Distributed IM System

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Abstract: **With recent changes in the technological and political climate, secure communication is becoming more and more necessary. There are many solutions to this problem already in existence, but they tend to have very complex interfaces. The purpose of this project is to create a censorship-resistant chat protocol and client that uses a simple and clean interface. This study explores the results of designing such an interface by way of user testing. Participants are asked to complete a series of tasks that would be common to using the chat client while their actions are recorded.**

Keywords: Instant messaging, chat, task-based user testing, interface design

I. INTRODUCTION

There is a number of different instant messaging, or IM, systems used today, all with various interface designs. However, many of them do not value security of communication very highly. For this project, we wanted to design an interface that provided the most desired features in an instant messaging client while providing a secure censorship-resistant backend. Many secure chat systems already exist, but they tend to be difficult to set up and utilize since they are typically made by developers, for developers. Through the use of a focus group, we determined which design features were necessary to include in our interface. We then tested our design choices with a sequence of user tests to determine how well our interface met our design goal of a simple interface on top of a more complex system.

II. SYSTEM DESCRIPTION

Based on the discussion of IM systems with a focus group, we determined that users wanted:

- Systems with a simple interface.

- Customizable options for message notification (sound, etc), blinking to signify receiving messages, and a count of unread messages from contacts

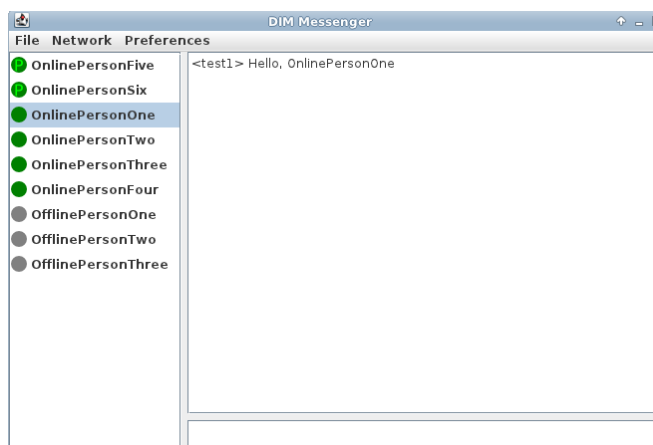- The ability to pin certain contacts to the top of their contact list

Figure 1. Screenshot of Distributed IM Interface

We included many of these features in the interface design. To increase simplicity, we limited the number of menu options and kept the design free of superfluous graphics. To incorporate customization, users are given the option of turning on/off sounds and blinking when a message is received and when a contact changes their online/offline status. The users can also set certain contacts as "pinned", which moves them to the top of the list.

Previous studies on IM usage [1] have shown that most IM users are engaged in other activities on the computer, such as browsing the Internet or working on documents, while having conversations. In order

to reduce the number of windows and conserve screen space, we decided to have the contact list be part of the chat window, as opposed to some systems that have the contact list as a separate window.

III. APPARATUS/METHODS

A. Participants

We ran 12 Vanderbilt students as participants in our study; 3 sophomores, 3 juniors, 5 seniors, and 1 graduate student. Out of the 12 participants, 9 were from the College of Arts and Science, 2 were from the School of Engineering, and 1 was from the Peabody School of Education. 3 of the participants were in the 18-20 age range and the other 9 were in the age range of 21-25. Of the participants, 7 were female and 5 were male.

Platform familiarity was recorded for each participant, but the data was not highly relevant since operating system usage was not involved in the testing. All participants were familiar with using a laptop, which was utilized in the testing of the IM system. All participants were familiar with instant messaging software; however, there were few consistencies among all participants. The most common chat systems used were Skype and AIM with 9 participants having past experience with them. Other chat systems were used less frequently, but could still contribute to ease of use.
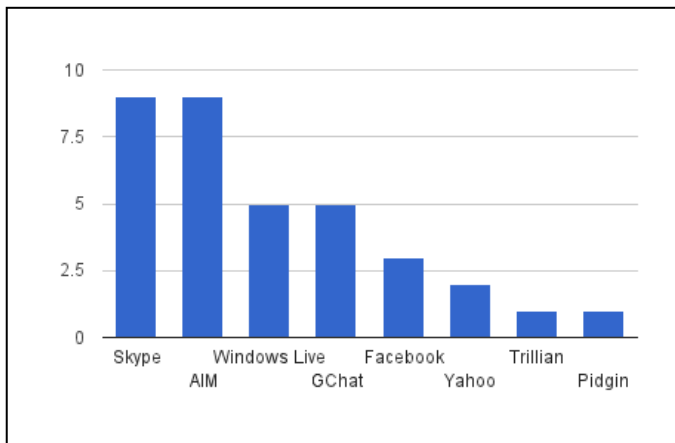

Figure 2. Graph of Chat Clients Used

The participants were drawn from various majors and schools in an attempt to attain a broad range of technological familiarity levels; however, this was not included on the survey. One of the participants was a native Japanese speaker, and they had difficulty understanding some of the English terms that were used in the system. Further testing with the English as a Second Language demographic should be done.

There were no important screening criteria for participants, with the exception that we wanted to test Vanderbilt students. All other criteria were left unfiltered.

B. Experimental Design/Apparatus

The purpose of the test was to determine the ease of use of our chat client. Since no comparison was to be made between our chat client and other clients or between the behavior of some participants and others, we opted for a within experimental design.

Participants were tested in pairs for one trial and presented with one laptop each with the chat client open and prepared in the center of the screen. Participants were introduced to the experiment with a brief summary of the system and the goals of the experiment. Participants then completed a pre-test demographic survey. After the survey was completed, the participants were issued with a list of tasks to perform in sequence while all interface actions, such as clicking buttons and opening windows, were logged for later analysis.

Several of the tasks assigned were unique (or near unique) to our client and were included in the test. These are contact pinning and settings importation. Since our client operates on encryption keys rather than a user name, and all contacts are stored locally, users must import and export settings files for backup. If a user loses his or her private key, he or she can no longer send or receive messages from the network. A task to import a dummy settings file was included to test how users handle this unfamiliarity.

The second major difference was contact pinning and unpinning. Many chat clients include a 'user group' functionality, which we decided not to include in this iteration of the client. Instead, we included a pin and unpin feature. This feature insures that pinned contacts stay at the top of the contact list rather than mixed in with other online contacts. The schema used to tier contacts is 'pinned and online', 'unpinned and online', followed by 'offline.'

As a part of this experiment, participants were instructed to chat with each other. Chat events, such as sending and receiving messages were logged, but the messages themselves were not. The purpose of this is to follow messages through the networking module to insure proper functionality rather than to test the interface. Another component of including a chat session is that our client does not include a 'send' button or indication of how to send a message. However, all participants quickly determined that the 'Enter' key sends the text present in the chat box. Furthermore, by including a chat session, we could get feedback from the participants on the formatting of text in the chat box.

Following the test, participants were immediately asked to complete a post-test survey that reviewed their subjective measurements of the difficulty of performing each task. Following that measure were three open-ended questions to gain feedback that could not be quantified.

There were not a large number of variables in the test. The only critical independent variable was the task performed, and the dependent variable was the time taken to complete the task. There were, however, several sources for error in the time measurements. Since the two participants did not use the same model of computer and touchpad sensitivities were different, the time taken to perform a task may have been different. There was also a bug on one laptop where the pin/unpin functionality did not behave as expected, which caused some confusion on the part of the participants, rendering much of the time data irrelevant.

IV. RESULTS

In the post-use survey, we asked how easy the chat client was to use and how easy it was to complete certain tasks using a scale from 1-9, with 1 being very difficult and 9 being very easy. For general ease of use, the average rating was a 7.33, with a standard deviation of 2.23. According to the participants, starting a new chat was the easiest functionality, with an average rating of 8.25 and a standard deviation of 0.87, followed by changing the notification settings, which had an average rating of 8.08 and a standard deviation of 1.16.

TABLE I.   STATISTICAL ANALYSIS

Task	μ	σ
Overall Difficulty	7.33	2.29
Add Contact	7.75	2.00
Import Settings	7.25	2.60
Pin Contact	7.5	1.73
Unpin contact	7.5	1.73
Start Chat	8.25	0.87
Change Settings	8.08	1.16

The standard deviations of the ratings given are rather high, but this was due to one participant whose responses were all outliers. This participant commented that she was unfamiliar with "chat terms," which made interacting with the software deviate from our expectations. Since the test was designed for users with experience using other systems, this causes a deviation in our data. We also included the analysis when excluding this participant.

TABLE II.   STATISTICAL ANALYSIS (EXCLUDING OUTLIER)

Task	μ	σ
Overall Difficulty	7.90	1.04
Add Contact	8.27	0.90
Import Settings	7.82	1.77
Pin Contact	7.73	1.62
Unpin contact	7.73	1.62
Start Chat	8.45	0.52
Change Settings	8.18	1.17

V. CONCLUSION

In conclusion, the design of this instant messaging interface was well-received by most participants. The extreme outlier commented that the terms were very difficult to understand since the participant is unfamiliar with "chat terms." Another instance where expectations deviated from the norm were in a participant who is a native Japanese

speaker. The participant "didn't know the English terms" used in the chat program. Given that these two mention language usage as a problem, it may be wise to revisit the language used in the software for simplicity and consistency.

Another common complaint in the comments was the lack of some expected reactivity in the program. This was most evident in the fact that, when chat sessions are empty, there is no significant change in the interface when selecting a new user. Some animation or other indication should be included to clear this issue up.

The most common complaint by far was the behavior of the pinning functionality. The pin/unpin button was located under a context menu when right clicking a contact, and was difficult for some participants to locate. Furthermore, there were several previously uncaught bugs in the pin/unpin functionality that caused confusion for the participants. On one laptop, the pin and unpin functionality did not work at all. The other major bug noticed was that pinning would work on the first attempt, but unpinning would take some time and/or multiple attempts to adjust the list. These bugs need to be resolved, and the pinning functionality should be made more apparent to the user.

Participants frequently mentioned that importing settings was unfamiliar to them, but not difficult to do. A better explanation of why this task is necessary could reduce confusion.

Outside of these, there was only one suggestion made to improve the interface. One participant suggested that the user names in the chat window be colored in order to more easily distinguish who sent which message. This is a common feature across many chat clients, so it will be worth including.

REFERENCES

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