



Telepresence using VR Headgear

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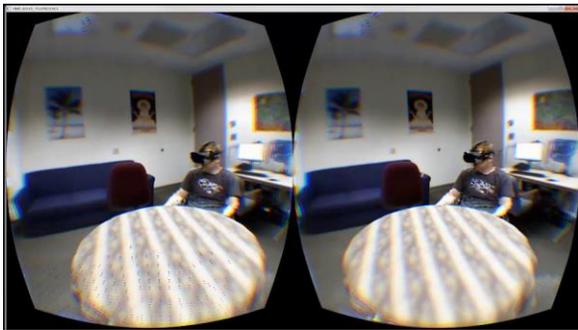
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The Challenge

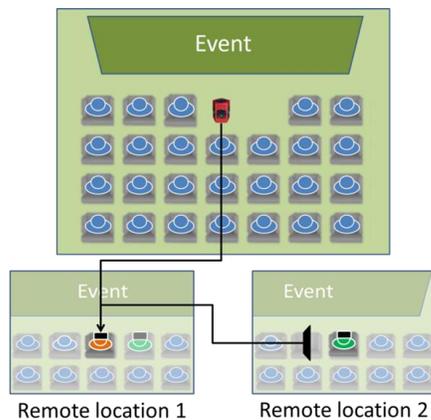
The goal of telepresence is to immerse the user in a remote location. Towards this, our research group builds systems using commercially available VR HMDs to immerse the user in a remote location. However, using VR headgear for telepresence has been hindered by their very nature, as they obscure part of the wearer's face. We explore methods to digitally replace the HMD with pre-scanned face models of the user's face. We explore solutions to immerse users in public events and in private meetings.

System Overview

For private meetings - We scan a familiar location such as an office and immerse the users in this environment. We acquire point clouds from each of the user's location and draw them in appropriate places in the virtual shared room.



For public events - It is very expensive to scan environments of public large venues such as stadiums, halls or outdoor scenes. For such venues, we place a panoramic camera at the event in place of the user and stream the live video feed from the panoramic camera. An appropriate region of the image from the live video feed of the panoramic camera is displayed to the user using a VR HMD. In addition, we draw imagery of a remotely located friend onto the panoramic image such that the friend appears to be seated next to the wearer.



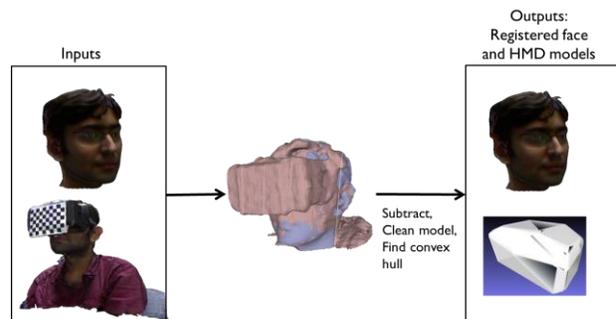
The Approach for VR Headgear removal

We scan the users with and without wearing an HMD. We align these scans and obtain a geometric relationship between their face models and the HMD. While the telepresence session is taking place, we actively track the HMD and using geometric relations previously derived we segment out the HMD and draw

Highlights

- Project uses VR HMD to immerse wearer in remote locations.
- Methods to acquire imagery of the event:
 - Public events: panoramic cameras
 - Private meetings: room scans
- RGBD cameras are used to acquire imagery of distant friends. Temporal filtering and graph cuts are used to reduce noise and improve segmentation.
- The worn headgear is digitally removed and a face model of the wearer is drawn in place to give a sense that the user was not wearing an HMD.
- Tiny video cameras are placed inside the HMD to acquire facial expressions and eye movements. This is work in progress.

the scanned face model of the user in the appropriate place. We are exploring methods to show live imagery of the wearer's face and eyes hidden by the HMD by placing tiny video cameras inside the HMD. The detected eye gaze direction is used to select a pre-scanned face model from a set of previously scanned face models.



Current Project Members

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Keywords

Virtual reality; Telepresence

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