

BeWithMe

An Immersive Telepresence System for Distance Separated Couples

Samarth Singhal and Carman Neustaedter

School of Interactive Arts + Technology, Simon Fraser University, Surrey, Canada

Introduction

Long distance couples use computer mediated communication as a critical tool to stay connected over distance for maintaining their relationship. They use face-to face video communication tools to support their co-located needs.

However, the challenge with these systems is that they typically support a **limited field of view**, mostly confined to an **indoor space** and **focus on conversations** for the sole use of the system when, in reality, couples may wish to do far more over a video connection.

Design Considerations

The design of our system is based on four principles:

Mobile and Flexible

Enable couples to be a part of each other's experience and encourage anytime and anywhere communication.



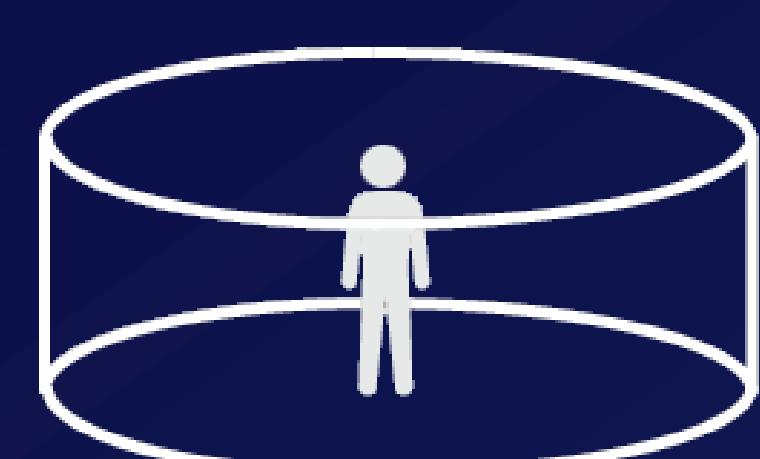
Omnidirectional View

Providing the couples with the entire 360 degree horizontal plane of view (panoramic view) to better understand remote location.



Independent Navigation

Providing the viewer with an independent navigation of the entire remote context, removing the burden of camera control.



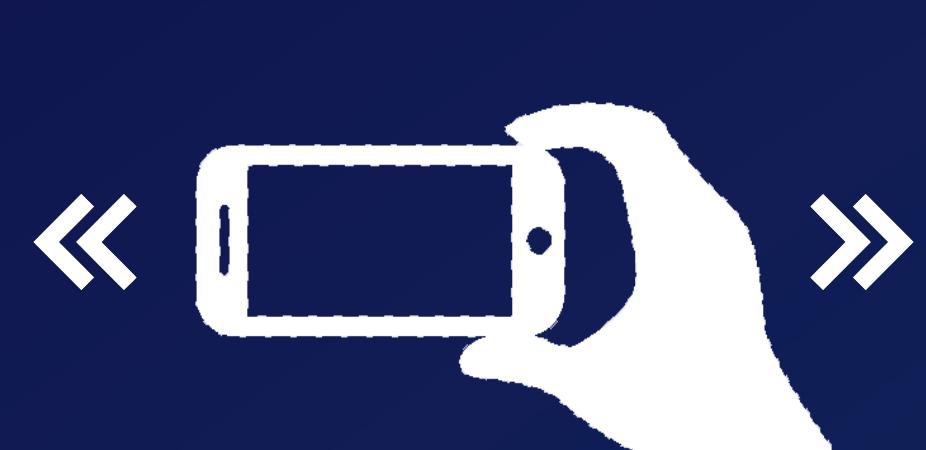
Effective Interaction

Providing three flexible interactive mechanisms that allow the user to navigate the video with a greater control over the contents they want to view and allow them to switch to any one.

Touch-Screen Control



Rotation of Device



Immersive VR Display



System Design

The system works with four main steps:

1. Image Acquisition

To acquire the omnidirectional image from a smartphone, we use a hyperboloidal lens- GoPano lens. This provides us with a complete 360 horizontal FOV.



2. Image Transformation

We de-warped the donut shaped image obtained from the GoPano lens to a panoramic image using OpenCV image transformation techniques.

Donut Shaped Image



Transformed Panoramic Image



3. Image Transfer

We packed the panoramic image using an encoder and transferred it to a central server using Real Time Messaging Protocol (RTMP). We transcoded this RTMP feed to HTTP Live Streaming (HLS) which optimizes media streaming.

Source Image



Encoder



RTMP Server



HLS Video



4. Image Presentation

We mapped the panoramic image to a spherical 3D model to allow viewers to view it from any perspective. The remote viewer could navigate the 360 video with perspective control using touch, rotation of device, and thorough rotation of their head on an immersive-display.