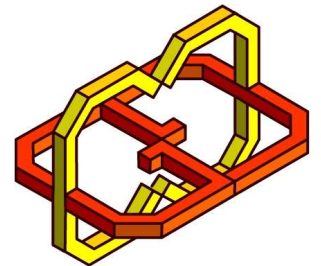


# VR Newsroom

A CGGC/GIP Project by Natan Yellin

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# Overview

VR Newsroom is an experiment in browsing online news in virtual reality. It explores ways that VR can be used to facilitate *discovery* and *exploration* of large amounts of content. Online news was chosen for the content of the experiment because of its dynamic nature. Live APIs were chosen so that every time VR Newsroom is loaded different content is displayed.



## The Newsroom

“The Newsroom” is a large 3D cylinder lined with picture boxes. Every box represents a recent story in the news and each box’s texture is an image drawn from that news story. The user is placed in the center of the cylinder and can walk and teleport freely. Vertical movement is facilitated by an elevator lift inside the cylinder.

Due to performance considerations, all new stories are preloaded on startup. News stories are constantly swapped with one another via a rotation animation. This makes the newsroom feel more dynamic.



## Designing for Immersion

The goal of every virtual reality experience to make the user forget that they are wearing a headset. This is commonly referred to as “immersion”.

Early versions of VR Newsroom featured a dynamic world but a mostly static player. Teleportation was added in order to extend the world boundaries and create the illusion that the player can walk anywhere they want. An elevator lift was added to enable vertical motion as well.

Initially, the player’s motion was limited in the elevator lift to prevent them from falling off. Surprisingly, user testing showed that people **strongly desire** the ability to walk off the elevator and fall to their death. Ironically, allowing users to do something that they would never do in real-life made VR Newsroom more lifelike.



# News Sources

Most news articles are loaded via the newsapi.org JSON API which provides access to over 70 news sources.

These sources include The NY Times, CNN, Wall Street Journal, Reddit (homepage), Fortune, Google News, Hacker News, Engadget, Time, Wired, and more.



## RSS Feeds

VR Newsroom contains experimental support for loading any RSS/ATOM feed containing images. This can be used to load articles from most blogs. It can also be used to load more general websites. For example, the Serious Eats recipe collection provides a listing of recent recipes over RSS. It is also possible to load Facebook posts, Flickr images, Pinterest pins, and more by using the open source RSS Bridge project.



## User Interface

The HTC Vive controllers are extremely robust in the types of input that they allow. Early in the project it was decided that VR Newsroom would limit the number of buttons used in order to simplify the user experience.

Whenever possible, in-world items are controlled by gripping in-world items with the Vive controllers or a laser pointer attached to the controller. For example, the elevator lift is controlled by pointing at a large in-world “Up” button and holding down on the controller’s trigger. Haptic feedback allows the user to find the “Up” and “Down” buttons without looking at their hands or the buttons.



## Filtering

The strength of an experience like VR Newsroom is that it enables users to visually process far larger amounts of material than a traditional two-dimensional user interface. Various features were tested for enabling users to sort this data and customize the type of news stories which they see. Further experimentation is needed in this area.





## UX Testing

During the development of VR Newsroom it was tested on multiple volunteers from the Technion student population. Feedback from these students was critical. It drove design and development decisions. We recommend similar testing for all future CGGC/GIP projects.



## Software Stack

VR Newsroom was written in C# using the Unity 3D game engine. The SteamVR API was used to access the HTC Vive along with the open source library VRTK. A custom RSS/ATOM parser was written to enable robust image-extraction from feeds. Common MVC patterns were implemented in Unity in order to separate data-loading logic from the presentation layer.

During development we discovered and reported bugs in VRTK and were in touch with Unity's technical support regarding performance issues with dynamic texture loading.



## Text to Speech

The IBM Watson text-to-speech API is used to “read” news out-loud stories when they are selected. This enables the user to pick out the next story they are interested in while listening to an audio clip of the previous story’s description.



# Performance Optimizations

Unity3D normally parses image assets and converts them to compressed textures at compile-time – a potentially expensive operation on large images. VR Newsroom dynamically loads news stories at runtime so it can't benefit from normal preprocessing. Statistics were gathered on all images loaded and it was found that certain news websites serve very large uncompressed images that take up to 750ms to load each. However, even moderately sized images pass the 11ms mark which prevents a smooth 90 FPS. Therefore all images are loaded at startup. Other options were explored including out-of-process caching with HTTP proxies like Polipo and Image Optim.

