



# SMS-Based Mails Tracking Management System Using Smart Phones

Onedigbo M. O., Idara I. J., Godwin O. A, & Ifreke J. U.

Department of Computer Science

Akwa Ibom State University

Akwa Ibom State, Nigeria

Idarajames@aksu.edu.ng

+237030985358

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## ABSTRACT

The process of sending and receiving mails in most schools in Nigeria is stressful. This process is such that sent mails pass through series of approvals before they arrive at the final destination. The setbacks associated with this process are: delay, loss of mails, missed deadlines, poor managerial incompetence etc. To address these setbacks, an SMS-based Mails Tracking Management System (SMTMS) which incorporate an SMS notification is developed. SMTMS is a system that allows registered users to send mails across different departments and track them without the involvement of human intervention. Furthermore, the incorporation of an SMS notification helps the sender and recipients of mails to know the status of their mails at any given time. The developed system is more reliable to both parties (the sender and recipient of mails) because it reduces delay, increases easy accessibility of mails and decreases the administrative workload in mail exchange. The system is designed with Object Oriented modelling tool and developed using PHP, while Communication between mobile devices is made using an SMS gateway.

**Keywords:** SMS-based, Mail Tracking Management System, Smart Phones.

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## 1. BACKGROUND TO THE STUDY

Records are an important resource in any organization because they provide information on both historical and current activities of an organization. Proper records management could help organization to manage their information, protect them from mutilation, preserve their corporate memory, and foster accountability and good governance, Chinyemba and Ngulube (2005). For an official interaction to take place, an organization's records must easily be easily accessible and routed to personnel who are in need of them. This process is termed mailing and it signifies the process of creation, dispatch, and delivery of mail in an organization. Additionally, effective mailing process enhances easy communication and coherence among different sections of an institution. In most tertiary institutions in Nigeria, the process of sending, receiving and locating mails is challenging.



The process is such that a mail has to pass through several stages (such as intense documentation, series of approvals, etc.) before getting to a recipient. This traditional approach leads to loss of mail (s) due to location or user anonymity, missed deadlines, poor managerial incompetence etc. To address these setbacks, an SMTMS is developed.

SMTMS is concerned with enhancing mail exchange channel and shortening the time involved in mail processing and delivery. It offers immediate and easy access to information, which according to Tagbator, (2015), may affect an institution's productivity positively. Tracking systems are highly beneficial because they provide the link between information systems and the records in the supply network of an institution. SMTMS also enhances file retrieval, improves productivity in offices and allows pre-emptive measures to be adopted. In addition the primary function of SMTMS to facilitate free flow of mails through an organization; that is, to ensure that available information is retrievable and can be rapidly disseminated to where and when it is needed. This is highly advantageous as locate-ability and availability of an institution's files could assist the institution to realize its objectives, initiate rapid progress, and pave the way for outstanding development within departments. The remaining parts of this study are as follows: section 2 discusses the existing tracking system, section 3 gives a summary of the objective while section 4 and 5 give an highlight of the objective and related literature. Furthermore, section 6 discuss the methods used in achieving this study, section, 7 gives discussion on findings while section 8 concludes the work followed by contribution to knowledge in section 9.

## **2. EXISTING TRACKING SYSTEM**

- i. Email Tracking System: It involves the creation and forwarding of mail using the internet and enables users who have email account to exchange messages with registered user on a server. Email tracking technologies are useful when a sender wants to know if an intended recipient actually received an email, how many times a mail is opened, etc.
- ii. Package Mail Tracking System: This tracks the location, monitors the status of packages/product on transfer and oversees package delivery. It tracks the status of a physical product on transfer based on a unique mail ID assigned for every shipment made. Package Mail Tracking System uses barcode scanners and e-mail programs to automatically detect tracking numbers in packages and receipts and print the real time location of the package. Systems are used to log in details of arriving packages by recording the items from different carrier companies; the time the delivery is made, tracking number etc. The recipients are constantly notified of the packages by sending reminders via emails. Once the package is received by the end recipient, the system record the timestamp, the recipient signature etc.; the package is logged out and the mail ID is disabled.

Although existing mailing Systems are highly advantageous; as locate-ability and availability of institution's files could assist the institution to realize its objectives, initiate rapid progress, and pave a way for outstanding development within departments, a lots still has to be considered.

## **3. STATEMENT OF PROBLEM**

Several times, the progress and whereabouts of a mail is not known and cannot be traced because mails dispatched through the dispatch register documentation are subject to human error. Therefore, the approach becomes unreliable for staff and administrators of an institution to carry out their functions. Moreso, the problems with this approach include missed deadlines, undermined decision making, unreliable system etc. Hence, there is need to develop an SMTMS to avert these challenges.



#### 4. OBJECTIVE

The objective of this study is to develop SMS-based Mail Tracking Management System that would assist staff of an institution to generate, send, and monitor the transfer and delivery of mails across different unit/departments in an institution while reducing stress and delay in the mailing process.

#### 5. RELATED LITERATURE

According to National Informatics Centre (NIC) (2013), a file tracking system was developed for government offices in New Delhi, to automate the manual office procedure. It was reported that the system supports electronic file movement with encryption of files and digital signature. It also issues an acknowledgment to a sender about the status of receipts or files on transit; uses a centralized database, is controlled by a central administrator. The system was implemented using ASP.net and MySQL database.

The drawback of the system is that it does not have an activity log to keep history of file users and modification. According to Iaito Infotech (2013), it was reported that Radio Frequency Identifier (RFID) based File Tracking System was developed to keep track and maintain large no of valuable documents/files for a long time. The system uses a file tag label which contained the name of files and other related information, including a file number to track and identify files. The major challenge of this system is that it can only be applied to track stationary files such as library documents and cannot be used to initiate file transit. Krasniqi (2013) developed a file transfer system to track and keep records of file transfer for Epoka University. The system introduced a unique file numbering which helped in file management and status monitoring. The drawback of this system is that users cannot interact with each other. It is strictly restricted to file upload and transfer, and had no room for user interaction. Also, there was no feedback mechanism to ascertain the success of transferred mail. Omoregbe et al. (2014) developed a File Tracking System (FTS) for Covenant University, which was similar to the work of Krasniqi, (2013).

The major aim of the system was to improve productivity amongst core administrative personnel. This was achieved using an email messaging Interface which allowed employee to interact with each other and exchange documents other than files. The drawback of this system is that it does not issue acknowledgement to users about the status of mail sent; if delivered or rejected. Banday et al. (2015), developed a file tracking system as the solution for effective and efficient management of files. The users of the system were categorized into Super Administrator, Auditors, and Administrators; and each type of user assigned a role to maintain the system. This feature presents a setback in that; a breakdown in any of the module would result in the dysfunctional system.

Within the extent of our literature, none of the existing systems adopt a Short Message Service (SMS) acknowledgement mechanism where both the sender and recipient of the mail is serviced appropriately.

#### Our Proposed Approach

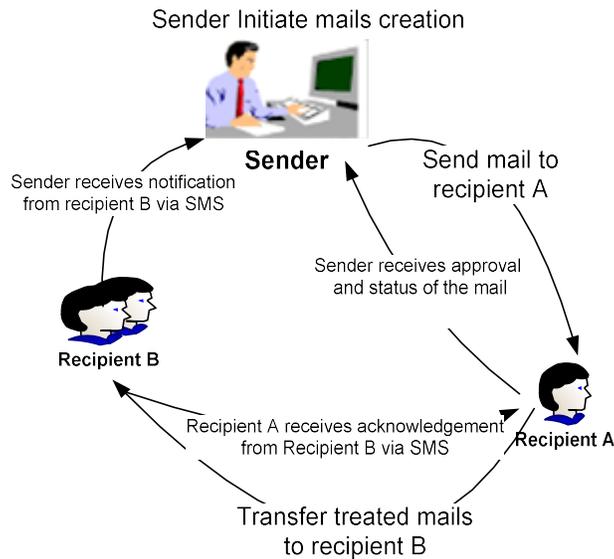
SMTMS is an intranet based mailing solution that has the ability to connect various sections of the institution together through proper information dissemination. With SMTMS, the services of a middleman (admin officer and the dispatch clerk, which are usually needed to document and transfer files respectively, within tertiary institutions) are not required to maintain and initiate mails transfer. In addition to being able to create, track, and backup every incoming mail, the system is developed to also cater for mails which sometimes, are expected to pass through several personnel before reaching final destination for approval. The system also has the ability to notify users of the system, about the whereabouts and status (i.e whether the mail is rejected, delivered, pending or ready to be viewed) of their mails.

This will consequently minimize the human intervention required in mailing and also strengthen the administrative workflow. A typical instance of our approach is presented in Fig. 1.

In this figure a mail is initiated by the 'Sender' to be delivered to 'Recipient B'. Before this mail finally reaches Recipient B, it has to be cleared by 'Recipient A'. However, for the Sender to know the status of the mail, an SMS notification is built into the system to enable the 'Sender' to get an instant notification the moment the mail reaches both Recipient A and B in a progressive order. The system takes charge of sending and keeping track of the mails to the next recipient once it has been approved.

## 6. METHODOLOGY

The proposed system adopts an OOAD approach which simplifies the software development process using the concept of modular programming (converting a job into modules). The system was further developed using PHP, while the mobile communication is integrated using an SMS API.



**Fig. 1: Proposed SMTMS Architecture**

### SMS Feedback Mechanism

In order to increase the reliability of the process and induce communication between the application and mobile devices, an SMS gateway is integrated into the system using an SMS API. This gateway allows a system to send or receive SMS transmissions to or from a telecommunications network. It is responsible for routing a message to the message gateway which will be outsourced to a target server. The target server then receives the message and re-routes it to the target device (Phone) using the mobile number. This functionality increases the robustness of the system and optimizes user satisfaction.

## 6.1 The Research Design

The proposed system is modelled using Unified Modelling Language (UML) with specific emphasis on Use Case and Sequence diagrams. The use case diagram in Fig. 2 describes how the proposed system interacts with outside actors by using use cases; which represents a functionality that a system provides to its user while Sequence diagram in Fig. 3 provides a detailed representation of messages exchanged among a set of objects over time.

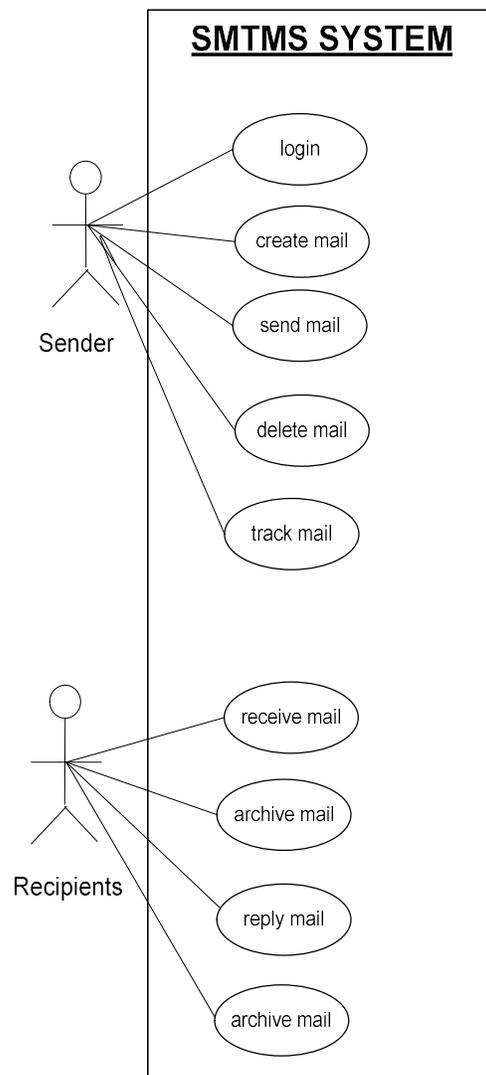
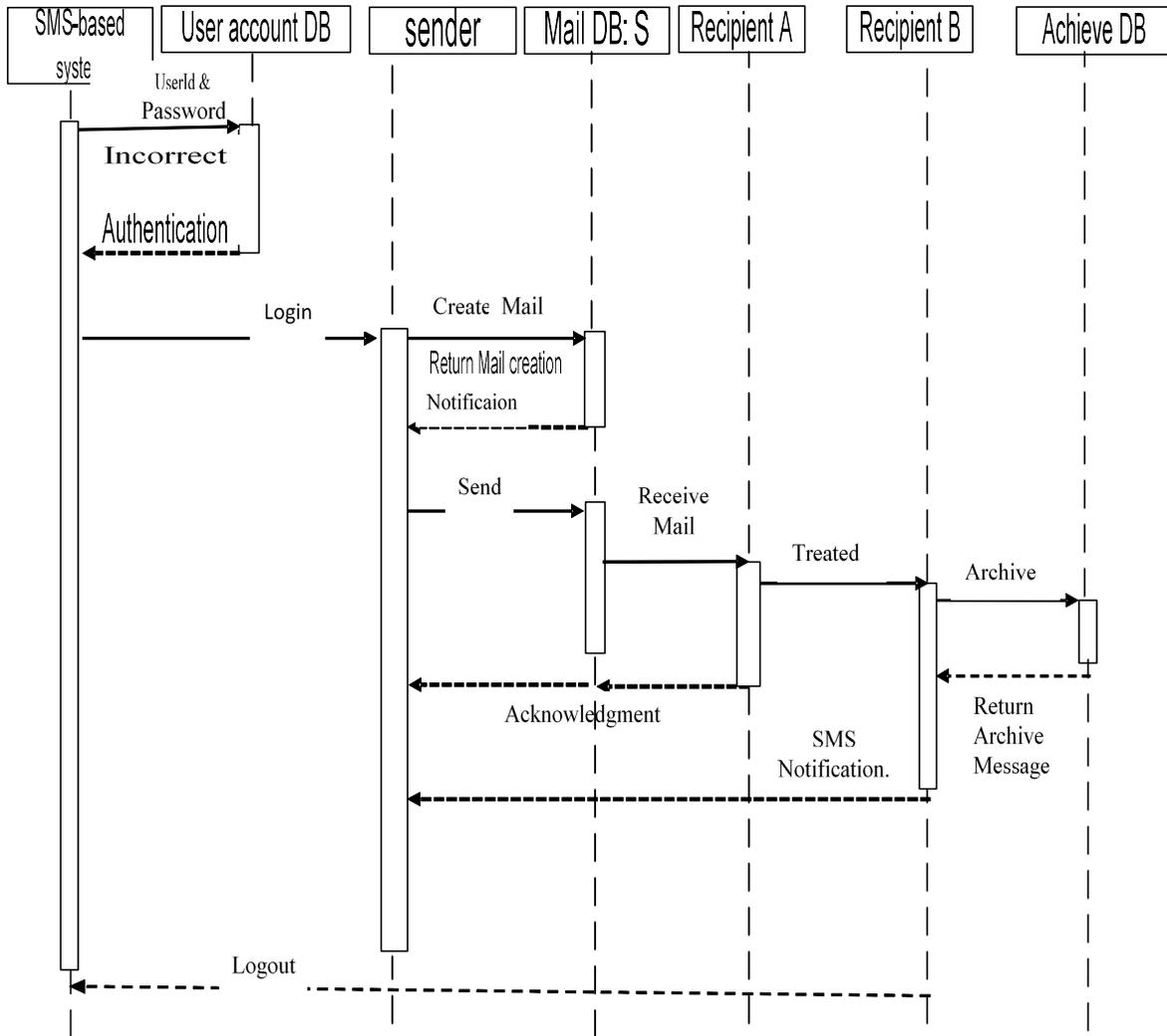


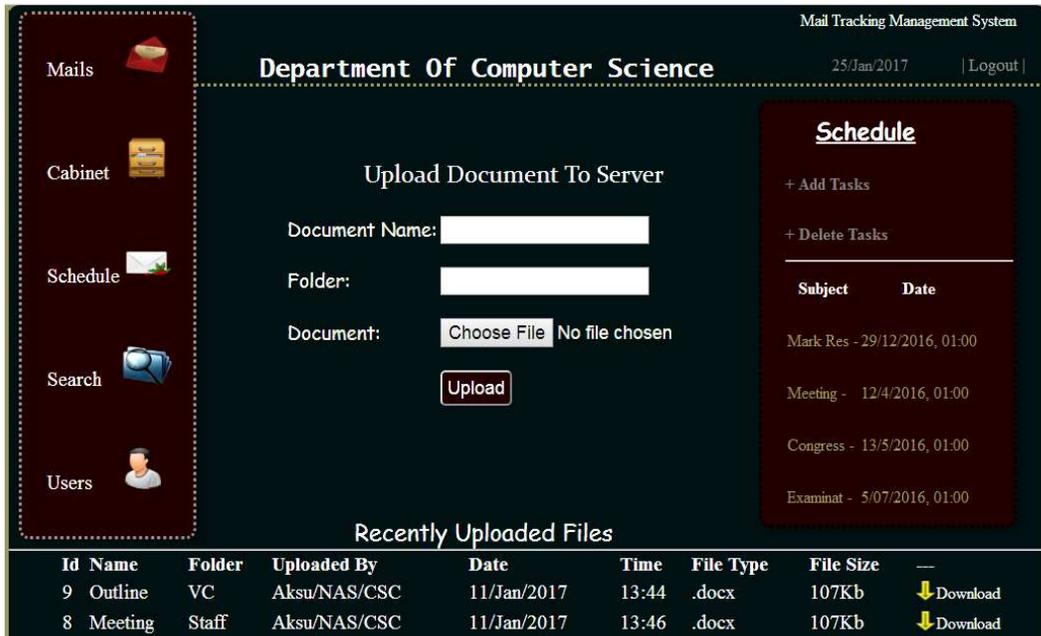
Fig. 2: SMS-based Mailing System Use case Diagram



**Fig. 3: Proposed SMTMS Sequence Diagram**

## 7. DISCUSSION OF FINDINGS

Snapshots which represent results and an evaluation of these results are presented. Fig. 4 shows the home page for registered departments/units while Fig. 5 shows a mail creation page for multi-mailing list. This is a case where multiple approvals from different users are required to carry out the mailing process. Once a mail is signed, the system automatically forwards it to the next recipient on the list. In Fig. 6, the sender of the mail is also notified of the approval and status of the mail earlier sent. In Fig. 7, the next receiver gets a SMS notification while Fig. 8 shows status of sent mail by the sender.



Mail Tracking Management System

Department Of Computer Science 25/Jan/2017 | Logout

Upload Document To Server

Document Name:

Folder:

Document:  No file chosen

Recently Uploaded Files

Id	Name	Folder	Uploaded By	Date	Time	File Type	File Size	
9	Outline	VC	Aksu/NAS/CSC	11/Jan/2017	13:44	.docx	107Kb	
8	Meeting	Staff	Aksu/NAS/CSC	11/Jan/2017	13:46	.docx	107Kb	

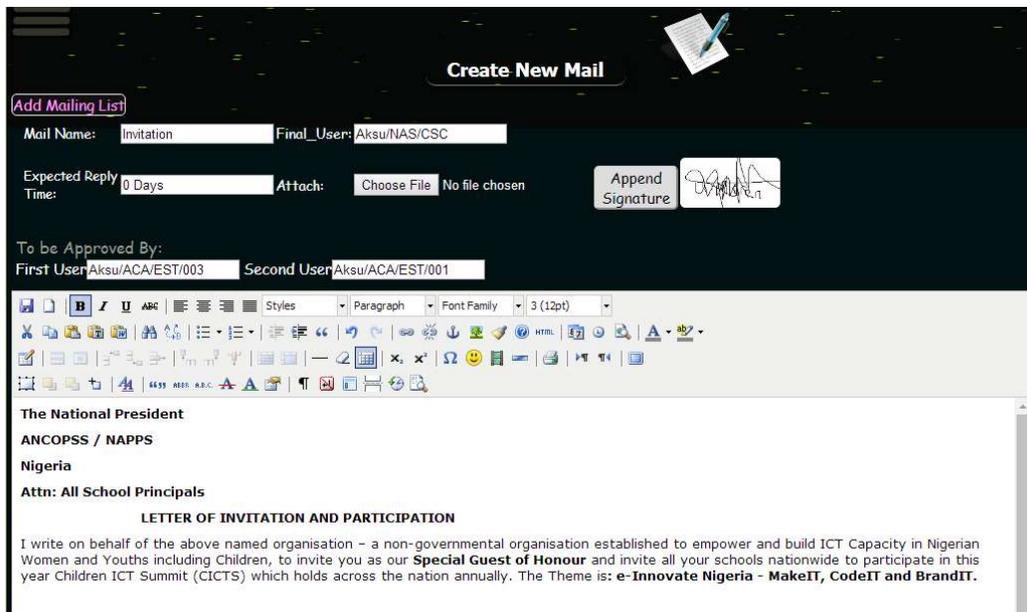
**Schedule**

+ Add Tasks

+ Delete Tasks

Subject	Date
Mark Res -	29/12/2016, 01:00
Meeting -	12/4/2016, 01:00
Congress -	13/5/2016, 01:00
Examinat -	5/07/2016, 01:00

Fig. 4: SMS-based Mailing Home Page for registered Department



Create New Mail

Add Mailing List

Mail Name: Invitation Final User: Aksu/NAS/CSC

Expected Reply Time: 0 Days Attach:  No file chosen

To be Approved By:  
First User: Aksu/ACA/EST/003 Second User: Aksu/ACA/EST/001

**The National President**  
**ANCOPSS / NAPPS**  
**Nigeria**  
**Attn: All School Principals**

**LETTER OF INVITATION AND PARTICIPATION**

I write on behalf of the above named organisation - a non-governmental organisation established to empower and build ICT Capacity in Nigerian Women and Youths including Children, to invite you as our **Special Guest of Honour** and invite all your schools nationwide to participate in this year Children ICT Summit (CICTS) which holds across the nation annually. The Theme is: **e-Innovate Nigeria - MakeIT, CodeIT and BrandIT.**

Fig. 5: SMS-based Mailing Creation Page (For Multi-mailing)

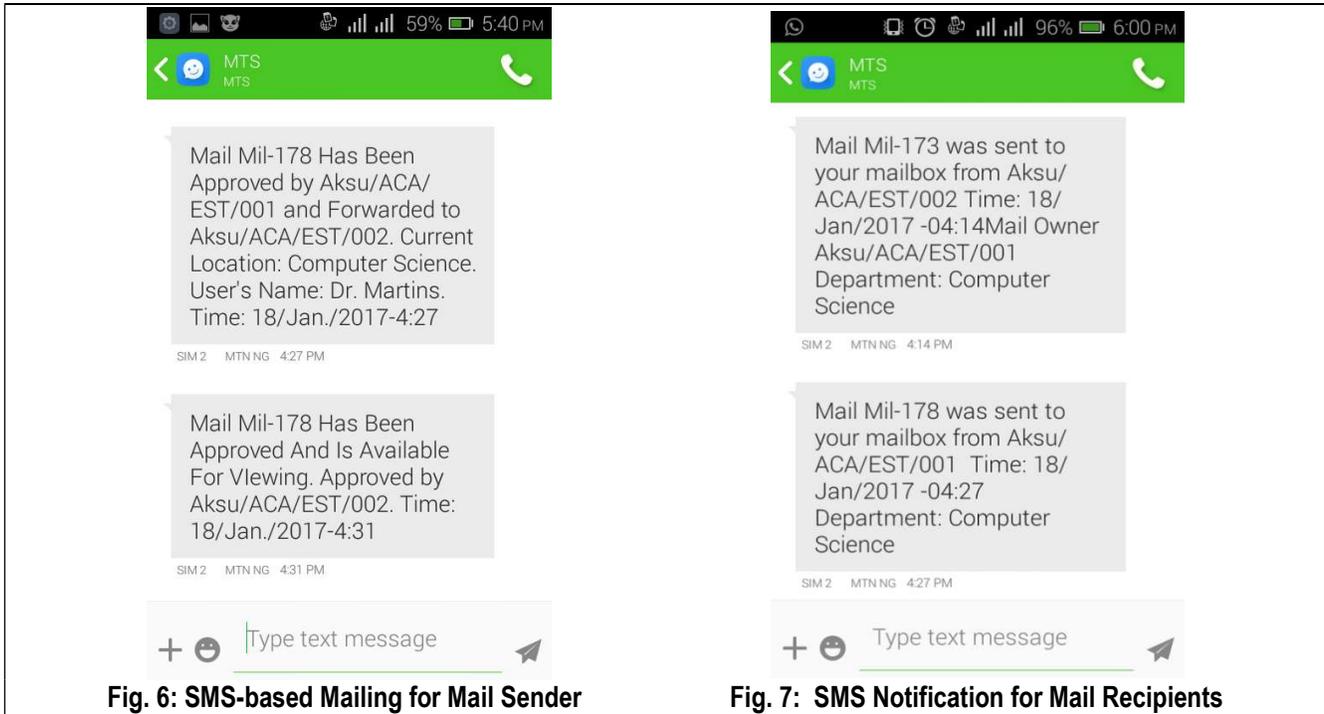


Fig. 6: SMS-based Mailing for Mail Sender

Fig. 7: SMS Notification for Mail Recipients

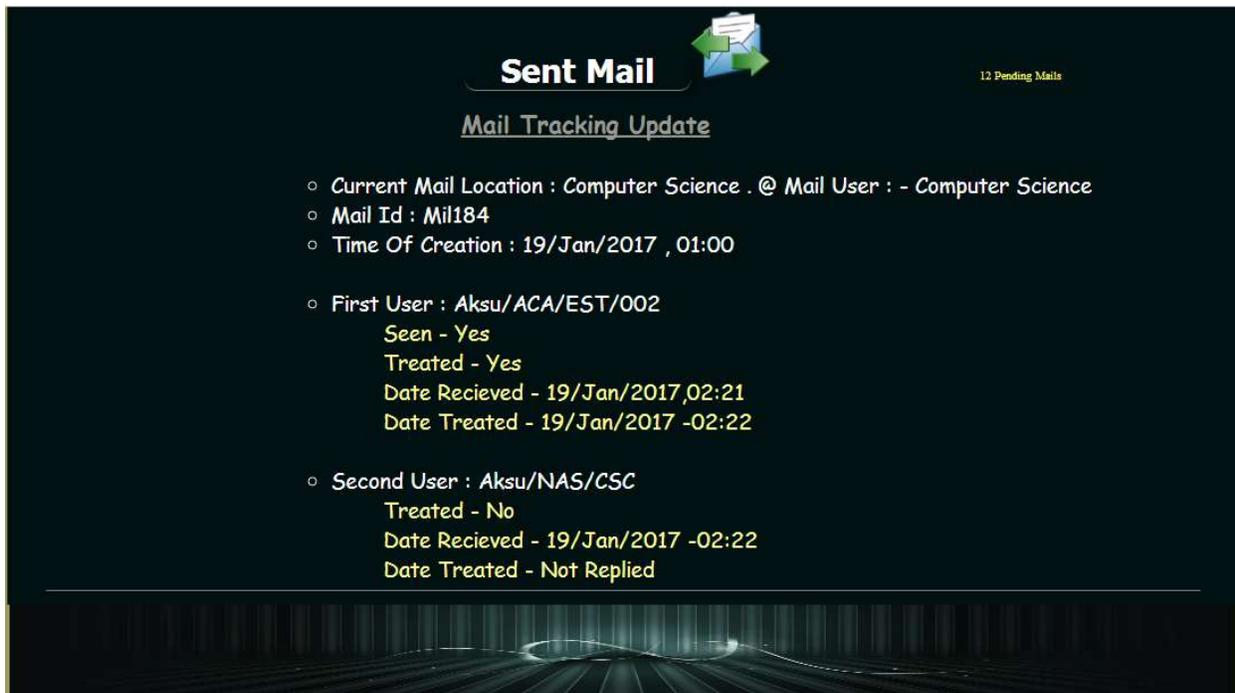


Fig. 8: Online Mail Tracking



Fig. 9 is an interface with functionality which allows mail senders to track the status of their mail online. It is available for both single and multi-users mailing and contains details such as the time a mail was created, who the first recipient and second recipient of the mail where, was the mail received, seen and replied? Figure 8 shows the inbox page of a registered recipient while Fig. 10 represents the e-file archive module for every registered department which provides a backup storage to hold all the mails.

ID	Name	From	Message	Attachment	Date	Time	Status	Days
Mil197	Information	Aksu/ACA/EST/001	This event is a year T		26/Jan/2017	13:17	Untreated	0
Mil196	Tracking	Aksu/ACA/EST/001	This attribute is nece		26/Jan/2017	13:04	Untreated	0
Mil195	Payment	Aksu/ACA/EST/001	Register your school (		26/Jan/2017	13:19	Untreated	9
Mil190	INTRO	Aksu/ACA/EST/001	This chapter focuses	PTab	26/Jan/2017	13:13	Untreated	0
Mil189	believe	Aksu/ACA/EST/001	zdfmmmmmmmmmm		26/Jan/2017	01:00	Untreated	8
Mil186	Abstraction	Aksu/ACA/EST/001	Mailing in tertiary in		25/Jan/2017	13:12	Untreated	4
Mil183	TTTTT	Aksu/ACA/EST/001	GFEDTYTGJUYKUI	main	19/Jan/2017	16:06	Untreated	0

Fig. 9: SMS-based Mailing System Inbox Page

Id	Name	Folder	Uploaded By	Date	Time	Download
9	Outline	VC	Aksu/NAS/CSC	11/Jan/2017	13:44	Download
8	Meeting	Staff	Aksu/NAS/CSC	11/Jan/2017	13:46	Download
7	Result	Student Matters	Aksu/NAS/CSC	11/Jan/2017	13:46	Download
3	Result	Student Matters	Aksu/NAS/CSC	11/Jan/2017	13:44	Download

Figure 10: E-File archive



## 8. CONCLUDING REMARKS

The proposed SMTMS is designed to track mails that are created digital thus reducing the stress in the existing system. It is a reliable system where highly sensitive and relevant mails are passed around with control and guarantee. The proposed system is developed to help reduce delay and extensive administrative work load in mail exchange from one department to another. This is achieved by incorporating a SMS medium which minimizes the human intervention required in mailing. The major benefit of the proposed system is improved reliability in management activities as mails can be readily sent with an assurance of immediate and fast delivery and retrieval.

## 9. CONTRIBUTIONS TO KNOWLEDGE

In contribution to knowledge, the result of this work shows that the adoption of an SMS technology helps in fast mailing process thus minimizing the human intervention required in mailing and also strengthens the administrative workflow. As future work, the security of the proposed system will be analysed and enhanced.

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