A Localized and Secure Method for Transferring Bank Information by SMS for Persian Banks

M. Hassan Shirali-Shahreza
Computer Engineering Department, Yazd University, Yazd, IRAN
Email: hshirali@yazduni.ac.ir
Website: http://shahreza.shirali.ir

Mohammad Shirali-Shahreza
Computer Science Department, Sharif University of Technology, Tehran, IRAN
Email: shirali@cs.sharif.edu
Website: http://mohammad.shirali.ir

Abstract—Nowadays m-banking (mobile banking) is widely used in many banks. It has embarked upon supply of various services based on different systems and with the aid of various services such as the Short Message Service (SMS). However in developing countries such as Iran, m-banking is facing some challenges. One of these challenges is the issue of language of this system, because the main language of this system, in both side of bank system and customer mobile phone, is English. Also one of the main issues in m-banking services is the security of the systems.

For solving the above problems, we proposed a method in this paper. By this method we send secure banking messages as well as Persian SMS for mobile phones even they are lacking the support of Persian language. In this method, the Persian SMS message is changed into an SMS picture message and this picture is sent to the customer. Therefore any mobile phone can receive the message correctly in Persian language and also the security of sending the message is increased.

This project is written in J2ME language (Java 2 Micro Edition) and has been implemented on Nokia mobile phones, models N71, 6680 and 3310.

Index Terms—Localized M-Banking, Mobile-Banking (M-Banking), Persian Language, Picture Message, SMS (Short Message Service).

I. INTRODUCTION

A. Background

After expansion of the use of mobile phones and advancements in mobile communication, mobile phone companies decided to add some extra features to their mobile phones in order to attract more customers. One of the first services offered on the mobile phones was the short message service (SMS). SMS is the transfer and exchange of short text messages between mobile phones. SMS is defined in accordance with standard of GSM digital mobile phones. According to GSM03.40 [3], the length of message exchanged is maximum 160 characters stored in 140 bytes based on the data saving method under the standards. These messages can be a mixture of letters and numbers and even non-text binary form. With the use of the same binary messages, pictures can be also sent which names picture message [4]. Of course these pictures are only in two colors and of a low quality. Exchange of SMS is done indirect and through an SMS agent (SMSC). The following can be named as some of the advantages of SMS [5]:

1. No place restriction: In mobile banking, one can do banking transactions from any place in the world.
2. High penetration coefficient: The high penetration coefficient of mobile network in the world, guarantees the development and success of mobile banking services.
3. Fully personalized: Mobile phones are strictly private and are used only by their owner. Therefore it increases the possibility of user authentication.
4. Availability: Most of the people keep their mobile phones at their side, both indoors and outdoors, and therefore, the customers can be served any moment.

In general, the mobile banking has been well received as it increases the convenience of the customers and reduces banking costs.

To exchange information with the customer, services such as Short Message Service (SMS) or Multimedia Messaging Service (MMS) can be used.

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• Communication is possible when the network is busy;
• We can exchange SMS messages while making telephone calls;
• SMS messages can be sent in offline mode.
MMS is a technology that allows a user of a properly enabled mobile phone to create, send, receive and store messages that include text, images, audio and video clips. Using MMS has benefits such as sending pictures of larger size and don’t need to send multiple SMS for a long message.

But it has some disadvantages such as:

- More costly
- Not available in some countries
- Imposes a heavier load on the network

B. Problems

Considering the numerous advantages of SMS and especially the low cost of this service, it has been well received by the Iranian people as well especially by the youth.

Iranian banks have also embarked upon using SMS to offer their banking services. This has been also well received by the customers, because, as mentioned earlier, the cost of SMS is low and SMS can be sent while network is busy as well. However, there are some problems here. One of the problems is the security issue and the other is the fact that not all mobile phones support Persian language.

One of the services offered in mobile banking is sending notifications and alerts as well as the information requested by the customer. These services can be provided through SMS [6]. While sending SMS, the messages can be sniffed on the way and stored by a hacker. This is very important especially in cases when important and sensitive messages are communicated.

The other problem is that not all mobile phones support Persian language. Therefore, due to uncertainty of the support of Persian language by all mobile phones, the Iranian banks do not send SMS in Persian but rather in English letters or Finglish.

Of course due to the fact that most users in Iran are not fully familiar with English, most of the banks do not use English for sending SMS and prefer to use Finglish instead.

Finglish is in fact Persian language in English script. For example, instead of "سلام" they write "Salam". Also most of mobile phones support only Arabic language and therefore do not support the four letters of "ش", "ض", "ط", and "ظ" which are exclusive to Persian language.

Therefore, some people prefer to send their messages which include these four letters in Finglish.

Using Finglish has imposed some deviations on Persian language and has even changed the people’s dialect to some degree. Therefore a solution should be sought.

C. Solution

As indicated in the background subsection, two-color pictures can also be sent via SMS. One of the proper strategies to solve the said problems is to send Persian SMS in picture message format. In this form, if somebody wants to automatically extract the message, he should use a Persian OCR (Optical Character Recognition) program. Considering the large number of SMS exchanged every day and the weakness of Persian OCR programs, automatic extraction of information from SMS picture message is a difficult and time consuming process with low chance of success. Also, here is no problem of supporting Persian language. The next section will explain the suggested method and its implementation in full. In the final section the conclusion will be made.

II. OUR SUGGESTED METHOD

The issue discussed here is the possibility of a safe transfer of banking information as well as sending Persian SMS in a manner to be displayed by all mobile phones. In order to solve these problems, this paper suggests sending Persian SMS message in the form of an SMS pictures message.

This method is simple. The concerned program receives the input text. This text is then converted to an SMS picture message and finally sent to the customer (Figure 1).

A. Overview of System

The proposed system consists of two parts:

1- Bank server which is sending the messages.
2- User client which runs on the user mobile phone and receives the message.

The user must be registered in the bank system before and enter his mobile phone information. The reason of doing this procedure will mention in the next subsection.

The information to be sent to the customer is prepared by the bank system. This information is extracted from the database. The information is converted to black and white images and sent as some SMS picture message. The SMS picture message format is selected according to the user mobile phone information.

The user’s mobile phone is only needed to capable to receive SMS picture messages. Nowadays this feature is almost available in all mobile phone models.

B. System Requirements and Designing

The server database model is selected by the bank according to the circumstance and requirement of that bank. Therefore we do not suggest any model and in our implementation, our program only receives the information from a resource which can be a database or other resources.

Figure 1. An screenshot of our program.
For sending the messages, we use a Nokia mobile phone. Our program is written in J2ME (Java 2 Micro Edition) language. J2ME is a special version of Java language for small devices such as mobile phones and PDAs (Personal Digital Assistant). Most of the mobile phones support Java. Therefore, it can be implemented on many types of the mobile phones.

The SMS picture messages do not have the same format on all mobile phones and each mobile phone brand has its own special format. So it is not possible to use a same format for sending an SMS picture message to different mobile phones from different brands. For example SMS picture messages format in Nokia mobile phones is OTA, but this format is not supported by Sony-Ericsson or Siemens brands and their mobile phones cannot show the SMS picture messages which are sent by Nokia mobile phones in OTA format.

For solving this problem, it is necessary to identify the recipient mobile phone brand before sending the SMS picture messages for it in the proper format. For achieving this goal, each customer should enter his mobile phone IMEI code when registering in the mobile banking system.

The IMEI number is a 15-digit number which is unique for every mobile phone and it is used to recognize the GSM/DCS/PCS mobile phones in network services. This number has various usages such as the recognition of the stolen mobile phones. Since the beginning of 2003, its format is NNNXXXXXYY-ZZZZZZ-A. The first 8 digits (NNXXXXYY) are the verification code of the respective country. The next six digits (ZZZZZZ) are the serial number of the mobile phone and the last one digit is a control-related number.

It is possible to identify the mobile phone brand using this number. Therefore when the bank receives a request from a customer, it can detect the brand of mobile phone and sends the prepared SMS picture message in a proper format which is compatible with that mobile phone.

Since we use a Nokia mobile phone to send the SMS picture messages, the pictures are converted to OTA format.

The SMS picture message format in Nokia mobile phones is OTA. The structure of this format is as follows [5]:

The header of this format consists of 4 fixed bytes, is as follows:

- Byte 1) 0000 0000 (→ 0)
- Byte 2) 0100 1000 (→ 72)
- Byte 3) 0001 1100 (→ 28)
- Byte 4) 0000 0001 (→ 1)

As you can see in the above header, the second and third bytes indicate the height and width of the picture.

The structure of the body of the picture contains the pixels in 0 and 1. The amount of each pixel is saved in one bit. In each bit, 0 indicates the black and 1 the white color. Thus, every 8 pixels are saved in one byte. The order of saving of the pixels is from the left to the right and from the top to the bottom of the picture. Considering the size of the picture, the entire size of an SMS picture message is 256 bytes (Figure 2).

As the size of SMS picture message is normally 72×28 pixels, a limited size of text can be accommodated in the picture. As the size of Persian letters is not the same, a precise size cannot be determined for each line, but 2 lines and in each line 8 to 11 characters, i.e. a total of 16 to 22 letters can be accommodated in a picture message.

In some new enhanced mobile phones the feature of sending SMS picture messages is disabled, although these mobile phones hardware have capability of sending SMS picture messages.

For solving this problem there are two solutions:

1- Using AT Commands: AT Command instructions are in fact created as a protocol for interfacing and control of modems. As mobile phones can also be used as a modem, these instructions exist in mobile phones as well. In addition, by adding some special instructions, the mobile phone has become capable for other works such as sending or receiving an SMS picture messages.

2- Using mobile phone programs: Some mobile phone developers are publishing programs which are able to send SMS picture messages by using the mobile phone hardware features.

Because in this project we are using an enhanced Nokia mobile phone for sending the SMS picture messages, we faced the above problem. However in the final implementation, this problem does not exist, because instead of using a mobile phone, the SMS picture messages are sent by an SMS gateway program running on a computer. Our solution for this problem and results of our implementation is described in implementation subsection.

C. System Implementation

At first, the information to be sent to the customer is being prepared by the bank system. After receiving this information, our program separates 18 letters and saves them as the form of two lines in an SMS picture message (Figure 3) and repeats this action until the entire text is stored in the form of picture messages.

Of course, regarding to the MMS specifications, we can add the feature of sending the information through MMS instead of SMS picture messages as an optional choice.

In order to send the SMS picture messages, the Nokia N71 mobile phone is used. As we mentioned before, in some new enhanced mobile phones like Nokia series N phones, the feature of sending SMS picture messages is disabled, although these mobile phones hardware have capability of sending SMS picture messages.

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1- Using AT Commands:
2- Using mobile phone programs:

According to the above problems, we used both methods solutions for solving our problem.

First we send our SMS picture messages using AT Commands.

In order to send the SMS picture messages by AT Commands, the Nokia N71 mobile phone is connected by a USB cable to a desktop computer. Then the prepared picture is first placed in an SMS based on the SMS standard.

Considering the form of SMS picture message for Nokia mobile phones (OTA format), the process of changing the text into SMS picture message is carried out quickly and in less than a second and does not need heavy processing.

The convertor program is written by J2ME programming language.

For compiling the programs, we use Sun Java Wireless Toolkit for CLDC. We also use Java 2 Platform Standard Edition Development Kit 5.0. For developing our program on Nokia mobile phones, we use use Carbide.j software.

The software consists of two classes. One of these classes is responsible for implementation of program GUI (Graphical User Interface). This class, which has been extended from "Form" class, receives the information from the bank system.

The other class of this program is creating SMS picture messages from the inputted information. In this class, first an image object is created. This image has the standard OTA format size, i.e. 72×28. Then the information is written in the image using drawstring command. The image font is monospace, its style is plain and the size of font is medium. The information is written in two lines.

Now the image is converted to the OTA format. For this purpose an array integer with the size of 72×28 is created. Regarding to the image object, each cell of array get the value of 1 (means black color) or 0 (means white color).

Finally the program saves the array as an OTA file with the algorithm which is described in previous subsection. For saving the file, the program used JSR75 Optional Package (FileConnection API). This optional package enables program to has access to files and directories existing on such devices as mobile phones through presentation of FileConnection API. By using it the program can create, read, and write files and directories on mobile phones and on memory cards installed on mobile phones [7].

If the information message is bigger than one standard SMS picture message, the program is run repeatedly until the whole of information is converted to multiple SMS picture messages.

Then our program sends SMS picture messages through the mobile phone by the use of AT Command instructions [8].

The time for sending each SMS picture message by AT Command instructions and using a Nokia N71 mobile phone was about 3 seconds.

This method is very complicated, time consuming and cannot be used in anywhere.

Then we use a mobile phone software for sending the SMS picture message. In this project “Symot DrawSMS” software [9] is used for sending SMS picture messages by Nokia N71 mobile phone (Figure 4).

This program gets the picture in one of the GIF (Graphics Interchange Format), JPG, BMP (Bit Map) or PNG (Portable Network Graphics) formats. Then send it as an SMS picture message.

We use this program for sending our SMS picture messages, because this method is faster and easier than previous method and also does not need any special resources.

Our program was tested by a Nokia 3310 mobile phone which is a simple and old mobile phone with black and white screen (Figure 5).

Also it was tested by a Nokia 6680 and Nokia N71 which are series 60 3rd generation mobile phones. The SMS picture messages were received and displayed correctly (Figure 6).

III. CONCLUSION

This paper presents a method for sending secure banking messages as well as Persian SMS for mobile phones lacking the support of Persian language.

By using this method, there is no need to use Fingilish (writing Persian using English script).

Also different Persian fonts such as Badr, Nazanin, Zar and so on can be used for writing messages which add to the beauty of the message text.

The advantages of this method include low cost, no busy telephone lines, compatibility with old mobile phones -as we tested on a Nokia 3310 mobile phone- and availability of SMS in all countries.

This method can be used for sending Persian advertisement SMS addressed to a large group of users with different mobile phones without worrying on the problem of reading the Persian message. Even, a small picture can be accommodated in the advertisement to make advertisement attractive.
The above method can be used not only in Persian but in other languages such as Arabic, Chinese, Greek, etc. Considering the significance of Persian language in the multi-thousand old civilization of Iran, organizations such as Iranian banks and Iranian Telecommunication Company should use such methods for sending banking messages and their advertisements in Persian.

REFERENCES


M. Hassaan Shirali-Shahreza is an assistant professor in the Computer Engineering Department, Yazd University, Yazd, IRAN. He was educated at Isfahan University of Technology, Isfahan, Iran (B.Sc., Computer Hardware Engineering, 1986), Sharif University of Technology, Tehran, Iran (M.Sc., Computer Hardware Engineering, 1988), and Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran (Ph.D. Computer Hardware Engineering, 1996). In 1994 he was a visiting research scholar in the Electrical Engineering Department, Southern Methodist University (SMU), Dallas, Texas, USA.

His interesting fields are Genetic Algorithm, Neural Networks, OCR (Optical Character Recognition), and Pattern Recognition.

He is a, member of Iranian Computer Society, Iranian Society of Cryptology and a senior member of IEEE.

Mohammad Shirali-Shahreza is an undergraduate student in computer science at Sharif University of Technology in IRAN. He got his diploma from Allameh Helli high school, Tehran, IRAN, that is a school for exceptional talents students.

He is selected as “Iranian Distinguished University Student” in 2008.

His project on Steganography won the best prize of 5th Iranian Khwarizmi young festival.

He has 61 accepted papers in international conferences, nine published papers in journals, one book and one Iranian patent.

He won the “undergraduate youngest research award” from Iranian Society of Cryptology (2006), "the young researcher award" of IEEE ICTTA 2006 conference and "the young researcher award" of the 11th International CSI Computer Conference.

He is a student member of IEEE and Iranian Computer Society. His research background includes Steganography, CAPTCHA, mobile programming, and e-learning.