X3D Mobile VR

Unity H-Anim Viewer Implementation

Web3D Korea Standardization Meeting

Los Angeles, CA, USA

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Mobile VR and Sensors

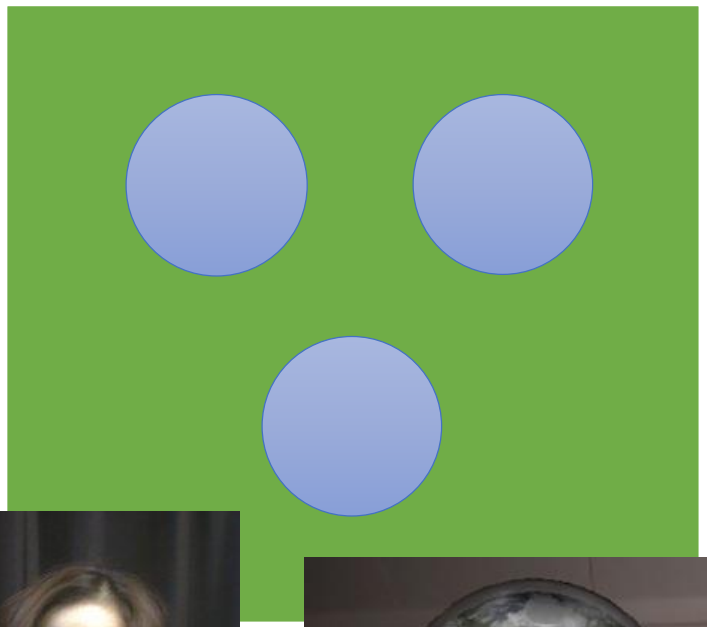
- HMD (Gear VR)
  - Camera, Acceleration, Zyro, Proximity, Magnetic
- Mobile phone
  - Camera, Zyro, GPS, Gesture, Proximity, Light, RGB, Acceleration, Magnetic, Temperature, Pressure, Atmosphere

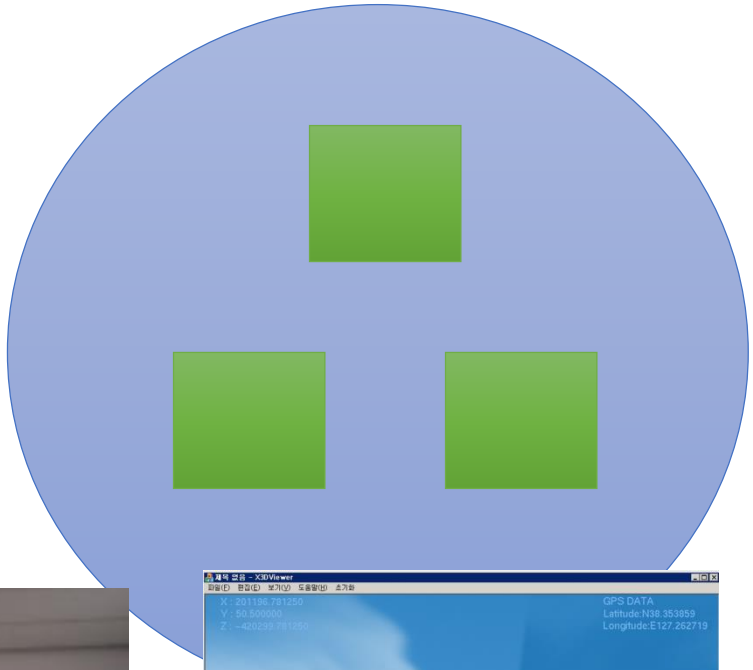
- An example of mobile travel VR
- 3D VR world
  - Geo-synchronized
  - Units specified
- Sensors
  - GPS, Camera, Acceleration, Zyro, Proximity, Light, RGB, Temperature

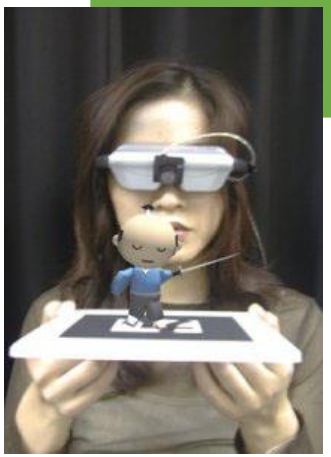
Mobile MAR

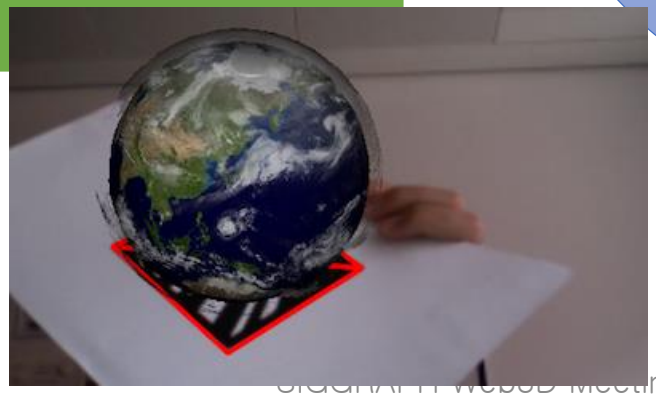
Video worlds + Augmented objects

3D VR worlds + Augmented video objects

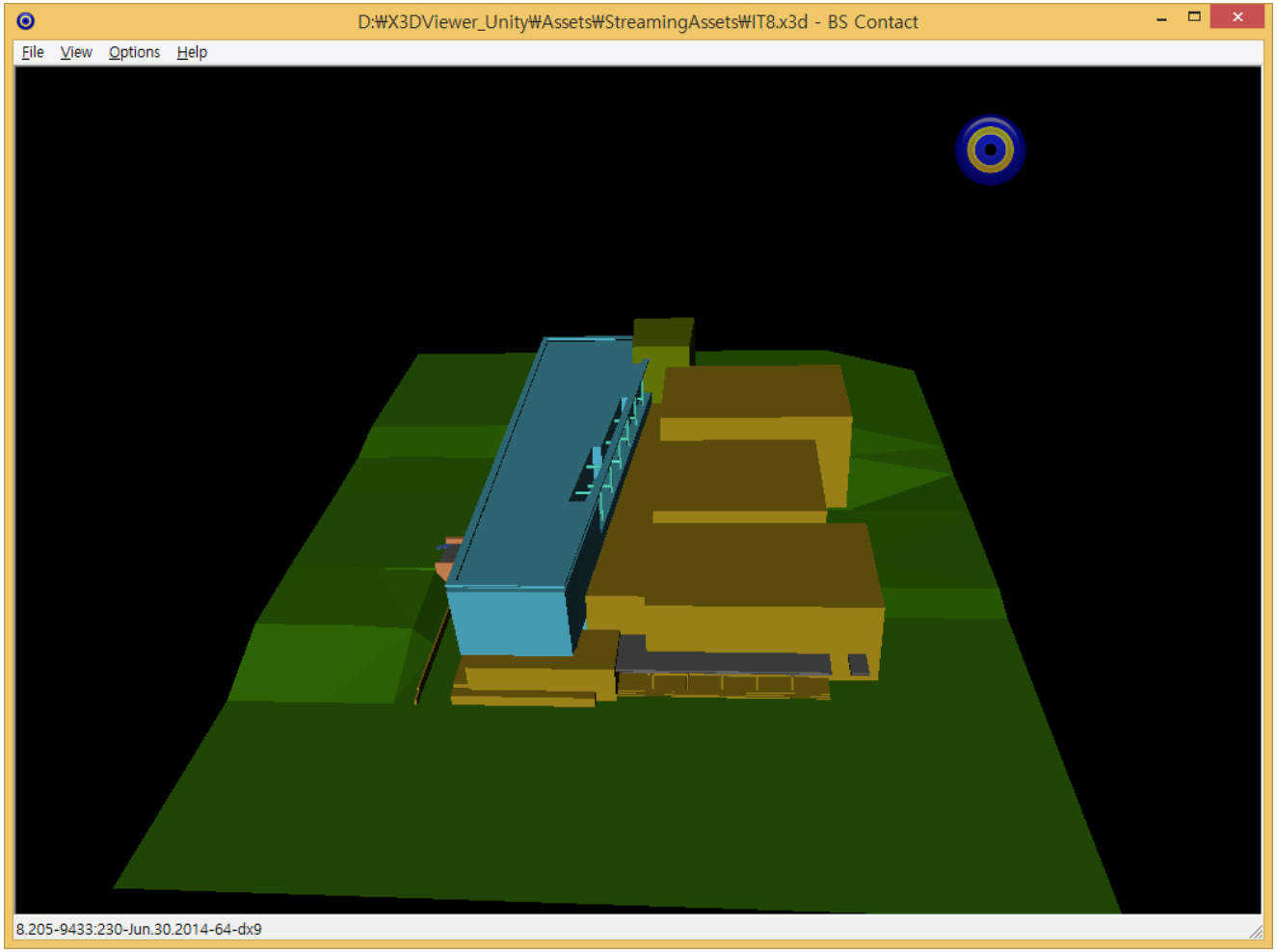




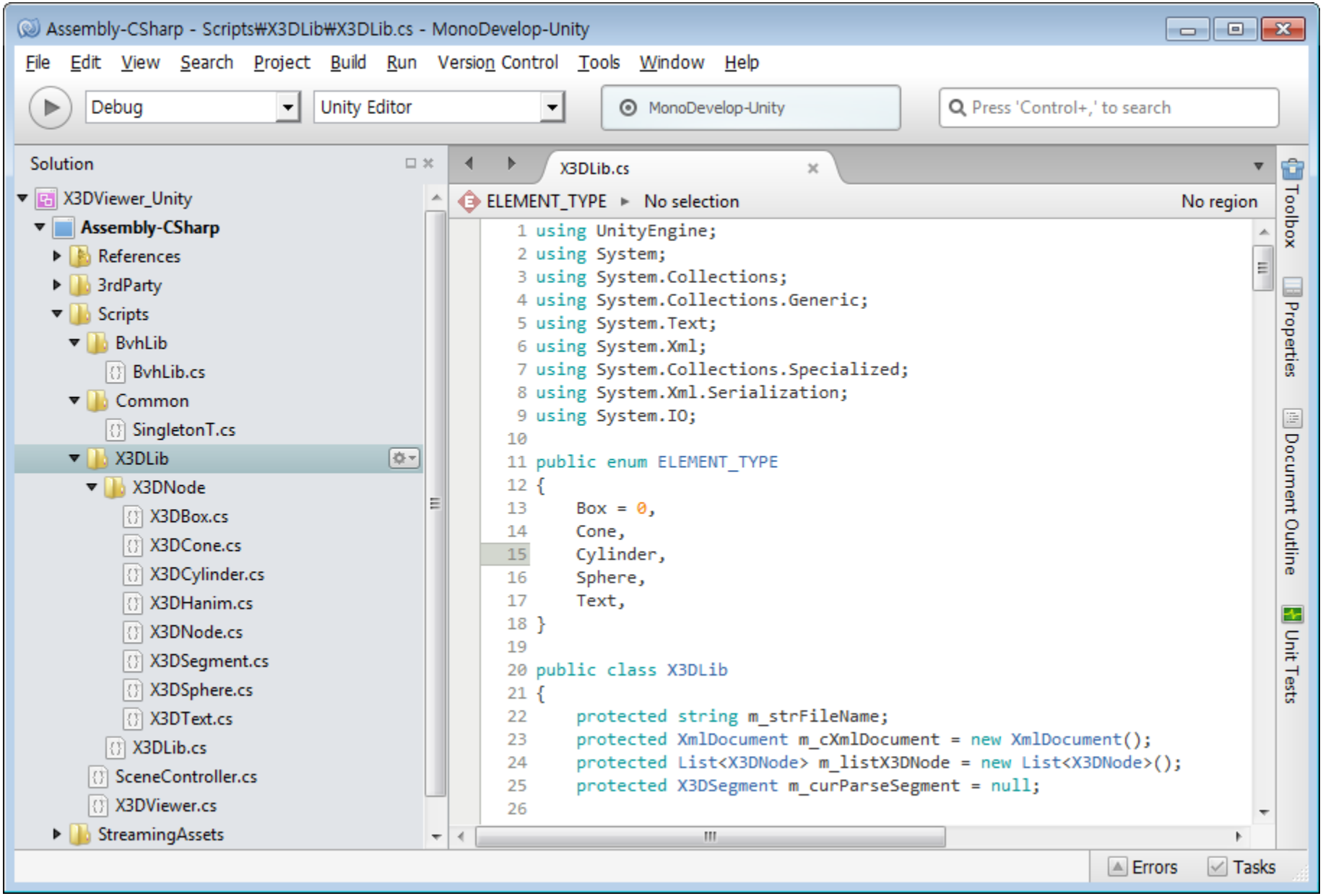




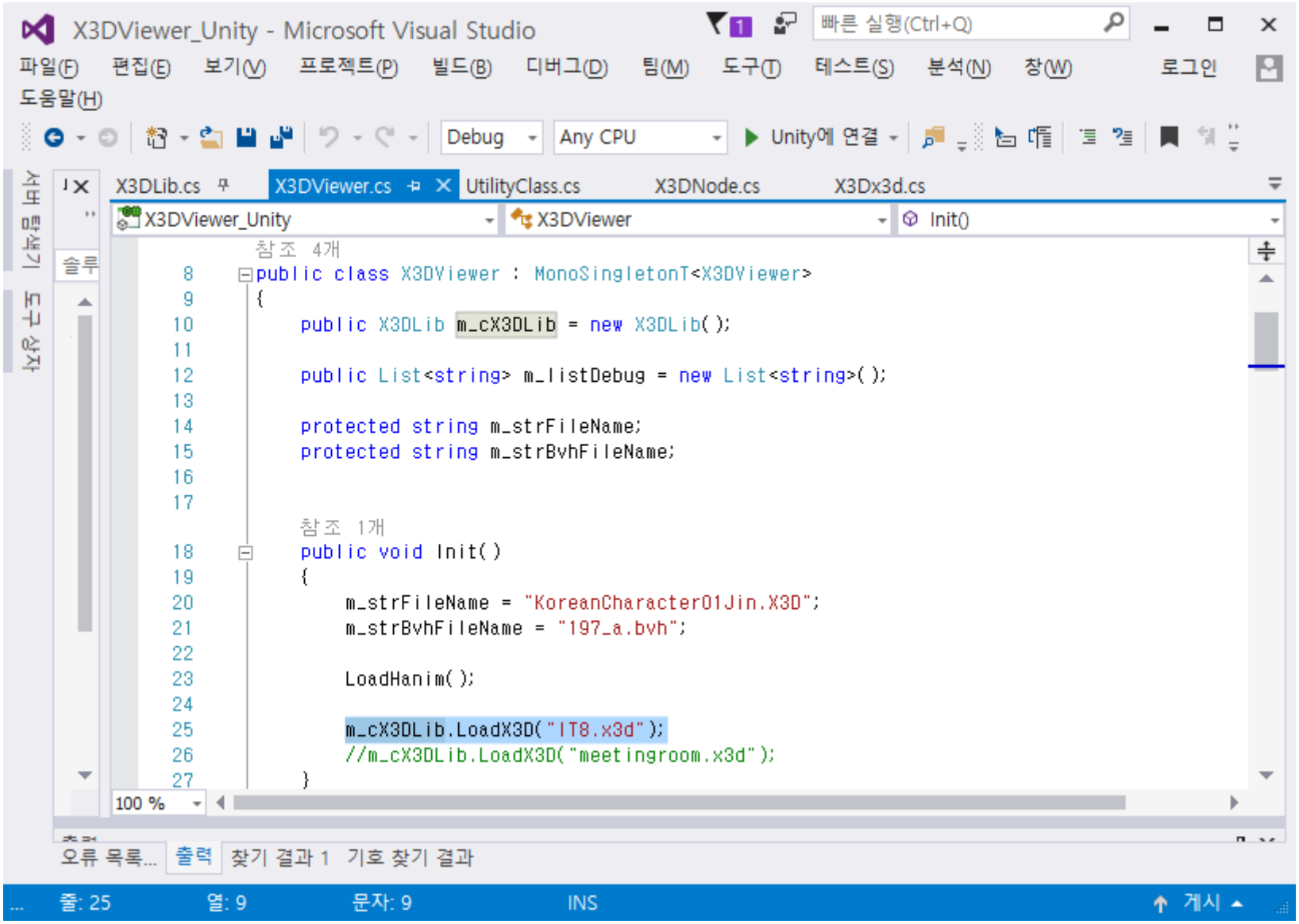
An Example X3D File



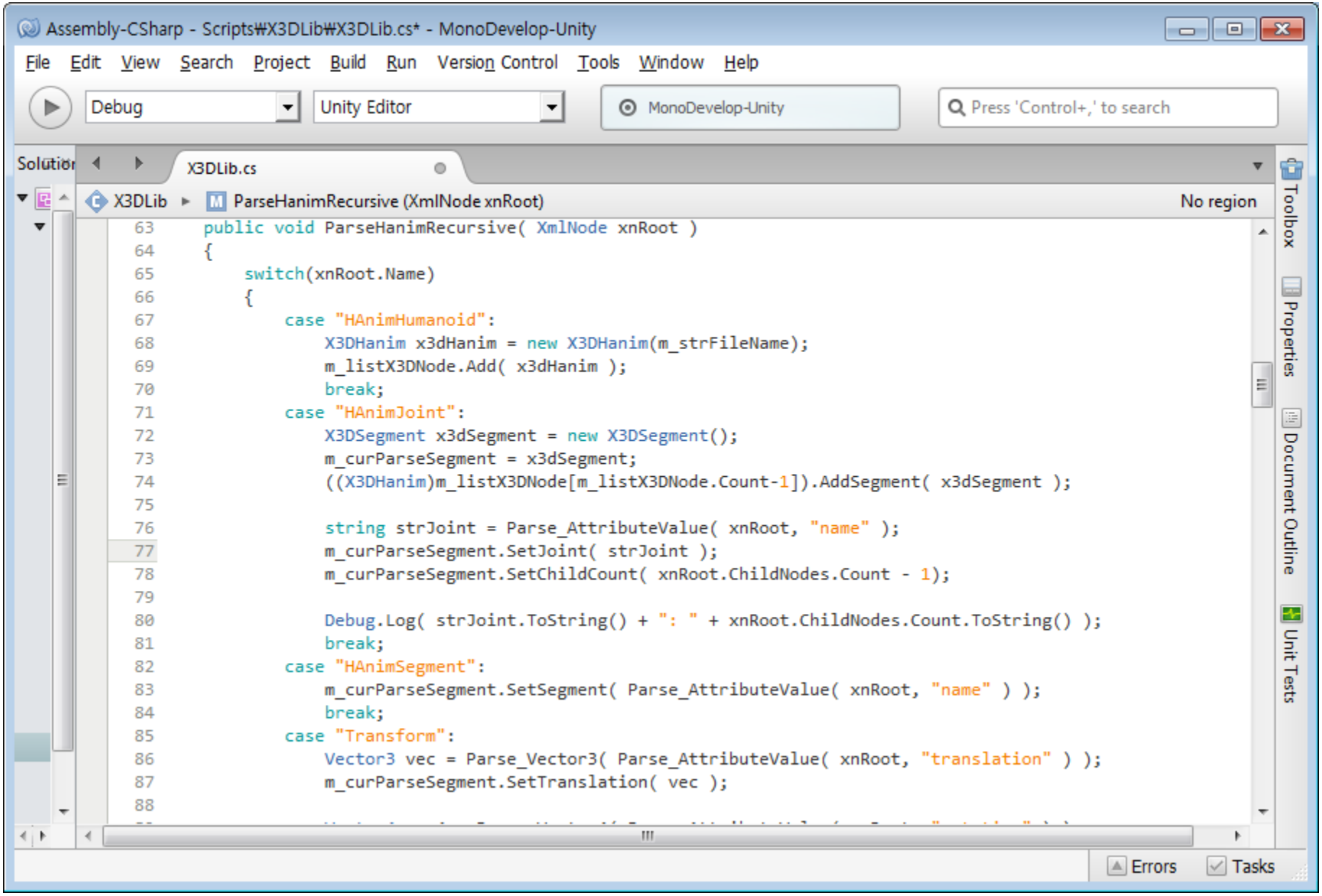
Unity H-Anim Viewer Organization



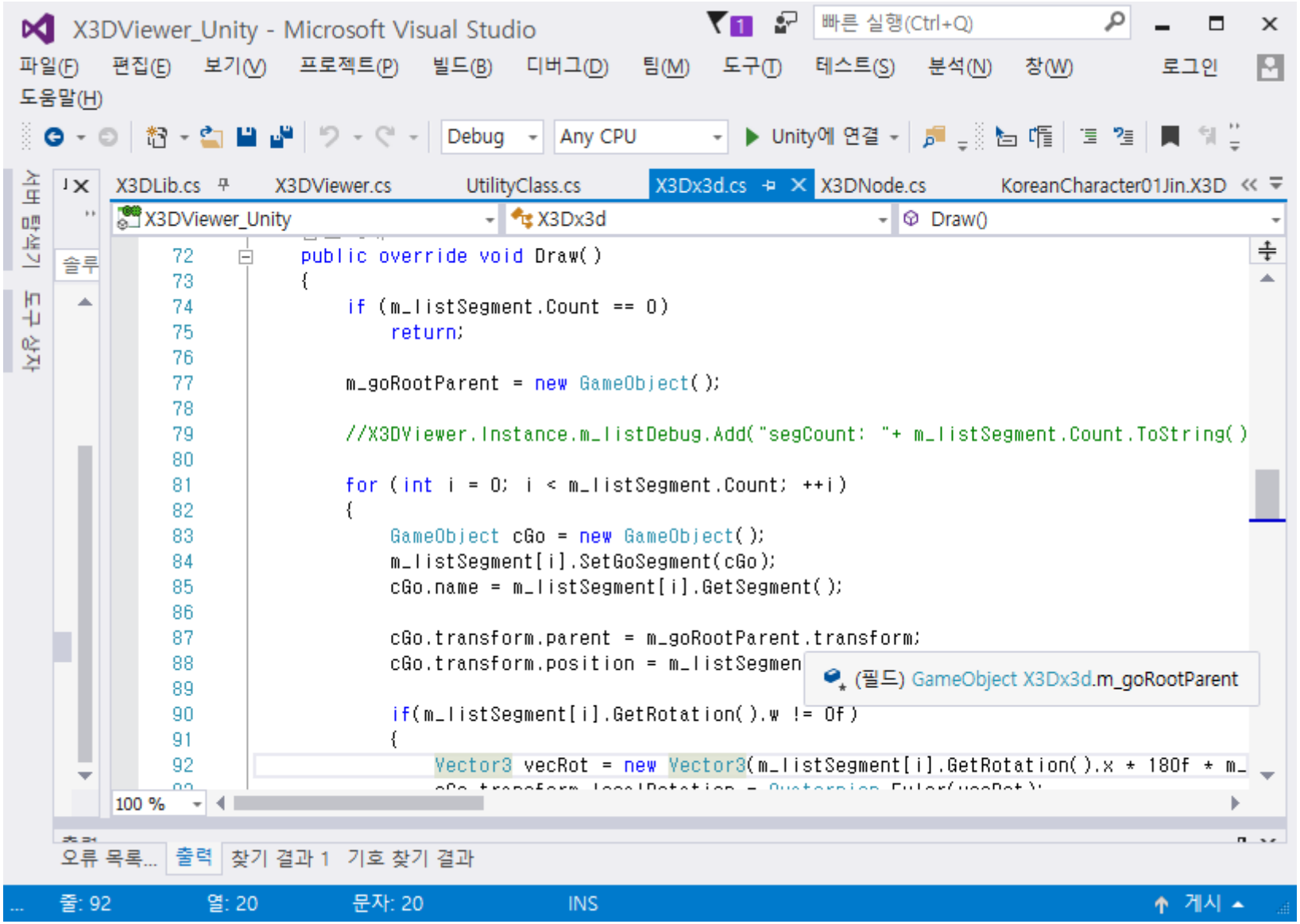
Import an X3D File into Unity



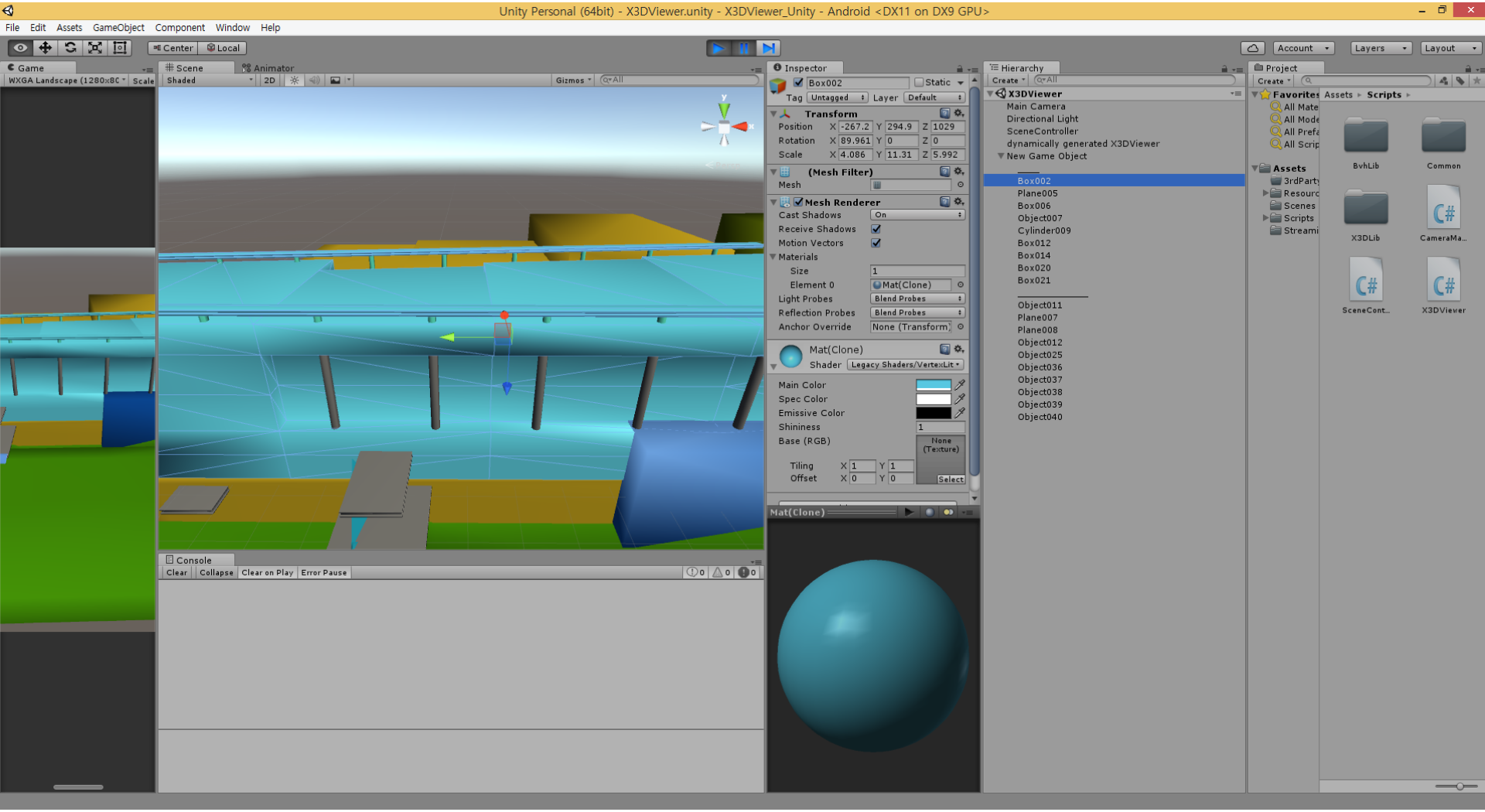
X3D Parsing in Unity



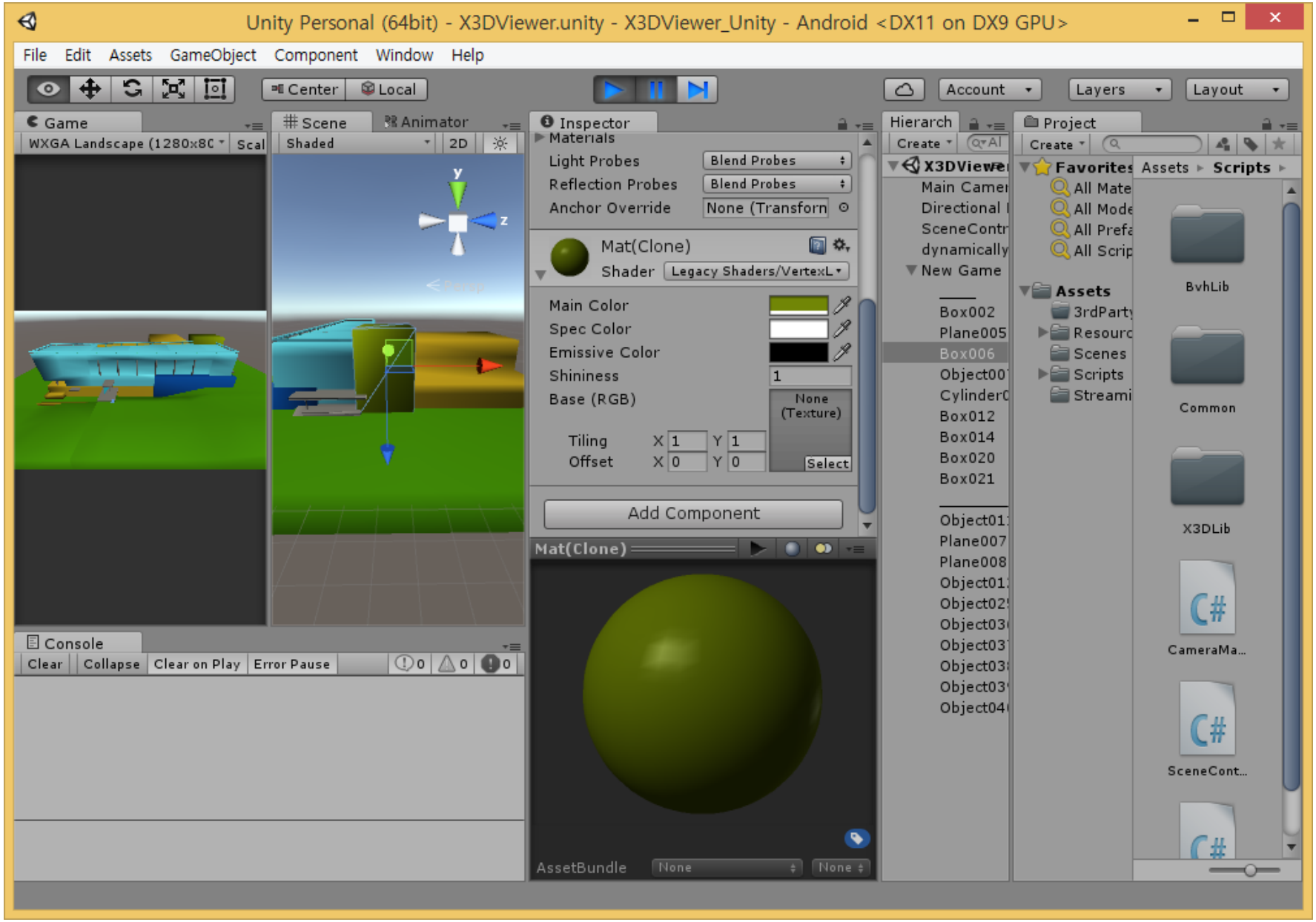
Draw an X3D File



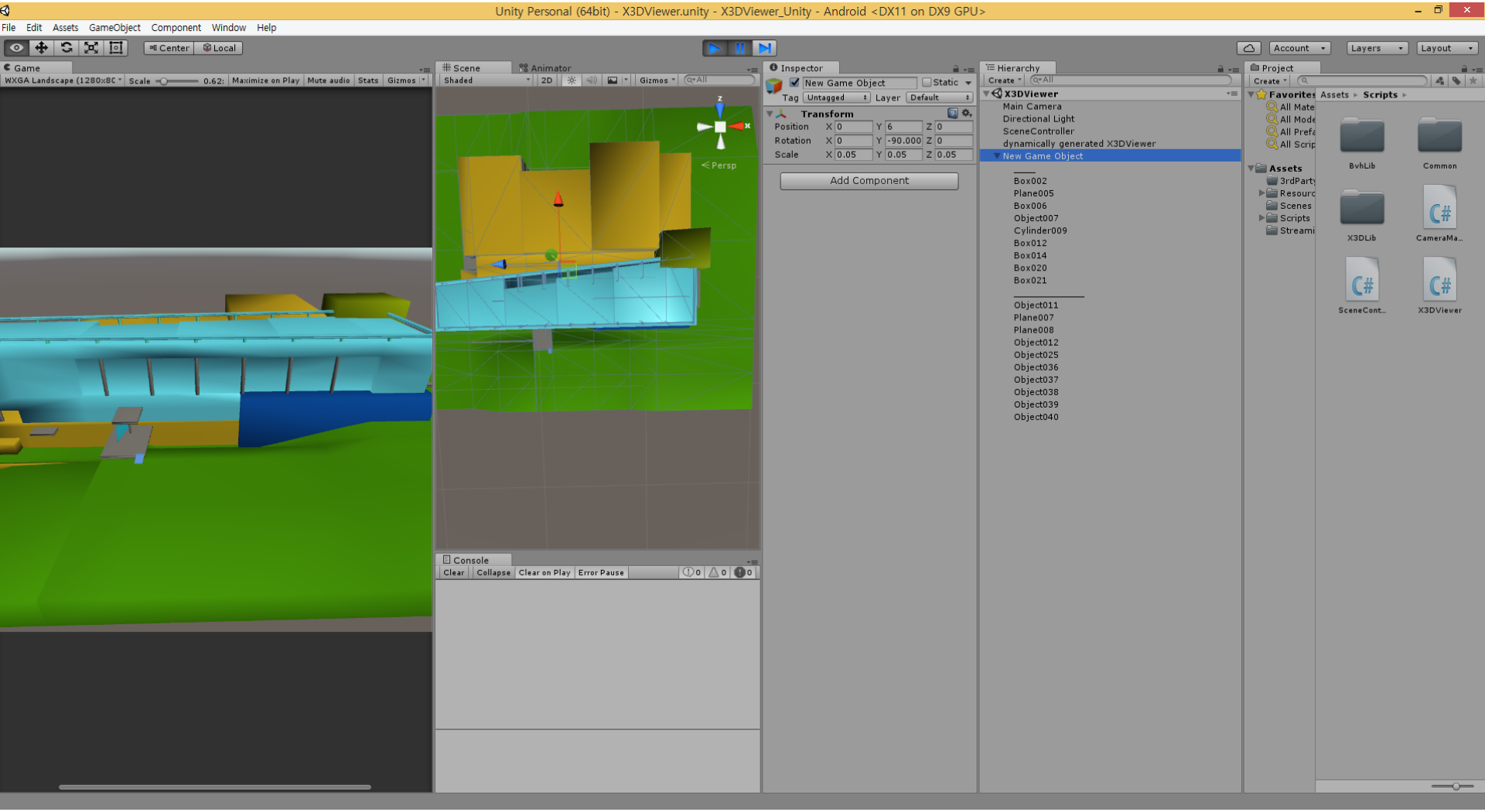
Unity X3D Scene Generation



Unity X3D Scene Generation



Unity X3D Scene Generation



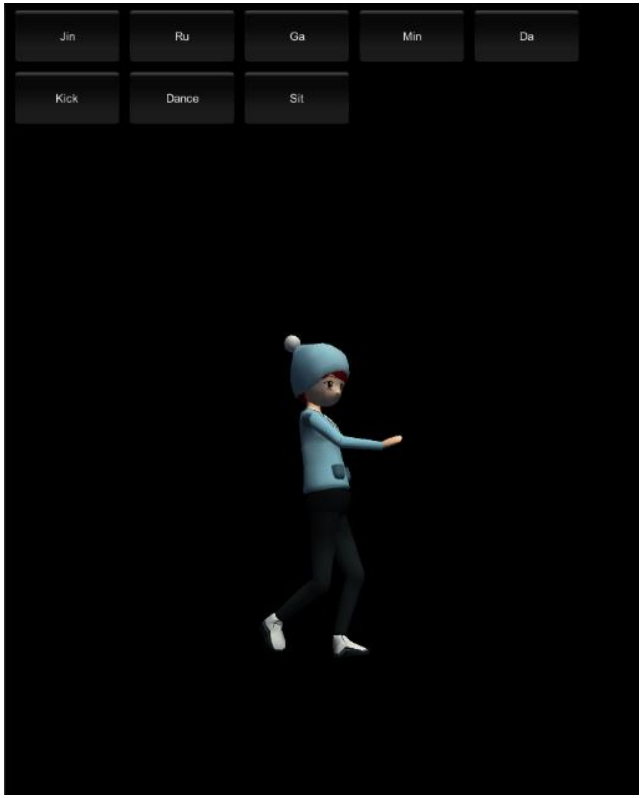
Unity X3D Texture Mapping

```
public IEnumerator CoroutineLoadImage()
{
    string strFileName = m_listSegment[0].GetTextureName();

    WWW www = UtilityClass.LoadFile(strFileName);

    yield return www;

    m_texImage = www.texture;
}
```

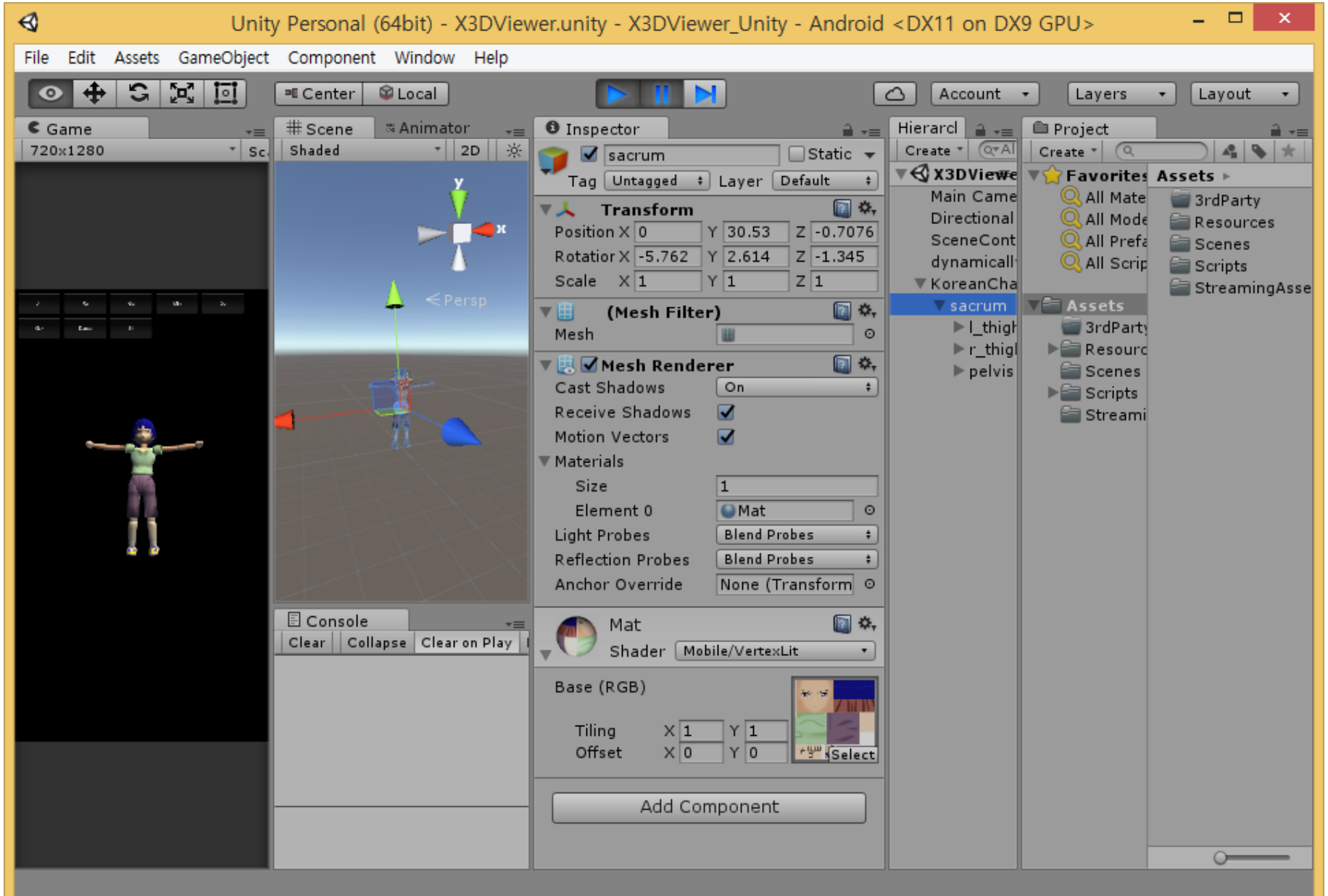
Unity X3D Texture Mapping

```
public override void Draw( )
{
    if (m_listSegment.Count == 0)
        return;

    m_goRootParent = new GameObject( );
    m_goRootParent.name = m_strFileName;
    List<GameObject> listParent = new List<GameObject>( );

    //X3DViewer.Instance.m_listDebug.Add("segCount: "+ m_listSegment.Count.ToString( ) );

    for (int i = 0; i < m_listSegment.Count; ++i)
    {
        GameObject cGo = new GameObject( );
        m_listSegment[i].SetGoSegment(cGo);
        cGo.name = m_listSegment[i].GetSegment( );

        if (listParent.Count > 0)
        {
            cGo.transform.parent = listParent[listParent.Count - 1].transform;
            listParent.RemoveAt(listParent.Count - 1);
        }
        else
        {
            cGo.transform.parent = m_goRootParent.transform;
        }

        cGo.transform.position = m_listSegment[i].GetTranslation( );
        cGo.transform.localRotation = Quaternion.Euler(m_listSegment[i].GetRotation( ));
        //cGo.transform.lossyScale = m_listSegment[i].GetScale( );

        for (int j = 0; j < m_listSegment[i].GetChildCount( ); ++j)
        {
            listParent.Add(cGo);
        }
```

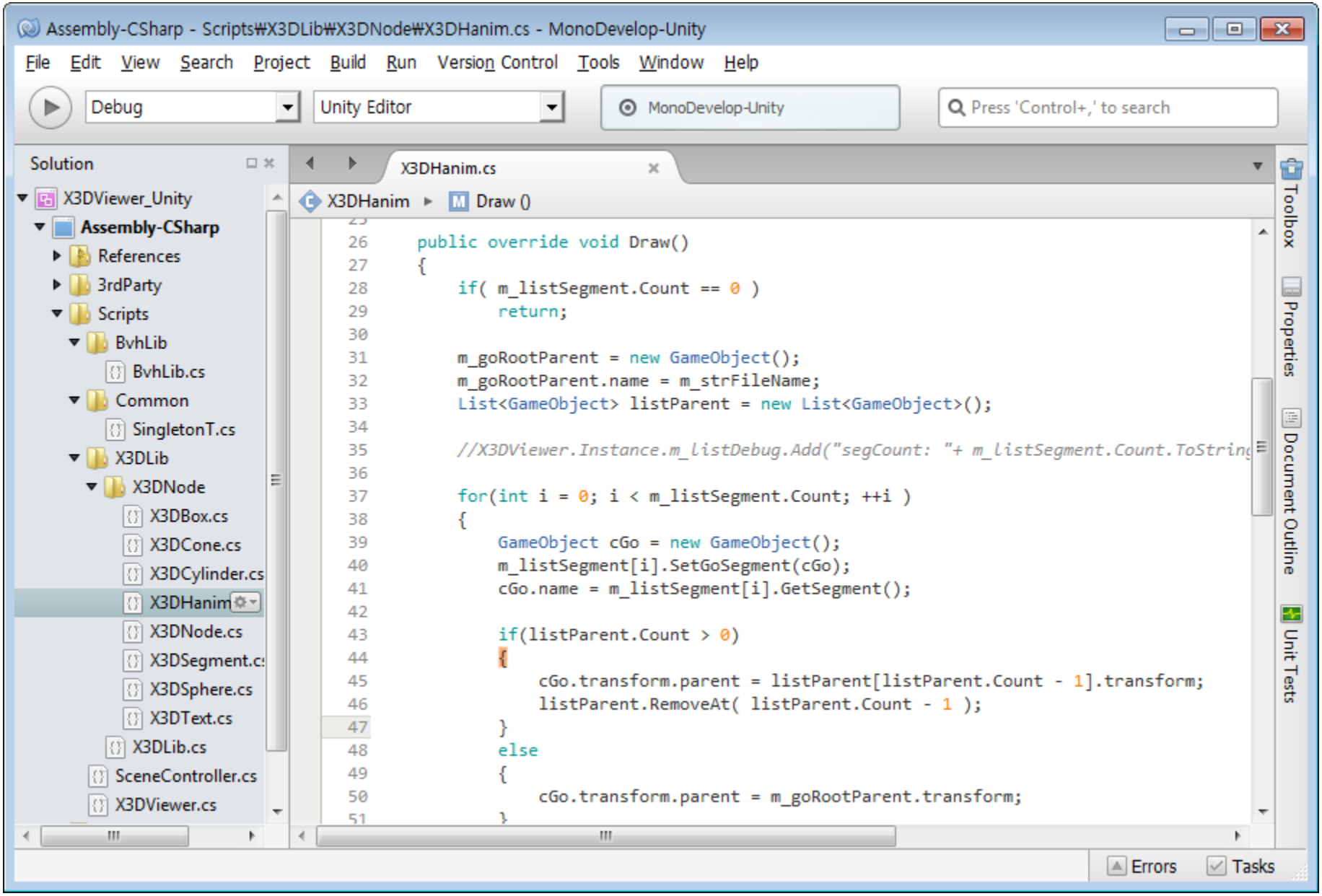
Results of Unity X3D Texture Mapping



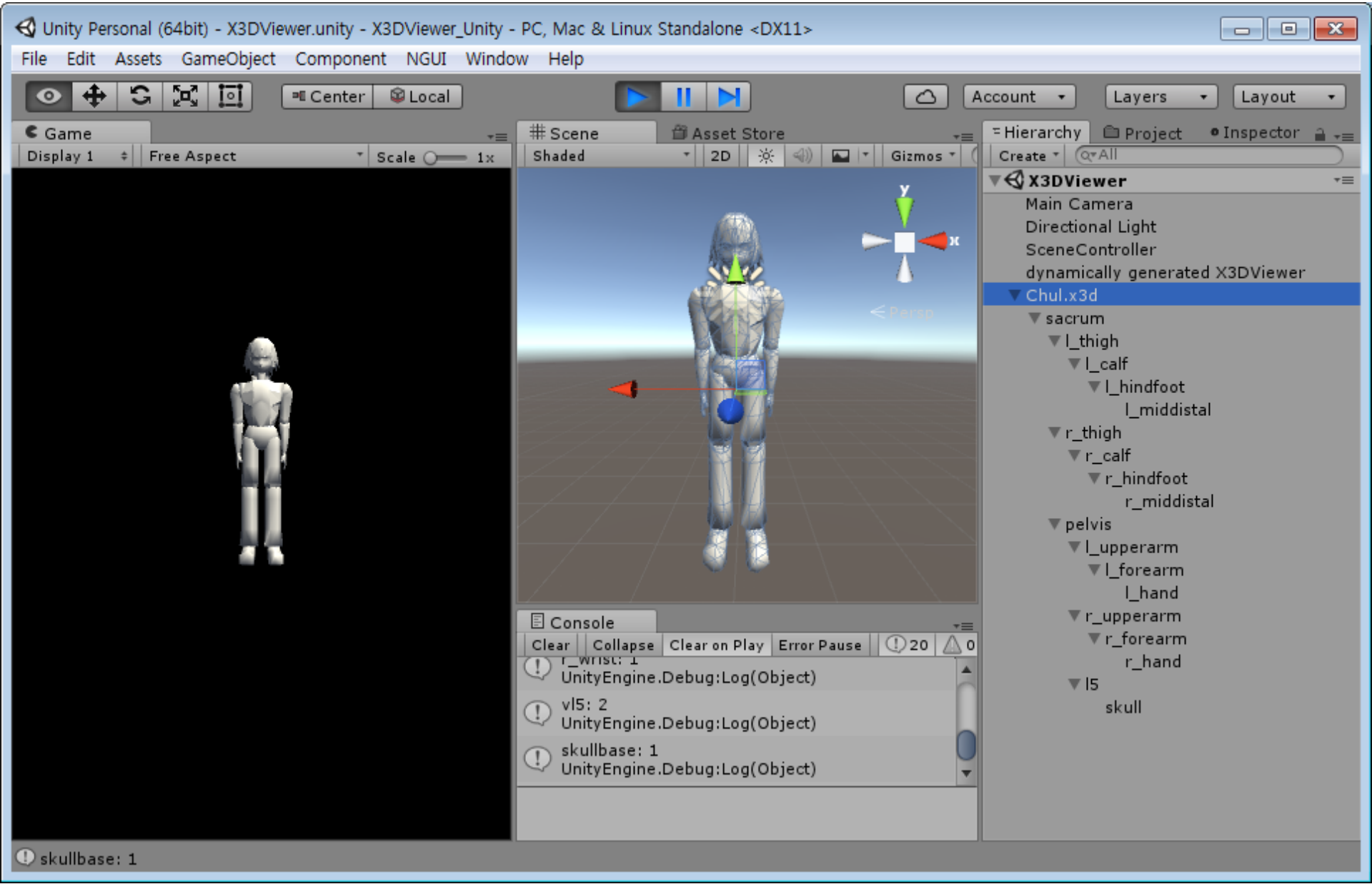
Results of Unity X3D Texture Mapping



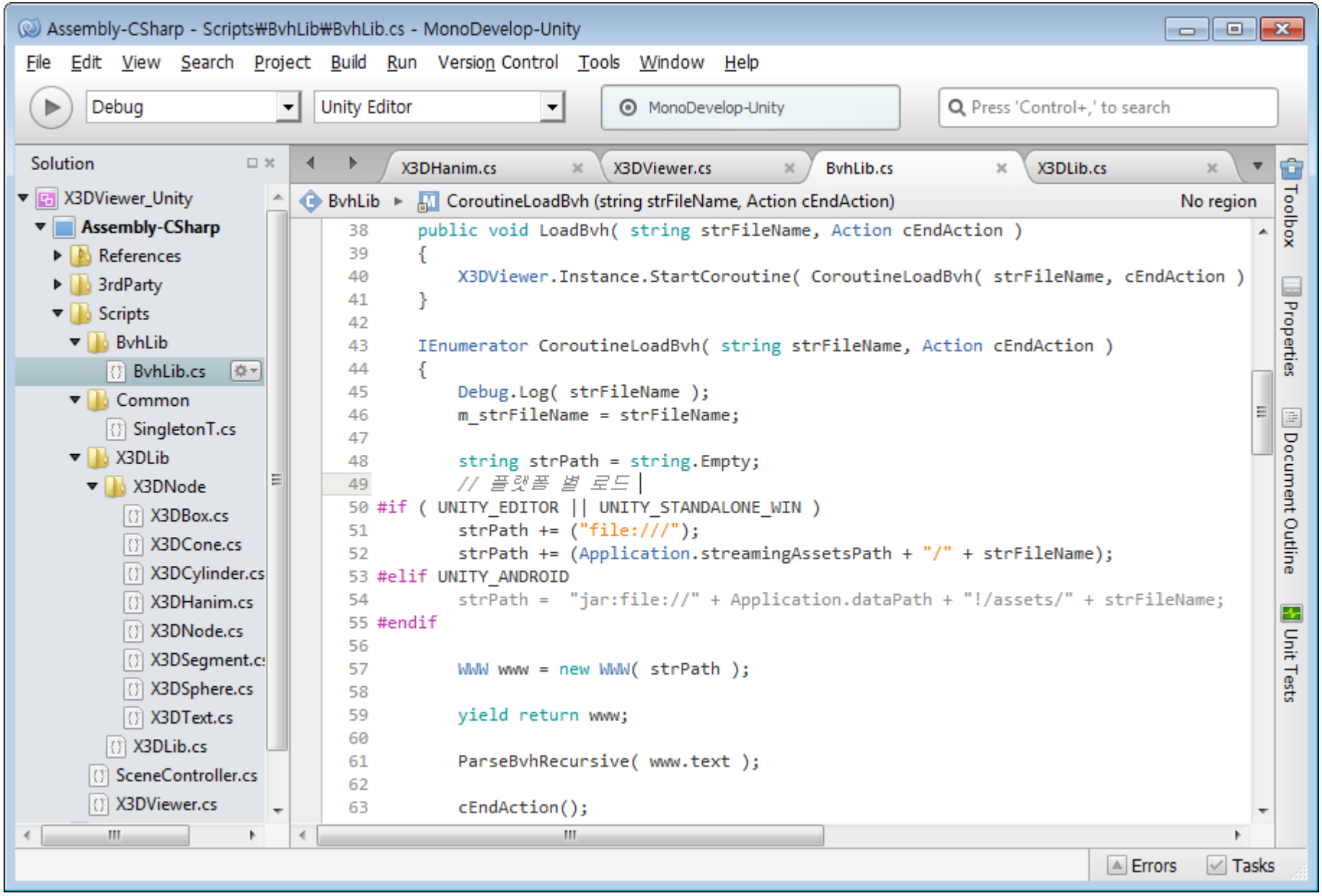
Draw an H-Anim Character



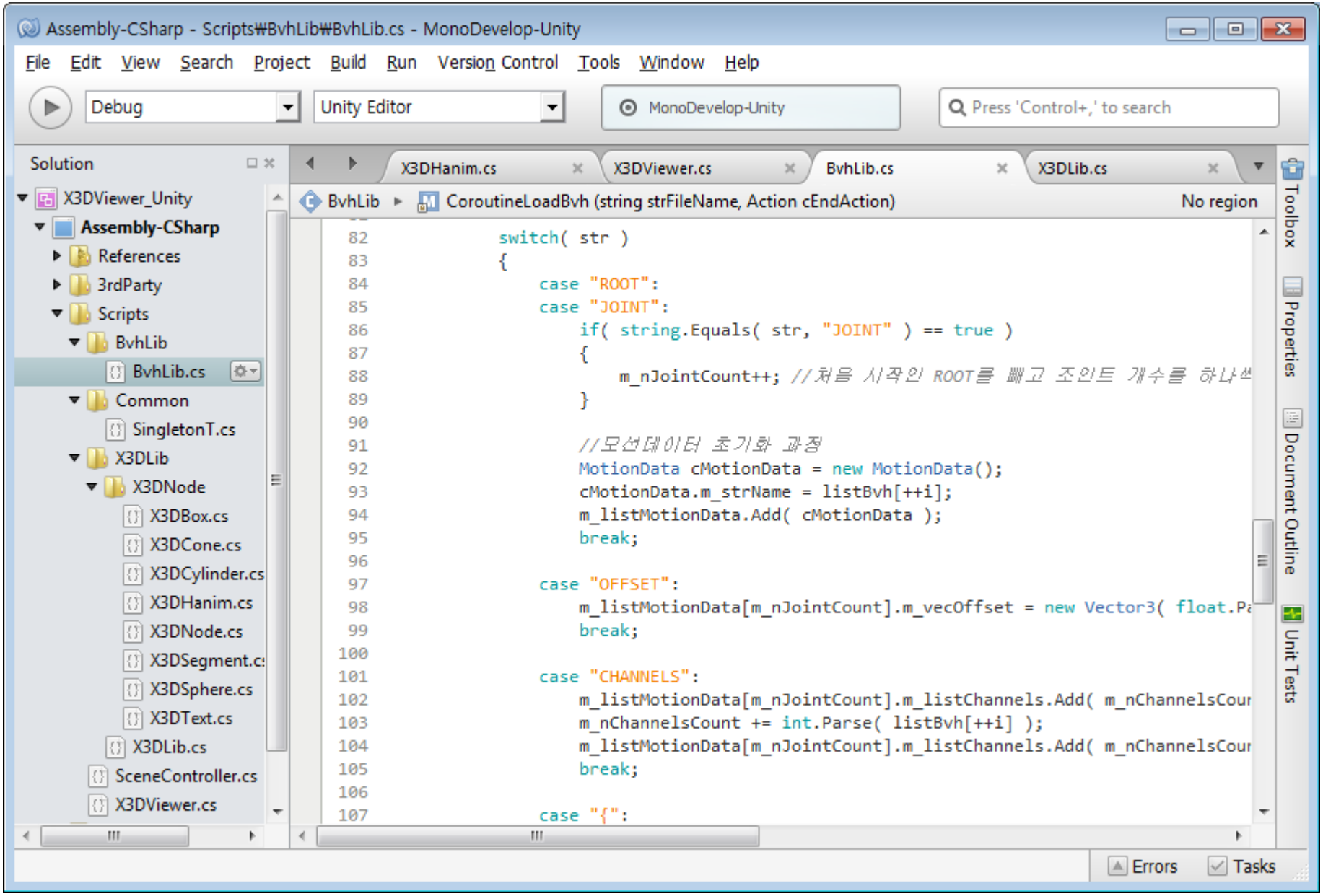
Load the H-Anim Character



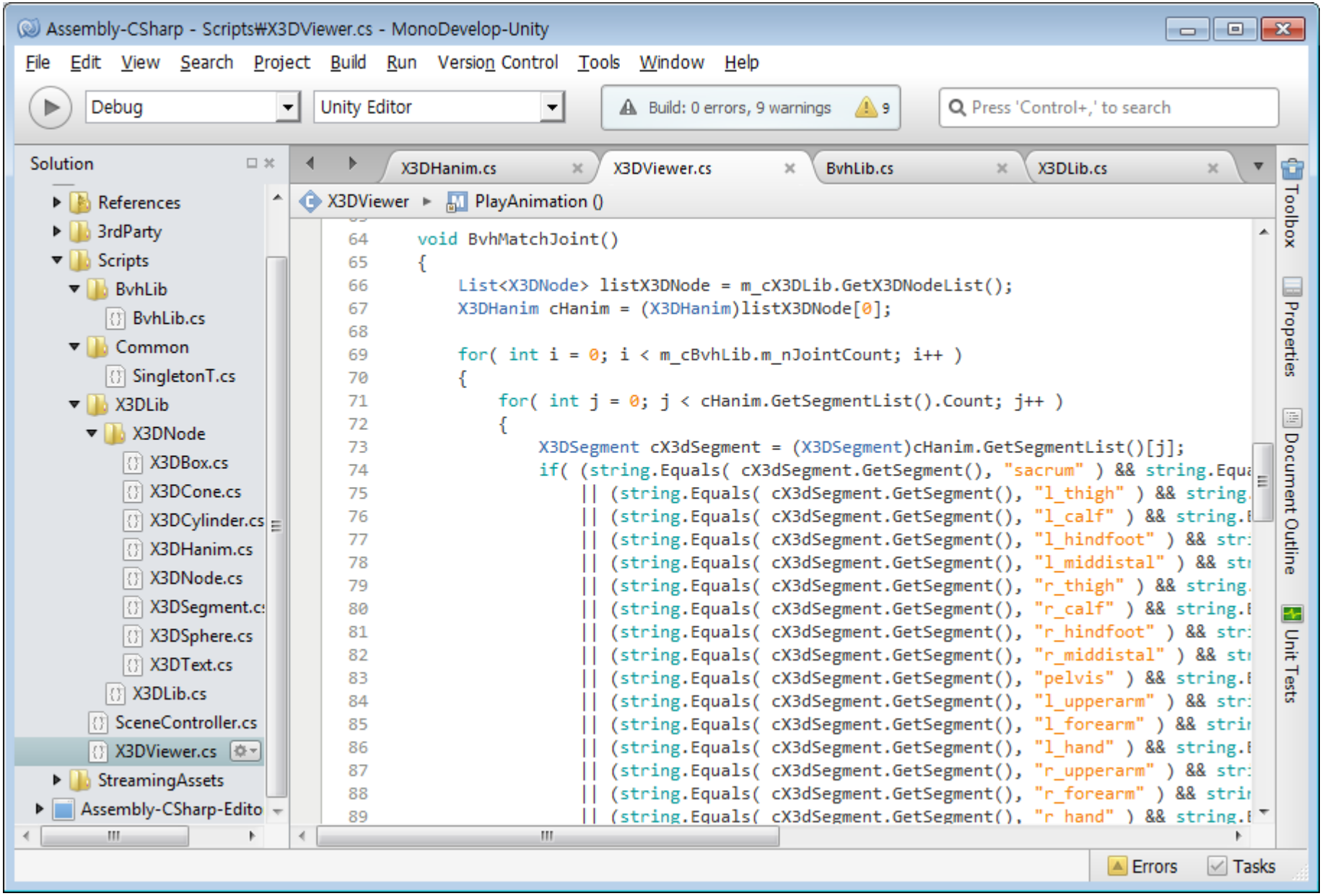
Load BVH Mocap Data



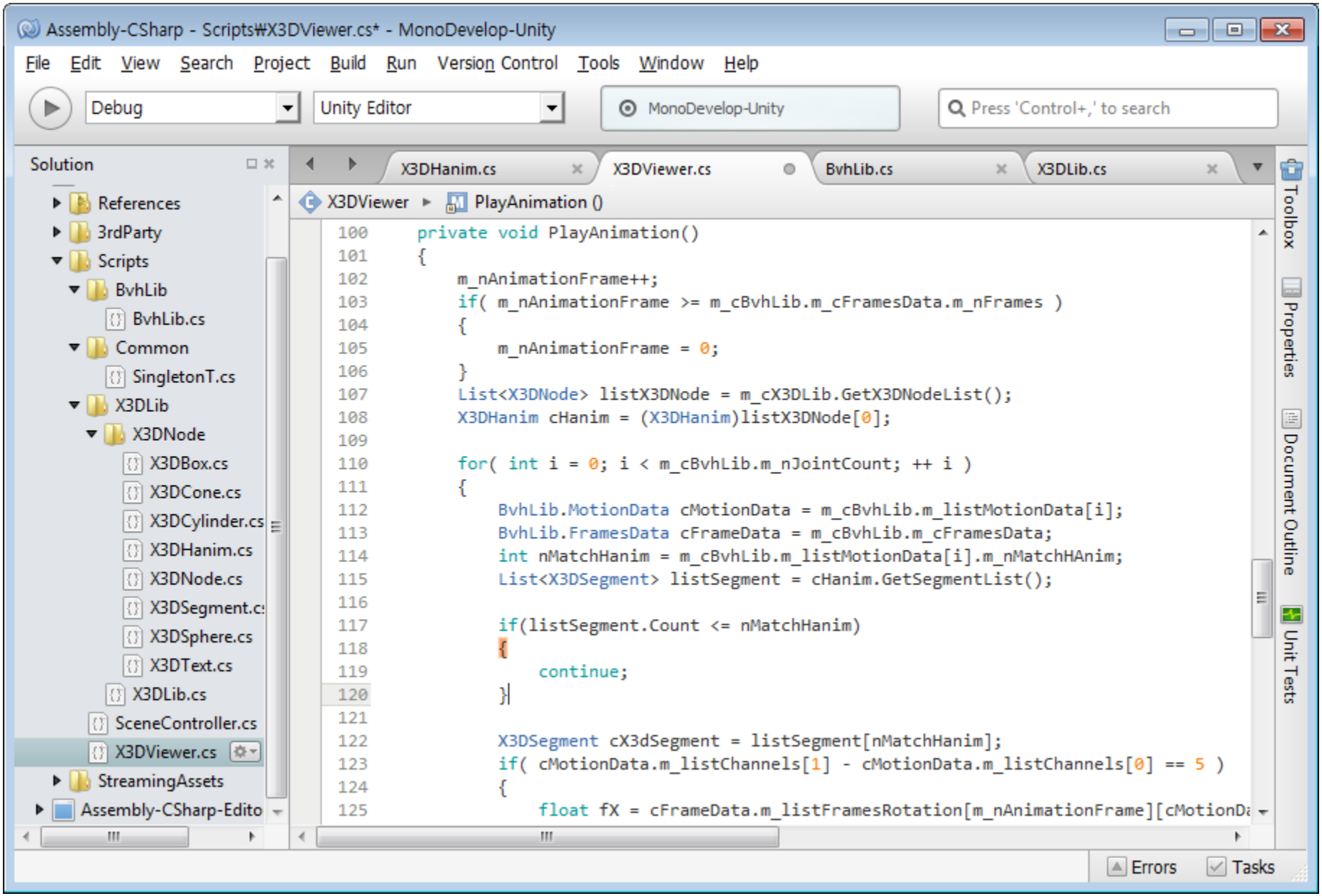
Parse BVH Mocap Data



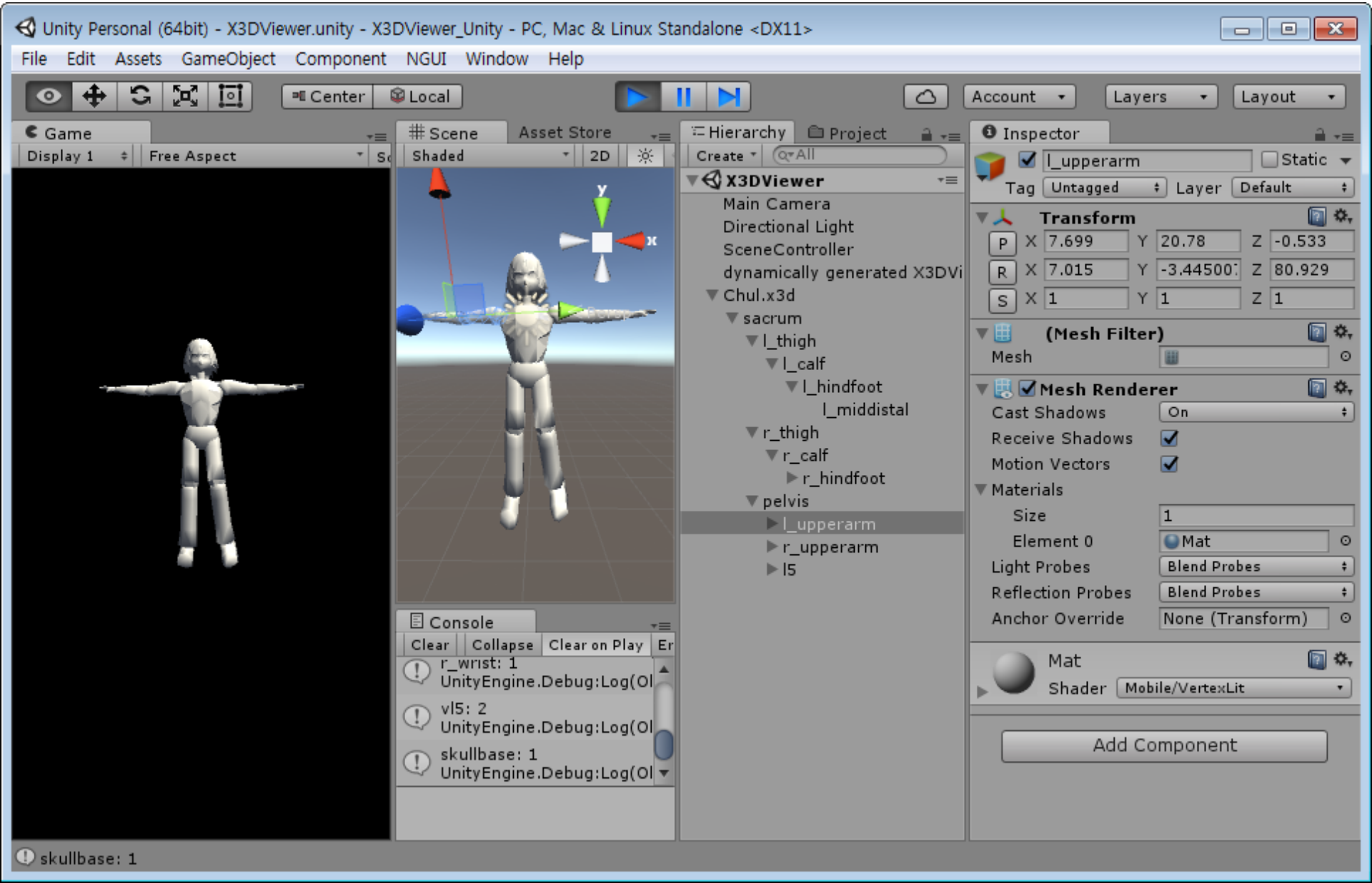
Joint Mapping of BVH to H-Anim



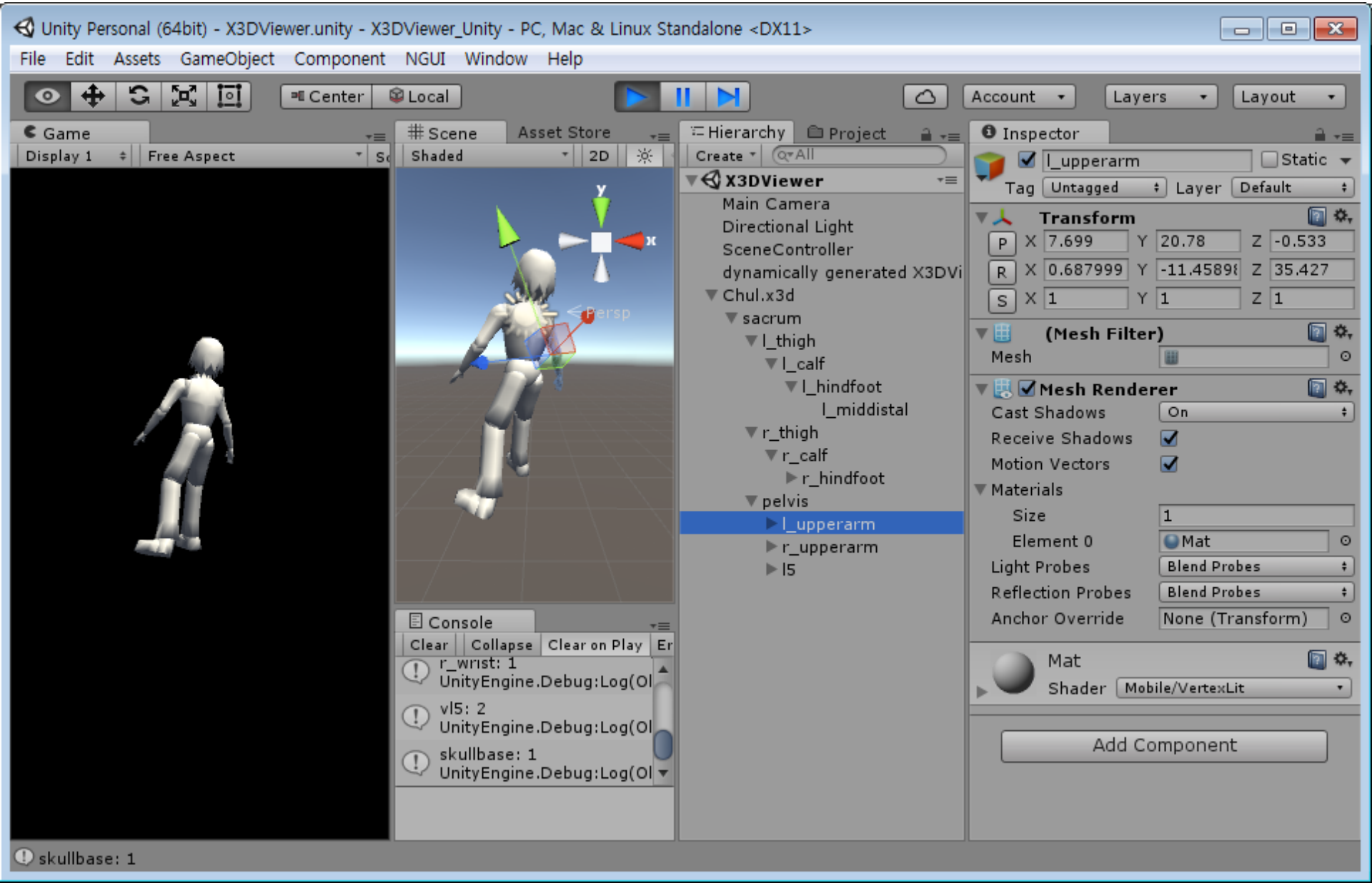
BVH Mocap Animation



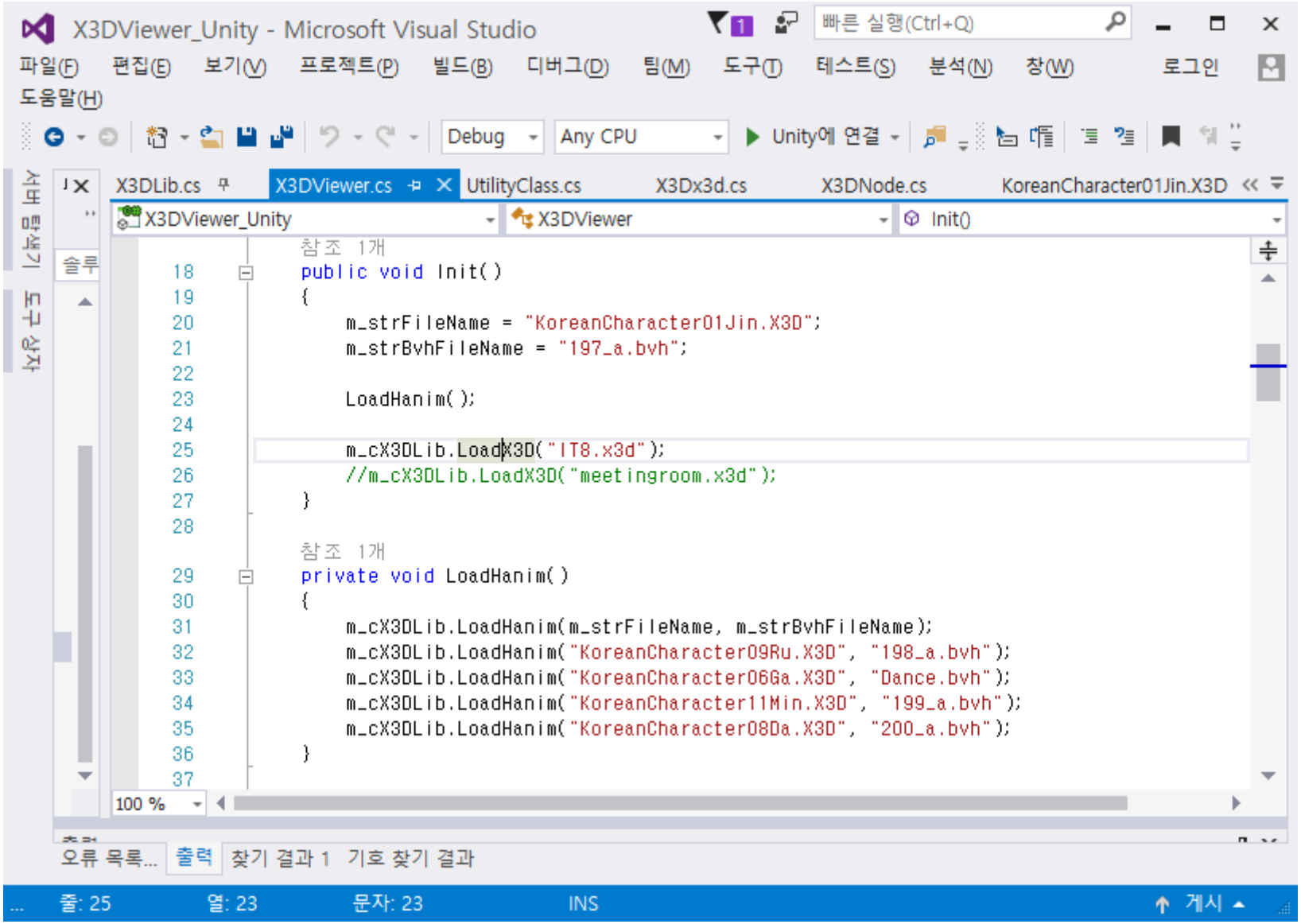
Display Unity BVH Mocap Animation (1)



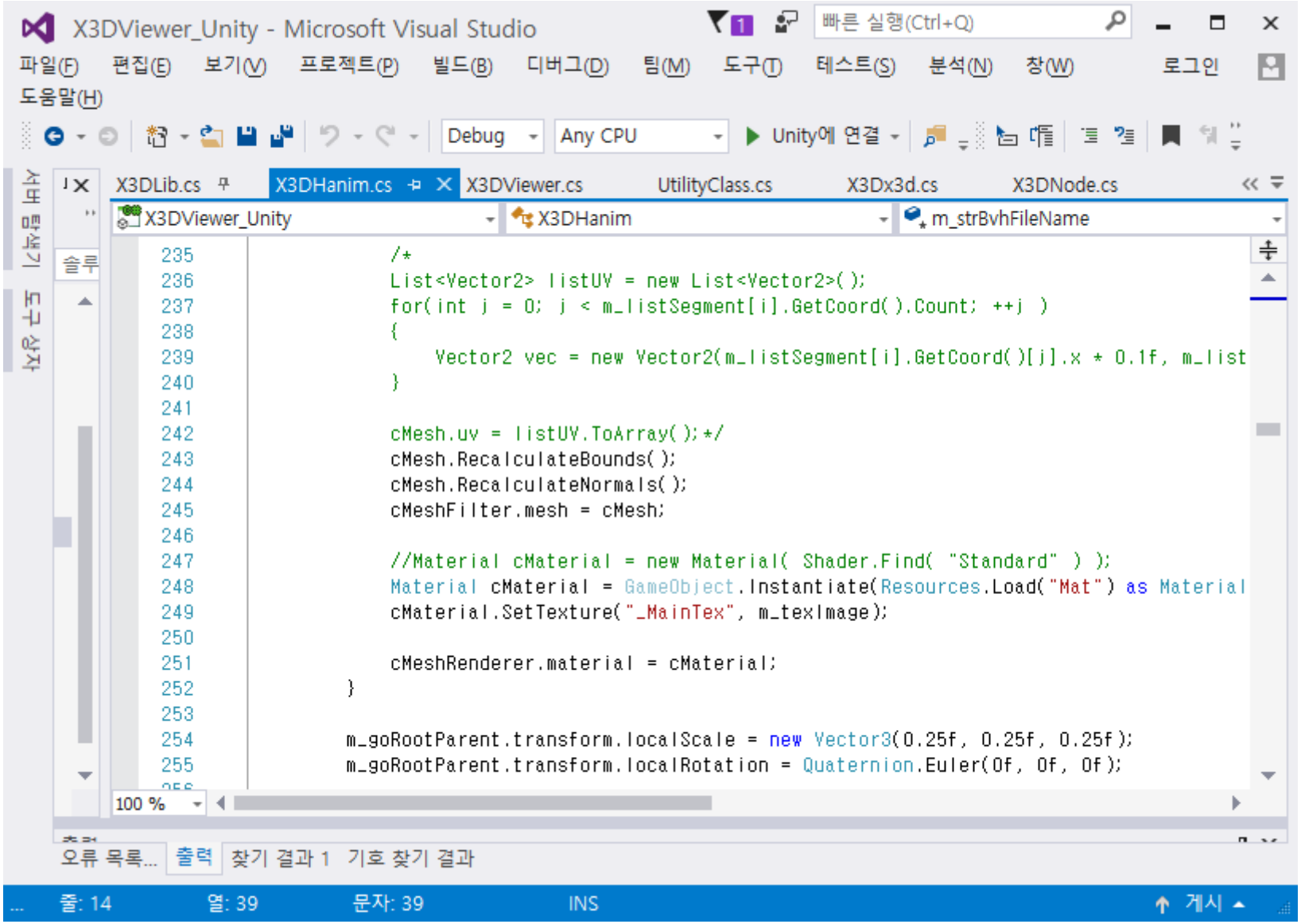
Display Unity BVH Mocap Animation (2)



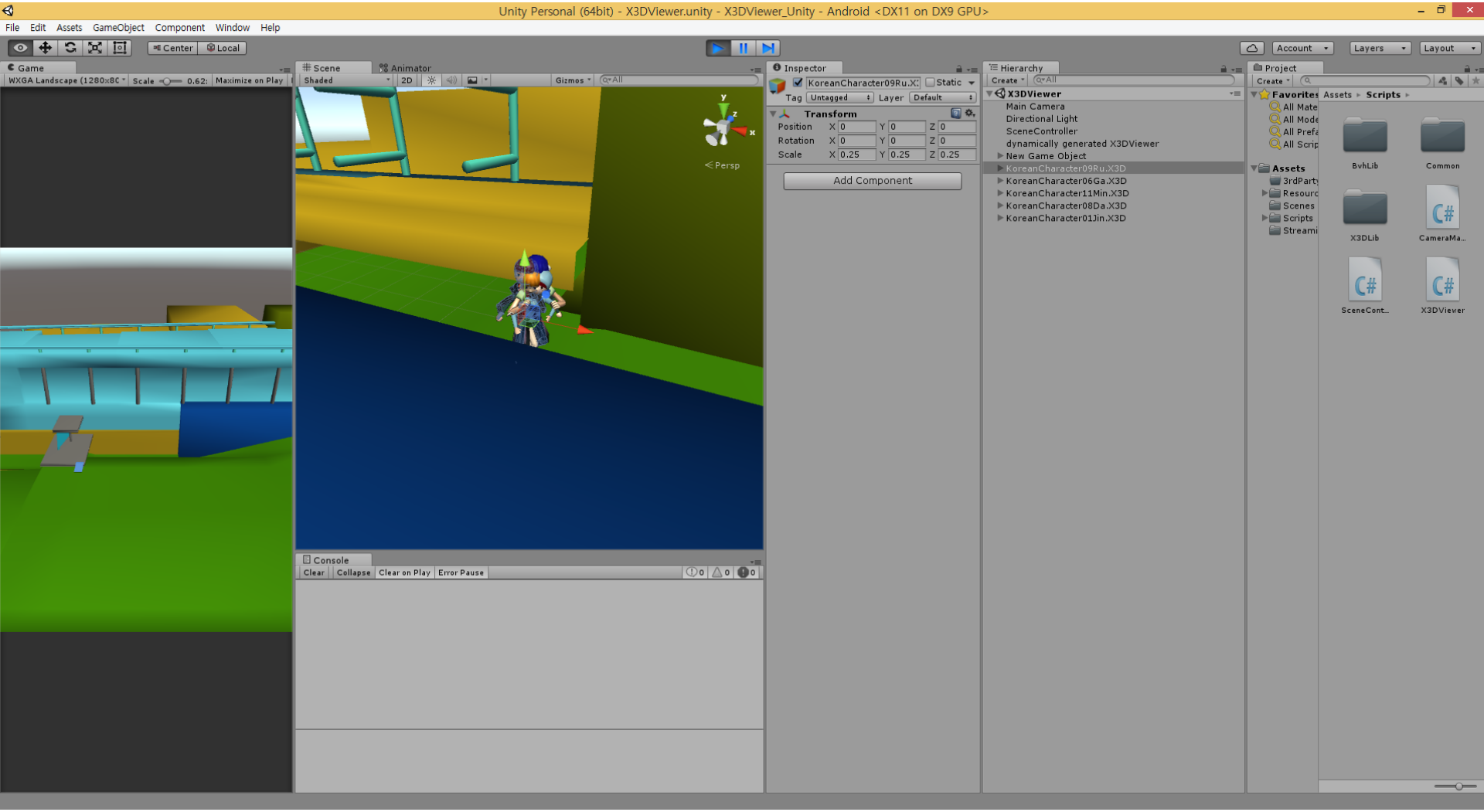
Load Multiple H-Anim Characters



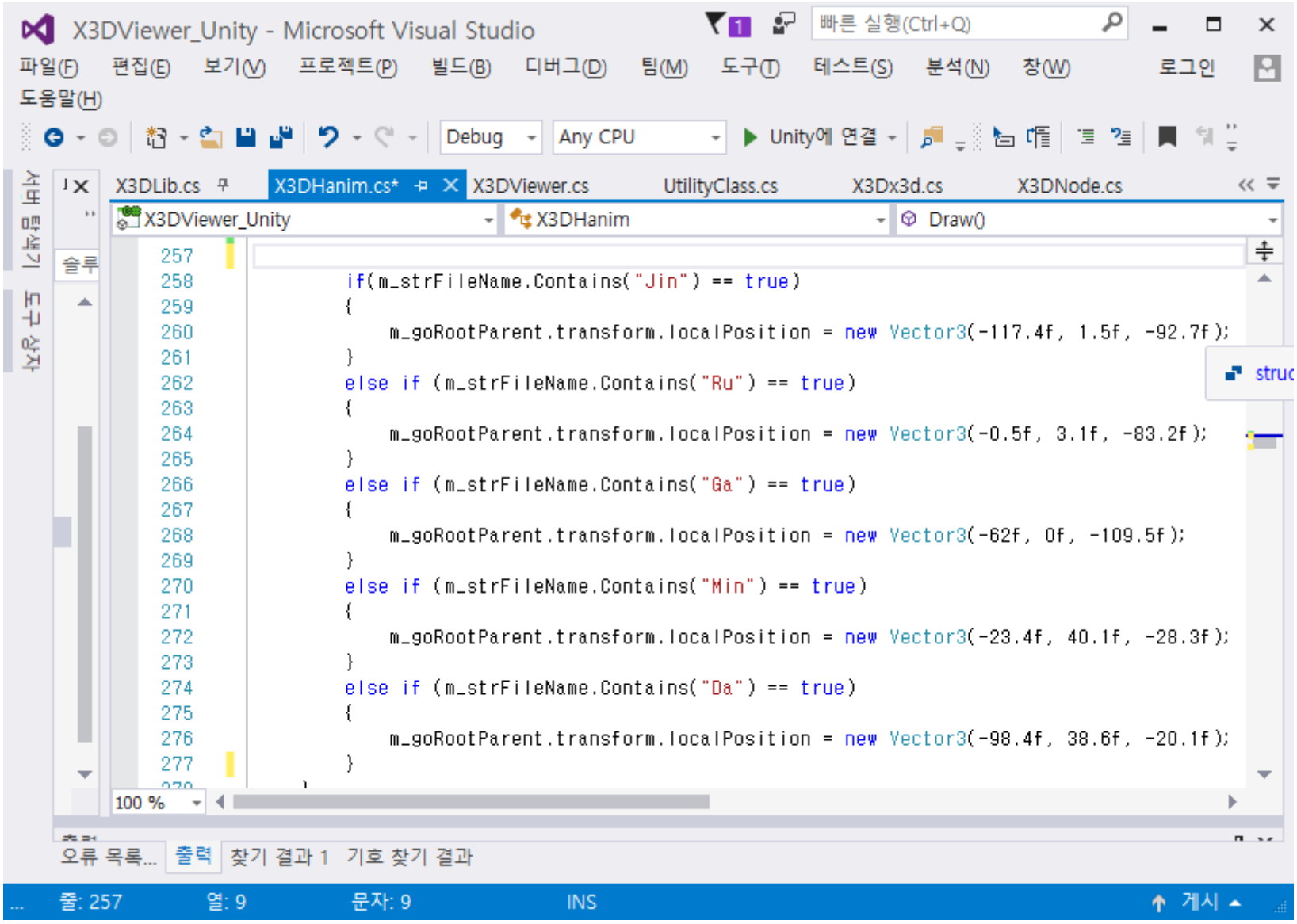
Transform Texture and Size



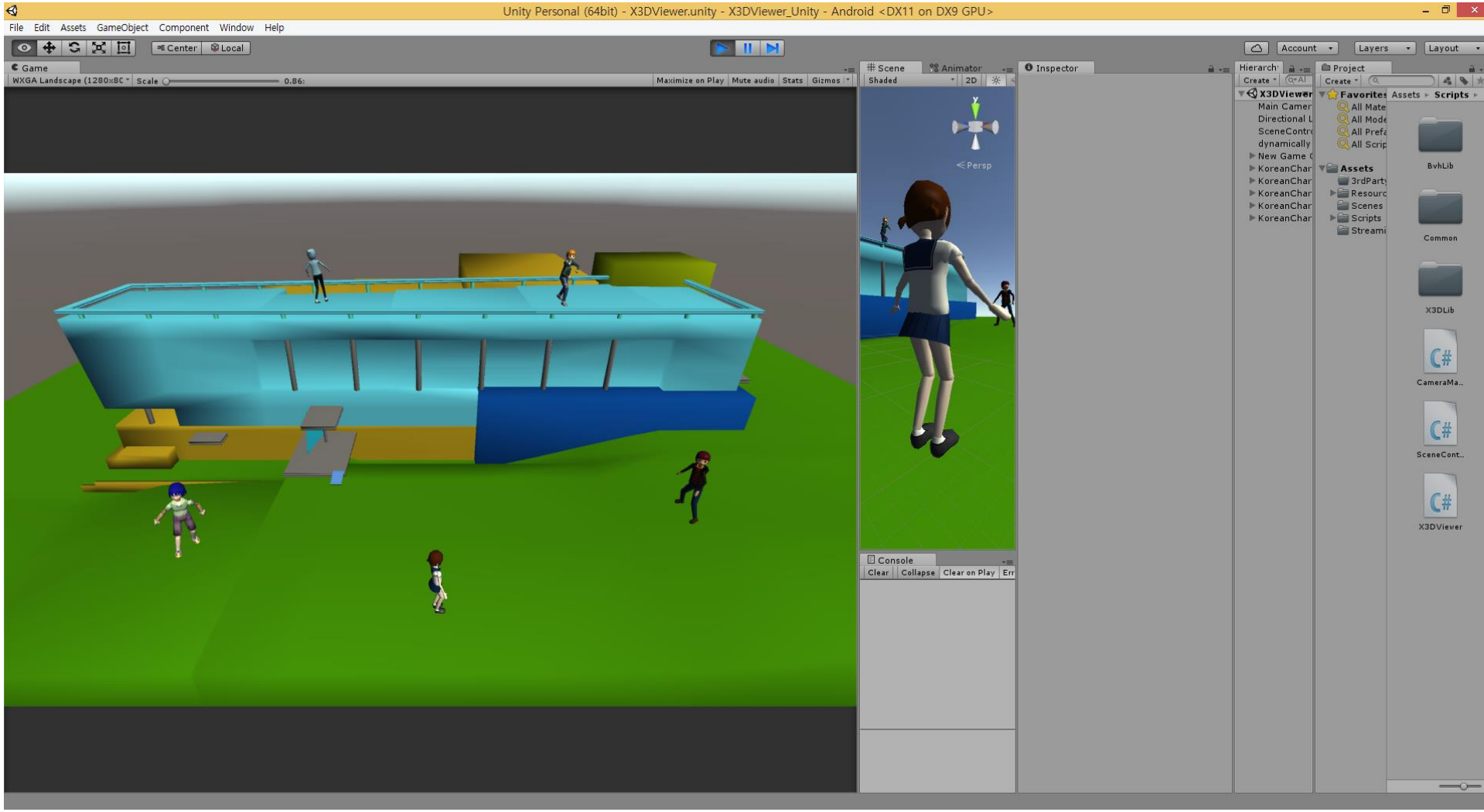
Load Another H-Anim Character



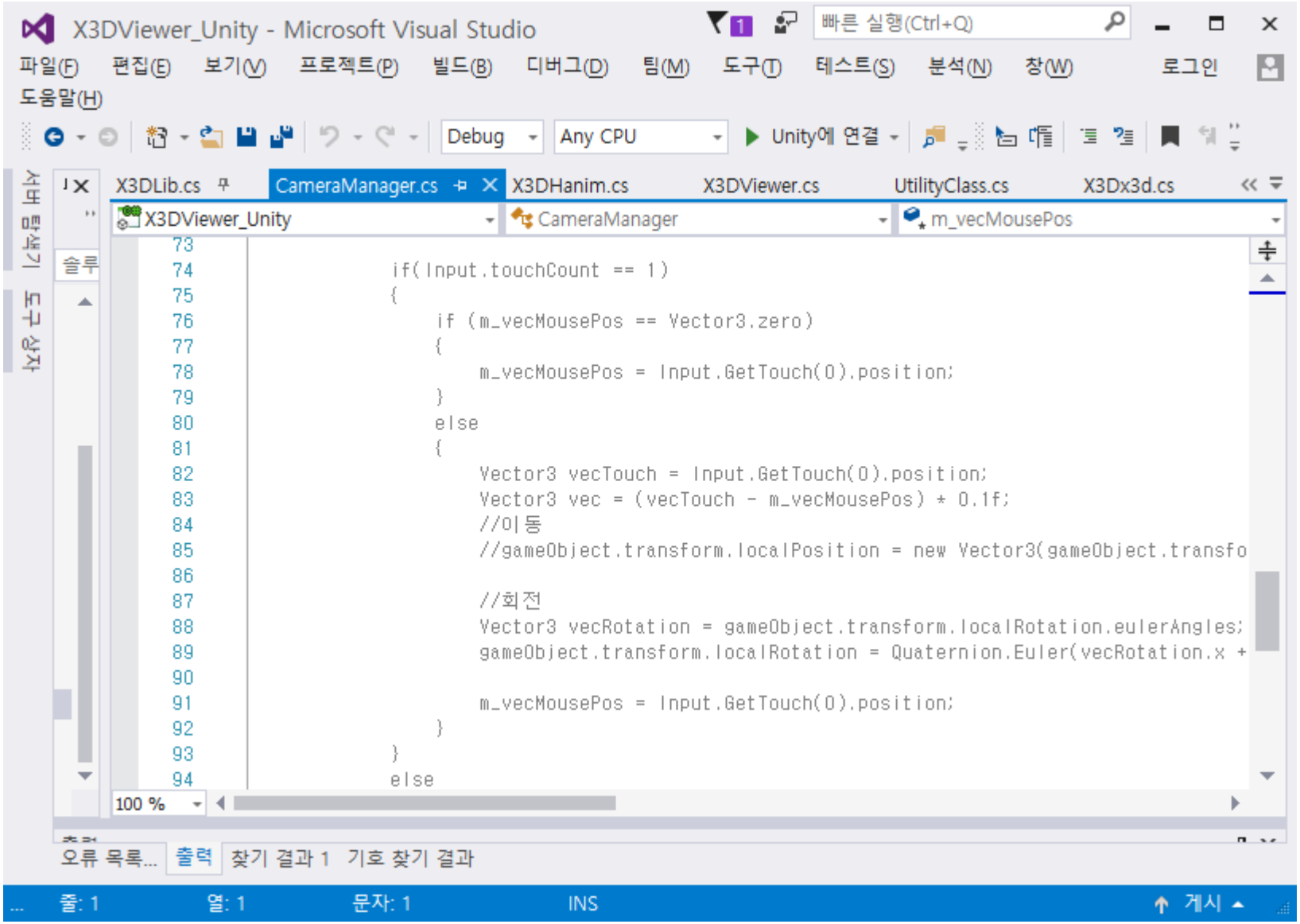
Adjust H-Anim Coordinates



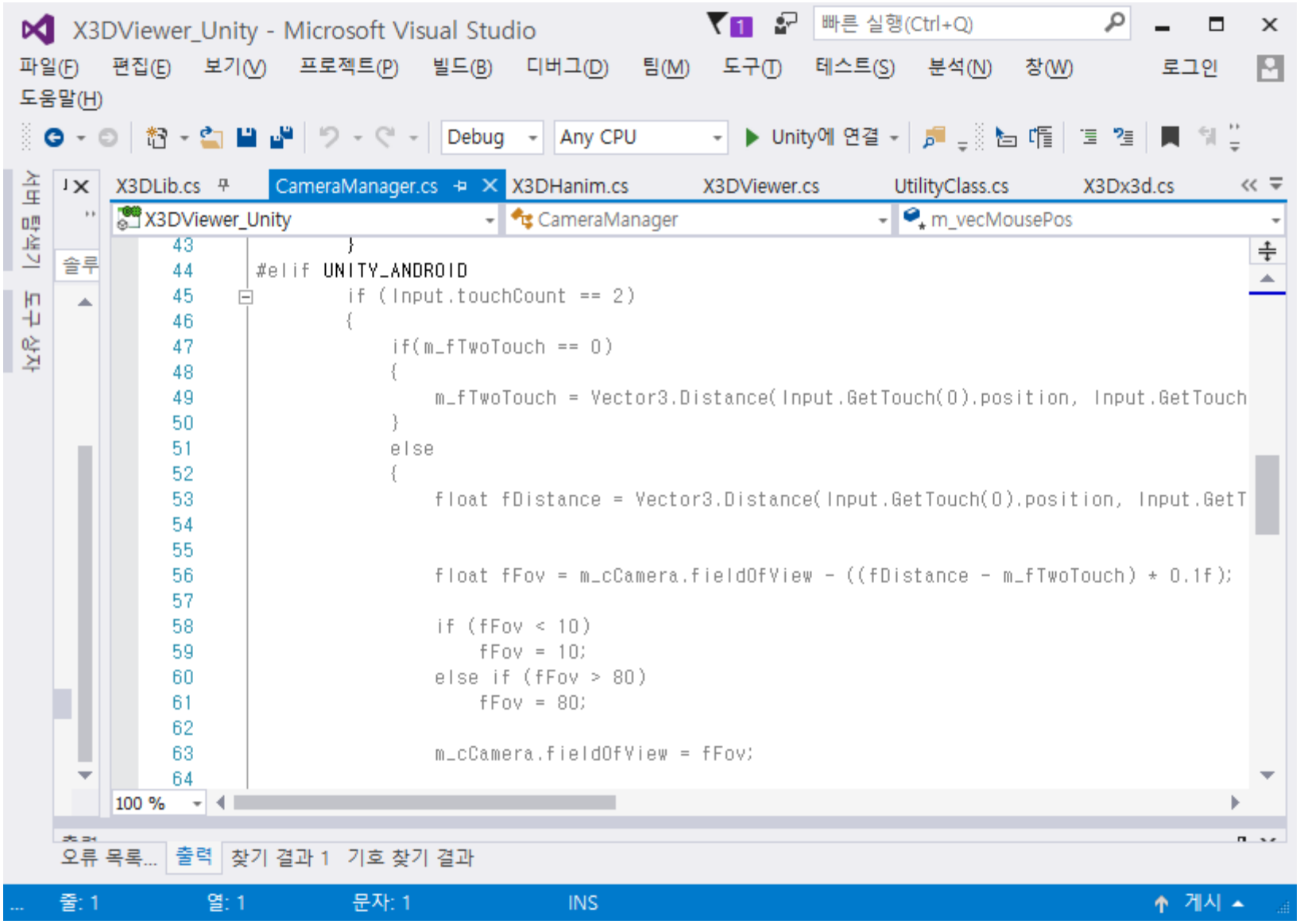
Results of Loading Multiple H-Anim Characters



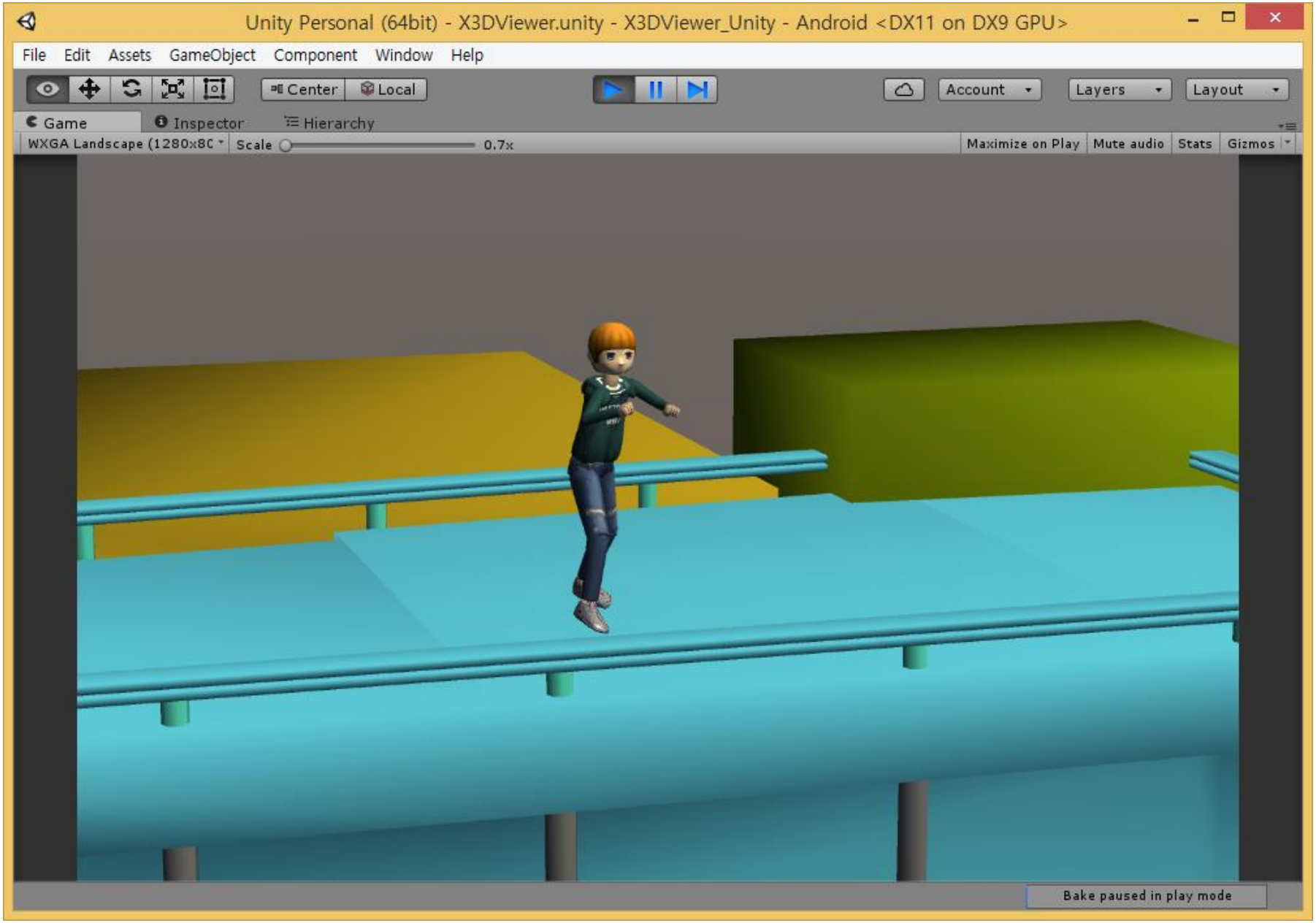
Rotate X3D Camera



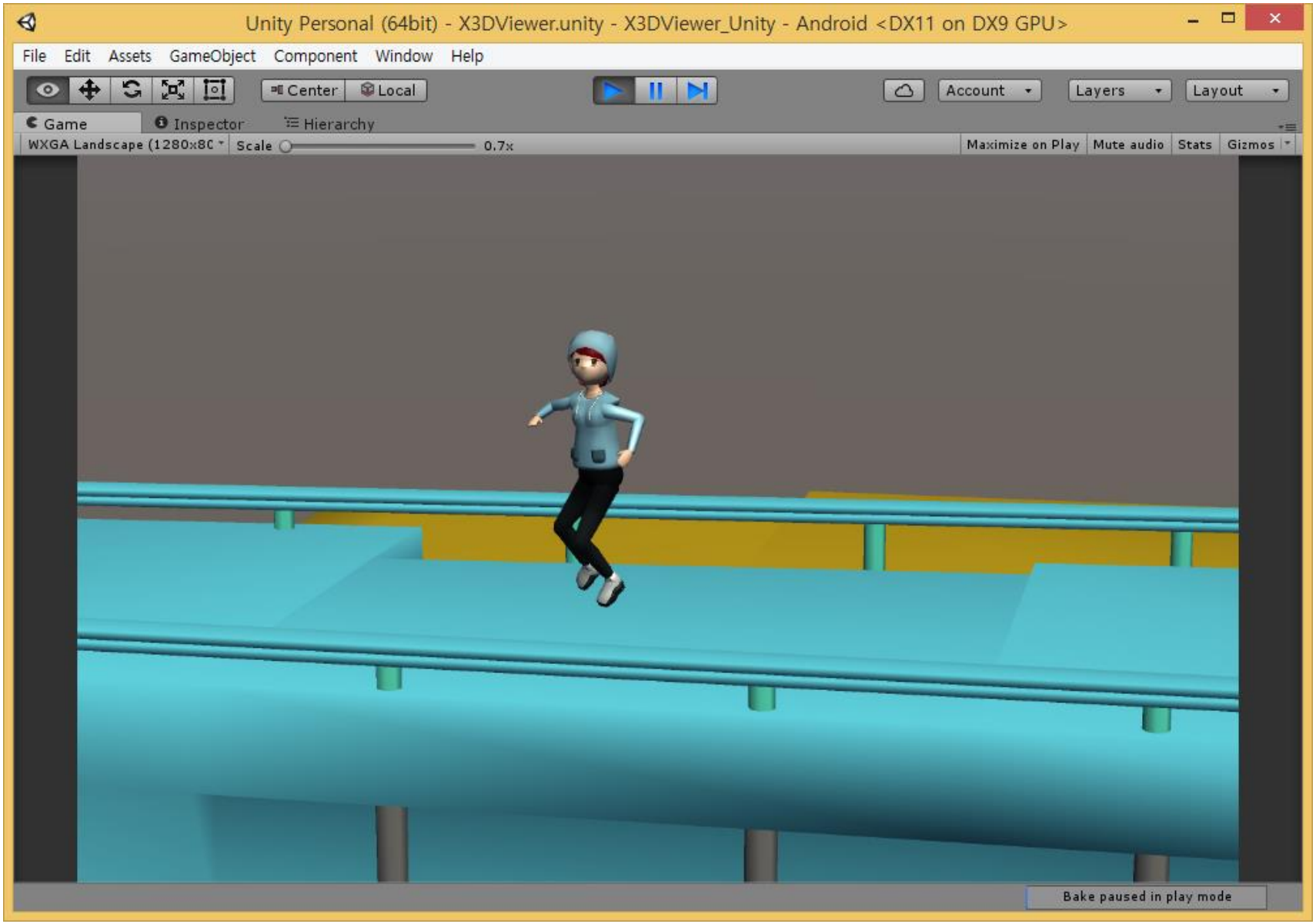
Adjust X3D Camera FOV



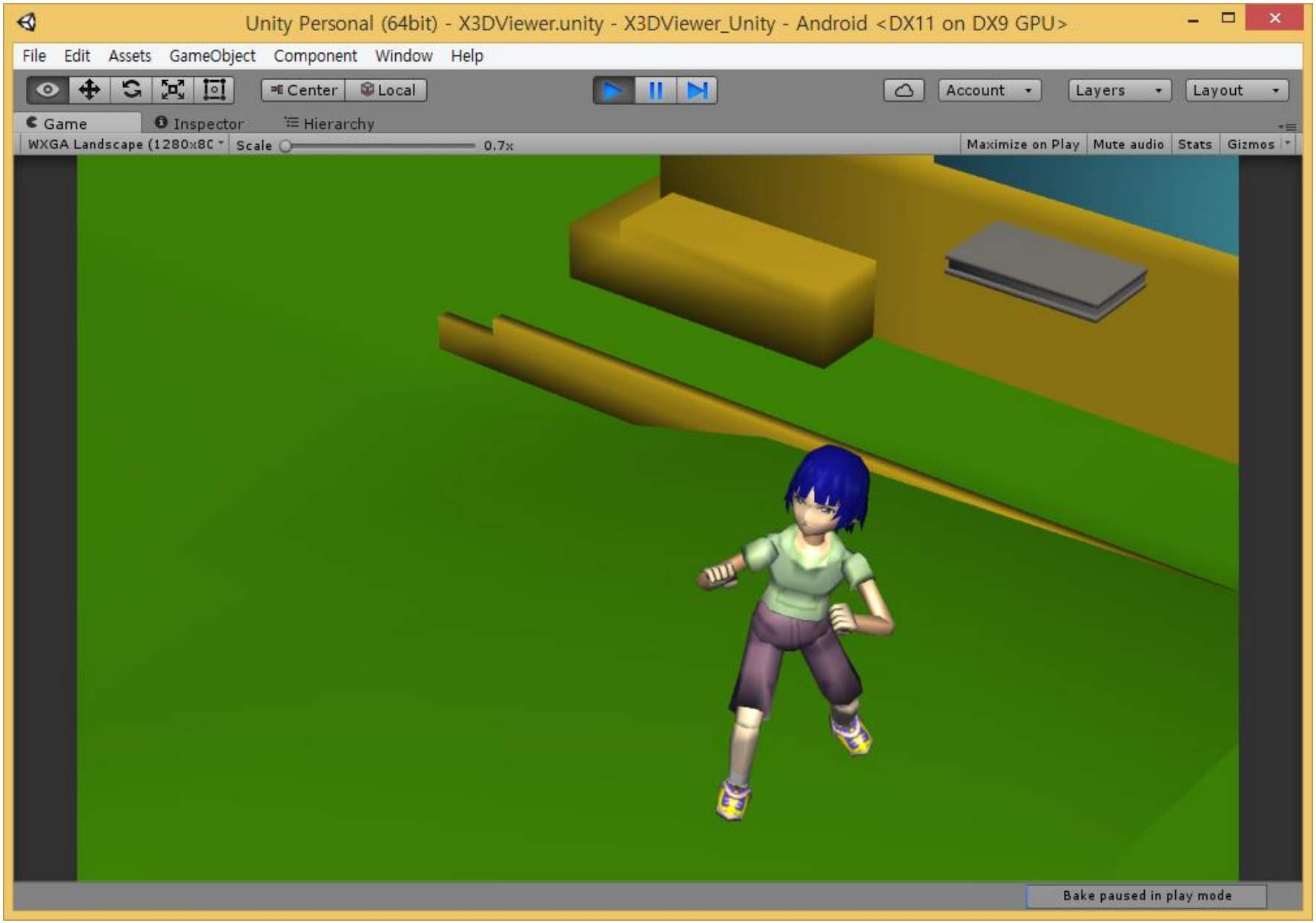
Screen Touch for Camera Rotate and Zoom (1)



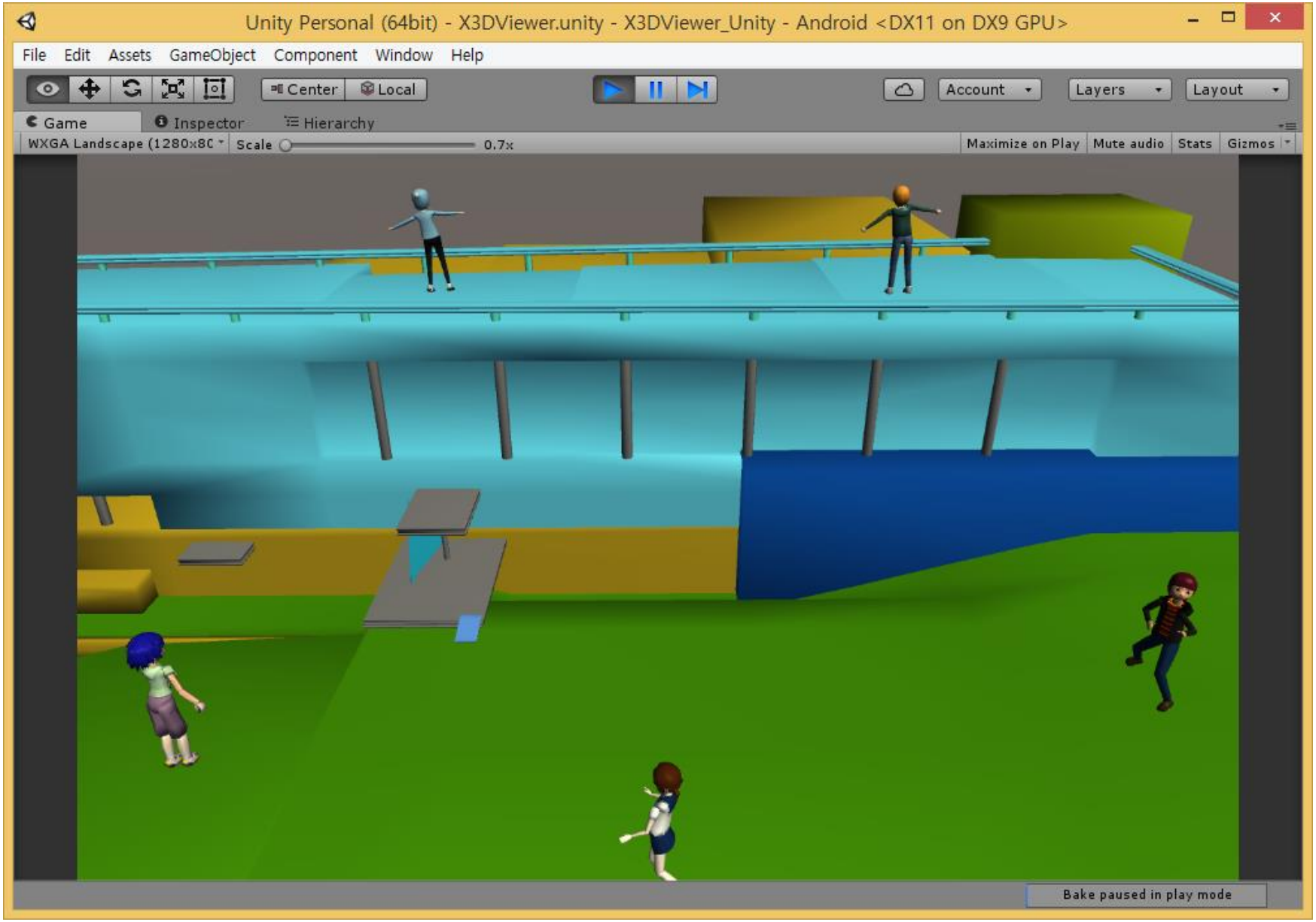
Screen Touch for Camera Rotate and Zoom (2)



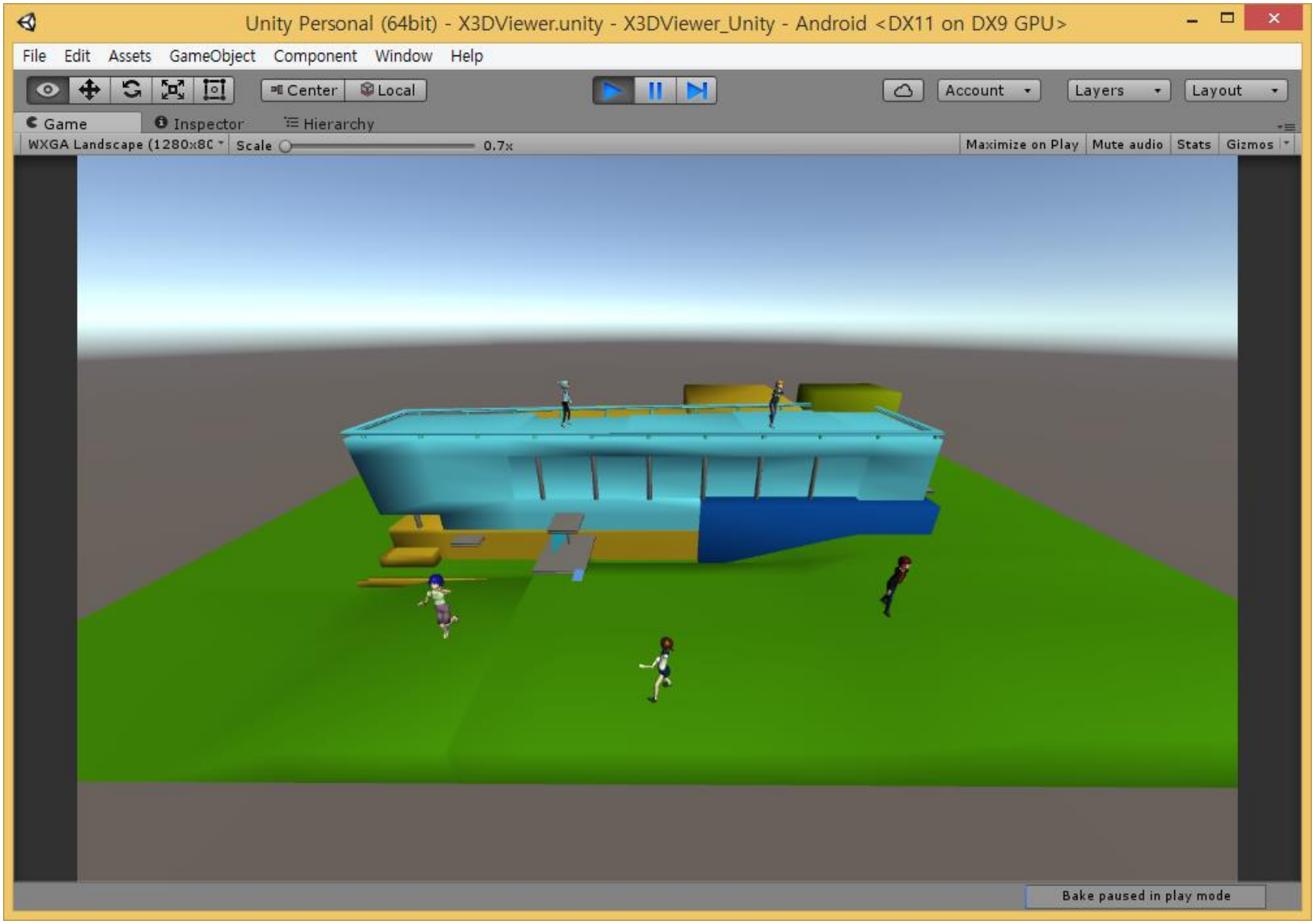
Screen Touch for Camera Rotate and Zoom (3)



Screen Touch for Camera Rotate and Zoom (4)



Screen Touch for Camera Rotate and Zoom (5)



Conclusions

- Goal
  - X3D based mobile 3D data representation and exchange
  - Representation of mobile sensors, their functions, and interaction with copied real worlds
- X3D based Mobile VR
  - Geo-synchronized X3D worlds (copied real worlds)
  - Units specified scene graph
  - Physical sensor nodes and device interfaces
- Unity X3D Mobile VR Implementation
  - Unity H-Anim Viewer
    - Import and load X3D
    - X3D texture mapping
    - Load an H-Anim character
    - Load Multiple H-Anim characters
    - H-Anim motion capture animation
    - X3D camera control by screen touch

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