Virtual Painting: Painting in the Virtual Realm

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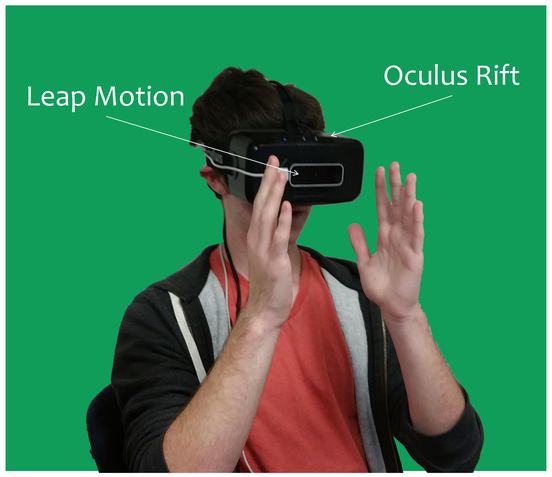
Introduction

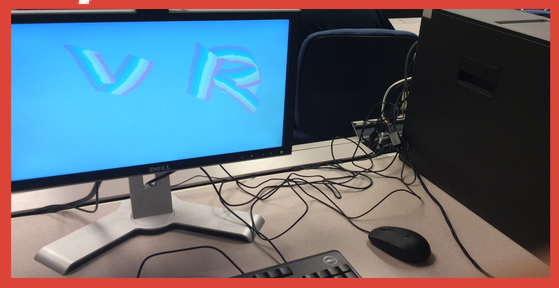
Using the Unity Engine, the Oculus Rift, and Leap Motion Technology, we created an Immersive Virtual Reality Experience so that you can draw in 3D.



What is Oculus Rift?

The Oculus Rift is a set of virtual-reality goggles that uses state-of-the art displays and stereoscopic visuals to provide a truly immersive Virtual Experience.

Why we did this



There is a lack of development in 3D user interfaces for painting in Virtual Reality. Our research tackles this problem, and provides a possible solution to bridge interactions in real world to the virtual world.

What it does

By tracking the user's thumb and index finger, the software generates a trail, or "mesh" along the path the hand covers. The user has the ability to change the size of the mesh generated by altering the distance between the aforementioned fingers. Further, incorporating the use of both hands, the user is given greater control over when the meshes are generated; the presence of both hands indicates the draw mode, and the first detected hand (to accommodate right and left hand dominants) acts as the drawing brush.

How it was done

This program was made using the programming language C# (C Sharp) in the Unity engine, with Oculus Rift and Leap Motion. We use the position of the user's thumb and index finger to make the software generate a trail of meshes that follows the user's hand. Atop this core functionality, we added conditions to make the user's experience more intuitive, and to allow for more control.

```
void Start () {
    leap = GetComponent<HandController> ();
    controller = leap.GetLeapController ();
    dynaMesh = new Mesh();
    dynaMesh.subMeshCount = 1;
    mFilter = GameObject.FindGameObjectWithTag("MeshHere").GetComponent<MeshFilter>();
    meshRenderer = GameObject.FindGameObjectWithTag("MeshHere").GetComponent<MeshRenderer>();
    vertices = new List<Vector3>();
    triangles = new List<int>();
    uvCoords = new List<Vector2>();
    whereInTheMesh = 0;
    handsInLastFrame = false;
}
void Update () {
    frame = controller.Frame ();
    hands = leap.GetAllGraphicsHands ();
    if(hands.Length>0){
        handsInLastFrame = true;
        DynamicMeshGenerator(hands);
    } else{
        noHandsWhatToDo();
    }
}
```

What is the Leap?

A sensor device that supports hand and finger motions as input, so that you can reach into the world beyond the screen – in virtual reality.

What we accomplished

Virtual Painting shows the practicality and potential of the research - from a technology and art perspective. In slightly over two weeks, we have demonstrated the ability to "draw", and control how we draw - as one would expect with a pencil.

The Next Step

Potentially the next steps for the research are the following:

- Making more versatile tools
- Adding more intuitive controls
- The ability to modify existing meshes
- Material Control
- 3D Modeling
- Rigging
- Lighting Control
- Greater Precision