Web 2.0 Meets Wearable Augmented Reality

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Abstract

This paper explores how a wearable computer with an augmented reality interface can provide real time contextual interactions, based on location aware Web 2.0 social network information.

1. Introduction

This paper is concerned with how to connect users through Web 2.0 social networking technology in a contextually aware manner. Web 2.0 social networking technologies currently provide both direct and indirect temporal spatial information about user's movements, and provide a means for people to self organize into groups that can contain friends, co-workers, or classmates. We are investigating the use of wearable computer Augmented Reality (AR) technology to visualize Web 2.0 information and to allow elegant hands free interactions to communicate with people in these ad-hoc social networking groups. Visual information is presented based on a user's current physical location.

Web 2.0 technologies provide several sources of information about people such as chat histories, photographs, GPS trails, blogs, and VoIP communication. AR allows a richer presentation of this information over a standard map interface. Our wearable computer implementation provides a first person perspective interface allowing the display and interaction of in-situ information in the environment.

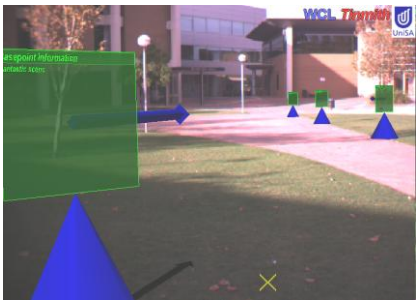

Figure 1. Visualization of cone-shaped trail markers in AR

When a user is exploring a location, the following actions are taken when they wish to interact with their friends. Firstly they view the AR information in the location to determine who and where their friends have been at this location. Figure 1 depicts the user's view through the HMD of video see-through AR overlay. The blue cones indicate a trail by a friend who have been there and are currently online. They can then adjust the number of trails to make a sensible decision. And finally, they choose to interact with Web 2.0 services of the friends online, such as communicate vocally through VoIP, by stepping on one of those cones.

2. Background

Placing the power of Web 2.0 on a handheld mobile device is a current research interest [1]. We are particularly interested in supporting mobile 3D AR information for Web 2.0. Güven and Feiner [2] developed techniques for the visualization and navigation of situated hypermedia in a tourist application. They were interested in providing the visualization of links (trails in this paper) and nodes (icons in this paper) for complex tourist guide information. Mastsumoto, Hashimoto, and Okude [3] instrument a common umbrella with a mobile computer, GPS, orientation sensors, digital camera, and a digital projector to make an Internet Ready Umbrella that interacts with Flickr and Google Earth.

3. The system

Our implementation is based on the wearable AR Tinmith [4] system with a video see-through head-mounted display and a Python program developed to perform the interaction and querying with two Web 2.0 technologies, Twitter and Skype.

3.1 Querying

There are a number of methods to determine where a person has been. A set of friends could allow the user to query their location information recorded from a GPS sensor. Nokia viNe is a good example of sharing trails of

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geo-referenced data. Web 2.0 information from your friends could also be mined for location information, as this could contain the explicit description of a location they have visited; such as available in Twitter update messages. There could be photo albums with images containing GPS coordinates as supported by Flickr.

The query process requires Tinmith to provide a location-based keyword (such as London) to a custom Python program, which uses the *twyt* library to query past Twitter status updates from friends for the keyword and the *Skype4Py* library to obtain the friend's Skype status. Tinmith uses the results to filter the Icons to display and allow the user to call their online Skype friends.

3.2 Visualization

The two main visualization techniques used are Trails, and Icons. Trails are constructed from the GPS coordinates previously recorded. Our system allows the user to view trails of where their friends have walked in the past. These are visualized with colored 3D markers at each of the corresponding GPS coordinates. For each marker, there is a billboard sign indicating who made the trail, the date the trail was made, and a possible reason they were at this location. Location based information in the form of text and images can also be viewed. Each friend has a unique marker shape to identify their trails, see Figure 1 with cone-shaped markers. We set the trails to record the position of every 10 seconds, which allows a suitable point distribution along the path taken, assuming that movement at a constant rate. In the future we would like to import trails created with Nokia's viNe system.

Trails provide two major forms of information to the user. First they show which friends were close to the user's current location. The trails also provide interesting directions to explore the local area, as an impromptu guided tour of the location, either with or without real time VoIP interaction. Icons are a simpler form of information visualization to show possible locations of friends not in the immediate vicinity, but within easy walking distance, from 100m to 1km away. They are displayed hovering above the starting point of the corresponding trail. Icons show the name and date of the person visiting these locations, as well as summary of information about the trail. Icons automatically rotate to attract attention and to be readable from any viewpoint. Icons will display the retrieved Twitter information if corresponding GPS location data is not found.

3.3 Interaction

The interaction the user performs at a location is the inspection of trails and icons to find out who, when and why a person has visited a location. To keep the hands free nature of the system, we have implemented a walkin' menu to interact with the elements of the interface. The menu is activated by the tilting of the head greater than 45 degrees down from a level viewing angle. Once activated, a small set of menu items appear as semi-transparent, planar square polygons. These items are evenly spaced on a fan curved in front of the user at ground level. To select an item the user then walks onto the menu item. Each square polygon displays a title and a description of the menu item. Icons are represented using the same square polygon object.

Through the top-level menu items, users may apply a number of filters to reduce information, including the activation/deactivation of trails, preset groups filtering (family, friends, and/or, colleagues) and the ability to view the five most recent trails.

To interact with a trail, a user steps onto one of the 3D objects in the trail to bring up a walkin' menu concerning this trail. A "start VoIP" menu item allows the user to start a VoIP conversation with the friend who created the trail. If the friend is currently on Skype, the menu item is displayed in green, otherwise it is red. Menu items displayed for trails include 1) additional information about the trail's owner, 2) textual information left at the base point, and 3) images taken near the base point. The menu items also allow the user to send a simple predetermined Twitter direct message to the trail's owner (currently set to "Hello!"), and display any Twitter messages that contain the current location of the user. Interaction with icons is performed in a similar fashion to trails. A walkin' sub menu contains current visible icons.

4. Conclusion

In conclusion we present the use of wearable AR system to support a hands free interface to Web 2.0 social networking technology. We developed a set of interactions utilizing the walkin' menu and the user's GPS position, and finally a set of visualizations to convey both the menus and Web 2.0 information.

5. References

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