AFFECTIVE GESTURE FEEDBACK INSTANT MESSAGING ON HANDHELD

A.K. Adesemowo*, W.D. Tucker†

Computer Science Department, University of the Western Cape, 7535, Bellville, South Africa
F: +27 21 959 1274, E-mail: *kadesemowo@iee.org †btucker@cs.uct.ac.za

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Abstract

Mobile devices and mobile networks are becoming more data-centric (evident in Japanese I-mode) even as mobile network voice Average Revenue Per User are declining, new stream of data services are required which must take cognisance of handhelds features albeit their small screen estate and input/output limitations. A text only Instant Messaging (IM) built on the Internet Engineering Task Force open standard Session Initiation Protocol (SIP) and SIP for Instant Messaging and Presence Leveraging Extensions (SIMPLE) has been developed in line with our novel introduction of a user-defined text Hotkey feature. Given that text communication possesses expressive discourse with some presence level, we seek to show that one-click text-gesture fast-tracking enhances text communication further. For this study, we are taking a hybrid quantitative and qualitative approach. Initial results have shown that an Affective Gesture approach is more likely to improve IM chat spontaneity/response rate. Enhanced input mechanisms for handheld IM system are expected to increase co-presence between handheld users and their desktop-based counterparts while in a synchronous discussion.

1 Introduction

One compelling reasons for 3G is the availability of reasonable throughput on mobile and handheld. Services are required thereof to take advantage of this improved speed to attract and offer value for money for customers and revenue stream for operator and investor. 3G is all about improved speed and anytime anywhere communication. We are looking into ways of enhancing ubiquitous anytime anywhere text-based communication [2]. A text only Instant Messaging (IM) built on the Internet Engineering Task Force (IETF) open standard Session Initiation Protocol (SIP) and SIP for Instant Messaging and Presence Leveraging Extensions (SIMPLE) has been built in line with our novel introduction of a user-defined Hotkey feature [1]. These text hotkeys and emoticons acts as on-click Affective Gesture (AG) [13], which are in similitude with Face-to-Face (F2F) expressive instant gesture: Facial expressions provide an important spontaneous channel for the communication of both emotional and social displays. Drawing on the premise that text communication possesses expressive discourse with some presence level (co-presence) [7,21], we seek to show that one-click AG fast-tracking of both text hotkey and 2D emoticons enhances text communication further. IM co-presence [7,8] capabilities are entrenched in its text oratory expressive discourse [9], awareness and limited turn-taking and sequencing.

For this study, we have taken a hybrid quantitative and qualitative approach. Quantitative instances of Hotkeys usage are counted from server and client side logging instrumented into the IM coding, while pre and post study questionnaire are used to collate users' usability and usage feedback.

Initial results have shown that an AG approach is likely to improve IM chat spontaneity. The degree of IM chat spontaneity improvement is greater for computer techies classify as "early-adopter" and much less for non-computer folks representing typical users. The two categories need to be grouped together in a weeklong test.

Despite IM improvement on the limitations of traditional text communication (gestures, awareness, turn taking, sequencing), it requires further add-on features and capabilities: Kinetic IM [3], Reality IM [4], Image IM [6], Sound ID [12], Facial Affect IM [13]. Moreover, it needs standardisation and deployment in an open protocol environment such as SIP [5,18]. This is in line with mobile network standardisation of SMS. IM has been moving to the mobile domain [6,15] in line with increasing trend of mobile devices becoming data-centric [2,14]. This added to the backdrop of declining mobile network voice Average Revenue Per User (ARPU) makes it essential for operators to look into ways of harnessing higher ARPU from IM as one of its data revenue drawing from the success of SMS especially in Europe. To this end, there is a need for facilitated gesture input in an interactive IM chat on handhelds. IM extends SMS further with its quasi-synchronous capability and other co-presence offerings: A trend that has followed the evolution of text messaging [11] from asynchronous to synchronous IM [17], which is that of being interactive and co-presence centric. SMS, though widely available and established, suffers from its asynchronous nature.

Coupled with IM co-presence [7,10] and open environment, we expect to demonstrate that the AG approach is more likely to improve IM chat spontaneity. Work in similar domain has been on closed systems [12,21]. These should help enhance IM conversation to being more interactive, like a gestured voice chat does.

2 Background

Aside IM awareness work done on closed system [12,21], many of the research looking into IM characteristics, adoption

and usability have either taken an ethnological approach {12,16] of IM ways of use or IM interface redesign [3,4,6,13]. However, we view IM as a communication environment [6] with co-presence capability and not just a (communication) tool.

2.1 Co-presence

The definition of social presence found the bases of co-presence viewing text communication specifically IM system not necessarily as a communication tools or tele-operable entity but as a communication medium. This is so according to [20] because social presence relates to the social model as part of the Non-self. Entity and communication environment relationship in Computer-Mediated Communication (CMC) can be grouped into three as in table 1 below.

Tele-operation	Human	→	Machine	(remote)
Tele-presence	Human	→	Place	(remote)
Co-presence	Human	→	human	(remote)

Table 1: CMC Entity and Communication Relationship.
The Human → Machine (Remote) termed teleoperation, Human → Place (remote) telepresence and our interest the Human → human (remote) co-presence.

In rephrasing [19], we can say that the ultimate goal of these (co-presence) efforts is to produce a transparent human link; a user interface (IM User Agent) through which information (context data) is passed so naturally between operators (Imessagee) within an open environment (SIP/SIMPLE Network) that the user achieves a sense of presence (Awareness) within their site (space and place, [10]). This notion of co-presence so deduce narrow down to the online presence and awareness of interlocutors. This paper rest within the domain "a user interface (IM User Agent) through which information (context data) is passed so naturally between operators (Imessagee)".

2.1 Related Work

There exist interesting work being done within the Affective space in facilitating IM gesture input to enhance IM spontaneity. [13] Facial Affect IM (FAIM) presents an IM application that analyzes a person's facial affect in real time while the Kinetic IM (KIM) [3] integrate kinetic typography effects into IM. The Viktoria Institute Amigo [6] is an IM that allows free form images as well as handwriting to be sent between Imessagee tapping into inking technology. "My Text" feature is available on Pocket PC MSN messenger. However, these facilitated gesture inputs are yet to explore the AG mode of sending IM messages (text, image, emoticons) though Amigo comes so close. The Architectural layout is shown in Figure 1 below.

3 Development

We draw on the premise that text communication possesses expressive discourse with some co-presence level [19,20], to show that one-click AG fast tracking of both text hotkey and 2D emoticons enhances text communication further.

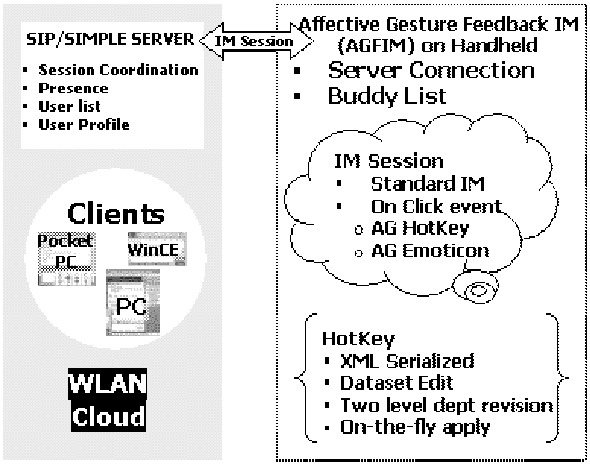

Figure 1: AGFIM Architecture Layout
AG Feedback IM (SIP UA) running on handhelds connects over WLAN to SIP/SIMPLE Network that coordinates sessions. Hotkeys are persisted into XML files and loaded into memory as Datasets.

A text only IM was built on the IETF open standard SIP/SIMPLE using Microsoft Real-time Communication Library (RTCClient) [1]. SIP platform was chosen because SIMPLE extends [5] SIP for IM session in two modes: Page and session. In session mode, SIP handles the rendezvous and hand over transfer to the Message Session Relay Protocol (MSRP) [5].
The text only messaging SIP User agent (UA) interoperates with other SIP client such as MS Windows Messenger (WM) and Portrait as shown in Figure 2. They all connect to MS Live Communication Server LCS. Thin client UA and native Pocket PC UA would be developed in future work with the same RTC Client libraries.

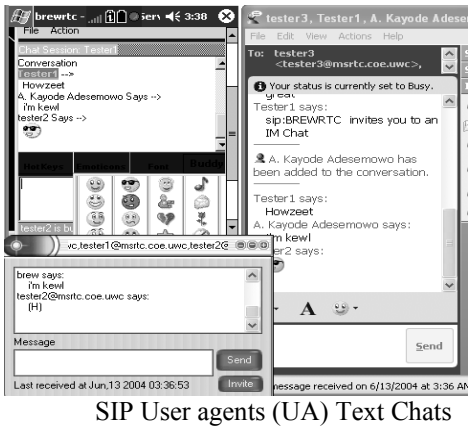

Figure 2: SIP User agents (UA) Text Chats
Text chats between three different UA (Windows Messenger, MSR Portrait and our text-only SIP UA). The text only AG IM shows AG Emoticons.

The user-defined text Hotkeys shown in Figure 3 and the Emoticons used for expressive gesturing were implemented as on-click and on_keypress events to provide AG fast-track feedback. Event driven IsComposing progress trackers allows other parties to know who is composing a messaging, thereby

enhancing turn taking in a conversation. Similar concepts such as handset speed dialling or clickable menu items in event driven programs have proved effective.

Figure 3: The Affective Gesture SIP UA

The AG Feedback IM: Screen shot of text chat on handheld showing the User-defined Affective Gesture Hotkeys.

The area of importance is the gesture enhancement made to an IM chat on a limited input entry, small screen space handheld and not how effective IM measures against real F2F or audio discussion as shown on top row in table 2.

AG User-defined HotKey	AG Emoticon		IsTyping Event	Online Presence	Buddy List
Affective Gesture Fast-track Feedback			Awareness Co-Presence		
Page-mode/Session MSRP Messaging			Info	Presence	
Media : Message	Invite	Ack	Ok	Subscribe, Watcher	

Table 2: AG Fast-track hierarchical layer

Hierarchical layer view shows the AG Feedback and Awareness Co-presence framework. On top sits enhancement implementations.

Awareness is implemented by a buddy list on the main window. For this research, we state that online presence [18], (Awareness) relates to who is or is not online in the IM social space [10,20]. Presence indicators are indications of what interlocutors' actions are, such as IsTyping.

The mobile network consists of a WLAN hotspot (as a proxy for 3G MobileIP). 3G deployment is on track in South Africa with the proposed trial run by Vodacom (http://www.cellular.co.za/news_2004/june/062704-vodacom_south_africa_to_trial_3g.htm).

4 Experimentation

4.1 Methodology

For this study, we have taken a hybrid quantitative and qualitative approach. In the quantitative Conversational Analysis CA, instances of Hotkeys usage are counted from both the server and client side logging that is instrumented into the IM coding. Pre and post study questionnaires are used to collate users usability and usage feedback. Pre-trial questionnaire captures participants IM background knowledge and introduces the AG feedback concept. The post-trial questionnaire provides feedback on the AG emoticon and hotkeys introduced in the IM testing. Noting that our hypotheses is not testing normative usage of emoticons but rather AG usage of emoticon and most especially user-defined Hotkeys, we took a quote from [13] FAIM paper, to asked set of questions on the usefulness and effectiveness of features introduced.

> "Although emoticons are quite useful, they provide a very limited means of expressing emotions. They do not capture the dynamics underlying the emotional processes and have to be explicitly inserted in-line by the user, removing the spontaneity of affective interactions" [13].

4.2 Experimental Design

Thirty-four people were e-mailed to fill the online pre-trial questionnaire. Out of the twenty-three respondents, three were outside the University of Western cape: one at University of Natal, another working in Johannesburg and third at Howard University, USA. Two separate trials were made with groups of four and five participants respectively. The group of four consists of non-techies having two people unfamiliar with IM and one who has not used IM at all. The second group of five were drawn from computer science graduate students. Each participant were tasked to create a terminal session from their handheld to the server from where they run the AG IM which have been carefully designed to fill the PDA screen enabling a normal PDA application look-and-feel. On login in to the SIP server, each participant starts an IM session with an intelligent agent (bots) UA that has been coded as a Distribution list and chat room. The bots offers on-screen help (keyword) and guide for participant successfully accomplished the task of creating distribution list and chat room. Thereafter, a multiparty chat session is started among participant, which further enable them to use the IM system features further. After trial discussions were held with both groups while group two filled the post-trial questionnaire. In each group, one participant was on a Sony Vaio notebook with the rest on Pocket PC PDAs.

4.3 Initial Result

Pre-trial questionnaire results shows that an AG approach is likely to improve IM chat spontaneity. In table 3 overleaf, 57% of respondent affirm to AG text hotkey "Definitely will be helpful", while 9% were not sure. When asked if AG emoticon will enhance, 35% affirmed, "Definitely will prefer AG Emoticon" while none said, "Will not" but interestingly 5% will still prefer their emoticon remain AS IS.

The first group of non-techies faced myriad of difficulties in getting the IM to work. None of them cold chat effectively nor create distribution list or chat room in the bots. The single most experienced amongst them however noted that the AG features might be useful in her chat should there be more time frame to engage the handheld further.

In the second group of computer techies, two of the participant completed the task of creating a chat room and all of them modify and use the hotkey feature.

Would a user-defined "My Text" Hotkey AG feature be helpful in your IM chat?

1	Definitely will be helpful
2	Probably should help
3	Not sure would be helpful
4	Probably would not be helpful
5	Definitely will not be helpful
6	Don't know

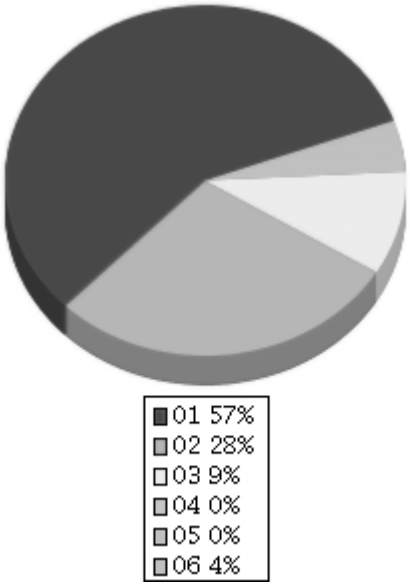

Table 3: "My Text" AG Hotkey question

The sample pre-trial questionnaire shows result for respondent response.

4.4 Discussion

The degree of IM chat spontaneity improvement is greater for computer techies classify as "early-adopter" and much less for non-computer folks representing typical users. We are not able to draw a conclusion to why the non-techies could not use the AG IM system at least to a functional level. Would this be the limitation of handhelds (small screen space and limited input facilities) or the ineffectiveness of the AG features? Is it a combination of both? Further work need to be done on determining if the AG feature would be able to enhance text communication for typical non-techie user. One of the techies has pointed out the essence of having a dual gesture input, which offers the user choice of which mode to use either AG Hotkeys and Emoticons or traditional text in-line. Hopefully, this might help in a subjective within and without experiment. The two categories would have to be grouped together in an extended trial. Encouraging result from the early adopter tends to show that enhancement to IM such as AG features are on track to improving text communication spontaneity. With IM in the social space [10], other user expected to play "catch-on" with the early adopters. SMS has point the way to this that it's in the usefulness of meeting a need. Ahonen [2] also reason along this line while discussing finding killer app for 3G.

4.5 Future Work

Results from further experimental trials will help us in drawing a much better conclusion. Ten participants will take part in a free form and structured chat session after which they will fill the post-chat questionnaire.
Adaptive intelligent agent (bots) UA would be implemented as Distribution List and Chat room for participant to engage in. The text hotkey would be profiled allowing for three profiles: Personal, Official, and Family. Inking technology will be explored and send on the fly send as AG.

5 Conclusion

From the pre-trial questionnaire, we found that AG approach is likely to improve IM chat spontaneity/response rate. The post-trial questionnaire and discussion affirm to this. Enhanced input mechanisms for handheld IM system are expected to increase co-presence between handheld users and their desktop-based counterparts while in a synchronous discussion. We are hoping that AG text Hotkey will give chat users immediate response (synchronous affective feedback) capability. In similar fashion, we believe, traditionally handling of emoticons, as in-line entry should rather be AG. Further uptake of IM on handheld could help generate more data traffic for the more network.

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