

Ubiquitous Information Gathering with SMS Query Service

Yousef Awwad, Chia-Feng Lin and Shyan-Ming Yuan
Department of Computer Science,
National Chiao Tung University,
Hsinchu 30010, Taiwan

Abstract: - The use of mobile phones by all generations; young and old people, and the wide spread of the short message service SMS because of the low cost and ease of use have made us to think of employing mobile phones with SMS to enable the learners to get information and knowledge every where and any time. Learners who visit museums or parks like to learn about the contents and keep the information they acquire for longer time easily. So our system enables the learner to do that by SMS query. The learner send the number of any item to central phone number (server number) then he receives the answer in short time and low cost.

Key-Words: - SMS, Information Gathering, Mobile Learning, Museum, GSM Modem, Mobile phone

1 Introduction

Mobile learning can make use of the mobile phone device and the short message service to enable the learner to get information anywhere and anytime. The short message service (SMS) was developed as part of the Global System for Mobile Communications (GSM) and it allows mobile systems and other network-connected devices to exchange short text messages with a maximum length of 160 characters [1]. Stone and Briggs have shown that SMS has a quicker response time for interactive activities in education than email on the web especially for young people [2]. Kadirire showed that SMS can be successfully used during group discussions in schools or business settings. It preserves anonymity, which allows people to articulate their views without fear of being criticised and is relatively easy to use. In such a system, a small frame piece called stickie which is consisted of message, sender information, and time stamp, etc, is introduced. The stickies can be showed (or projected) on screen of LCD projector to inform the speaker or presenter that there are someone who post a question or comment. The stickie is associated with a colour attribute which gets fading with the time goes on to indicate how long it has been posted [1]. SMS can also be used to access banking details, local information services like traffic announcements, and weather forecasts, etc [3].

By comparing the response time of SMS and email, Stone & Briggs have shown that SMS has a quicker response time for interactive activities in education than email on the web. A possible

explanation is people always carry with mobile phone but not always on the web [1] [2].

Thornton and Houser [4] made a poll to 333 female Japanese university students regarding their use of mobile devices. They found that email (or short message service) was the most utilized mobile phone feature. Students reported making relatively few voice calls (a mean of 7 calls per week). In contrast, students reported exchanging on their mobile phones an average of almost 200 email messages each week (with an average length of about 200 characters each).

Our system is designed to give the learner brief text of information while he is visiting a museum or a park where he can make a query using unique number. SMS is quick and easy to use, and in our approach the learner needs only to type a number which makes typing and using phone keypad easier. The National Palace Museum in Taipei /Taiwan uses an audio device. Visitor borrows the device and pushes a bottom to play audio about an item in the museum. But in this way the documentation is difficult because the audio is played quickly and the visitor will watch many items inside the museum. In our system the visitor will receive the information as a text on his mobile phone which enables him to review and store it.

2 Methodologies

A museum or a park where each item has a unique number written on a card with the system phone number (server number) that identifies the place, visitors to that place may like to learn about some items there. The place may be wide that makes SMS is the best way to communicate with

information sever in comfortable way. So the visitor only writes the item number in SMS message and sends it to the system server using system phone number. After that, the visitor will receive a message in SMS format contains information about that item. Figure 1 describes the inquiry process.

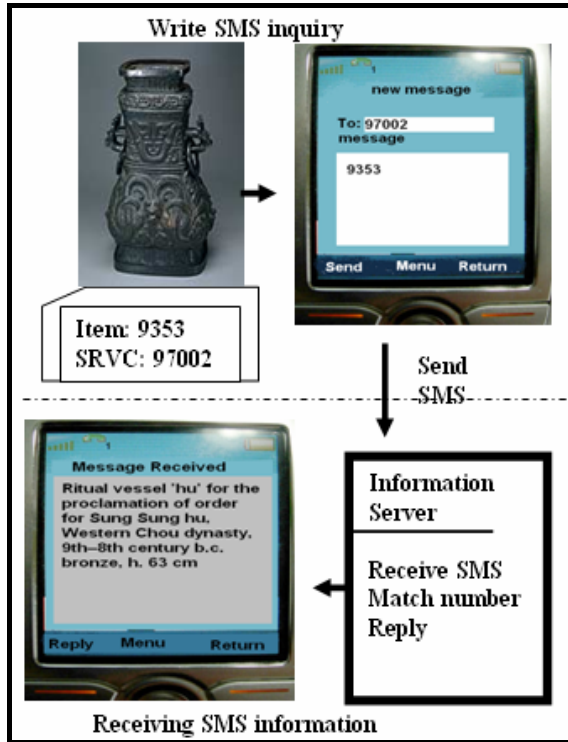


Fig1. Data flow between learner and information server

The time period for the whole process using the SMS depends on the time needed to send and receive the message, in the average it is 0.71 seconds for sending SMS via the COM port to the mobile phone measured for serially injected message [5], then it takes around 5 seconds to reach the destination according to our experiment using Chung Hua telecommunication network in Taiwan, in our case the time will be doubled since it is for sending and receiving. Also it depends on the time needed to write the SMS contents and the server phone number, in our case the message content is very short and they are only digits that most mobile phone users used to type quickly. So the total process for normal user will be around one minute for each item.

The cost of this query service in museum or park depends on the cost of the SMS message. In Qatar the ministry of interior offers very cheap SMS services such as traffic violation inquiry and official documents expiry information for public [6]. Prepaid cards can be used for charging this service, another way is to use a counting function in the

software to count and calculate the cost for the visitor.

The number of digits used in the unique card number depends on the number of items exist in the museum or the park. It is recommended to use short number if possible to enable the learner type it quickly. The server phone number digits are assigned from the mobile operator. Some mobile phone companies give special numbers for special services.

3. System overview

The idea of the system is to make use of one of most popular wireless service that is SMS. Our research uses the SMS architecture in addition to some equipment (system hardware) as shown in figure 2.

3.1 Hardware

The system hardware contains the following:

1. Desktop personal computer (Pentium PC) which has the hardware equipped to support the communication links for the system operation and operates as a server.
2. GSM data cable to connect the GSM phone with the PC.
3. GSM phone to send and receive SMS over the GSM network that contains Base stations (BS), mobile switching centre (MSC) and short message service centre (SMSC).

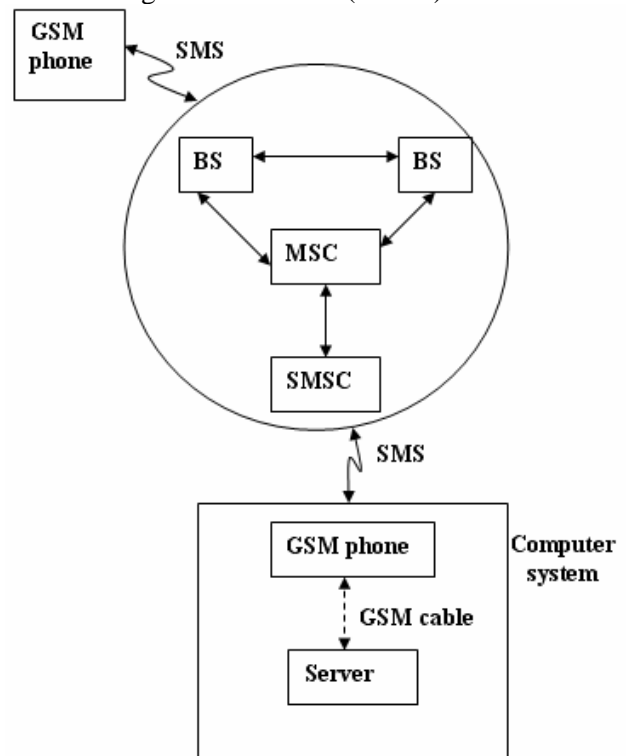


Fig2. System Environment and Hardware

3.2 Software

The system software uses .NET framework, open source GSM library for sending and receiving message from the computer to the mobile phone and access database which contains a table for the information according to a unique column number.

Note: there are four used numbers in this design; system phone number for the GSM modem, Sender phone number, received number which is a unique number sent by learner in the message to query the item and stored number that represents the item number in the database.

When the learner sends a message to the system phone number; the software will receive it and does the following:

1. The software calls event handler every specific time to check if the GSM modem has received new messages or not.
2. It retrieves the SMS message plus the sending mobile phone from the GSM modem using the GSM library.
3. It takes the message content that is a unique item number and matches it in the database using SQL commands.
4. If the received number matches the stored number in the database, the software calls the information from the table and compares the length with the SMS message length, if the information length is more the software divide it to pieces, each piece is less than SMS message length to guarantee the delivery of all information.
5. The software sends SMS of information pieces to the sender phone.
6. The visitor receives the SMS, and he can collect information as much he wants.

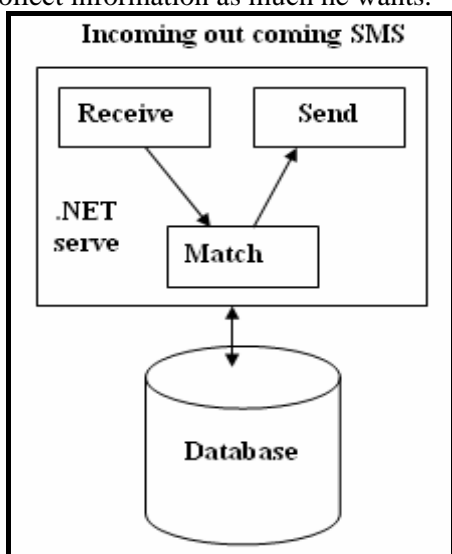


Fig3. System Software Structure

3.3 Database overview

Whenever server receives request form phone, it will check the index table as show in Fig4. It use Server number and item number as unique identity. After check the item number, it got a message about the item. Then response the message back to GSM phone. Database should check the server number and item number can not be the same.

Index	Server number	Item number	Message	Accounting
001	0912345678	027	Something	3
002	0912345678	033	Something	4

Fig4. Item Index Table

The accounting field in index table means count how many time the message send. This information can be use for charging and analysis which one is popular.

4. Scenario

To demonstrate the usage of system architecture presented in this paper, a preliminary experiment was made in Ali Shan Mountain. The mountain which is considered one of the most beautiful sceneries in Taiwan is very wide with thick forests that make SMS is the best way to collect information in different places. A visitor to that place sees many sights which contains historical, natural and social elements. Each element has identifying card that shows its name and the age. There is a number on that card, for example in the Mikado Birds place the card number is 534 and the server phone number is for example 0912345678, so the visitor writes in the SMS message 534 and sends it to 0912345678, then he receives the statement "Mikado Pheasants: Syrmaticus, game bird, it is national bird in Taiwan. Lives in high mountains and inhabit bamboo forests. Lay 5-10 eggs in a clutch", then he can save it to do more research if he is interested in the topic. Figure 4 shows the real message in the mobile phone as a result of the SMS query service.



Fig4. Received SMS reply

4. Limitations

The main disadvantage of SMS is the limit of 160 characters on the length of the message. Our system enables the learner to receive more than one SMS message for each inquiry if the length of the related information exceeds 160. IEE Review may 1997 shows that SMS gets longer by using new compression standards and dynamic Huffman algorithms so that the SMS length will be 240 characters [7].

Another issue is the network coverage in the place. Nowadays mobile phone operators cover most of the area in the country. So the traveller can send and receive SMS every where.

5. Conclusion

This paper has described how to make use of a simple wireless service SMS to enrich mobile and ubiquitous information gathering. In a place where each item has unique number the learner can inquiry about it and receive the reply in short time. And then he can save what he received for future revision. Also the use of this system will be not profitable, so the learner will be charged the minimum value.

Our next step is to enable the learner to receive more information with different formats as audio, video or pictures by using multimedia messaging service MMS or extended SMS (SMSX).

References:

[1] Kadirire, J. The short message service (SMS) for schools/ conference , 3rd International Conference on Multimedia and ICTs in Education (FORMATEX 2005), Caceres/Spain. 2005

[2] Stone, A and Briggs, J. "ITZ GD 2 TXT – How To Use SMS Effectively In M-Learning" Mlearn 2002.

[3] Garner, I, Francis, J and Wales, K. "An Evaluation of the Implementation of a Short Message System (SMS) to Support Undergraduate Student Learning". Mlearn 2002.

[4] Thornton, P., & Houser, C. Using Mobile Phones in Education, 2nd IEEE International Workshop on Wireless and Mobile Technologies in Education (WMET'04), 2004

[5] William Enck, Patrick Traynor, Patrick McDaniel, and Thomas La Porta. "Exploiting Open Functionality in SMS Capable Cellular Networks". the 12th ACM Conference on Computer and Communications Security (CCS'05) November 7-11, 2005, Alexandria, VA, USA

[6] State of Qatar, ministry of Interior, <http://www.moi.gov.qa/English/Services.htm>. march- 2006.

[7] IEE MAY 1997, Personal Communication, Short Message gets longer.