

## Interactive VR Game Day

### Background

Hospitalization can be an unpleasant experience for pediatric patients, especially kids when they suffer from physical pains caused by diseases and/or suffer from isolation to events happening outside the hospital. Providing meaningful enrichment activities besides medical care can greatly reduce patients' stress and provide them opportunities to interact with outside world.



<https://www.practicalpainmanagement.com/resources/news-and-research/fda-approves-oxycontin-pediatric-patients>

### Objectives

- Use available VR / MR technology (e.g. Acer Mixed Reality Headset) to provide an opportunity for short- / long-term pediatric patients at CS Mott Children's Hospital to virtually observe and participate in some live UM athletic event(s).
- Use haptic, audible and visual feedbacks based on VR / MR headsets to make game watching an immersive experience, involving virtually sitting in the stadium, interacting with players, and interacting with other patients.
- Future direction: Make some VR sports games available to patients at halftime to relax

### Clients

Beth Pickard, Director Strategic Partnerships, UM Athletic Department

JJ Bouchard, Child life Specialist, UM Health Systems

David Chesney, Professor teaching EECS495

(Potential) Pediatric patients at CS Mott Children's Hospital

### End User

Pediatric patients at CS Mott Children's Hospital

Personas

Gameday (existing) lab at CS Mott

### Scope and functions

This project will primarily focus on proof-of-concept scope to show that VR / MR technology can provide a unique solution to various difficulties patients may face in hospital.

- The primary function to realize is setting up multiple 360 cameras in several locations inside the stadium and then video stream live games to MR headset to immerse children

into the game. Virtual Reality headset provides three-dimensional visual and stereophonic sound which differentiate it from watching TV;

- Creating an interactive experience for attendants to chat in a virtual chat room, either voice-based or speech-to-text based; This chat room can create a virtual community for all the patients to watch the game together, simulating the interactive audience experience in the stadium. Patients can talk, express their feelings and share ideas which greatly ease their loneliness and create a strong support within patients
- Then if time allows, writing a live VR video call with sports players can make the experience more involved and next-generation like. Children always love fancy technologies and this remote game attending experience will give them the opportunity to see where technology is leading the world

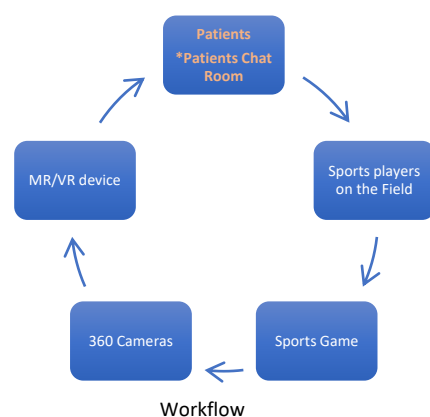


Figure 1. Bullet Screen “danmu” for VR chat room

## Timeframe

	Description of Work	Start and End Dates
Phase One	Project Architecture: Figure out how much time commitment is required for each member; Understand customer needs in detail; What technology or devices are optimal to achieve the project’s need and then prepare relative equipment	9/17/18 – 9/21/18
Phase Two	Research on available 360 cameras in the market and how to stream the video data over to the MR devices. Setting Up Cameras + Video Streaming	Alpha one (Month 1)
Phase Three	There are a lot of chat rooms (gaming, sports, makeup, etc.) Find out which technologies these chat rooms typically use and how these technologies can be a good fit for VR/MR. Notice: MR have speech recognition, so speech-to-text and then flowing the bullet comments (“danmu” in Chinese; also known as “danmaku” subtitles) over the original video is also a cool idea. See Figure 1 Chat Room Software Development and Testing	Beta two (Month 2)
Phase Four	If time allows – Video Call with player	Month three (Month 3)

Final Phase

Before the final presentation, we can test our prototype or final product with end customers – Kids in the hospital! Collecting their feedbacks, positive things and negative things can help improving current product's flaws and lead to a better solution

Before final presentation

### **Project Distribution Logistics**

At the beginning when the project design is not finalized, all group members should brainstorming what features should be added or prioritized. Based on group members' skillsets, timeline will be adjusted according to how familiar everyone is with VR/MR technology. After that, at each stage of the project, the job will be split evenly based on every member's availability, skills, and area of interest. If all group members have adjustable schedules, the whole team can meet and push the project forward collaboratively. For example, one member should investigate available cameras, one member investigates video streaming technology, and one member study how to transform video source data into VR headset-compatible format. Then after the research, the implementation can be done simultaneously or collaboratively depending on how difficult the task is.

### **Programming Languages & Environments**

We will use C# for developing software on Windows Mixed Reality Headsets. Unity will be used as the game engine to prototype and implement the user interface. Since the project involves video streaming. Note that with 360 cameras the video format may be uncommon and the data throughput may be extremely large. Thus, there will certainly be some technical challenges to overcome and networking knowledge is highly useful.

### **Skills Anticipated**

C#, Unity, Mixed Reality Headsets, Networking(UDP/TCP)

Windows desktop with high-end GPU is required to fully function VR/MR headsets. Any gaming laptops/PC can be used for development. Certain CAEN computers can also be preferred working stations.

### **Project Goals**

This project is a comprehensive learning experience for everyone not only because of the wide range of Computer Science technologies involved but also the experience of team collaboration.