TeleTourist: Immersive Telepresence Tourism for Mobility-Restricted Participants

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Abstract

People can have experiences through video calls that are otherwise inaccessible. For example, someone who cannot leave the home may wish to experience visiting the zoo. We present TeleTourist, a system that uses video calls with strangers to share experiences for people with mobility restrictions. We designed TeleTourist to enhance immersion and personalization, as well as help balance the relationship between participants of the video calls. We discuss features we have implemented or envisioned for TeleTourist, as well as attributes we wish to evaluate in future work.

Author Keywords

Telepresence; accessibility; mobile; virtual tourism

ACM Classification Keywords

H.5.3. Group and Organization Interfaces: Computer-supported cooperative work; Synchronous interaction; K.4.2. Social Issues: Assistive technologies for persons with disabilities

Introduction

Video calling offers people experiences they otherwise cannot have, be it conversing face-to-face across continents or attending conferences from afar. Taking this concept further, video calling could also enable participants with mobility restrictions to experience activities that are otherwise inaccessible. A tourist in Paris could participate in a video call from a phone using the back-facing camera to virtually "bring along" people who cannot leave their homes but wish to travel. A patient bound to a hospital bed could virtually experience paragliding through a similar video call with someone who is paragliding. In this poster we present

TeleTourist, a system to facilitate video calls to share such experiences between strangers and people with mobility restrictions. Through TeleTourist, we hope to offer immersive windows to the world outside the walls that define the space someone is bound to, personalize the experience, and increase a sense of social connection for those who may feel isolated when unable to leave their homes or hospitals.

Related Work

Virtual Photo Walks™ [2] is a charity organization that shares our goal of using video calls to bring experiences to people immobilized by disability, illness, or age. Professional photographers volunteer to give a tour to an invited group of participants over Google Hangouts at a pre-set time. TeleTourist's ideas aim to build on this concept with the following key differences: include features to enhance immersion and personalization of virtual tourism experiences, structure interactions to encourage a more mutual relationship than a charity or donation, automate the matching process among participants, and scale involvement to beyond professional photographers.

The Nomad and the Couch Potato [3] is another related project centered around having one person share experiences through mobile video calls (the "nomad") with someone they know well in a living room (the "couch potato"). This research explored how contextual information can enrich the experience by incorporating a second, shoulder-mounted smartphone to capture additional footage from the nomad, and a second display for this additional footage or a map of the nomad's location for the couch potato. Among the features TeleTourist adds to video calls, it similarly aims to incorporate contextual information to the video

Figure 1: Concept of including a button for capturing pictures of experiences in video calls.
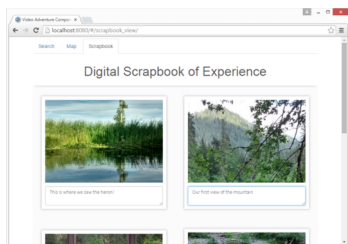

Figure 2: Screenshot from prototype for a tele-tourist to scrapbook an experience with images he or she captured through the system.

call, though among strangers and without requiring additional smartphones or displays.

Formative Studies

Before designing TeleTourist, we conducted semi-structured interviews with people who have mobility restrictions. We interviewed a total of 6 participants (4 female, 2 male) for approximately an hour each. They were members of an assisted living community or a retirement community, with an age range from 65 to 89 years old. Each of them own a computer and are at minimum familiar with the concept of Skype.

Five of the six participants were very excited to try this concept. Additionally, these participants were comfortable with the idea of strangers sharing experiences, found the concept of having someone narrate the experience important, and wanted to see suggestions for TeleTourist activities in addition to listing their own desires.

System Overview

We envisioned and built features to enhance the experiences shared by someone over mobile video calls (the "sharer") and from one to a handful of people with mobility restrictions who wish to partake (the "tele-tourists"). These features intend to serve as modular tools for the tele-tourist to contribute to the sharer's experience, to bridge a two-way beneficial relationship compared to what a charity or donation may imply. The features also intend to augment immersion, personalization, social connection, and a sense of purpose for the tele-tourists. We further envision the system to also automatically connect these sharers and tele-tourists based on profile information, such as their interests, and contextual information, such as their
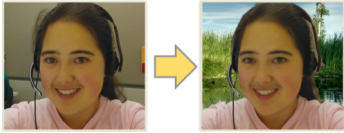
Figure 3: Concept for replacing the tele-tourist's image background with an image from the sharer's video footage.
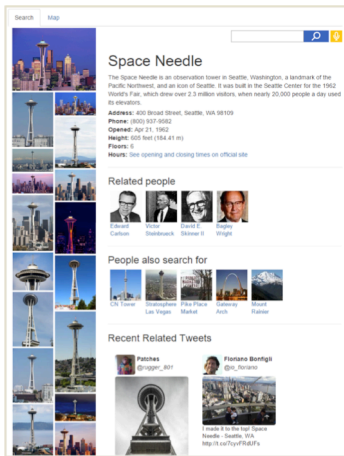

Figure 4: Screenshot of prototype displaying searched information about the Space Needle including a summary and related images, facts, search terms, and Tweets. The search bar in the upper right enables manual searching while the button next to it enables automatic searching using keywords automatically extracted from speech recognition.

locations and schedules. We detail these system features below.

Virtual Scrapbooking

One feature centers on a convenient interface for the tele-tourist to capture an image of a particular highlight or scene from the experience (Figure 1). It enables tele-tourists to personalize and play a more active role in their experience, as well as take part in an activity (photography) that many people enjoy as physically present tourists. Additionally, someone sitting at home can likely capture a picture more easily than someone holding a phone that is occupied with a video call. Tele-tourists can later curate and annotate these photos with captions (Figure 2), producing an artifact of the experience for not only themselves but also for the remote sharer who was with them. These sharers could even view the system as a service where sharing an activity over telepresence would, in return, have someone who was "with" them produce a personalized, human-curated scrapbook of the experience. We could also connect the scrapbooking service with other social media or digital photo album APIs to support different individuals' preferred ways to share photos.

Background Replacement

To help improve immersion, we can replace the tele-tourist's background to reflect the setting of the remote experience (Figure 3). The system would automatically update this background image to mirror the view from the phone's camera, periodically or constantly. Incorporating such images in virtual scrapbooking can also further personalize the experience.

Display Relevant Search Information

People at home often have larger screen real estate than those outside with smartphones occupied by a video call. TeleTourist can help tele-tourists leverage this advantage to share relevant information about the experience. For example, if the sharer came across a heron and wondered about heron wingspans, the tele-tourist could look it up. With the right information on screen, the tele-tourist could even serve as an informal tour guide for the remote sharer which can help balance the nature of their relationship during the call. TeleTourist could also automatically display information for the tele-tourist using contextual information (such as the sharer's location or description of the activity) or key phrases extracted from speech recognition applied to the sharer's and tele-tourists' conversation. It uses the fact that much of the world's information is already structured for display through mappings like the Google Knowledge Graph or Satori Entity Graph. Our prototype (Figure 4) explicitly and implicitly retrieves related information from the Satori Entity Graph, Bing image search, and Twitter. People can toggle whether the system uses the audio from their conversation for implicit retrieval. It transcribes speech through the Chrome Speech API and extracts key phrases from the resulting text using WikipediaMiner [1], a toolkit that can automatically annotate text with Wikipedia links.

Real-Time Map

TeleTourist can show a map of the sharer's real-time location (Figure 5). If available, it also displays an interactive Street View centered on the sharer's real-time location. The map could enable tele-tourists to contribute to the sharer's experience, by offering directions to specific locations or pointing out nearby attractions the sharer might not notice. The additional
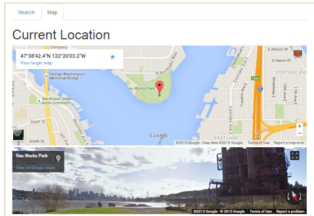
Figure 5: Screenshot of prototype displaying a map and Street View centered on a specific location.

Street View intends to increase immersion, offering tele-tourists means to explore other views of the same space in a self-driven manner, be it different viewing angles or different times of the day and year.

Matching System
Although not yet implemented, we envision TeleTourist to automatically match sharers with tele-tourists for different experiences. It would ask for and use scheduling constraints before suggesting a connection, as well as shared interests participants include in their profile or proposed activity descriptions. A sharer's GPS location could also trigger a notification of location-specific experiences of which tele-tourists wish to partake. People could also browse listed activity ideas to manually initiate matches, especially if they are interested in more activities than they could list. A consideration for the future is ways to prevent abusers from exploiting the system, perhaps by including a screening process or rating system for participants.

Future Work

In addition to completing the implementation of the aforementioned features, we want to address important research questions through a formal evaluation. We are primarily interested in how these features affect the experience for mobility-restricted tele-tourists, as they are the primary audience TeleTourist caters for; how system improves a tele-tourist's satisfaction determines the merits of further exploring the sharer's experience and overall development. There are several aspects of a tele-tourist's experience to investigate: whether and how individual or combined features in the system

- improve or detract from feelings of immersion (*i.e.* whether they were helpful or distracting).

- influence the sense of social connection.
- improve a sense of purpose.
- engage participants in a more active or passive role.
- influence overall enjoyment and satisfaction.

Conclusion

TeleTourist aims to use telepresence to offer an increased sense of social connection and a personalized, immersive window to an otherwise inaccessible world for people with mobility restrictions. It builds features on traditional video calling services with virtual scrapbooking, background replacement, and displays of relevant information, maps, and Street Views when available. We also discuss further visions to incorporate a matching system, as well as aspects to evaluate TeleTourist with.

Acknowledgements

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