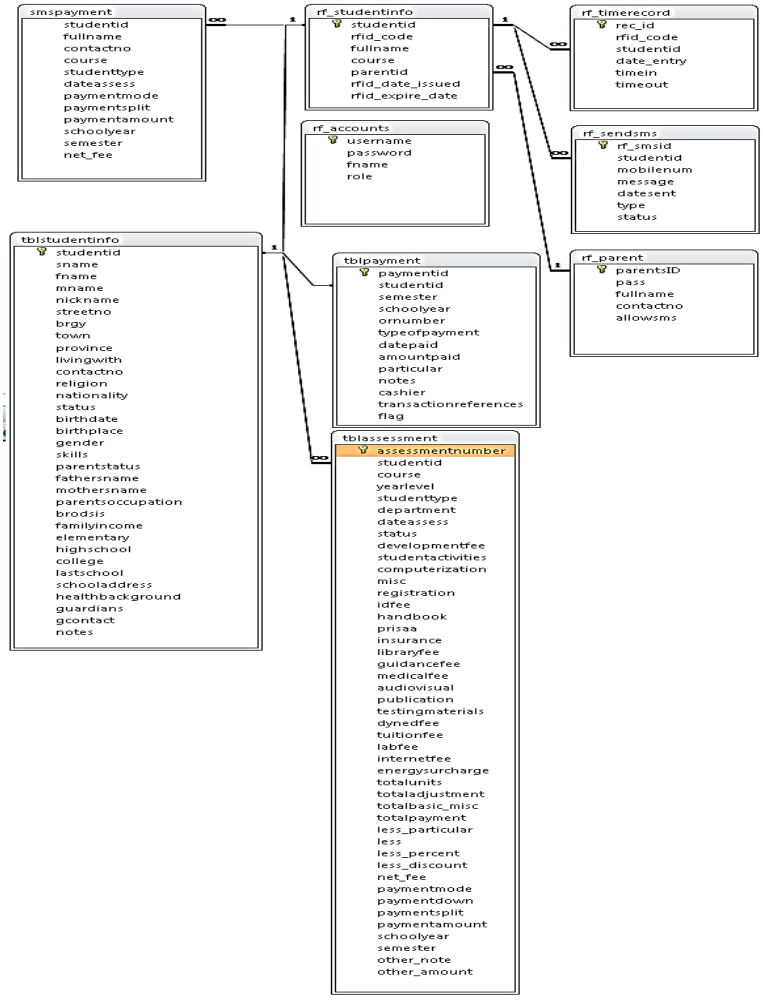


Figure 7.0 Database Schema

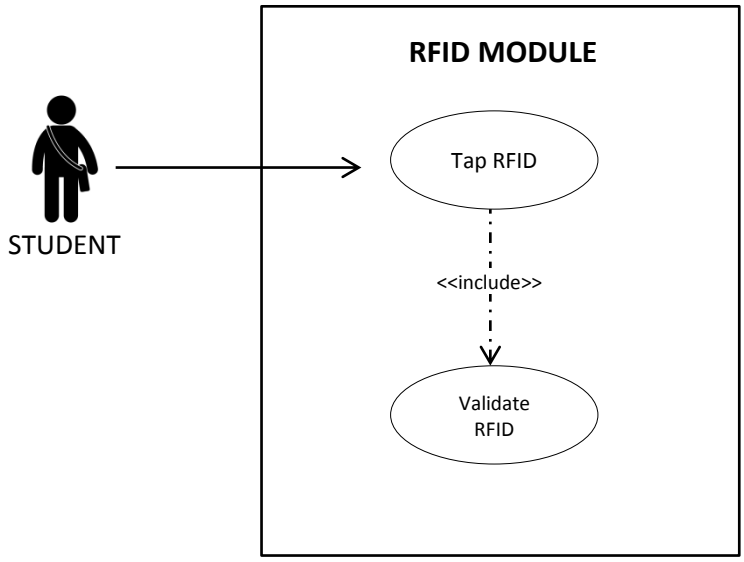


Figure 8 Use Case Diagram of RFID Module

Upon tapping the student's RFID, the machine will process and validate the tapped ID for confirmation whether the ID is registered or not on the RFID computer. The guard on duty should monitor and check the ID to be tapped by the student and see to it that the monitor displays the same picture on the ID and the bearer. The guard will also be responsible whenever possible if the student used a wrong ID and be immediately reported the incidents to the school administration. He will also be held liable for the wrong information declared in the RFID.

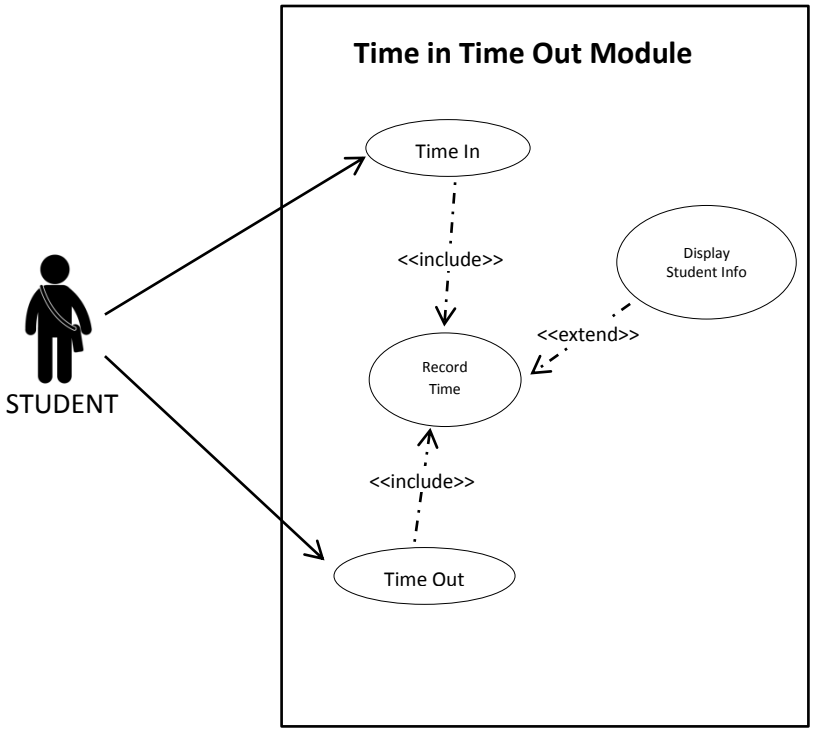


Figure 9 Use Case Diagram Time in Time out Module

After the RFID machine validated the students' ID, the system will record the time in and time out being recognized then displays the information of the ID owner. Upon the student's entry and tapped the RFID the time-in will be recorded to the database then it will send the SMS to the parents. To register the timeout, the student will again tap the RFID then the system will record the time-out then it will send SMS notification to the parents. So, in this figure, it showed and stated the records of students time-in and time- out stored in the database.

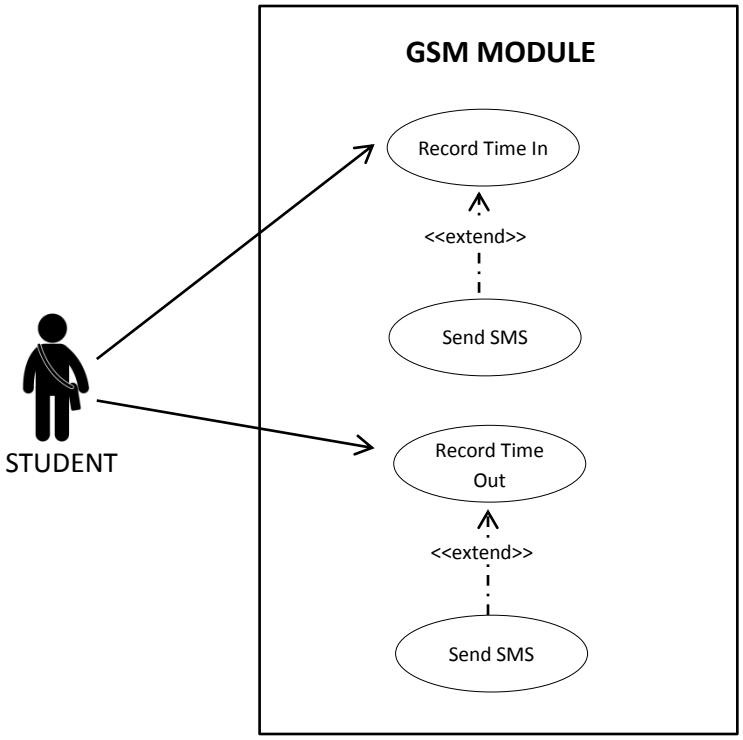


Figure 10 Use Case Diagram SMS Module

The figure 11 is the SMS Module responsible for sending SMS and notification. This module is held liable for sending time-in and time-out of the students, payment notification and class cancellation. So, when the student tapped his ID on the RFID reader, the machine will validate and record the time in and time out; it will then send a text message to the parents of the ID holder indicating the time-in or time-out of the students.

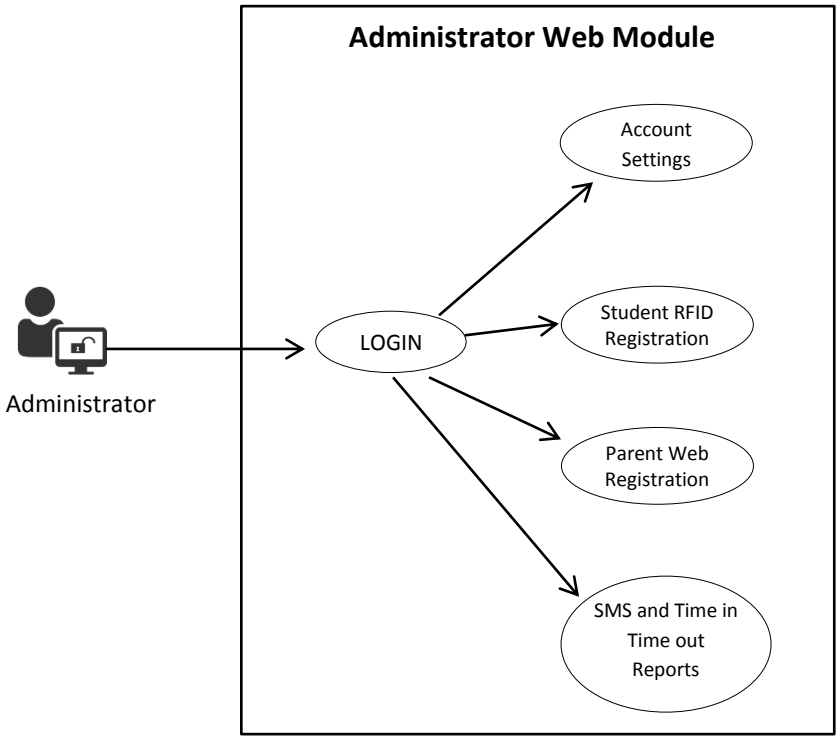


Figure 11 Use Case Diagram Administrator Web Module

The figure shows how the administrator can accept and register RFID, parent web account registrations and generate reports based on the time in and time out of the students and SMS History reports. Upon enrollment the student will go to the MIS department to get the RFID and fill out registration forms, the parent also is advice to accompany with the student for the parent account registrations. The admin can monitor the real time-in and time-out of the students. The admin can also add an account for the Registrar and accounting personnel who are responsible for sending SMS Payment notifications and cancellation of classes.

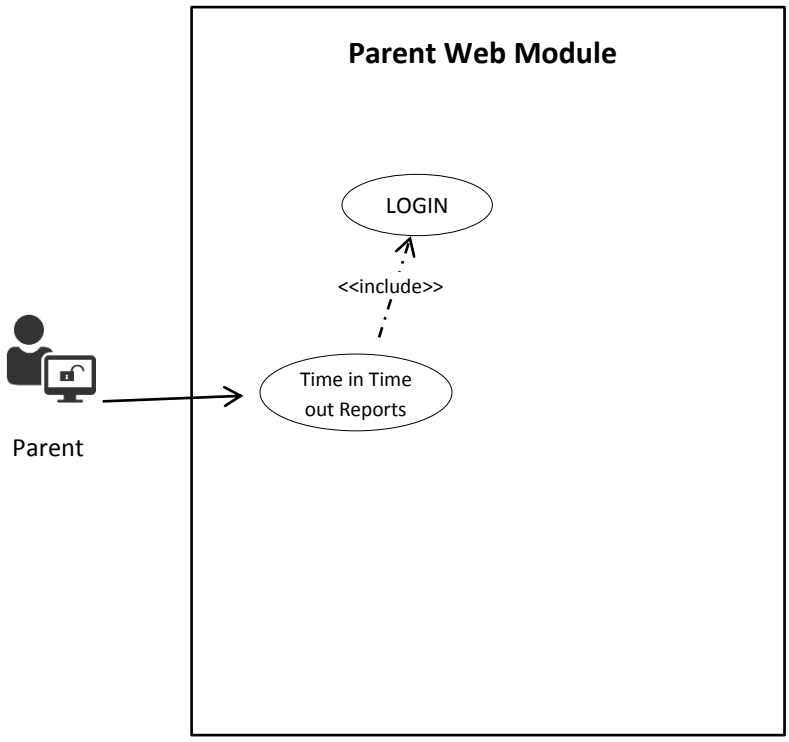


Figure 12 Use Case Diagram Parent Web Module

This parent web module will help the parent to monitor their children's daily school time-in and time-out without going to the school, and it generates reports of the time-in and time-out of the students by weekly, daily and monthly.

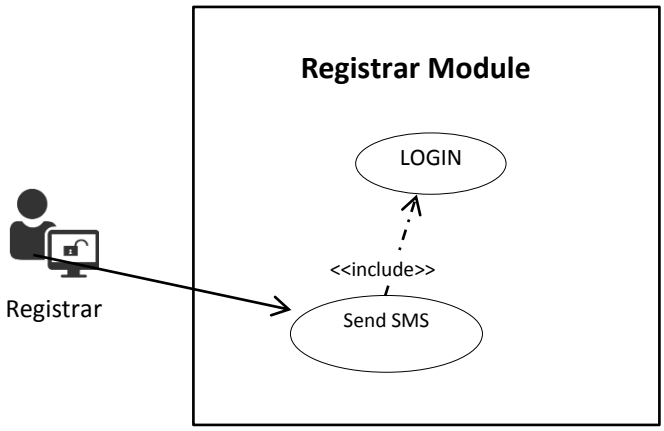


Figure 2 Use Case Diagram Registrar Web Module

The figure shows how the registrar can send SMS to all parents for any announcement of the cancellation of classes.

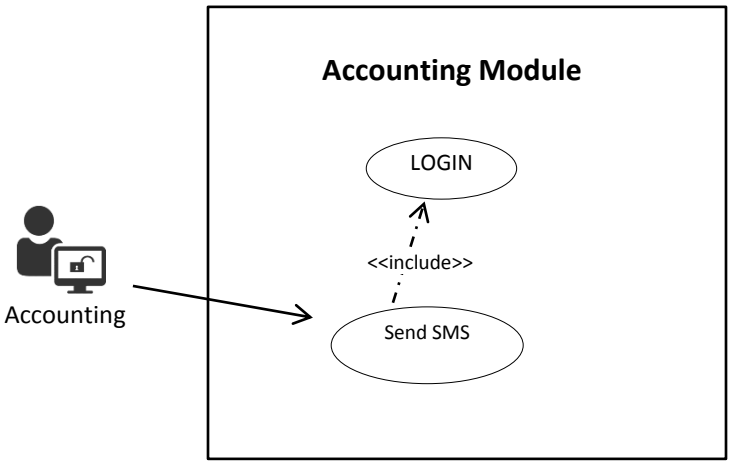


Figure 3 Use Case Diagram Accounting Web Module

The figure shows upon login with their accounts the accounting personnel can send SMS payment notifications to all parents Senior High School.

Coding Phase

The proponent will start the development of the system. For the coding paradigm, the proponent will use structured programming where Programs are divided into small self-contained functions in which focuses on process and logical structure and the data required for that process.

The proponent will use VB.Net for the capturing of RFID of the student and validate the if the card is still valid including sending of SMS. Mysql is used as the medium for retrieving and storing data. For the admin side and parent, PHP programming is used to develop the web interface of the e-notify system.

Testing Phase

In this phase, the researcher will present the testing plan and the operating procedure of each module.

There are four major testing phases that need to be completed before implementing a program: unit testing, integration testing, system testing, and acceptance testing.

Unit Testing

During this first round of testing, the program is submitted to assessments that focus on specific units or components of the software to determine whether each one is fully functional. The main goal of this endeavor is to determine

whether the application functions as designed. A unit may refer to a task, individual program or even a process in this step, and typically a White-box Testing approach is used to get the job done. One of the greatest advantages of this testing process is that it can be executed any time a piece of code is modified, allowing problems to be solved as soon as possible. Before launching, unit testing is very popular for software developers.

Integration Testing

Integration testing provides the ability for individuals to integrate all units within a system and test them as a group. This level of testing is designed for detecting interface faults between the modules / functions. This is especially advantageous as it defines the efficiency with which the units work together. Bear in mind that no matter how well each device operates, if not properly implemented, this will affect the software program's functionality. Individuals may use various test methods to perform these types of tests, but the particular method used to perform the job would rely greatly on how the units are described.

System Testing

Testing of device development framework is the first step in which the whole program is evaluated as a whole. At this point, the aim is to determine

whether the system has met all of the criteria outlined and to ensure whether it meets the quality standards. System testing is carried out by independent testers who haven't played a part in the program development. This research is carried out in environment.

Acceptance Testing

During the life cycle of Software development, changes in specifications can often be misunderstood in a way that does not meet the users ' intended needs. During this final step, the customer must check the program to see whether the application meets the needs of their organization. Once the phase is now complete and the software has passed, the program will then be delivered to production.

Software Test Plan Flow

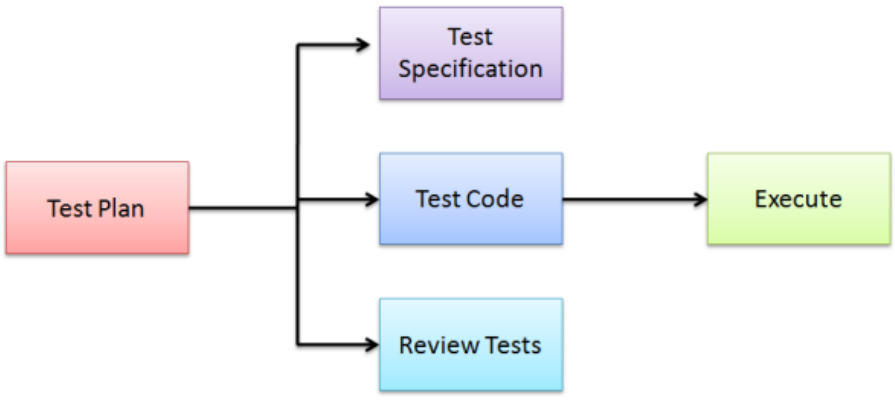


Figure 45 Software Test Plan

Test Specification a specification of inputs, expected results, and a set of execution steps associated with the testing of modules. This section contains subsections for each of the modules to be tested and each sub module is specifies the cases to be tested. Different types of software testing are performed depending on the size of the project, the current project phase, and the amount of progress made in the coding process. The types of testing include Unit testing which can also be called application testing and is used for evaluating specific pieces of code like functions and modules. Programmers will check each module to ensure that it performs as needed. Integration testing that will test the interfaces between modules; System integration testing is performed when the system needs to interface with other or third party systems. The testing tests against system specification for interfaces to other systems. Acceptance testing is a testing by the customer or end user to define whether the software is acceptable. In test code, you will be in a position to see what module is needed to fix or revise after the execution and to review those test results.

Table 4 Test Matrix

MODULES	TEST TYPE
RFID	Unit Testing / Integration Testing
SMS	Unit Testing / Integration Testing
Time in Time Out	Unit Testing / Integration Testing
Administrator Web	Unit Testing / Integration Testing
Parent	Unit Testing / Integration Testing
Registrar	Unit Testing / Integration Testing
Accounting	Unit Testing / Integration Testing

In test plan, the devices such as the RFID and GSM will go on testing and trial to know whether the machine is working and the system can integrate with the instrument.

Below is the unit test plan of each module

Table 5 RFID Module

Test ID	1
Test Name	RFID
Description	Ensure that components pass unit and integration testing, and perform basic operations as expected.
Pre-requisite	None
Test Environment	Acceptance Server
Test Strategy	Unit Testing

Step	Descriptions	Expected Results
1	Open the e-Notify Application.	The application is displayed correctly
2	It should be responsible when Tapping the RFID Card to the RFID reader	The application will read and display the unique serial of the RFID card.

To check for the RFID integrations, the testing condition will be conducted in the morning between 7:00 AM to 9:00 AM where the student is passing through the main entrance of the school.

Table 6 SMS Module

Test ID	1
Test Name	SMS
Description	Ensure that components pass unit and integration testing, and perform basic operations as expected.
Pre-requisite	None
Test Environment	Acceptance Server
Test Strategy	Unit Testing

SEND SMS and TYPE SMS		
Step	**Descriptions**	**Expected Results**
1	Open the e-Notify Application.	The application will display Message
2	It should accept input.	The GSM will accept text input.
3	It should response by sending SMS to the mobile phone of the parents.	The GSM will send SMS Notification stating the full name of the student including the time in or time out to the parents.

To check for the GSM SMS integrations and the sending of SMS the testing condition will be conducted in the morning between 7:00 AM to 9:00 AM where the student is passing through the main entrance of the school, and it will be attended by at least 2 to 3 parents who have a mobile phone.

Table 7 Time in Time out Module

Test ID	1
Test Name	Time in Time out
Description	Ensure that components pass unit and integration testing, and perform basic operations as expected.
Pre-requisite	None
Test Environment	Acceptance Server

Test Strategy	System and Database Testing

Time in Time Out		
Step	**Descriptions**	**Expected Results**
1	It should display the RFID data	Shows the student information
2	It should accept the time data from the system.	Time will be displayed.
3	It should record the time in and time out of the student in the database	Time in and Time out of the student is recorded in the database.

The testing condition for a time in and time out of the student will be conducted in the morning between 7:00 AM to 9:00 AM. The testing will be particularly of the testing accuracy of database section.

Table 8 Administrator Web Module

Test ID	1
Test Name	Administrator Web
Description	Ensure that components pass unit and integration testing, and perform basic operations as expected.
Pre-requisite	None
Test Environment	Acceptance Server
Test Strategy	Unit and Web Testing

Administrator Webpage		
Step	**Descriptions**	**Expected Results**
1	It should display the Administrator Login Page	The Web Login Page displays correctly
2	It should attempt to search the student data (all results found in DB path)	Search results are associated with the search query, and the method to save the query to the database is called.
3	Enter a search student name" input.	A search query with the entered student name and displayed the student information including time in and time out history

4	Register Student RFID and Student information	A search result will be base in the Student RFID if no record the data will be saved and RFID Card is ready to use.

Student RFID card registrations will be tested or conducted between 1 to 3 pm. The testing will be the focus in querying student RFID registrations and generating time in time out the history of the student including printing.

Table 9 Registrar Web Module

Test ID	1
Test Name	Registrar Web
Description	Ensure that components pass unit and integration testing, and perform basic operations as expected.
Pre-requisite	None
Test Environment	Acceptance Server
Test Strategy	Unit Testing

Registrar Web Pages		
Step	**Descriptions**	**Expected Results**
1	It should display the Login Page	The Web Login Page displays correctly
2	It should accept input.	The text box will accept text input.
3	It should respond by sending SMS to the mobile phone of the parents.	The SMS class cancellation notifications send to the parents.

To check for the sending of SMS class cancellation, the testing condition will be conducted in the morning between 7:00 AM to 9:00 AM and it will be attended by MIS personnel and at least two parents who have a mobile phone.

Table 10 Accounting Web Module

Test ID	1
Test Name	Accounting Web
Description	Ensure that components pass unit and integration testing, and perform basic operations as expected.
Pre-requisite	None
Test Environment	Acceptance Server
Test Strategy	Unit Testing

Registrar Web Pages		
Step	**Descriptions**	**Expected Results**
1	It should display the Login Page	The Web Login Page displays correctly
2	It should accept input.	The text box will accept text input.
3	It should respond by sending SMS to the mobile phone of the parents.	The SMS Payment notifications send to the parents.

To check for the sending of SMS payment notification, the testing condition will be conducted in the morning between 7:00 AM to 9:00 AM and it will be attended by MIS personnel and at least two parents who have a mobile phone.

Operating Procedures

This is a step by step system instruction gathered to carry out the operating procedure of RFID. It aims to aid the parents, faculty and the school management through SMS regarding monitoring of the students time-in and time-

out. Below are the different operating procedures of each RFID Module that indicate system and work instructions.

Table 11 RFID Module

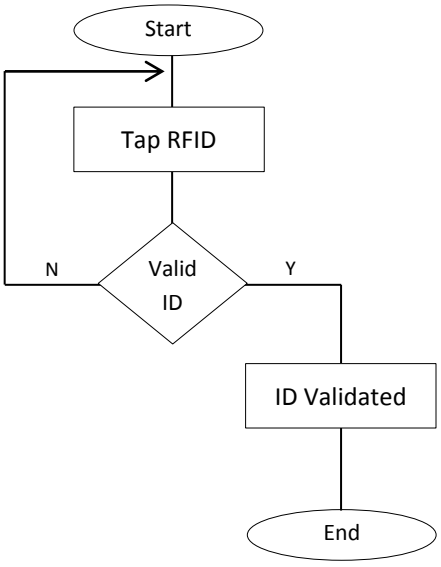
MODULE: RFID	
Process	**Work Instructions**
	For a student be able to go on the school campus. A student should use the RFID provide by the school and tap is to the RFID reader at the gate entrance. The e-notify system will validate the RFID. After validation, an image will show to the monitor of the students.

Table 12 SMS Module

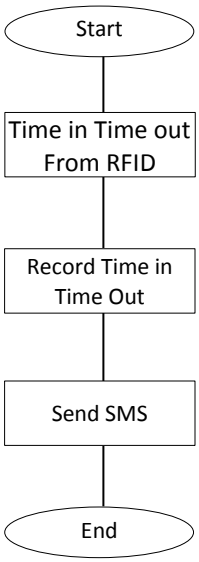
MODULE: SMS	
Process	**Work Instructions**
	After the student Tapped the RFID the e-notify will: Record the time-in of the student. For going out, it will also record the time-out. In every Time in Time out SMS Notifications will be sent to the parent.

Table 13 Time in Time out Module

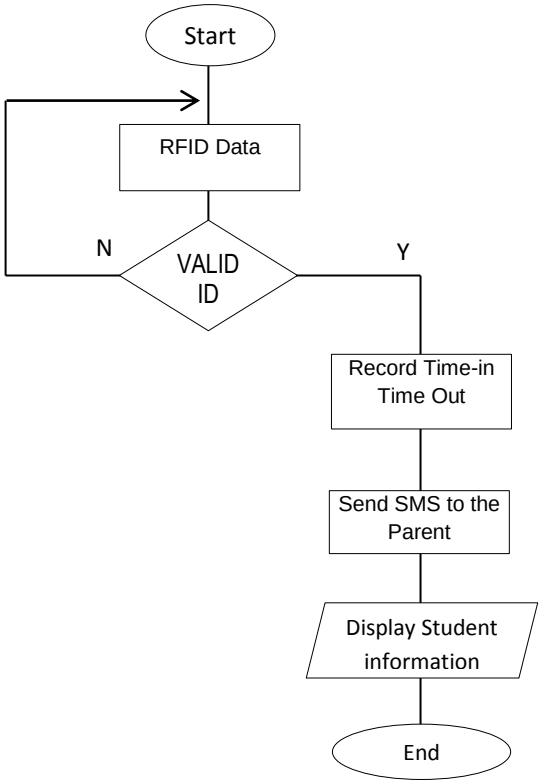
MODULE: TIME IN TIME OUT	
Process	**Work Instructions**
	Process RFID data from tapping. Check RFID Validity. It will record the Time-in and Time Out of the students to the database. Send SMS Time in Time out notifications. Display the student information including pictures in the screen

Table 14 Administrator Module

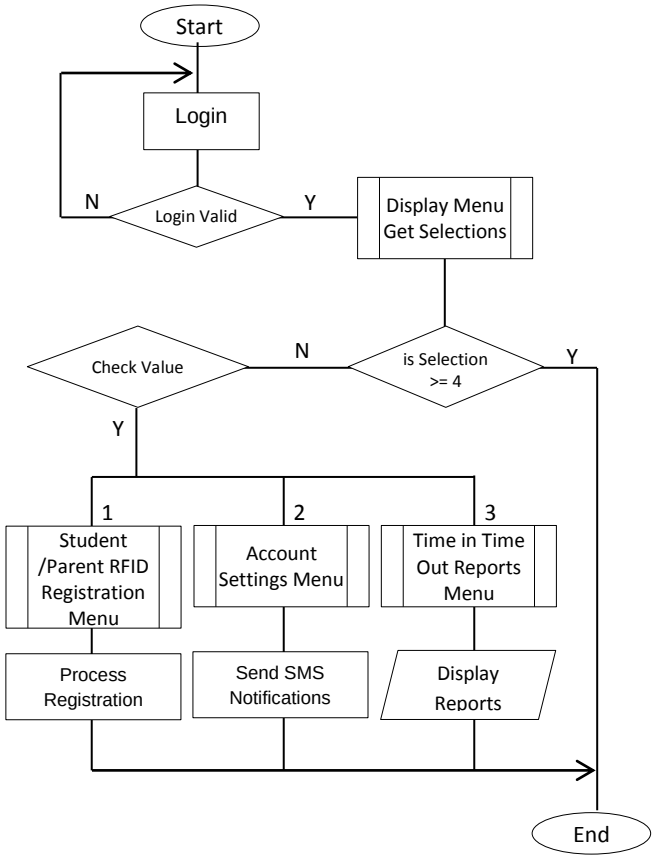
MODULE: ADMINISTRATOR	
Process	**Work Instructions**
	The administrator will log in to the web page. If you go to the Student and parent section, the RFID card can be registered, and creation parents account also included At the Account settings, you can create Registrars account and accounting accounts. The Time in time out reports can also be generated base on your selected student account.

Table 15 Registrar Module

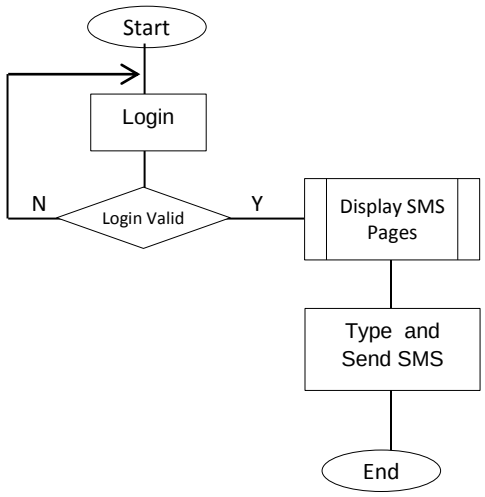
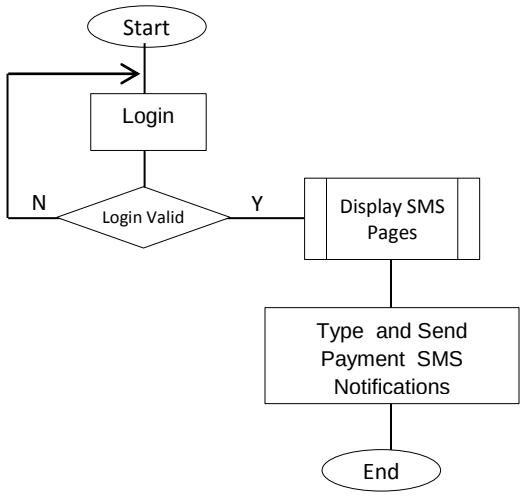
MODULE: REGISTRAR	
Process	**Work Instructions**
	Login the Registrars account. After the login, SMS page will be displayed. The registrar will type the SMS Class cancellations, and it will be sent to the parents.

Table 16 Accounting Module

MODULE: ACCOUNTING	
Process	**Work Instructions**
	Login the Accounting account. After the login, SMS page for payment notifications will be displayed. The authorized accounting personnel can send payment notifications to the parents.

Deployment Phase

For the deployment of the system, the researcher will be using a parallel approach that ensures the application performs correctly by monitoring the device and data in the database that will last for one month. The system is now ready to use and installed in school premises training may be required for end users to make sure they know how to use the system.

Maintenance Phase

In this stage of maintenance, a remedial care should be applied. This includes revisions and updating done to correct or fix problems, which are either discovered by the user or concluded by user error reports. There will also be a quarterly maintenance in a view to check the efficiency of the system while students are using it. Database backup is also a part of the maintenance.

3.2.3 Evaluation

After the testing strategies have been conducted, the proponent will create an evaluation questionnaire to assess the software further. The formulation of questionnaires will be based on the ISO 9126, which is the software product evaluation standard from the International Organization for Standardization. This international standard defines five characteristics that describe software quality namely:

(1) Functionality- The software features will be checked if they are all working correctly.

(2) Reliability- The software's fault tolerance and recoverability are high; it will not crash.

(3) Usability- The application can easily be understood and navigated by the end-users. The design and images to be used are easy to recognize.

(4) Efficiency- The system responds precisely and efficiently to the commands. It uses resources such as memory, the CPU, and the network.

(5) Maintainability- The software is easy to maintain, and it is stable.

(6) Portability- The software can be used and run in different web browsers' versions and screen resolutions. It does not require vital programs that are hard to install.

These characteristics were rated by the respondents using the 5-point Likert scale as shown in Table 3.

Table 17 Likert Scale

Scale	Range	Interpretation
5	4.6 - 5.0	Strongly Agree
4	3.7 - 4.5	Agree
3	2.8 - 3.6	Neither agree nor disagree
2	1.9 - 2.7	Disagree
1	1.0 - 1.8	Strongly Disagree

On the other hand, the statistical treatments for this study were frequency and percentage distributions for data presentation and weighted mean to determine the results of the software evaluation. Below is the evaluation criteria used by the proponent.

Software Evaluation Criteria

Direction:
Check the box that corresponds to your answer. Use the legend as your guide.

LEGEND: 5 - Strongly Agree 4 - Agree 3 - Neutral
2 - Disagree 1- Strongly Disagree

Table 18 Software Evaluation Criteria

Criteria	Indicators	Ratings				
		5	4	3	2	1
Functionality	The software performs the tasks required.					
	The software shows the result as expected.					
	The software interacts with another system.					
	The software prevents unauthorized access.					
Reliability	Most of the faults in the software been eliminated over time.					
	The software capable of handling errors.					
	The software resumes working and restores lost data after a failure.					
Usability	The user comprehends the use of the system easily.					
	The user learns to use the system easily.					
	The user uses the system without much effort.					
	The interface looks good.					
Efficiency	The system responds quickly.					
	The system efficiently utilizes resources.					
Maintainability	Faults are easily diagnosed.					
	The software can be easily modified.					
	The software continues functioning if changes are made.					
	The software is tested easily.					

CHAPTER 4
RESULTS AND DISCUSSION

4.1 Results by phase of study

Technical Description

IOT world where you can interact and communicate intelligently just about everything. In other words, the physical world is becoming one big knowledge with the Internet of Things. Utilizing device that can capture student time-in and time-out through passive Radio frequency identification Technology and send messages through the SMS technology will be a real help knowing that the child is already inside the campus. The admin part of the system will manage the RFID registrations, administer the Parents' account creation, monitor the Time-in Time-out Data and generates a time-in time out reports. The registrar of the school will handle the SMS notifications of cancellation of classes while the Accounting will be in-charge to address the SMS notification of school payments. The project focuses only on monitoring Senior High School students.

The first objective of the study is to utilize a device that can capture student time in and time out through passive Radio Frequency Identification Technology.

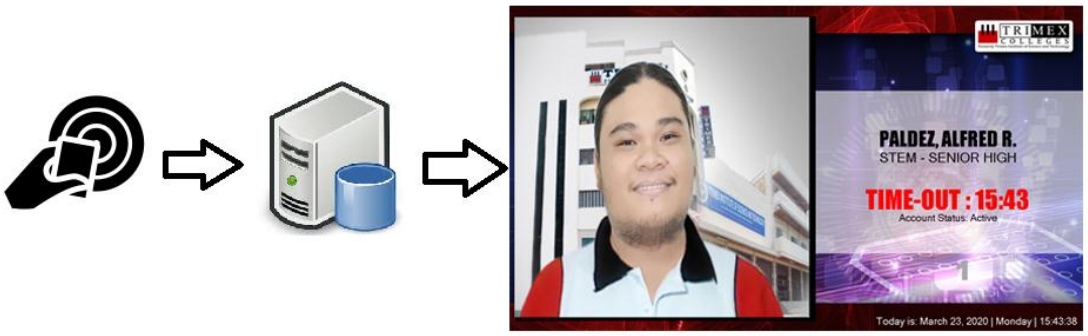


Figure 5 RFID Time-in Time-out Interface

The figure above shows the RFID is being tapped and check for RFID validity from the database server and displays the picture of the student who tapped the RFID. It will add the record of the time-in or time-out of the student, including the SMS notifications.

The second objective of the study is to design an application that will notify users via short message service technology of the following:

a. Class cancellation

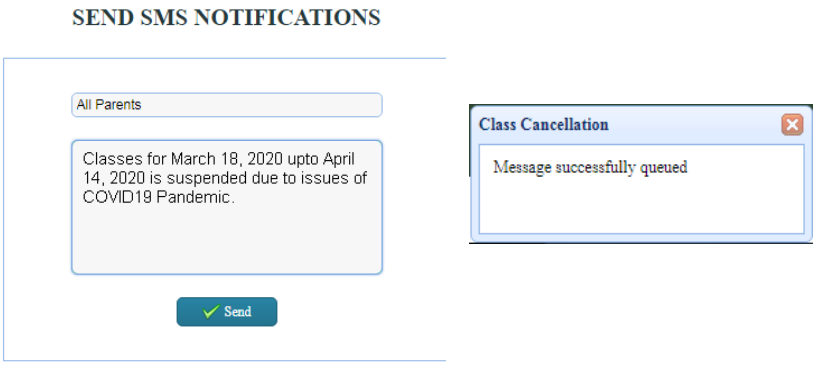
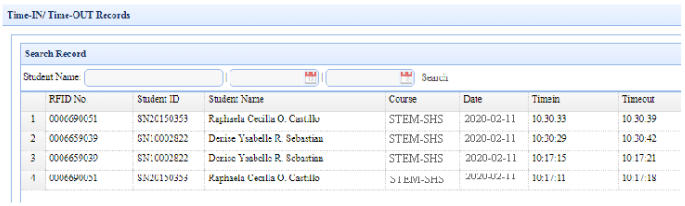


Figure 6 Class Cancellation

The above figure shows the flow of the SMS Format on how the parents will be notified whenever there are cancellations of classes. The Registrar who is the authorized person to send notifications to the parents is the one who is responsible for sending class cancellation.

b. Student time-in and Time-out



TIMEIN & TIMEOUT RECORD

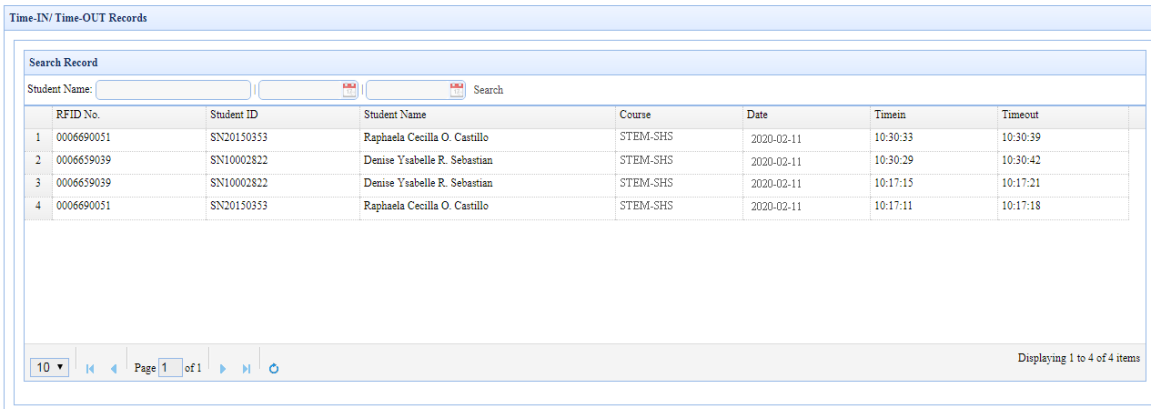
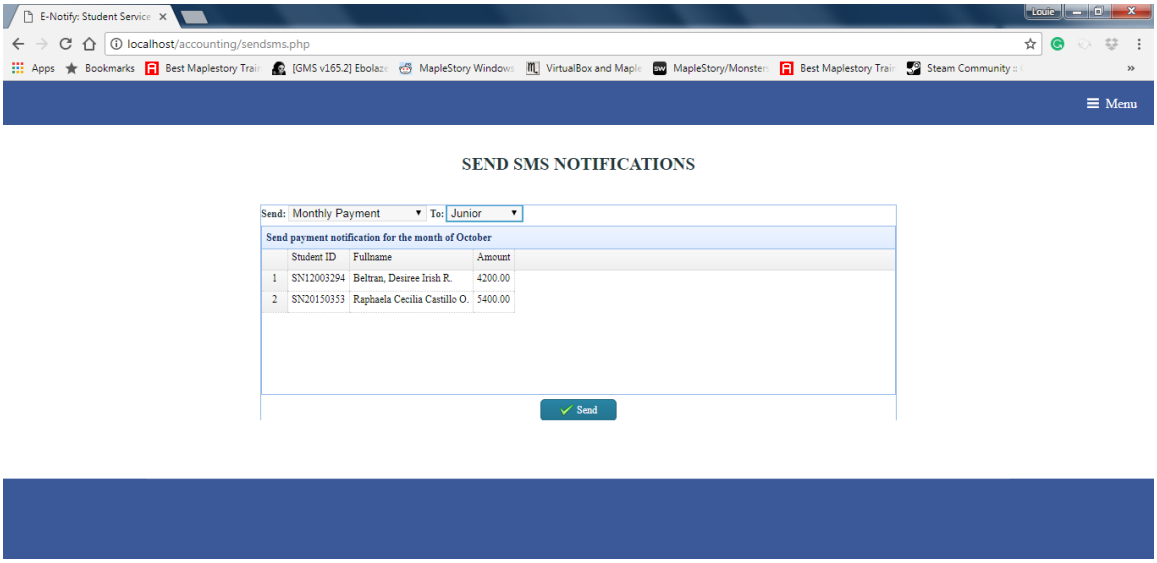


Figure 7 Students Time-in and Time-out

The above Student's Time-in and Time-out figure shows the record of each student who individually tapped the RFID.

c. Payment notification based on payment selected scheme or tuition fee.



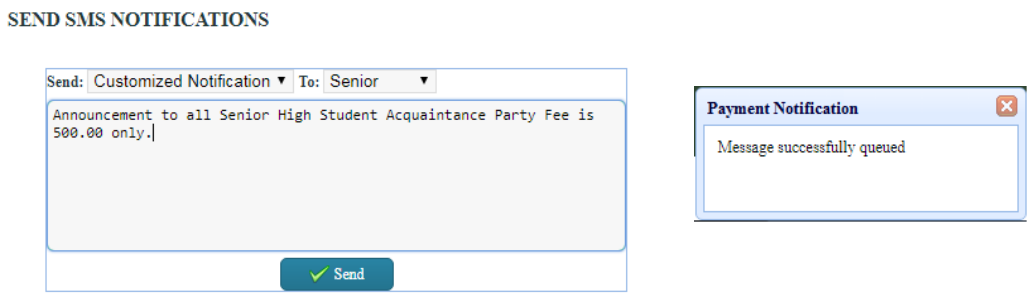


Figure 8 Payment Notifications

Figure 18 shows the send payment notifications; it can send monthly notification of the students to send to the authorized person from the accounting department.

The third objective is to generate reports such as:

a. Student time-in and Time-out

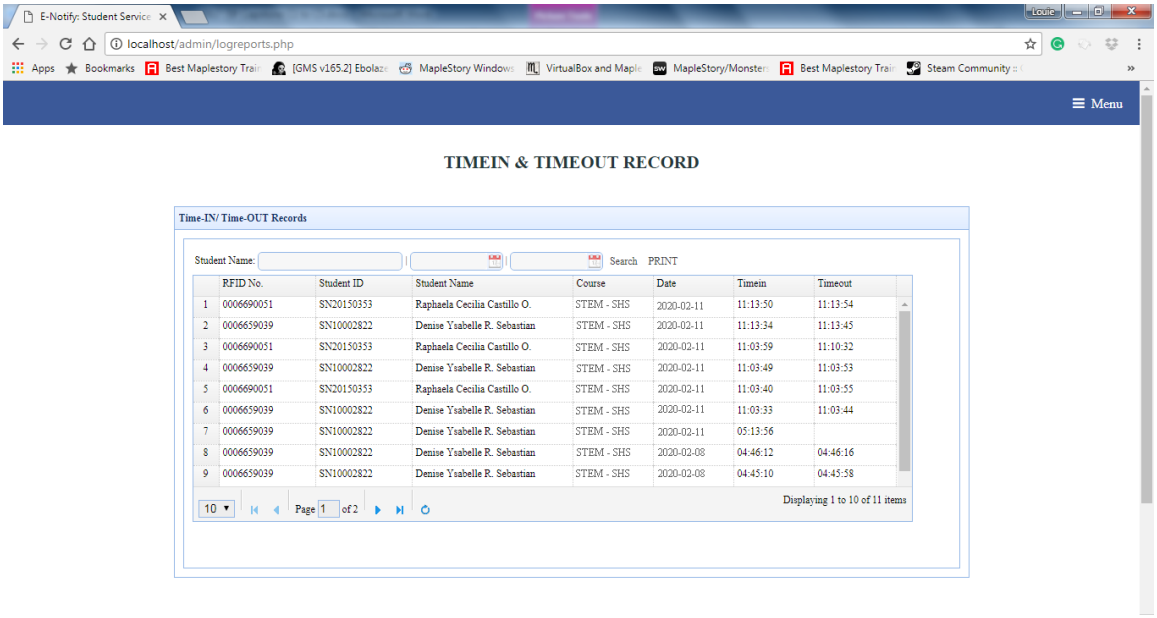


Figure 209 Students Time in Timeout Report

The Figure above regarding the students' time-in time-out report shows the date of the students' entry and exit. The reports generate daily, weekly, monthly and yearly reports of the students time-in and time-out.

b. SMS Message History

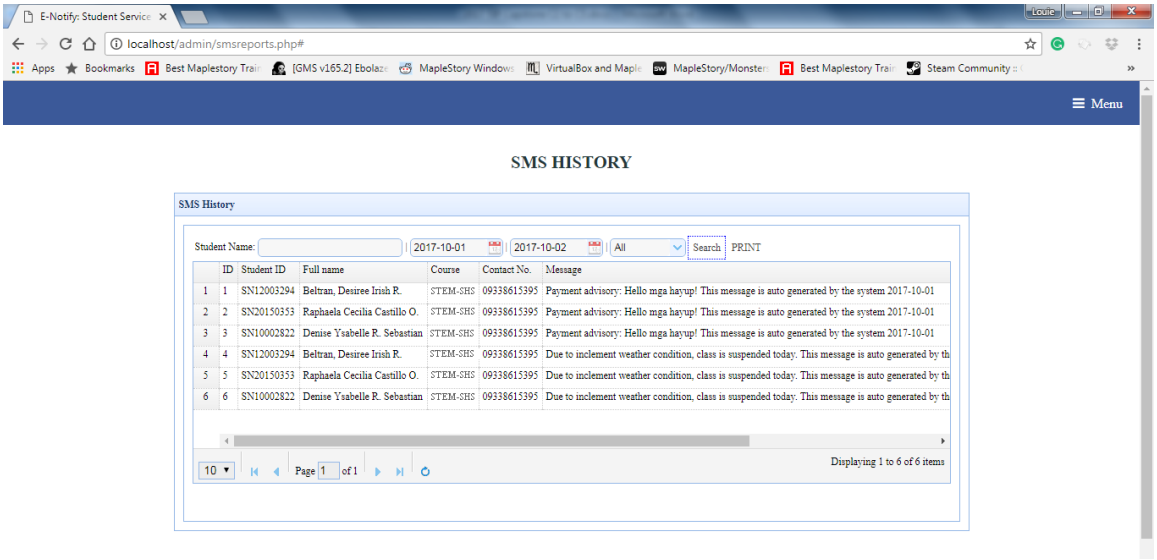


Figure 10 SMS Messages History Report

The above figure shows the sent and unsent reports SMS. Through this SMS History Reports the Admin as the responsible person can select or search students' SMS Records.

4.2 Verification studies

Software Evaluation Using ISO9126

The study is to evaluate the acceptability of the system using the ISO9126. The software was assessed using the set of quality metrics/criteria stated to validate the effectiveness of the software being developed. Criteria rank

according to the opinion of respondents after evaluating the software, five being the highest and one as lowest.

Table 19 Mean Score for Time-in Time-out

The response in the Functionality Criteria:

Parents Respondents

Criterion	**Weighted Mean**
Functionality	
• The system can detect the ID of each Student through RFID reader.	5.0
• The system can identify the Information, time in and out of each student.	5.0
• The system displays the students' picture accurately.	4.8
• The system has the capacity for multi-user processing	5.0
• The Web based Time-in Time-out History accurately display.	5.0
• The SMS notifications easily received and sent to parents.	4.8
Average	4.93

There were 56 responses among the Parent Respondents who Strongly Agreed that the software/system is fully functional regarding detecting, identifying, and displaying the student's picture for proper identification as well as the easy receiving and sending SMS to the parents. As such, only 4 of the respondents were in the Agreed level**,** and no respondents answered for the last

three categories on the scale. The total weighted mean for the Parents respondents for the functionality of the system is 4.93.

Table 20 Weighted Mean for the Admin Module

The response in the Functionality Criteria:

School Admin

Criterion	**Weighted Mean**
Functionality	
• The system can send SMS Payment Notifications	4.7
• The system can add parents and student RFID Accounts.	5.0
• The Web based SMS History accurately display.	5.0
• The Web based Time-in Time-out History accurately display.	5.0
• The SMS notifications easily sent to parents.	4.7
Average	4.88

The total weighted mean of 4.88 for the school admin respondents was distributed accordingly. Among the 50 responses on School admin as Respondents, 44 of them Strongly Agreed that the module response functionality is truly functional and visible. However, 6 of the respondents cast their Agreed situation may be due to some delay of SMS text received.

Table 21 Weighted Mean Responses in the Reliability Criteria

Parents Respondents

Criterion	Weighted Mean
Reliability	
• The system can generate a report of Time in and Time out.	5.0
• The system produces correct data through students' identification cards.	5.0
• The system can generate report of SMS History	5.0
Average	5.0

The total weighted mean of 5.0 was justified through the reliability of the system software; all the parent's respondents were Strongly Agreed that the reliability of the system can easily generate reports and shows accurate data of the students.

Table 22 Weighted Mean Responses in the Reliability Criteria:

School Admin Respondents

Criterion	Weighted Mean
Reliability	
• Produce the expected output or results	5.0
• Software does not have energy related wear-out phase.	5.0

• Produce correct student data using Identification cards.	5.0
Average	5.0

All the School admin Respondents who STRONGLY AGREED in the reliability test of the software is HIGHLY ACCEPTABLE. The weighted mean, 5.0 of Reliability criteria in the school admin' respondents group, falls on the HIGHLYACCEPTABLE scale.

Table 23 Weighted Mean Responses in the Usability Criteria

Parents Respondents

Criterion	**Weighted Mean**
Usability	
• Can be understood, learned, used and appear attractive to the user.	4.8
• Provides on-screen prompts and messages that are clear and helpful to the end users	4.6
• It is user-friendly.	4.8
• It is of great help to the end users in replacement to the manual system	4.8
Average	4.75

The Parents as respondents STRONGLY AGREED that the software is usable and user-friendly. On the other hand, only one respondent was dissatisfied with software which is on the Moderately Agreed response. It is

evidently seen in the weighted mean, 4.75 of the Usability criteria under parents' respondents' category. The resulted means of the proposed system can be easily learned, understood, beneficial and attractive to the user.

Table 24 Weighted Mean Responses in the Usability Criteria

School Admin Respondents

Criterion	**Weighted Mean**
Usability	
• Can be understood, learned, used and appear attractive to the user.	4.8
• Provides on-screen prompts and messages that are clear and helpful to the end users	4.8
• It is user-friendly.	4.8
• It is of great help to the end users in replacement to the manual system	4.6
Average	4.75

Not all of the school admin in the set of respondents STRONGLY AGREED in the usability of the system. The weighted mean, 4.75 of Usability criteria in the respondent's group still falls on the Highly Acceptable scale to the parent's responses which have the same weighted mean scale.

Table 25 Weighted Mean Responses in the Efficiency Criteria

Parents Respondents

Criterion	Weighted Mean
Efficiency	
• The software respond time is appropriate	4.6
• The software execution time is appropriate	4.9
• The resources used are appropriate.	4.7
• End users respond accurately and actively to the commands.	4.6
Average	4.7

There was a total of 31 responses from the parents' respondents who STRONGLY AGREED that the software is capable of providing appropriate response while performing its function. On the other hand, there were six parents who AGREED that the system uses appropriate storage resource of the computer and 3 MODERATELY AGREED. The weighted mean, 4.68 of the Efficiency criteria under the Barangay health workers respondents group, falls on the HIGHLY ACCEPTABLE scale.

The resulted 4.7 weighted mean showed that proposed system is efficient, and users can respond correctly was evident.

Table 26 Weighted Mean Responses in the Efficiency Criteria

School Admin Respondents

Criterion	Weighted Mean
Efficiency	
• The software respond time is appropriate	4.9
• The software execution time is appropriate	4.7

• The resources used are appropriate.	4.6
• End users respond accurately and actively to the commands.	4.8
Average	4.75

There were 32 responses among school admin in the set of respondents who STRONGLY AGREED that the system is HIGHLY ACCEPTABLE regarding Efficiency criteria. Also, six replies were AGREED in the capability of the software regarding resource utilization and time behavior, and two replies were among the Moderately Agreed. The weighted mean, 4.75 of Efficiency criteria in the school admin' respondents, is closely related to the responses of the parent's group of respondents and both fall on the HIGHLY ACCEPTABLE scale.

Table 27 Parents Respondents Summary of the Software Evaluation on e-Notification

Criterion	Mean	Interpretation
A. Functionality	4.93	Highly Acceptable
B. Reliability	5.00	Highly Acceptable
C. Usability	4.75	Highly Acceptable
D. Efficiency	4.7	Highly Acceptable

Table 28 School Admin Respondents Summary of the Software Evaluation on E-Notification

Criterion	Mean	Interpretation
A. Functionality	4.88	Highly Acceptable
B. Reliability	5.00	Highly Acceptable
C. Usability	4.75	Highly Acceptable
D. Efficiency	4.75	Highly Acceptable

In general, the software yielded a total weighted mean of 4.85, from both parents and school admin respondents which fall on HIGHLY ACCEPTABLE interpretation of data. Also, it is already proven that there is no significant difference among the response of the compared means of the two categories of respondents.

CHAPTER 5
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 SUMMARY

Radio Frequency Identification is the way in tracking the student's time – in and time out. With the help of the system RFID and the Internet of Things, the students monitoring is easy to access and the accuracy and reliability of the data, the system gives accurate information to the parents.

The IoT provides information through SMS, a very convenient method of communication with the maximized used of technology. Parents and students communicative process will now be a brilliant fashion of communication. The conducted software evaluation takes a significant part in the achievement of the objectives of the study.

5.2 Conclusions

Based on the aims of the study and the results of the evaluation the following conclusions were drawn;

1. With the used of the RFID students monitoring system, the time-in and time out of the students will be easily sent to parents via SMS since RFID captured the data of students' time-in and time-out accurately.

2. With the help of the RFID, the designed application that notifies users via Short Message Service Technology were accessed and determined quickly. The cancellation of classes, students time-in and time-out and the payment notification based on payment scheme of tuition fee was accurately observed. The data on this application is secured; the location of each student was tracked.
3. Generating reports with the help of internet browsers is convenient and flexible for printing the History of SMS and Time-in time-out.

5.3 Recommendations

The researcher of the study further recommends the following:

1. Utilization of Active RFID to maximize the use of technology.
2. Adding android application to take full advantage of the monitoring of the student inside and out of the campus.
3. Recommended to be used by other neighbouring schools