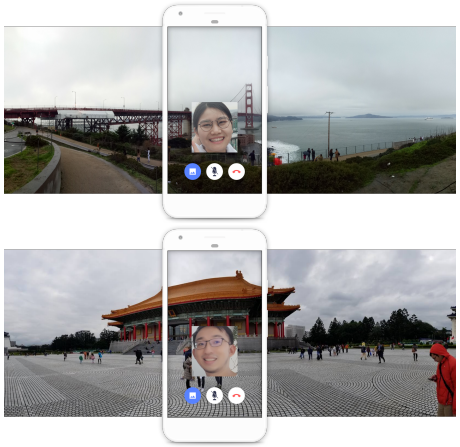

Figure 1: 360° photo video chat interface: This is an example of two people video calling from San Francisco to Taiwan. We use a 360° photo as a background and talking head as a floating window.

As If I Am There: A New Video Chat Interface Design for Richer Contextual Awareness

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ABSTRACT

We introduce a novel video chat interface with a 360° photo as background in order to offer richer contextual and background information. We conducted a preliminary user evaluation in a lab setting. Paired participants were randomly assigned to two conditions, using regular interface or 360° photo interface. Each participant video chatted in pair, then completed a post-study survey and answered several questions about their experience. Participants reported to have less behavioral interdependence and more inclusion of others using 360° photo video chat interface. They also reported having strong interest in employing it in long-distance intimate relationship, and made some suggestions for design iterations.

KEYWORDS

Computer-mediated-communication; video chat; contextual information; mobile; interface design; 360° photo.

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INTRODUCTION AND MOTIVATION

Communication as a collaborative activity needs the participants to have sufficient grounding knowledge[5]. In video communication, with the assistance of visual and audio information, participants are able to establish grounding knowledge. But compared with face to face (FtF) communication, participants do not share physical surroundings and are not able to co-presence. Previous research showed that the including of contextual information increases connectedness and engagement [9].

We are interested to know how we can provide richer contextual information in video communication for personal life and its impacts within the scale of current technologies. We designed a novel interface with 360° photo as video chat background in which users are able to learn about their partners' environment. We tested the prototype in a lab setting and identified both challenges and potential advantages. We expect this design to push the boundary of personal mediated communication and discover potentials instead of solving an existing problem.

BACKGROUND

In recent years, the research interest in video communication has moved from professional life to personal life. Studies have shown how video chat benefits families [1] and how people use video chat in major life events [11]. Different from video communication in workspace, video chat with friends and family members focus more on building and maintaining connectedness, trust and love [1, 4].

Shared experience in personal video communication

In personal domains, individuals tend to utilize video communication beyond the desk, moving from conversation to shared activities [4]. Video chat among friends and family does not have a particular conversational task but more a shared everyday experience of mundane activities together, such as children showing things and talking to grandparents [1]. These shared activities often happen not only in a fixed place, home, outdoors, and unexpected places, but also when people move around. Individuals tend to regard video communication in personal life as a result of relocation [4]. Sometimes people want to show some specific objects or give a "tour" of a place by moving the camera, which suggests the potential of configurable and portable video communication devices in personal domains [4]. However, most of the current commercial video communication tools, such as Skype, Google Hangout and FaceTime, adopt the "talking heads" interface in which users mostly only see each other's faces [11] while ignoring the display of environmental information. This kind of video communication interface may not be able to satisfy the users' needs described above.

Existing technologies to provide contextual awareness in video communication

Several systems demonstrate environmental information by utilizing a 360 degree camera to create an immersive experience. For example, Tang et al.'s [13] prototype employed a fixed 360° camera and audio communication to enable remote users to explore the environment independently and assist a

Figure 2: Brainstorming process: we wrote down as many ideas as possible without judgement, then grouped ideas into categories.

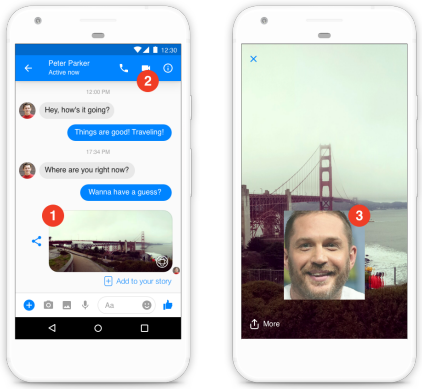

Figure 3: Prototype manipulation: (1) use the native camera to take a panoramic photo and send via FBM, (2) start the video call and (3) minimize the chat window and click the panoramic photo.

local partner in navigation tasks. Other systems such as Family Window [8] and Peek-A-Boo [12] employ two-way live video sharing to increase the feeling of connectedness and contextual awareness in domestic settings. However, these systems require specific devices and software, which may not be available for the majority of the population.

Kim et al.'s prototype [9] provides three types of contextual information in mobile video communication: map, live video, and a high-resolution images. Their field study showed that the image view was the most effective one for users to review what happened without affecting the live conversation. Participants also reported to engage more because they had the control of contextual views. Their study encouraged the design of an effective approach to offer contextual information in an interactive way.

DESIGN AND INITIAL PROTOTYPE

Informed by previous literature and existing technologies, we ran several sessions of brainstorming to generate potential designs for improving current video chat interface. We employed some ideating techniques such as How Might We (HMW), Point of View (POV), Explore the opposite and Change a status quo, as well as followed some brainstorming rules, for instance, encouraging “wild ideas”, deferring judgement, sketching on the fly, and writing down as many ideas as possible [7]. The brainstorming process is shown in Figure 2. Then we grouped replicated ideas and selected the "dark horse idea", which everyone agreed to be the most unconventional and possible to prototype and test.

Our design is a 360° photo video chat interface with which users are able to see each other's environment by moving around their mobile device. Their faces are displayed in a smaller floating window which are able to be moved around. We demonstrated the interface and manipulation using Facebook Messenger (FBM) as a quick prototype in Figure 3, which we also employed in the following user evaluation. Because FBM is the only social network application that has both features: sending 360 ° photos and initiating video calls.

PRELIMINARY USER EVALUATION

After solidifying a functional prototype, we conducted a preliminary user evaluation in order to answer the following questions:

- How does a 360° photo video chat interface impact people’s conversation and overall experience?
- What are the challenges when using the 360° photo video chat interface?
- What are potential advantages of a 360° photo video chat interface?

Methods

To more precisely capture the effect of the prototype in an inexpensive way, we tested our design using FBM in a lab setting. We modified the experiment design after several rounds of pilot studies.

Table 1: Measurements in the survey.

Variables (number of items)	Crobach's Alpha
Attention allocation (6)	0.87
Isolation (2)	0.95
Mutual awareness (4)	0.69
Mutual understanding (6)	0.92
Empathy (8)	0.88
Behavioral interdependence (6)	0.92
Closeness (2)	0.90
Spatial presence (3)	0.76
Inclusion of others	

We adopted 32 out of 38 seven-point Likert scale questions from Networked Minds Measure of Social Presence [3] which are relevant to the study purpose.

Table 2: Mean ratings and F value for the Control and Experimental conditions in the preliminary user evaluation (*p<.05; ** p<.01, +p<.10).

Variables	Ctrl	Exp	F
Inclusion of Others	4.17	5.03	5.12*
Spatial Presence	3.99	4.21	0.11
Closeness	5.21	5.15	0.13
Behavioral Interdependence	4.87	4.03	6.62**
Empathy	5.17	5.09	0.15
Mutual Understanding	5.74	5.68	0.13
Mutual Awareness	5.60	5.23	3.46+
Isolation	2.13	2.45	1.03
Attention Allocation	5.13	5.08	0.07

We recruited 34 pairs of participants from an east coast US university (N=68, 18 males, 50 females). Participants who knew each other personally before the study were qualified. They were randomly assigned to two conditions: regular video chat (control condition) and 360° photo video chat (experimental condition). Each condition had 17 pairs of participants.

Procedure. For both conditions, the experimenter first explained the study procedure and went through the consent form. Because participants' physical environments could affect their experiences with the app, we randomly assigned them to one of two specific places. They were required to video chat for 15 minutes and then completed a survey and a short interview afterwards.

Survey. We measured social presence by adopting parts of the validated Networked Minds Measure of Social Presence questionnaire [3], including co-presence, psychological involvement and behavioral engagement. We also measured the sense of physical space [10], closeness and inclusion of others[2]. The survey had 38 questions in total. The variables are shown in Table 1.

Interview. To help participants better recall details of the video chat, the interviews were conducted in pairs and encouraged both of the participants to answer each question.

We first asked some general questions about their frequency of face to face (FtF) communication and video chat. Then we asked how physically close they felt between their partner during the call. Participants were required to list the positive and negative aspect of the video chat, as well as to describe how much they could find out about their partner's environment from the interface. Those in 360° photo video chat conditions were asked the following extended questions such as motion sickness, comparison between the regular video chat and panoramic video chat interface, and willingness of using this interface in the future.

The interviews were transcribed verbatim and participants were labeled *A* and *B*. Participants' quotes are reported as *Pair Number[A/B][gender]* below. We first broke the transcripts into manageable sections and then open-coded to generate labels [6]. We grouped related labels and selected those that are informational to our design iteration. The key findings are shown as below.

Key Findings

Closer relationship and less behavioral interdependence. We conducted mixed models ANOVA with participants nested in dyads for responses to the survey. We found there is a borderline significant effect of mutual awareness ($F[1,67]=3.46$, $p=0.07$) that participants are more aware of the partner in the control condition. In addition, participants have significant lower behavioral interdependence in experimental condition ($F[1,67]=6.62$, $p=0.01$), which indicates that they reported to have more independent behaviors in 360° photo video call. They also reported to be more inclusive to their partner in the experimental condition ($F[1,67]=5.12$, $p=0.03$). The mean ratings of each measurements are shown in Table 2.

Awareness of the partner's surroundings.
"I feel I'm more likely to be curious about where she is and what she's doing. I feel I'm connecting with the environment she's in."(P2A[F])

Long-distance and intimate relationship
"Because my mom is always asking me to send photos and other stuff. I don't really send them many photos. So if I just call her and show her where I was and talked to her. I feel it would make her feel more involved. I feel that would definitely be useful." (P22B[M])

Show unique content
"She would be just scanning the room with the phone. I couldn't really see it. But with this, if she sent me the panorama picture, I'd be able to look at it on my own. And I feel I would get a better understanding."(P34B[F])

Most of the participants in the experimental group (26 out of 34) revealed interest and willingness to use the panoramic interface in the future. However there are challenges when using it.

Challenge: Awareness versus distraction. For some participants, the environment also increased potential distraction in video chat. They prefer to see partners' faces on the entire screen instead of the small window: *"I felt I'd rather to[sic] see their face and what's behind them. I think that's more intimate." (P6A[F])*

More aware of the environment. Participants described their video chat experience as being more aware of their partners' surroundings and activities, and more conscious about their own social behaviors, especially when they were unfamiliar with the other person's location. As *P22B[M]* commented, *"I literally saw a guy right next to him studying. There's[sic] interesting that you could get a little glimpse of what he was saying."*

Challenge: Complicated manipulation. Some participants reported complicated steps needed to set up the video call decreased their interest in using this interface . As *P6B[F]* commented, *"There's so many steps. You have to take a picture, and make sure you put your picture I set up, and I'll put yours. Just a lot of things to consider."*

Opportunities: Long-distance and intimate relationships. Some participants stated there is little need for them to set up a 360° photo video call if the partner is accessible via FtF communication or is a person with whom they are not familiar. Conversely, participants showed strong interest in using it with family or close friends. They think it will be easy for them to show around someone who cares about them but is far away. *"If there is an event I want them to experience, especially because they're so far away. It gives them a better picture of what we are doing or where we are." (P14A[F])*

Opportunities: Unique content. In addition, participants showed interest in sharing the environment when they are in a unique place or experiencing something valuable. They also describe it as useful when they want to show specific things. *P20A[F]* said, *"Maybe it'd be different if it was a sunset on a beach or something that we can watch together."*

DISCUSSION AND CONCLUSION

Limitation. This study has several limitations. First, the two locations were crowded public spaces and had negative impacts on the conversation. Second, people's opinions on FBM might have influenced their experience. Third, in the controlled setting, the video chat experience was less ecologically valid than in the field. Fourth, the effect of novelty may impact the impression of this prototype.

Future work. In the future, we are going to iterate the design based on users' feedback, for instance, we are offering the option to zoom in and out of a partner's talking head and simplifying the manipulation of generating and importing 360° photo. We also expect to evaluate the effect of this video chat interface in a real life scenario for long-distance intimate relationships.

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We present our 360° photo video chat interface, a novel design that allows users to obtain richer contextual information of a communication partner. Our preliminary user study showed that users reported to have less behavioral interdependence and more inclusion of others compared with regular video call interface. Participants reported they would use our interface for long-distance relationship and showing unique content. The results offer feedback for design iteration and future evaluation.

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