

VIRTUAL MAGZINE

Interactive Architectural Magazine



Yasaman Mobasse (119016)
yasaman.mobasser@uni-weimar.de

Bauhaus-Universität Weimar
Master degree

Programm MediaArchitecture /
IMAMS / IDE, Critical VR Lab.

Sommersemester 2018

Jörg Brinkmann

Introduction

Virtual reality (VR) refers to the experience that user completely is immersed into a three-dimensional virtual world and interacts with it. The term "virtual reality," was first used in the mid-1980s by Jaron Lanier, founder of VPL Research, who worked actively in the domain.

Today, with the development of media tools, many media industries, seek ways to make optimal use of new technologies for attracting people. Among the new technologies, VR (virtual reality) and AR (augmented reality) have been implemented recently by many of media industries to optimize their media tools. This has changed the traditional relationship between users and the industries; they have become more interactive. These technologies (VR /AR) extend the boundaries of storytelling and education which are important goals of many medias. these cross-media and non-linear storytelling principles can provide media industries with the opportunity to present more information for the users than ever before. VR technology has the potential to place the visitor at the center of an experience.

"A user interface where you can navigate in 3D can enrich the communication between humans, products, companies and information. A new world of opportunities is open: Interactive menus with spatial configurations, 3D webs with unexplored topological organizations adapted to the full scale and motion of our body and to the cognitive potential of our brain, and above all, a more seductive, sensorial and emotional user experience." [1]

Advent of VR in architectural field, help architects with permit approvals, design, marketing, and sales. Since, with the traditional way of presentation through 2D plans and renders, architects have difficulties to describe spaces to their clients and non-professionals who don't have adequate spatial experience. Also, the relationship between architects and structural engineers and other planners have improved. They can understand the idea behind the design better than before, since they can immerse into the spaces virtually before it is even built. They can explore, discuss and judge the design and find and correct problems. Therefore, more architecture offices are incorporating virtual reality into their workflows and project presentations. Moreover, there is no need to build the real models, since the floor plans and exteriors can virtually be represented. Consequently, the cost of construction has reduced significantly.

Designhaus, one of the Offices Using VR to present their designs, stated that "it helps [them] to visualize a space in a better way that, in turn, results in aesthetically pleasing and efficient spaces, and helps the client to better understand the design and make faster decisions. [It also helps] the construction team on the site during the execution phase." [2]

For the project 'Double Tree by Hilton Iquitos,' the architects stated that "the virtual reality experience surpasses any other technology developed so far for the interpretation of a space that [has not yet been built], and also communicating the project to clients. It has been an enormous contribution to the design process." [2]

The advantages of using VR in architecture are:

- feeling of being presence
- new understanding of scale, proportion, light, materials
- Higher levels of engagement
- Greater emotional connection to products & services

Concept

The main goal of this project is to use VR technology and to implement an interactive and futuristic presentation of contents for an architectural magazine. Architecture as the main subject has been selected, since it is about spatial design and experience. Accordingly, the goal of architectural magazines is mostly to presents the spaces and their elements to the readers. Normally, the contents of architectural magazines may range from introduction of interior and exterior space, furniture, construction materials and lighting fixture products.

For most of the content readers need to use their imagination. Due to this reason, most of the readers are architects and who work in the related fields. With the help of the 3D contents, especially VR, even non-professional readers can understand the designs better. Also, professional users can judge better about the contents. “the virtual reality scenario seems closer to reality than the experience of the same space experienced through plan and section drawings. There is an overall higher correlation of both the conscious reflections and the less conscious behavior between the real physical architectural space and the virtual reality space, than there is between the real space and the space communicated through plan and section drawings. We can conclude that the scenario with the best overall size estimations, compared to the actual measures, is the virtual reality scenario” [3]

With the help of the VR technology, readers will able to walk virtually through a magazine as they walk through galleries and see the contents as visitors and interact with them as users. They can see models and products and see the information about them. It can improve the way of advertisement, since the users (readers) can see the product virtually and compare the proportion and the materials. Users can see the effects of the lighting fixture in semi real environment. They can interactively immerse in the designed spaces and understand them as the designers want. They can toggle between the products and read their catalogs. Construction companies can collect comments during the planning phase and show [or allow visits to] the houses during the lease phase via the virtual magazines. Moreover, Virtual magazine provide Real estate agencies the opportunities to present the properties interactively and find costumers.

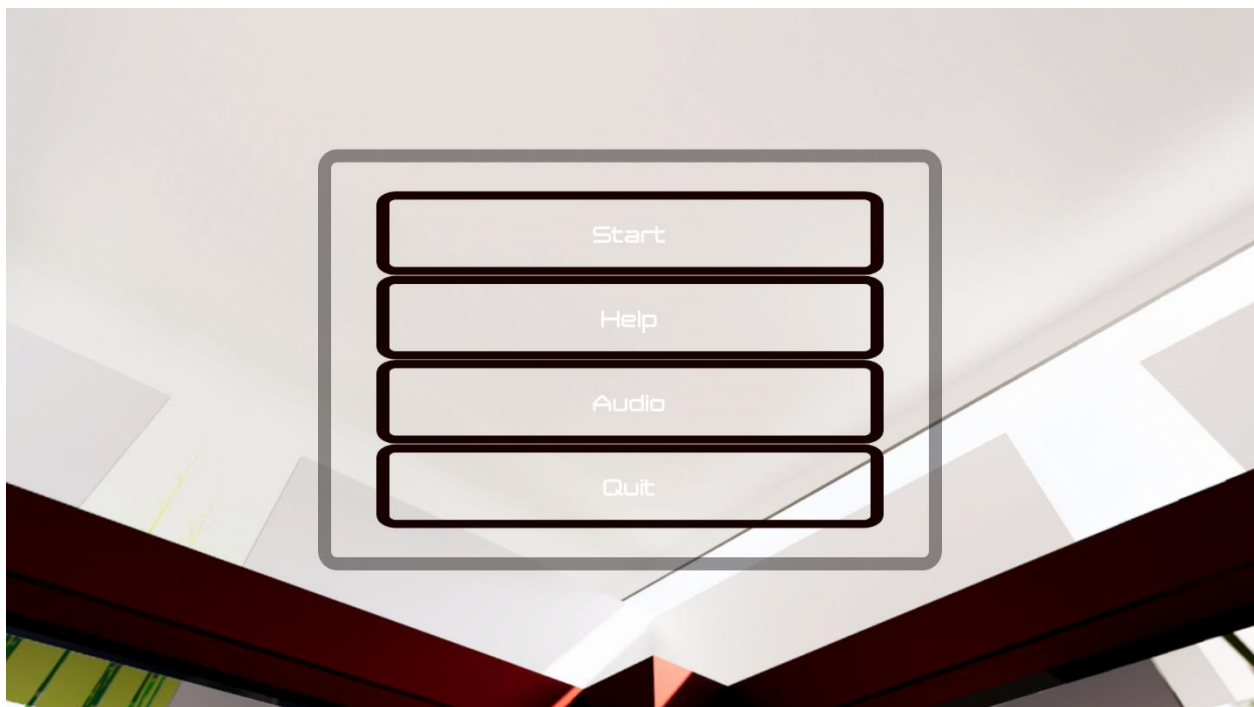
Users can write comments and communicate directly with the magazine authors or even with designers, companies and producers. Accordingly, they can see the feedbacks around their design or products in an easier way. consequently, this ability enhances the way of interaction between the subscribers and the magazine. Furthermore, users can watch the related videos and lesson to the interviews. The magazine can provide gamming contents to extend the target groups and attract young audiences. This can also help the storytelling and educational goal of the magazine.

The virtual magazine can represent any digital contents such as:

- Walkthroughs and 3d models
- Videos / Animation
- Audio / Interview
- Pictures / Panorama
- Articles/ Descriptions
- 3D/2D/VR Games

Interface

The interface of the VR magazine consists of an interactive virtual space as a medium to other digital contents. Users can interact with contents through the menus.



The main menu

The equipment for interact with the magazine are:

1. Displays such as:
 - Head-Mounted-Displays
 - Touch Screens
 - Mobile & Desktop screens
2. Controllers for navigation and interact such as:
 - HMD single point mouse
 - Touch gestures
 - Mouse & Controller gestures
 - Magazine Gadget

Also, a database is needed to store and access the contents. The contents can be organized by

- Keyword & type
- number of volume & issue

The application could be uploaded in any app stores according to the platforms. Users could download and install the app on their devices. PC Users can switch between VR or PC platforms from the main menu according to their needs. By installing the app, users would subscribe to the magazine and can download the contents monthly or weekly via internet.

Also, there is a potential to have multiplayer version which subscriber can virtually meet each other through costume avatars. They would able to interact and share the experience with each other. Furthermore, the magazine can have special gadgets or Easter egg to reveal the hidden contents for the users.

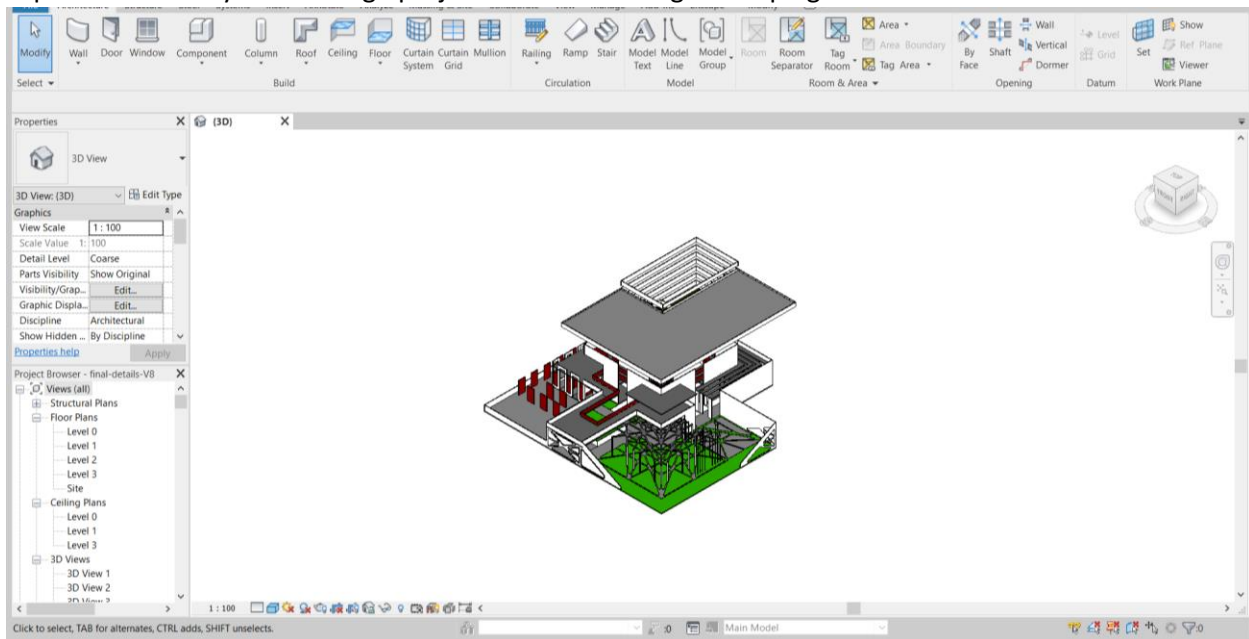
Designing process

The designing process includes 5 main stages:

- Designing the 3D model of virtual magazine with the help of 3D model software.
- Importing the 3D model to a gaming engine.
- Preparing the contents.
- Making the contents Interactive in the gaming engine via writing scripts and using existing interactive tools of the gaming engine.
- Build an application.

Designing the 3D model

For this project, Autodesk Revit was used for making the model. After completing the model, model exported as a unity walkthrough project via Walk-Through-3D™ plugin for Revit.



3D model of virtual magazine designed in Autodesk Revit

Importing the 3D model

Next step was to import the prefab and its materials from the exported walkthrough to the unity project.



3D model exported to Unity 3D from Revit

Preparing the contents

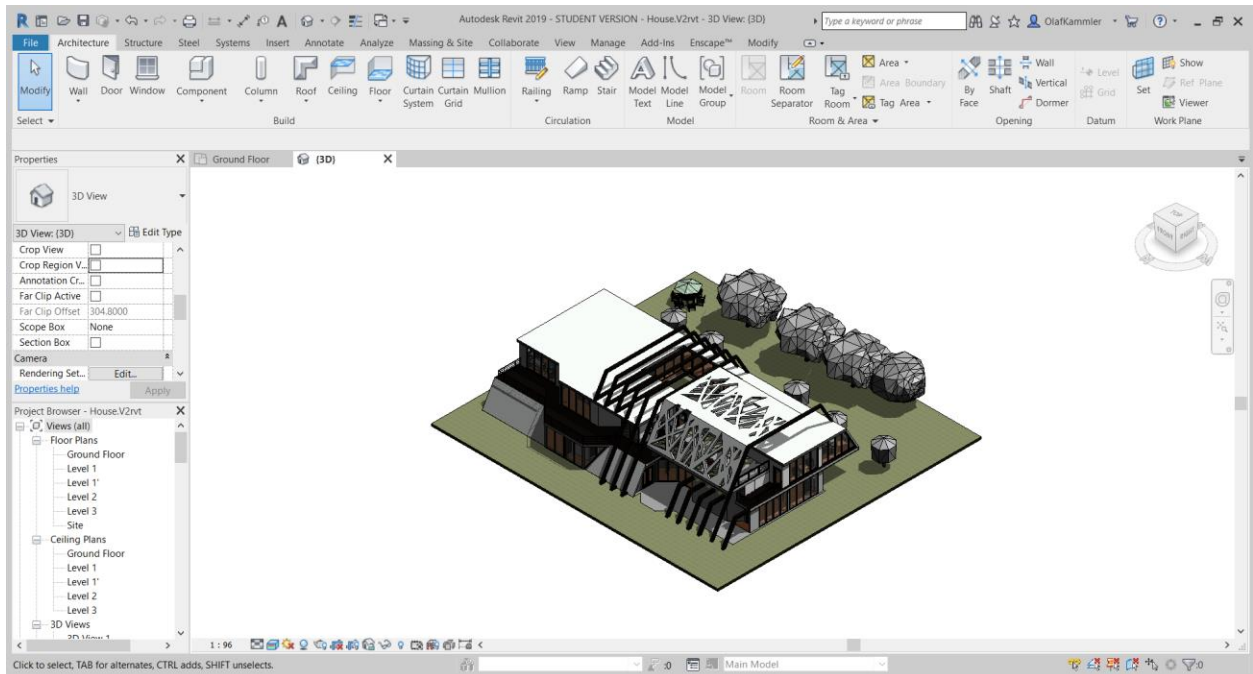
For this project, two subjects have been focused on which both have implemented inside the Architectural section.

Two pieces of furniture which belong to one company, were downloaded from the www.bimobject.com website.



Two types of sofa have used in the project which have chosen from Offecct company's products

The designed model was taken from one of my personal architectural design. For importing the model to the project, Walk-Through-3D™ plugin, as well, was used.



3D model in Revit

For preparing the panorama pictures of this project, Enscape™ plugin for Revit was used.



A Panorama picture exported from Enscape™ plugin

Making interactive contents

Unity engine has potential for making simple interactive function. But, complicated functions can be done with writing scripts. Unity works with two important programming languages: java scripts and C#. In this project, all the scripts have written in C# language through Microsoft Visual Studio. As an

example, we can mention three scripts which has been used for changing the material of the furniture in real time.

```

using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class MaterialChanger : MonoBehaviour {
    public RadialMenu menuPrefab;
    public Renderer objectToChange;
    [HideInInspector]
    public bool pointerOverButton, pointerOverMenu;

    [System.Serializable]
    public class MaterialInfo
    {
        public string title;
        public Material material;
    }
    public MaterialInfo[] materials;

    private RadialMenu currentMenu;
    private Transform childCollider;
    // Use this for initialization
    void Start () {
        childCollider = transform.GetChild(0);
    }
    public void OnPointEnter() {
        pointerOverMenu = true;
        //Spawn a menu
        if (currentMenu == null){
            currentMenu = Instantiate(menuPrefab) as RadialMenu;
            currentMenu.transform.position = transform.position;
            currentMenu.transform.rotation=transform.rotation;
            childCollider.localScale = new Vector3(1.5f, 1.5f, 1.5f);
            //Spawn Buttons
            currentMenu.SpawnButtons(this);
        }
    }
    public void OnPointExit()
    {
        pointerOverMenu = false;
        StartCoroutine(TryDestroyMenu());
    }

    public IEnumerator TryDestroyMenu()
    {
        yield return new WaitForEndOfFrame();
        if (pointerOverButton==false && pointerOverMenu == false)
        {
            childCollider.gameObject.SetActive(false);
            iTween.ScaleTo(currentMenu.transform.GetChild(0).gameObject,
            "oncomplete", "DestroyMenu",
            "oncompletetarget", gameObject);
        }
    }
    private void DestroyMenu()
    {
        Destroy(currentMenu.gameObject);
        childCollider.localScale = new Vector3(0.5f, 0.5f, 0.5f);
        childCollider.gameObject.SetActive(true);
    }
}

```



```

using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class RadialMenu : MonoBehaviour {
    public RadialBotton buttonPrefab;
    public bool autoSpaceButtons;
    public int numberOfButtons=5;
    public float buttonSize=0.5f;
    public float distanceFromCenter=0.5f;
    private RectTransform newButtonRect;

    private void Start () {
        transform.GetChild(0).gameObject.GetComponent<RectTransform>().localScale =
        Vector3.zero;
        iTween.ScaleTo(transform.GetChild(0).gameObject, Vector3.one, 1f);
    }
    public void SpawnButtons(MaterialChanger obj)
    {
        for (int i = 0; i < obj.materials.Length; i++)
        {
            RadialBotton newButton = Instantiate(buttonPrefab) as RadialBotton;
            newButton.transform.SetParent(transform.GetChild(0));
            newButton.transform.localScale = Vector3.one;
            newButton.transform.rotation =transform.rotation;
            newButtonRect = newButton.gameObject.GetComponent<RectTransform>();
            newButtonRect.sizeDelta = new Vector2(buttonSize, buttonSize);
            newButton.title = obj.materials[i].title;
            newButton.material = obj.materials[i].material;
            newButton.obj = obj;

            float theta=0;

            if (autoSpaceButtons == true)
            {
                theta = (2 * Mathf.PI / obj.materials.Length) * i;
            }
            else {
                theta = (2 * Mathf.PI / numberOfButtons) * i;
            }
            float xPos = Mathf.Sin(theta);
            float yPos = Mathf.Cos(theta);
            newButton.transform.localPosition = new Vector3(xPos, yPos, 0f) *
            distanceFromCenter;
        }
    }
}

```

Two mentioned script has been used for in the panel and radial menu prefab. The following script has been attached to the button prefab. For designing the menu and button sprites, Adobe Photoshop was used.

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

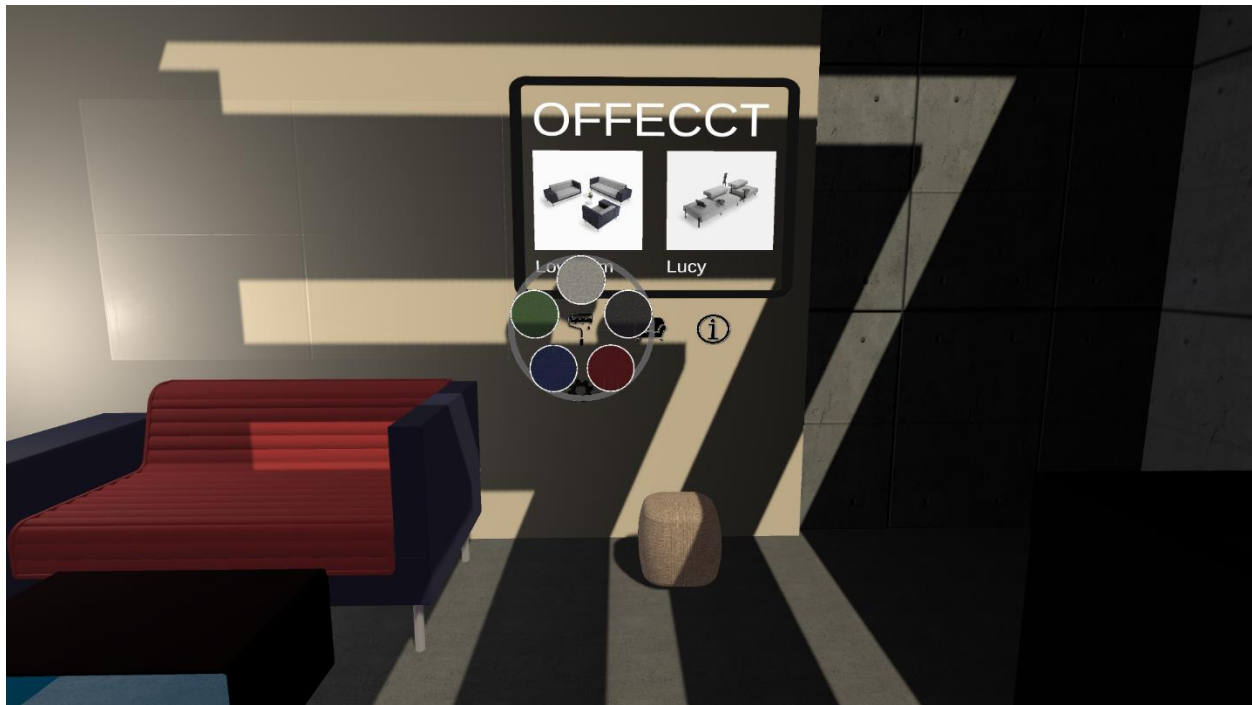
public class RadialBotton : MonoBehaviour
{
    [HideInInspector]
    public string title;
    [HideInInspector]
    public Material material;
    [HideInInspector]
    public MaterialChanger obj;

    private MeshRenderer childRenderer;
    private bool buttonEnabled;
    // Use this for initialization
    void Start()
    {
        childRenderer =
transform.GetChild(0).gameObject.GetComponent<MeshRenderer>();
        childRenderer.material = material;
        StartCoroutine(EnableButton());

    }
    private IEnumerator EnableButton()
    {
        yield return new WaitForSeconds(0.3f);
        buttonEnabled = true;
    }
    public void OnPointerEnter()
    {
        obj.pointerOverButton = true;
        if (buttonEnabled == true)
        {
            obj.objectToChange.material = material;
        }

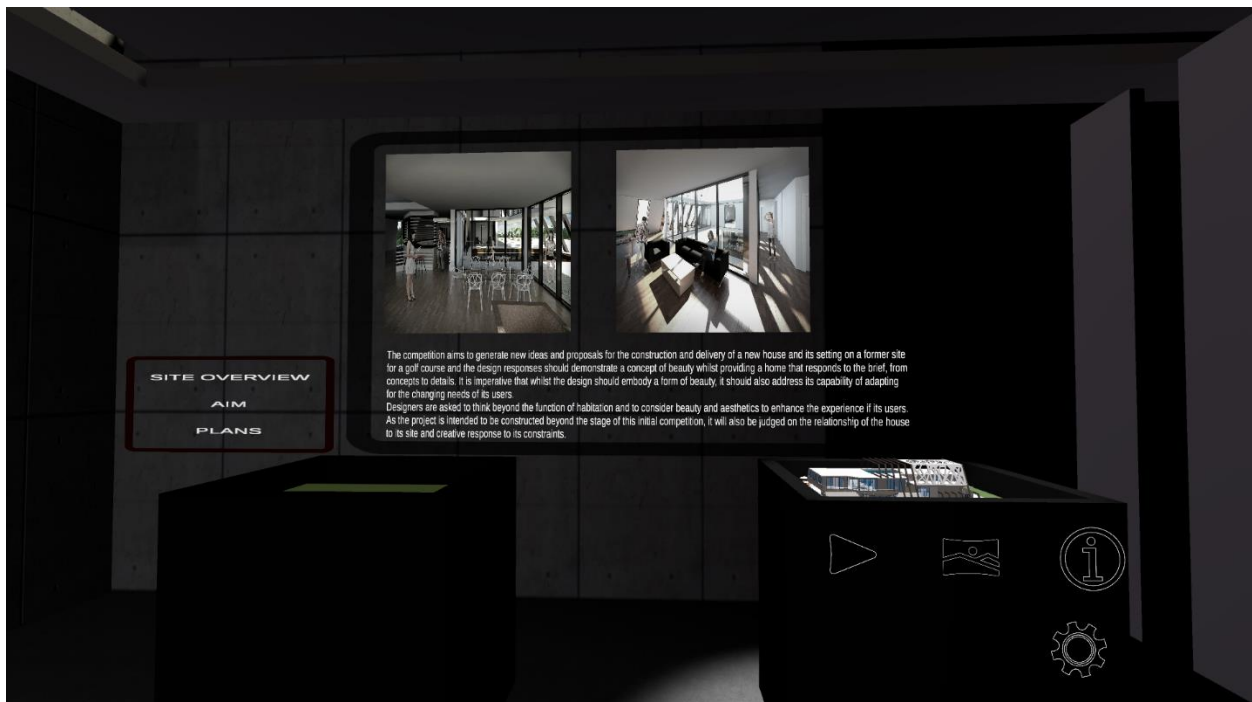
    }
    public void OnPointerExit()
    {
        obj.pointerOverButton = false;
        if(buttonEnabled== true)
        {
            StartCoroutine(obj.TryDestroyMenu());
        }

    }
    public void OnPointerDown()
    {
        obj.objectToChange.material = material;
    }
}
```



Material changer menu used for the sofas

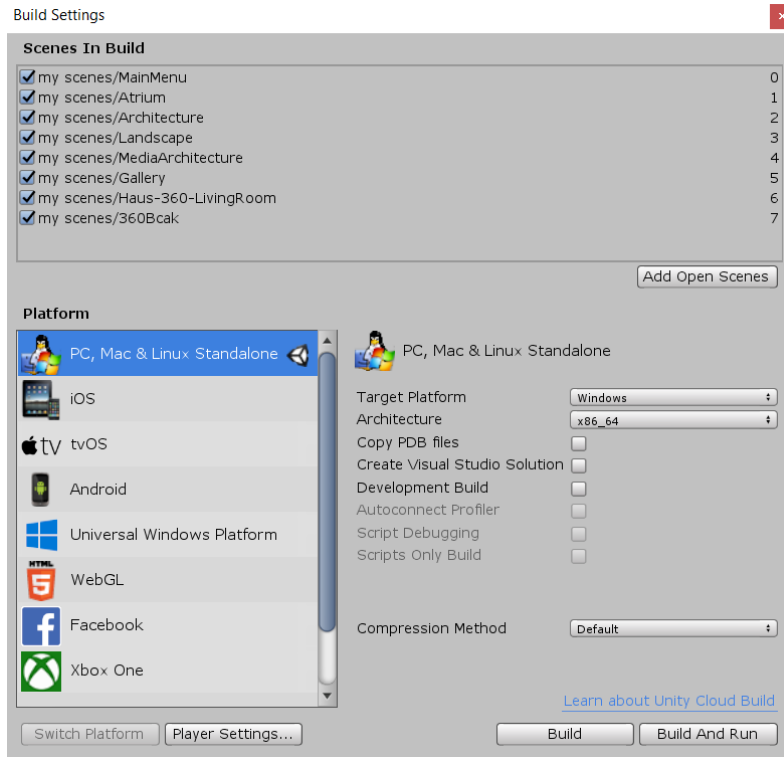
For making many of the interactive functions and menus, unity components such as UI Button and UI Toggle have been used.



A menu has been built without using any script

Build an application

The final part is to make an application. It is possible with Unity 3D build function.



Build setting menu in Unity

Conclusion

Virtual reality is a promising technology that can have a wide impact on the new goals of the media industries.

Magazine as an oldest version of media tool can adopt itself with this technology. VR can extend the boundaries of storytelling and educational goals of publishing Industry. This cross-media and non-linear storytelling principle can provide publishing industry with the opportunity to present more information for the users than ever before. VR technology has the potential to place the visitor at the center of an experience.

One of the subject which needs more spatial experience, is architecture. VR can help magazines to communicate the architectural materials and contents easier, faster and in an interactive way. VR has help the architects to describe spaces to their clients and non-professionals who don't have adequate spatial experience . With the help of the VR magazine, producers and real estate agencies can virtually showcase the products and properties.

Although the novelty of these technologies can distract the users from the subject, the problem can be resolved over time. Likewise, technical problems in implementing these systems require investment in further research. The other challenge of using VR in magazine is cybersickness that can cause by using VR glasses for a long period of time. One of the solution is to implement an option to change the text contents to the full screen mode. Hence, users can remove the glasses for reading the text. It can also help to improve the reading experience which may be hard on the VR mode.

References

1. Nacho Martín. "VR Architecture: Why the Next Design Frontier Will Be in Virtual Spaces" 02 Feb 2016. ArchDaily. Accessed 1 Oct 2018. <<https://www.archdaily.com/781391/vr-architecture-why-the-next-design-frontier-will-be-in-virtual-spaces/>> ISSN 0719-8884
2. Albornoz, Manuel. "5 Architecture Offices Using VR to Present Their Designs" [5 oficinas de arquitectura que usan VR para presentar sus diseños] 05 Aug 2018. ArchDaily. (Trans. Montano, Zoë) Accessed 1 Oct 2018. <<https://www.archdaily.com/899599/5-architecture-offices-using-vr-to-present-their-designs/>> ISSN 0719-8884
3. Anders Hermund, Lars Simon Klint, Ture Slot Bundgaard, Rune Noël Meedom Meldgaard Bjørnson-Langen. *The Perception of Architectural Space in Reality, in Virtual Reality, and through Plan and Section Drawings*. VR, AR & VISUALISATION | Experiments - Volume 2, eCAADe 36 conference.