

The Gong System

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ABSTRACT

We have developed a system called 'Gong' intended primarily for educational use. With the Gong system students and teachers can operate a text/audio board within a browser. Groups of people can talk to each other with text and/or audio chat. A web-based administration module provides ease of managing the system. The system has been deployed in real-world teaching environments.

In addition to pedagogical issues we learned a number of lessons related to real-world project development from this project, and these are also briefly discussed.

Keywords

Voice board, audio, text, distance learning, student

INTRODUCTION

The Internet has rapidly advanced into a medium which can be effectively used to support teaching and learning. Students of every age may learn at home, using their family PC to learn through the Internet. However, many previous and current attempts at using the Internet for this purpose have failed, possibly due to a lack of appreciation of the different nature of the Internet compared to conventional face-to-face teaching. For example, a great majority of Internet-based teaching simply copies the format of a textbook; that is, a page-by-page methodology is employed. Yet studies have shown that the majority of people cannot read text from a computer screen for any great length of time. This problem is particularly acute in language learning where practice in speaking and listening in the target language is essential.

Technology now allows communication through the Internet to move beyond text-based communication. What may better serve Internet-based teaching is to support communication through non-textual formats. With this in mind, a tool that supports Internet-based audio communication has been developed. We have called it 'Gong'. The idea of the system is that it will be used by multiple students and instructors, supporting both real-time communication and immediate access to the complete history

of recorded communications, extendable with further recordings at any point in time.

OVERVIEW OF THE SYSTEM

To address this, we have created a recordable, real-time audio communication system. The system is especially useful for language learning since it provides students with the chance to practice their language in a non-threatening environment in the comfort of their homes and at their own pace. The system currently has the following properties:

- Different areas can be set up for different groups of people to participate in a text and/or audio discussion board
- Voice messages can be recorded and played back in an audio discussion board
- Further responses, such as instructor comments, can be recorded and added to any existing voice message in the audio discussion board at any time
- The audio conversations can be automatically recorded in the discussion board
- The system is appropriately configurable by instructors through a simple easy-to-use interface

Practical usage of the system includes both distance learning courses as well as those which are not taught over distance but which would simply benefit from an efficient tool for complementary real-time transmission and appropriate storage of sound. The system may potentially be applied not just to those areas of tuition which naturally employ some kind of audio component, such as language courses, speech therapy, and learning to play a musical instrument, but which can be employed as a tool to support ongoing group discussion of any subject.

EXAMPLE SCREEN DISPLAYS

Students can access and use a Gong web board using any machine connected to the Internet. Figure 1 below shows a section of a web board used for an English language course. A list of audio and text messages is shown that can be selected and played. New messages can be added at any time.

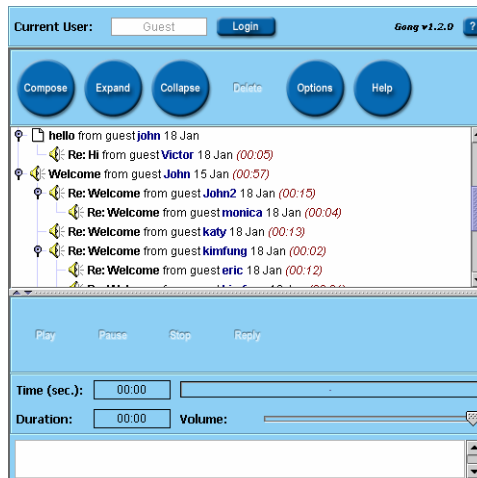


Figure 1. An example of the Gong system being used by a student, showing audio and text messages left by other students

In Figure 2 below one of the pages in the administration tool is shown. Audio web boards can be created and managed using this administration tool.

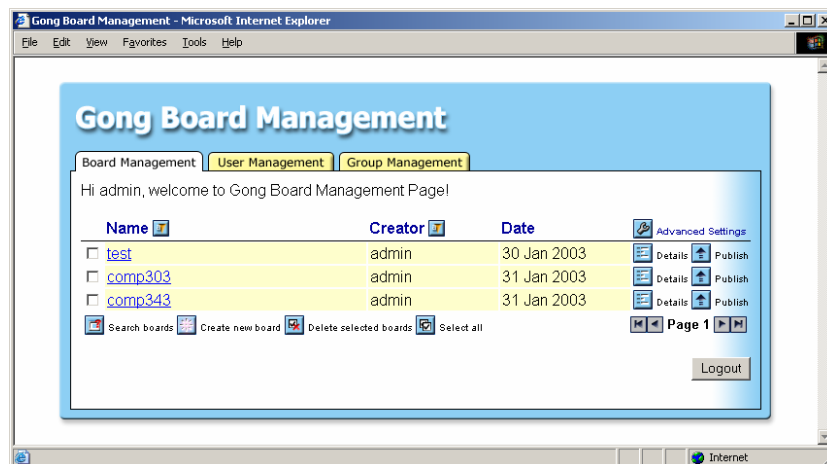


Figure 2. An example course-management screen showing two courses within the Gong system

More screen captures can also be found in the Gong website at <http://www.cs.ust.hk/gong/shots.html>.

An early version of the system was adopted for trial usage both in the Language Center and the College of Lifelong Learning (CL3) at the Hong Kong University of Science and Technology.

DISTRIBUTION

The Gong project is freely distributed at <http://www.cs.ust.hk/gong/>. The web site is shown below in Figure 3.



Figure 3. The Gong web site

The Gong system is available to anyone to download and try or use. There is no time limit or payment required. Useful general information about the Gong system is also distributed on the Gong web site, including guides for installation and usage.

As part of a dissemination effort, information about the Gong system was distributed last year to participants in the WorldCALL 2003 conference in Banff, Canada, in the form of a leaflet, and Gong has been featured at a variety of HKUST educational events. The Gong website has also been submitted to public search engines such as Google.com and Yahoo.com to increase web site traffic and general awareness.

DEVELOPMENT ISSUES

The majority of the Gong system was written using Java. Java can be regarded as a 'free' development solution. For students, the Java execution environment is freely downloadable from the Internet for installation on their computers. For the developer, tools to assist with Java programming are freely available. However, we found that when the Gong system was applied in a real-world situation with 80 or so students using their own computer systems, approximately 20% of the computer environments could not be used to run the Gong system. Investigations revealed problems with the Java installation process and Java itself, particularly the low-level code which is used for Internet communication.

After the basic system was developed so that asynchronous communication (simple text and audio messages) could take place, we extended it so that synchronous communication (real-time chat) was possible between students and teacher. The idea of this feature was that students and instructor could participate in an on-line audio chat session. During chatting the audio is automatically recorded by the system. Then, when chatting is finished, the audio is immediately available in the form of audio messages posted to the voice board. Students and the instructor can re-play the audio recordings as many times as they want, and can reply to them just as they would to normal web board messages. However, testing showed that this form of communication was unreliable. Investigations indicate that the Java communication code used may not operate properly. Consequently, at the time of writing this feature has had to be relegated to unsupported status.

A further issue unrelated to the Java language itself was that of firewalls. A firewall is a restriction placed on Internet communication. Traffic can be partially or totally blocked. However, a typical user may not even be aware that a firewall is in operation. This means that during the development phase it was common to encounter a student or instructor who believed that that Gong system simply was not working, when in fact the problem was one or more firewalls which were restricting Gong communication. The Gong system had to be re-designed in order to best work around this restriction. However, firewalls are increasingly becoming an issue with this kind of Internet communication software and, furthermore, as firewalls are typically configured by technical staff, the average user has very limited knowledge from which to appreciate this issue. Often the user is at the mercy of technical support staff to re-configure the firewall to permit Gong communication.

CURRENT WORK

Work is in progress in developing the Gong system and, depending on funding resources, it is hoped that the following items will be addressed.

1) Make Gong work on all computers. As described before, because of the differences in different versions of Java, not all PCs can currently run the Gong system. To eliminate this problem, we need to modify Gong so that it uses version(s) of Java which all machines can interpret.

2) Multi-language support for Chinese characters. As a language-learning tool, it is preferable that Gong have the ability to display different languages. It is especially important to display Chinese characters to support Cantonese and Putonghua learning.

3) Increase the speed of the system. Currently, the files are read from the disk when data is needed and the files are written to the disk when modification is applied. The speed would be greatly increased if all operations were to use data stored in the memory.

4) Extend the Gong System with reliable network transmission. Because of network security issues, it is not an easy task to reliably establish transmission between any two computers on the Internet. In order to improve the reliability of the system, we need to create our own network component.

SUMMARY

We have developed a free, configurable voice board system. Gong can be used as a complement to a face-to-face course and, to an extent, it can be used to replace face-to-face teaching, as was the case during SARS. It has been used with the HKUST College of Lifelong Learning (CL3) courses and HKUST Language Center courses. However, the large variety of real-world software environments has highlighted the need for further testing and adjustments to suit such environments.