

X3D Mobile VR
Unity H-Anim Viewer
Implementation

Web3D Korea Standardization Meeting
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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



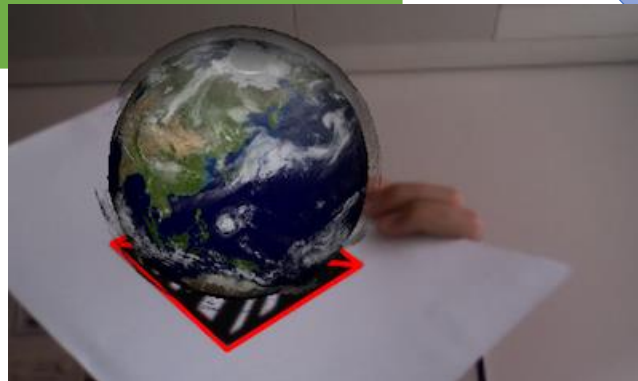
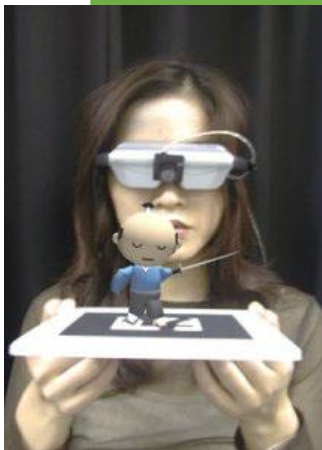
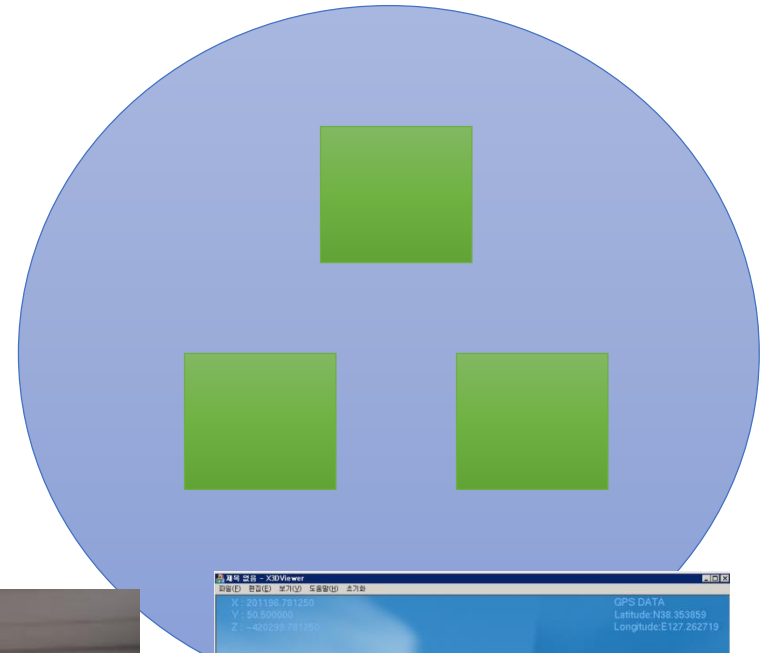
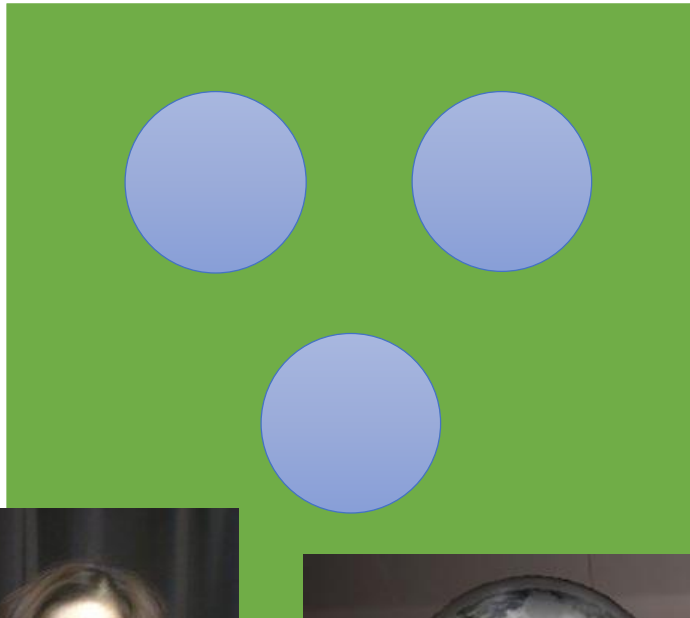
- An example of mobile travel VR
- 3D VR world
 - Geo-synchronized
 - Units specified
- Sensors
 - GPS, Camera, Acceleration, Zyro, Proximity, Light, RGB, Temperature



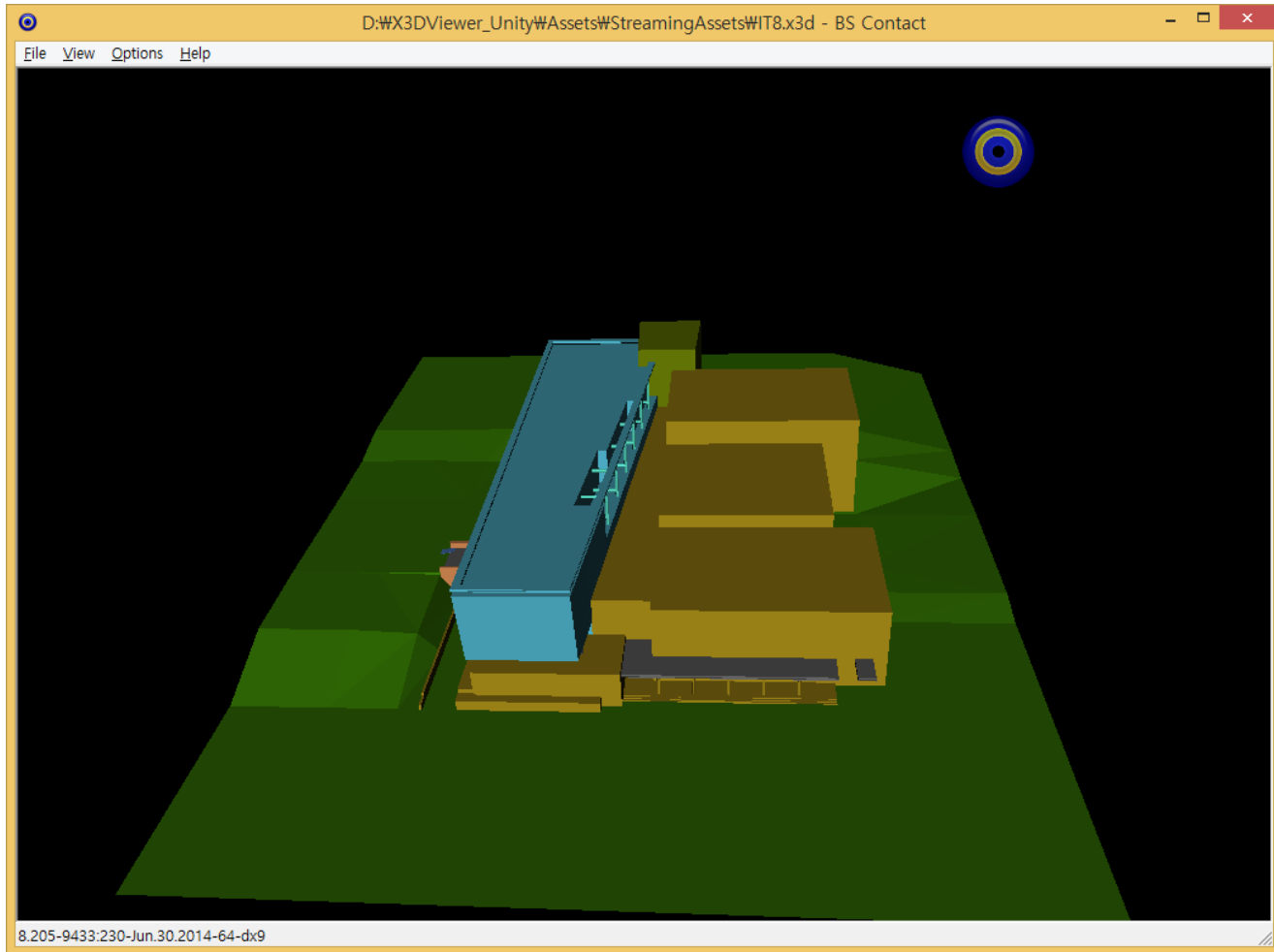
Mobile MAR

Video worlds + Augmented objects

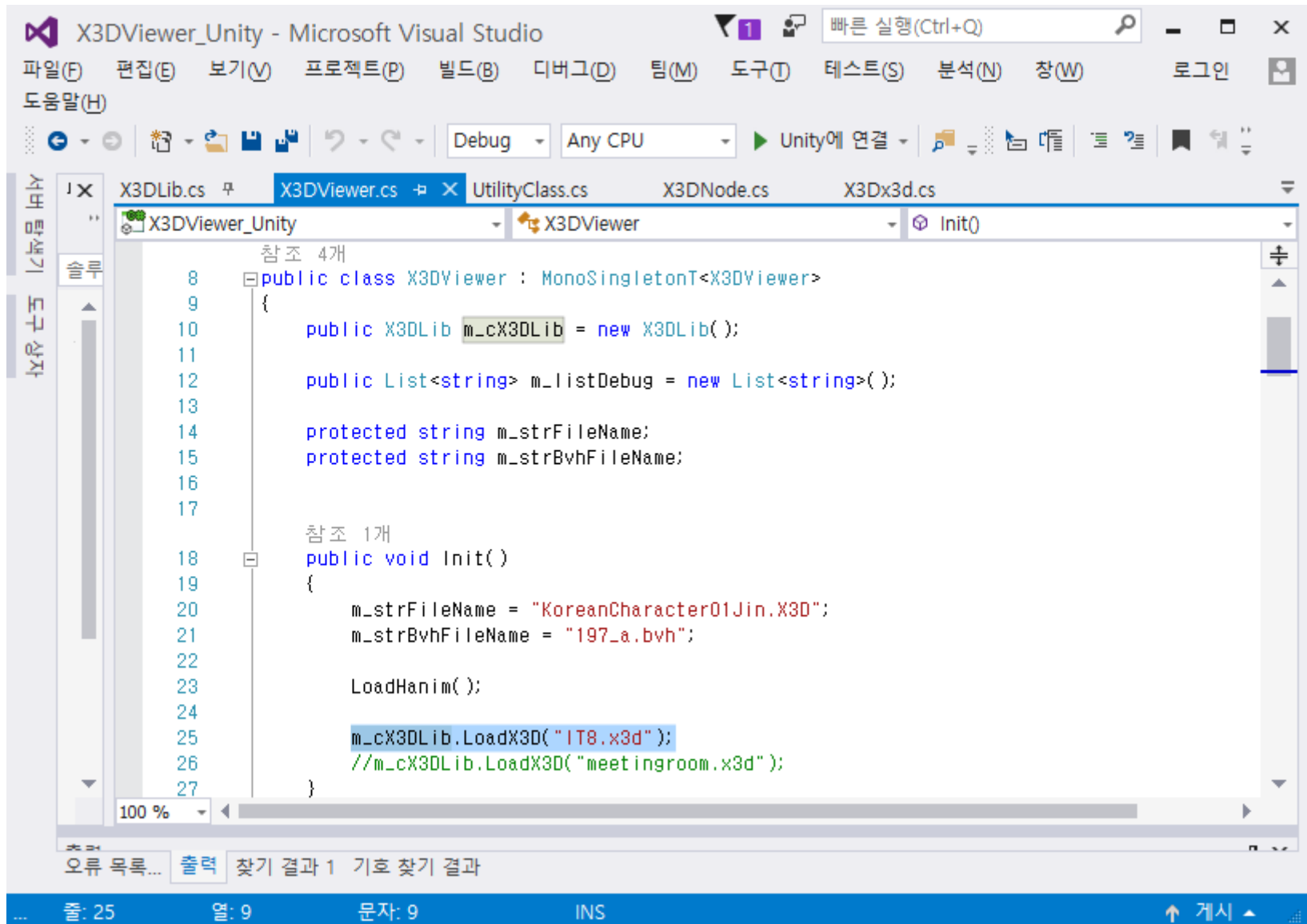
3D VR worlds + Augmented video objects



An Example X3D File

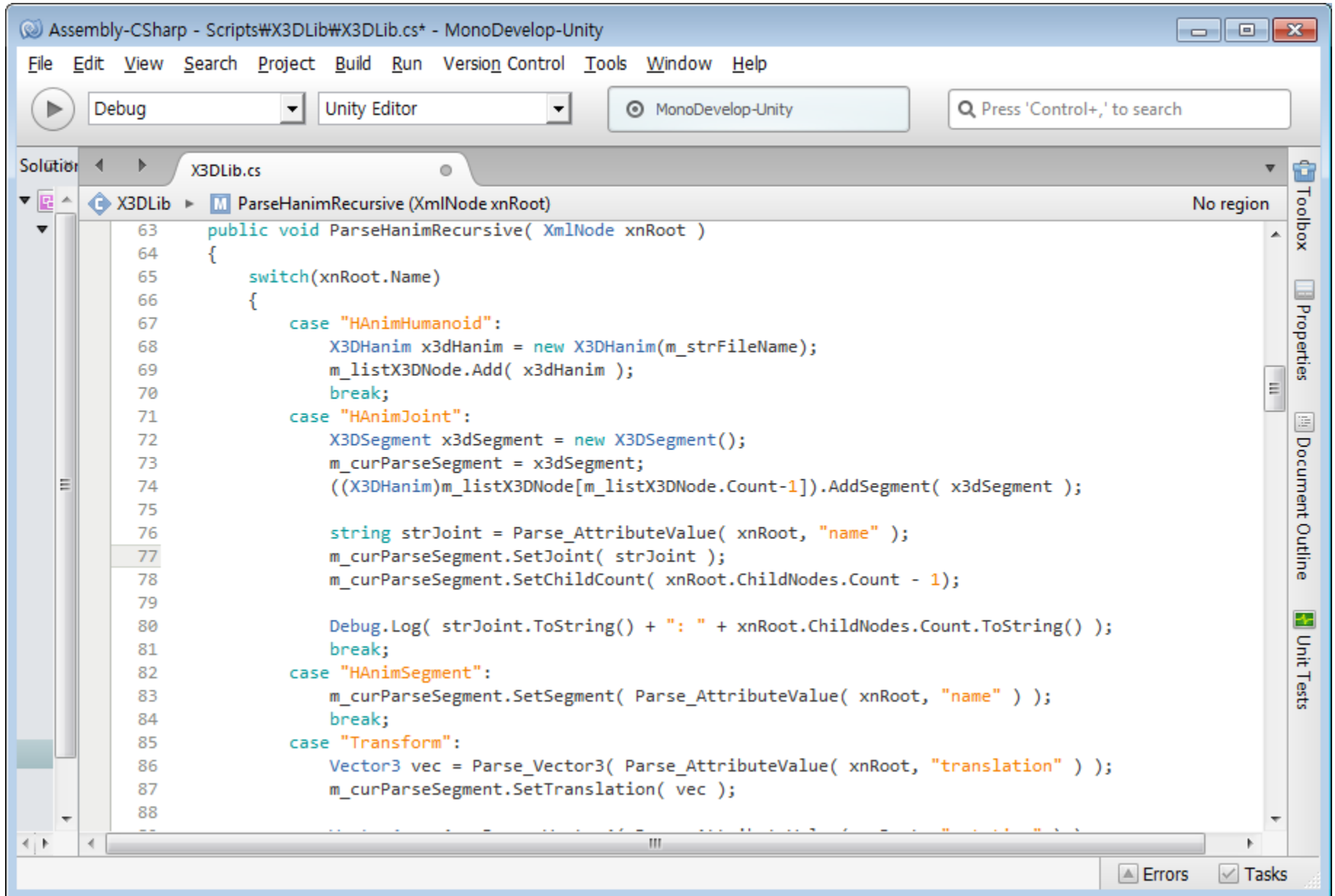


Import an X3D File into Unity



```
X3DViewer_Unity - Microsoft Visual Studio
빠른 실행(Ctrl+Q)
파일(F) 편집(E) 보기(V) 프로젝트(P) 빌드(B) 디버그(D) 팀(M) 도구(T) 테스트(S) 분석(N) 창(W) 로그인
F 도움말(H)
Debug Any CPU Unity에 연결
X3DLib.cs X3DViewer.cs UtilityClass.cs X3DNode.cs X3Dx3d.cs
X3DViewer_Unity X3DViewer Init()
참조 4개
8 public class X3DViewer : MonoSingletonT<X3DViewer>
9 {
10     public X3DLib m_cX3DLib = new X3DLib();
11
12     public List<string> m_listDebug = new List<string>();
13
14     protected string m_strFileName;
15     protected string m_strBvhFileName;
16
17
18     참조 1개
19     public void Init()
20     {
21         m_strFileName = "KoreanCharacter01Jin.X3D";
22         m_strBvhFileName = "197_a.bvh";
23
24         LoadHanim();
25
26         m_cX3DLib.LoadX3D("IT8.x3d");
27         //m_cX3DLib.LoadX3D("meetingroom.x3d");
28     }
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X3D Parsing in Unity

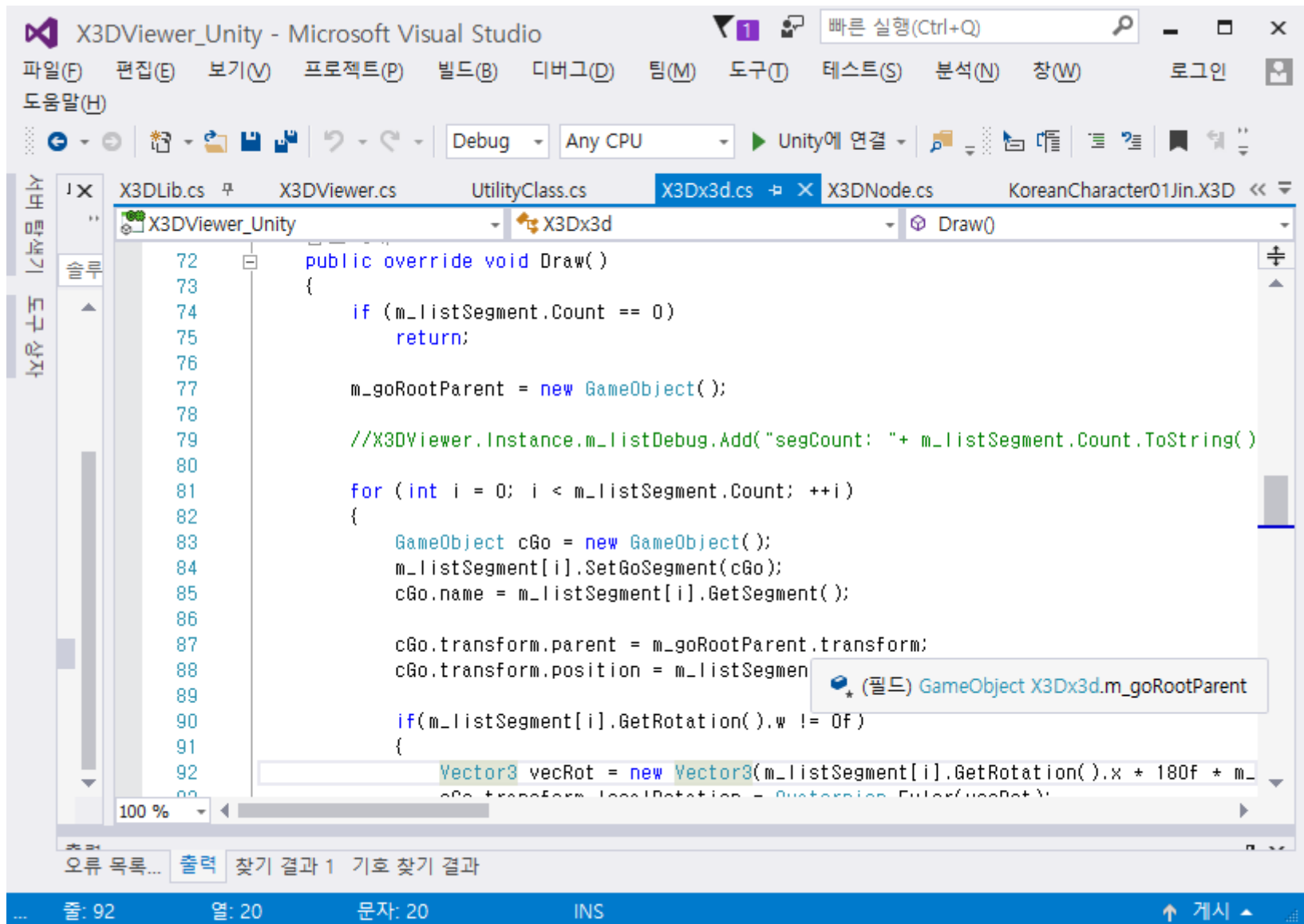


The image shows a screenshot of the MonoDevelop-Unity IDE. The window title is "Assembly-CSharp - Scripts\X3DLib\X3DLib.cs* - MonoDevelop-Unity". The menu bar includes File, Edit, View, Search, Project, Build, Run, Version Control, Tools, Window, and Help. The toolbar shows a play button, a dropdown menu set to "Debug", another dropdown menu set to "Unity Editor", a search icon, and a search box containing "Press 'Control+,' to search". The Solution Explorer on the left shows a project named "X3DLib" with a file named "ParseHanimRecursive (XmlNode xnRoot)". The main editor displays the following C# code:

```
63 public void ParseHanimRecursive( XmlNode xnRoot )
64 {
65     switch(xnRoot.Name)
66     {
67         case "HAnimHumanoid":
68             X3DHanim x3dHanim = new X3DHanim(m_strFileName);
69             m_listX3DNode.Add( x3dHanim );
70             break;
71         case "HAnimJoint":
72             X3DSegment x3dSegment = new X3DSegment();
73             m_curParseSegment = x3dSegment;
74             ((X3DHanim)m_listX3DNode[m_listX3DNode.Count-1]).AddSegment( x3dSegment );
75
76             string strJoint = Parse_AttributeValue( xnRoot, "name" );
77             m_curParseSegment.SetJoint( strJoint );
78             m_curParseSegment.SetChildCount( xnRoot.ChildNodes.Count - 1);
79
80             Debug.Log( strJoint.ToString() + ": " + xnRoot.ChildNodes.Count.ToString() );
81             break;
82         case "HAnimSegment":
83             m_curParseSegment.SetSegment( Parse_AttributeValue( xnRoot, "name" ) );
84             break;
85         case "Transform":
86             Vector3 vec = Parse_Vector3( Parse_AttributeValue( xnRoot, "translation" ) );
87             m_curParseSegment.SetTranslation( vec );
88     }
```

The right sidebar contains the Toolbox, Properties, Document Outline, and Unit Tests panels. The status bar at the bottom shows "Errors" and "Tasks" icons.

Draw an X3D File

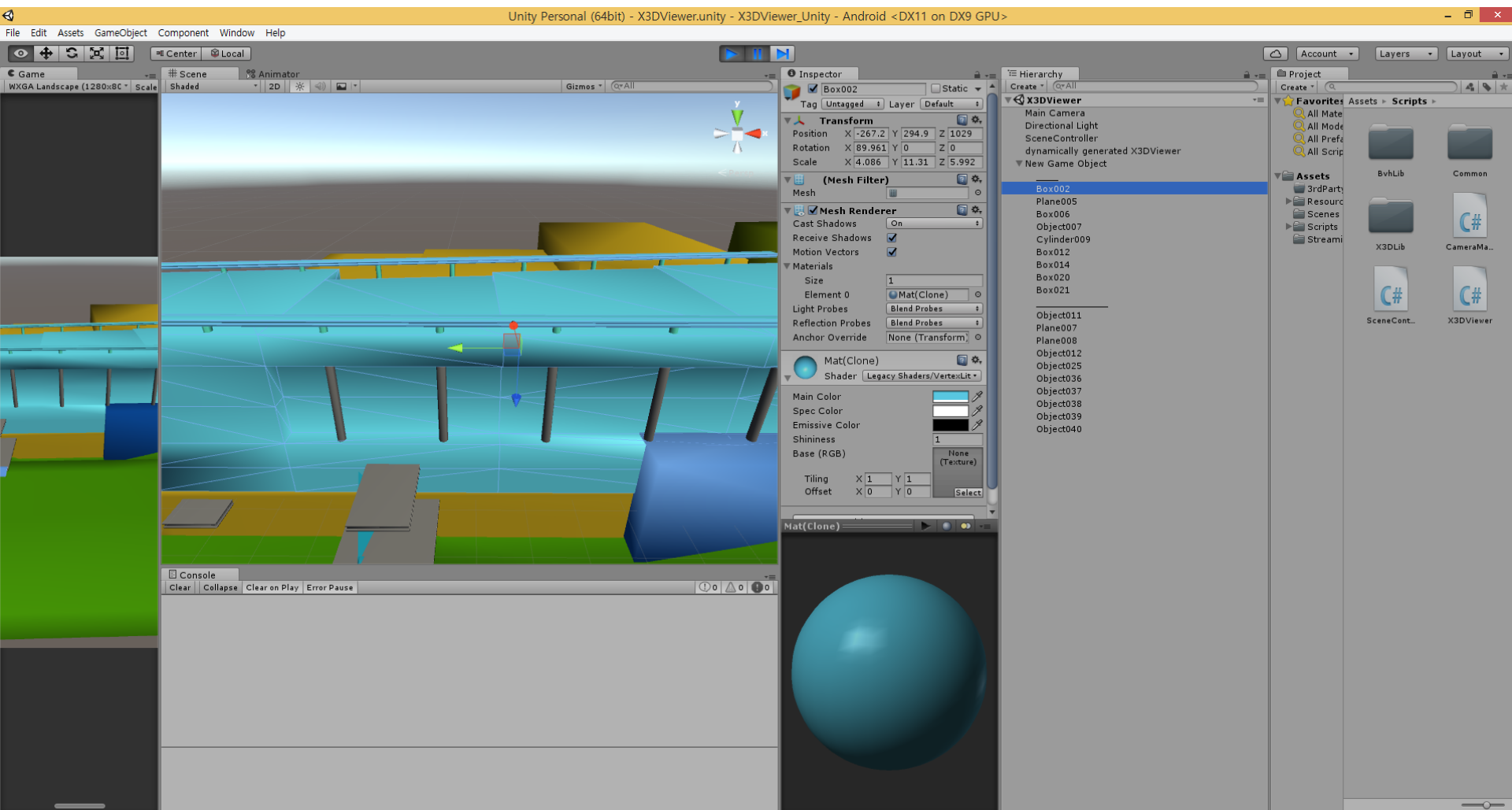


```
X3DViewer_Unity - Microsoft Visual Studio
빠른 실행(Ctrl+Q)
파일(F) 편집(E) 보기(V) 프로젝트(P) 빌드(B) 디버그(D) 팀(M) 도구(T) 테스트(S) 분석(N) 창(W) 로그인
오류 목록(H)
Debug Any CPU Unity에 연결
X3DLib.cs X3DViewer.cs UtilityClass.cs X3Dx3d.cs X3DNode.cs KoreanCharacter01Jin.X3D
X3DViewer_Unity X3Dx3d Draw()
72 public override void Draw()
73 {
74     if (m_listSegment.Count == 0)
75         return;
76
77     m_goRootParent = new GameObject();
78
79     //X3DViewer.Instance.m_listDebug.Add("segCount: " + m_listSegment.Count.ToString())
80
81     for (int i = 0; i < m_listSegment.Count; ++i)
82     {
83         GameObject cGo = new GameObject();
84         m_listSegment[i].SetGoSegment(cGo);
85         cGo.name = m_listSegment[i].GetSegment();
86
87         cGo.transform.parent = m_goRootParent.transform;
88         cGo.transform.position = m_listSegment[i].GetPosition();
89
90         if(m_listSegment[i].GetRotation().w != 0f)
91         {
92             Vector3 vecRot = new Vector3(m_listSegment[i].GetRotation().x * 180f + m_listSegment[i].GetRotation().y * 180f, m_listSegment[i].GetRotation().z * 180f, 0f);
93             cGo.transform.localRotation = Quaternion.Euler(vecRot);
94         }
95     }
96 }
```

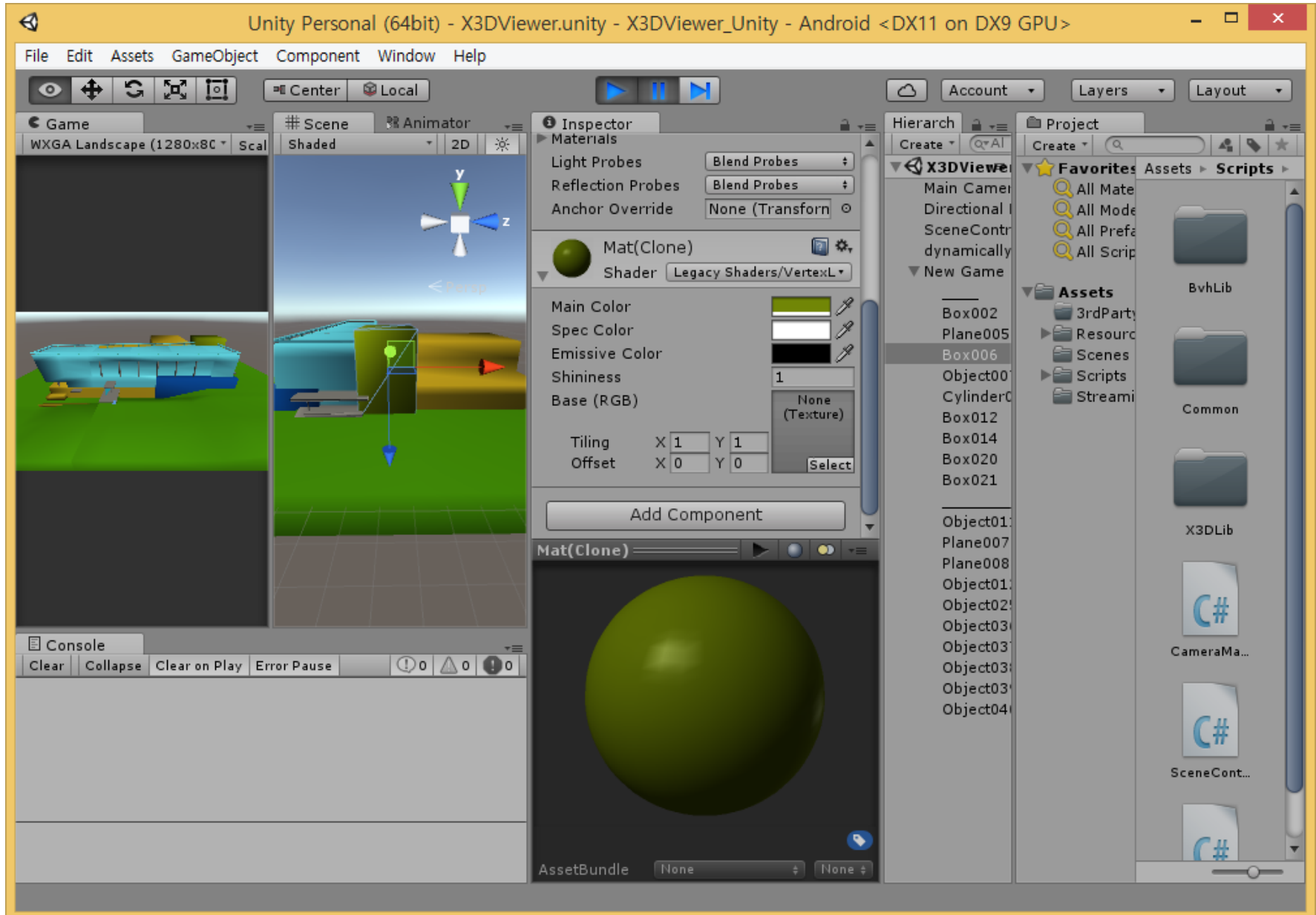
오류 목록... 출력 찾기 결과 1 기호 찾기 결과

줄: 92 열: 20 문자: 20 INS 게시

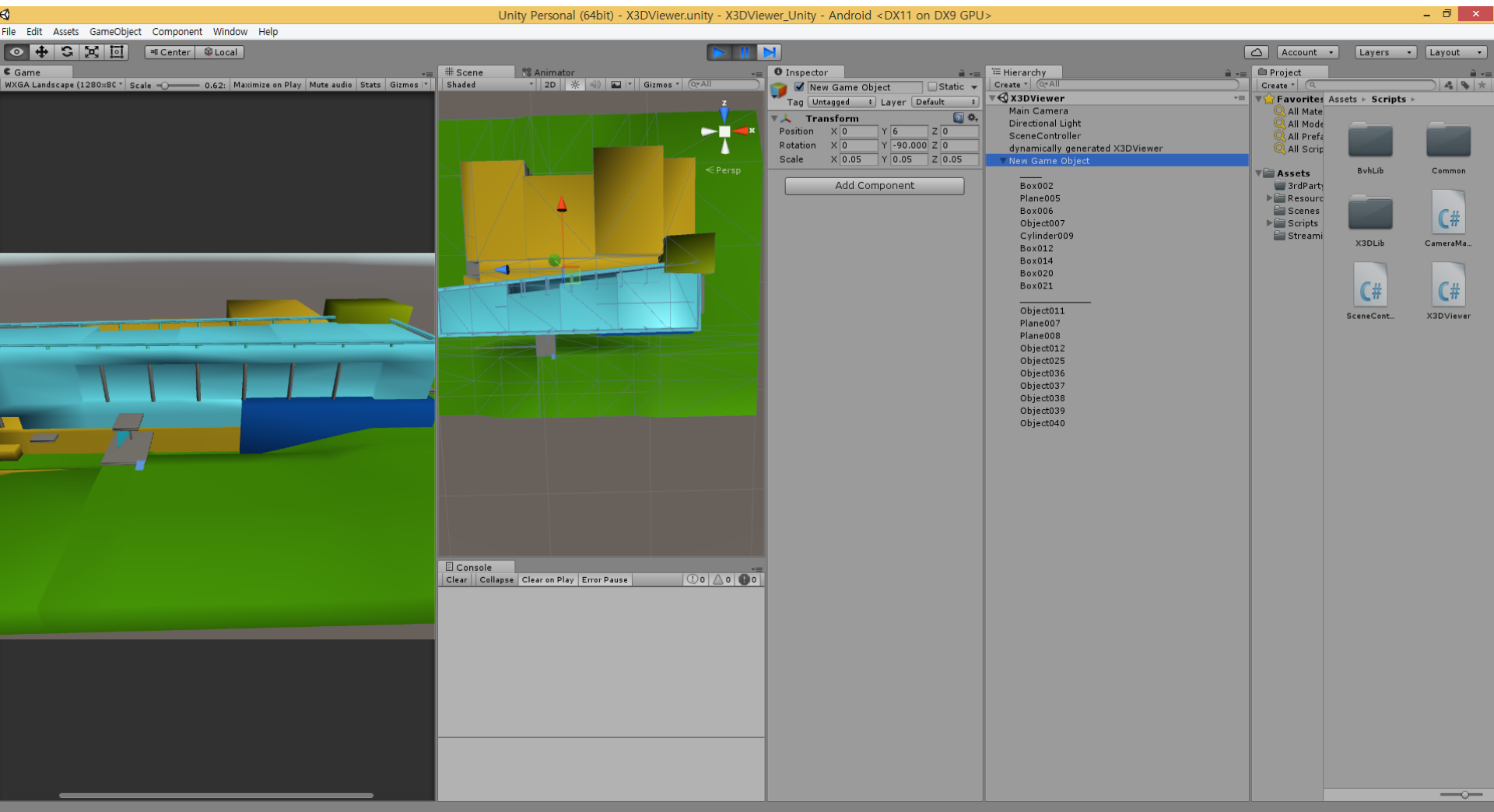
Unity X3D Scene Generation



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());

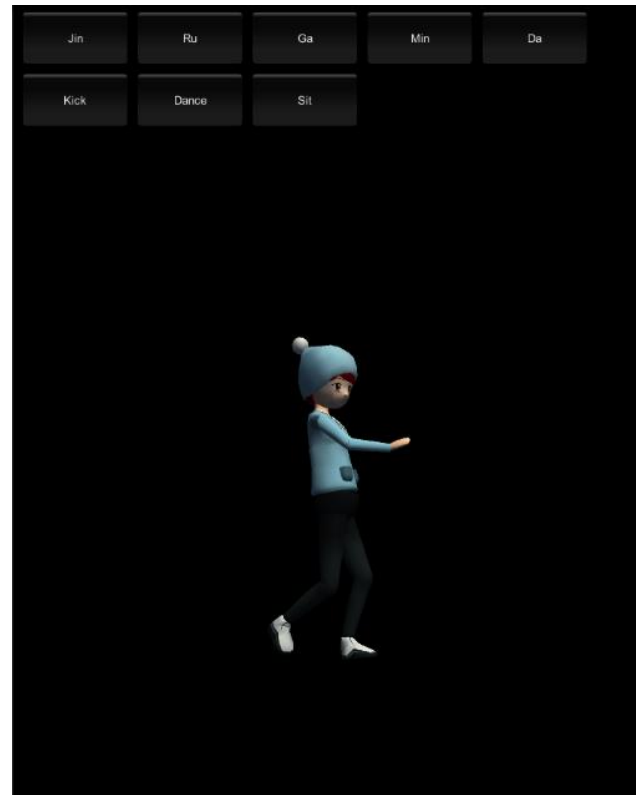
    for (int i = 0; i < m_listSegment.Count; ++i)
    {
        GameObject cGo = new GameObject();
        m_listSegment[i].SetGoSegment(cGo);
        cGo.name = m_listSegment[i].GetSegment();

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

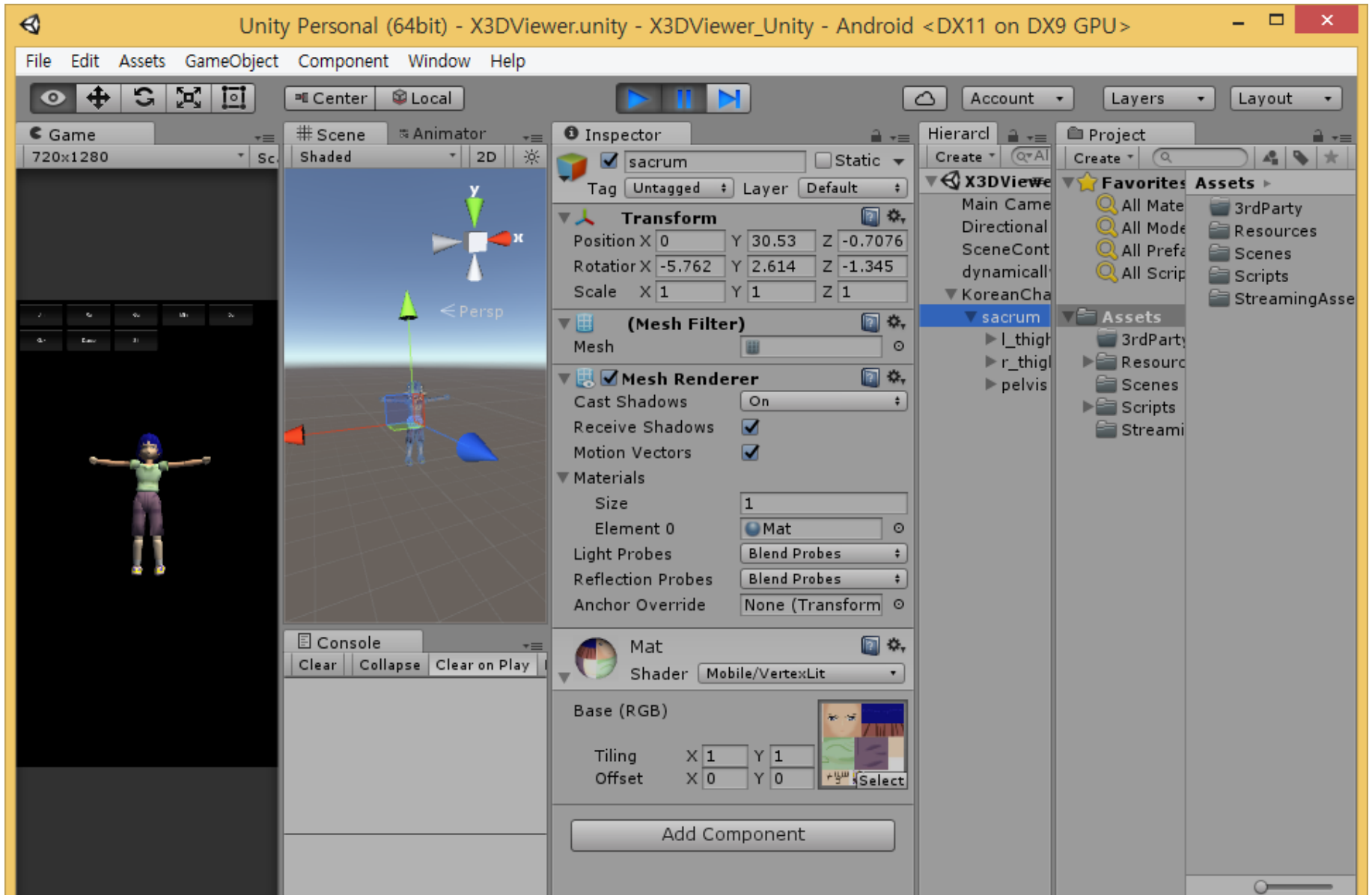
        cGo.transform.position = m_listSegment[i].GetTranslation();
        cGo.transform.localRotation = Quaternion.Euler(m_listSegment[i].GetRotation());
        //cGo.transform.lossyScale = m_listSegment[i].GetScale();

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

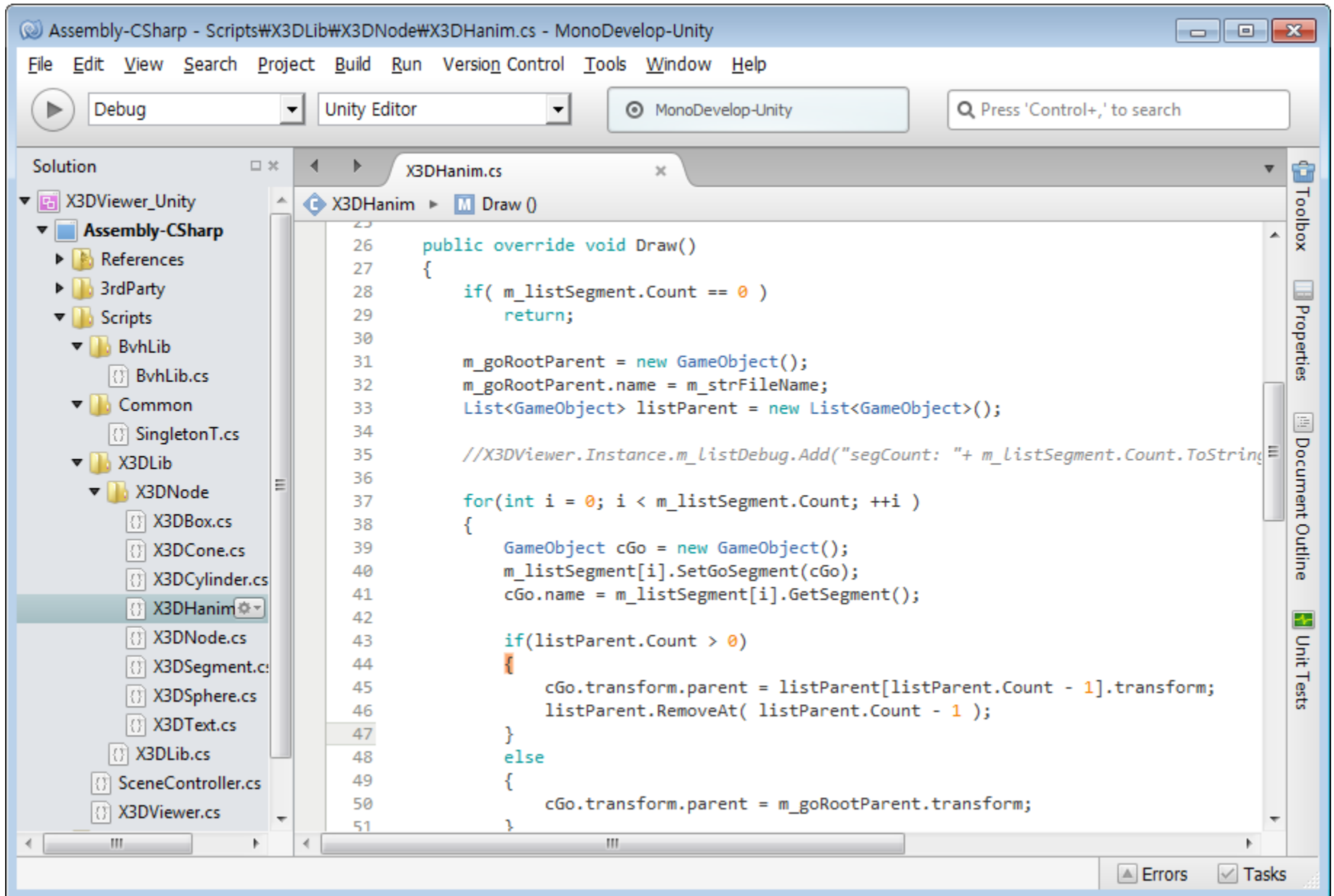
Results of Unity X3D Texture Mapping



Results of Unity X3D Texture Mapping



Draw an H-Anim Character



The screenshot displays the MonoDevelop-Unity IDE interface. The title bar reads "Assembly-CSharp - Scripts#X3DLib#X3DNode#X3DHanim.cs - MonoDevelop-Unity". The menu bar includes File, Edit, View, Search, Project, Build, Run, Version Control, Tools, Window, and Help. The toolbar shows a play button, a dropdown menu set to "Debug", another dropdown menu set to "Unity Editor", and a search box containing "Press 'Control+', to search".

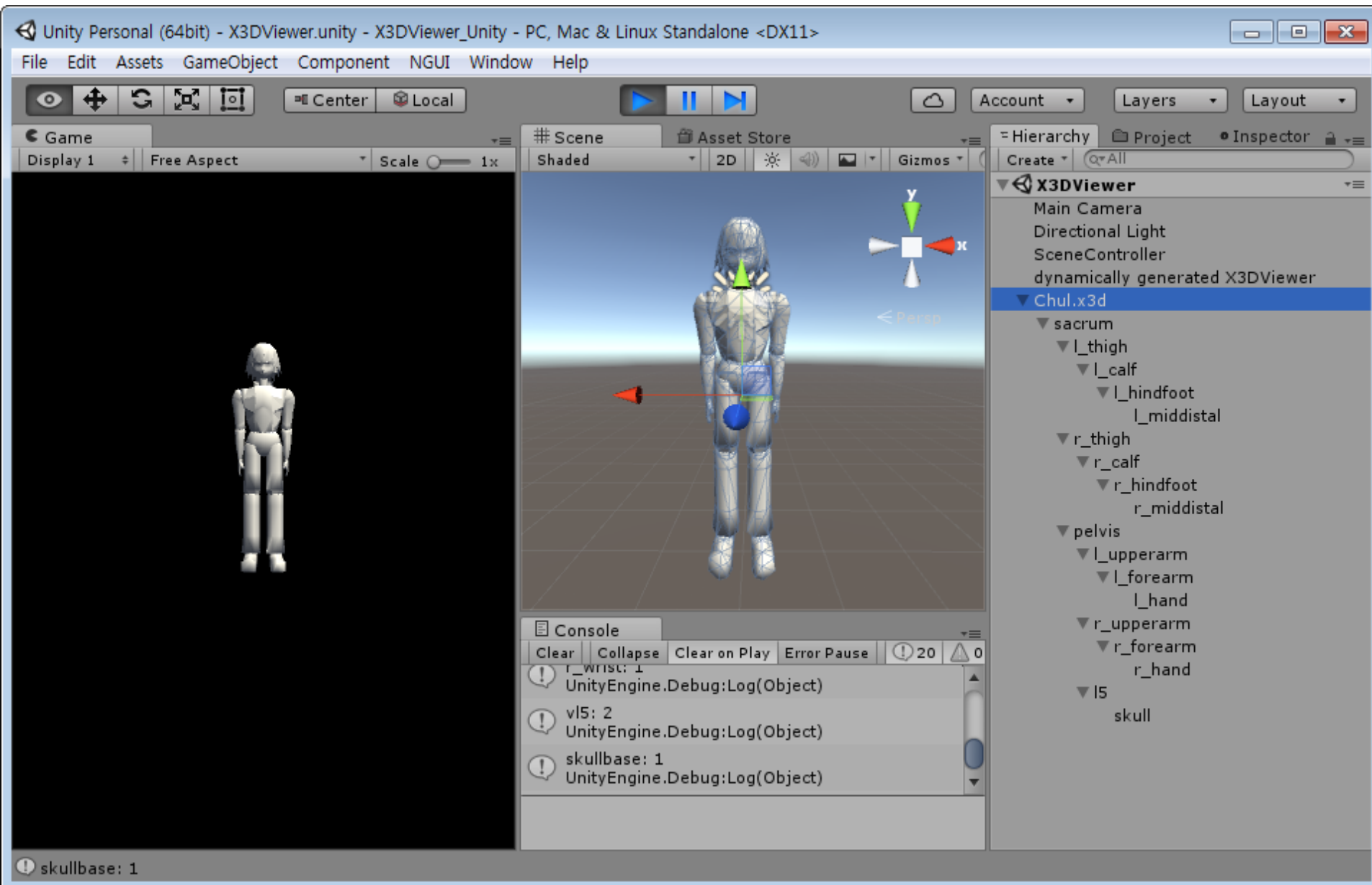
The Solution Explorer on the left shows a project structure with folders for "References", "3rdParty", "Scripts", "BvhLib", "Common", "X3DLib", and "X3DNode". The "X3DNode" folder is expanded, showing files like X3DBox.cs, X3DCone.cs, X3DCylinder.cs, X3DHanim.cs (selected), X3DNode.cs, X3DSegment.cs, X3DSphere.cs, X3DText.cs, X3DLib.cs, SceneController.cs, and X3DViewer.cs.

The main editor window shows the "X3DHanim.cs" file with the "Draw()" method implementation. The code is as follows:

```
25
26 public override void Draw()
27 {
28     if( m_listSegment.Count == 0 )
29         return;
30
31     m_goRootParent = new GameObject();
32     m_goRootParent.name = m_strFileName;
33     List<GameObject> listParent = new List<GameObject>();
34
35     //X3DViewer.Instance.m_ListDebug.Add("segCount: "+ m_listSegment.Count.ToString());
36
37     for(int i = 0; i < m_listSegment.Count; ++i )
38     {
39         GameObject cGo = new GameObject();
40         m_listSegment[i].SetGoSegment(cGo);
41         cGo.name = m_listSegment[i].GetSegment();
42
43         if(listParent.Count > 0)
44         {
45             cGo.transform.parent = listParent[listParent.Count - 1].transform;
46             listParent.RemoveAt( listParent.Count - 1 );
47         }
48         else
49         {
50             cGo.transform.parent = m_goRootParent.transform;
51         }
52     }
53 }
```

The right sidebar contains the Toolbox, Properties, Document Outline, and Unit Tests panels. The status bar at the bottom shows "Errors" and "Tasks" icons.

Load the H-Anim Character



Load BVH Mocap Data

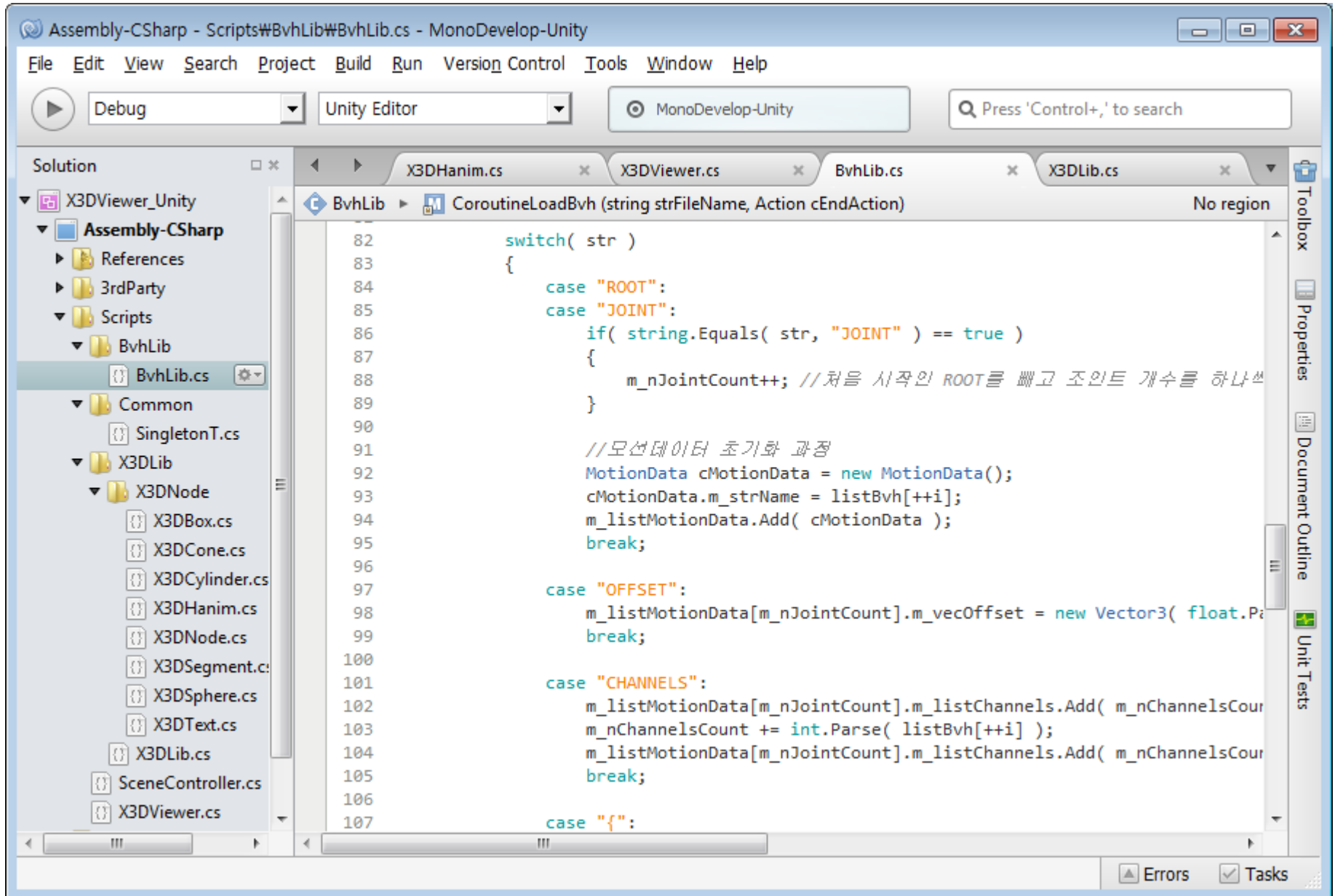
The image shows a screenshot of the MonoDevelop-Unity IDE. The main window displays the C# code for a class named `BvhLib`. The code defines a `LoadBvh` method and an `IEnumerator` `CoroutineLoadBvh` that handles loading BVH data from a file. The code is platform-specific, using `UNITY_EDITOR` and `UNITY_ANDROID` to determine the file path. The `LoadBvh` method starts a coroutine that calls `CoroutineLoadBvh`.

```
Assembly-CSharp - Scripts#BvhLib#BvhLib.cs - MonoDevelop-Unity
File Edit View Search Project Build Run Version Control Tools Window Help
Debug Unity Editor MonoDevelop-Unity Press 'Control+', to search

Solution
  X3DViewer_Unity
    Assembly-CSharp
      References
      3rdParty
      Scripts
        BvhLib
          BvhLib.cs
          Common
            SingletonT.cs
          X3DLib
            X3DNode
              X3DBox.cs
              X3DCone.cs
              X3DCylinder.cs
              X3DHanim.cs
              X3DNode.cs
              X3DSegment.cs
              X3DSphere.cs
              X3DText.cs
            X3DLib.cs
            SceneController.cs
            X3DViewer.cs

BvhLib ▶ CoroutineloadBvh (string strFileName, Action cEndAction) No region
38 public void LoadBvh( string strFileName, Action cEndAction )
39 {
40     X3DViewer.Instance.StartCoroutine( CoroutineLoadBvh( strFileName, cEndAction ) )
41 }
42
43 IEnumerator CoroutineLoadBvh( string strFileName, Action cEndAction )
44 {
45     Debug.Log( strFileName );
46     m_strFileName = strFileName;
47
48     string strPath = string.Empty;
49     // 플랫폼 별 로드 |
50 #if ( UNITY_EDITOR || UNITY_STANDALONE_WIN )
51     strPath += ("file:///");
52     strPath += (Application.streamingAssetsPath + "/" + strFileName);
53 #elif UNITY_ANDROID
54     strPath = "jar:file://" + Application.dataPath + "!/assets/" + strFileName;
55 #endif
56
57     WWW www = new WWW( strPath );
58
59     yield return www;
60
61     ParseBvhRecursive( www.text );
62
63     cEndAction();
```

Parse BVH Mocap Data



The image shows a screenshot of the MonoDevelop-Unity IDE. The main window displays a C# script named `BvhLib.cs` with the following code:

```
82         switch( str )
83         {
84             case "ROOT":
85             case "JOINT":
86                 if( string.Equals( str, "JOINT" ) == true )
87                 {
88                     m_nJointCount++; //처음 시작한 ROOT를 빼고 조인트 개수를 하나씩
89                 }
90
91                 //모션데이터 초기화 과정
92                 MotionData cMotionData = new MotionData();
93                 cMotionData.m_strName = listBvh[++i];
94                 m_listMotionData.Add( cMotionData );
95                 break;
96
97             case "OFFSET":
98                 m_listMotionData[m_nJointCount].m_vecOffset = new Vector3( float.Parse( listBvh[++i] ),
99                                     float.Parse( listBvh[++i] ),
100                                    float.Parse( listBvh[++i] ) );
101                 break;
102
103             case "CHANNELS":
104                 m_listMotionData[m_nJointCount].m_listChannels.Add( m_nChannelsCount );
105                 m_nChannelsCount += int.Parse( listBvh[++i] );
106                 m_listMotionData[m_nJointCount].m_listChannels.Add( m_nChannelsCount );
107                 break;
108
109             case "{":
110                 m_nChannelsCount = 0;
111                 break;
112         }
```

The IDE interface includes a menu bar (File, Edit, View, Search, Project, Build, Run, Version Control, Tools, Window, Help), a toolbar with a play button and a dropdown menu set to 'Debug', and a search bar. The Solution Explorer on the left shows a project named 'X3DViewer_Unity' with folders for 'References', '3rdParty', and 'Scripts'. The 'Scripts' folder contains a sub-folder 'BvhLib' with the file 'BvhLib.cs' selected. The right sidebar contains panels for 'Toolbox', 'Properties', 'Document Outline', and 'Unit Tests'. The status bar at the bottom shows 'Errors' and 'Tasks'.

Joint Mapping of BVH to H-Anim

The image shows a screenshot of the MonoDevelop-Unity IDE. The title bar reads "Assembly-CSharp - Scripts#X3DViewer.cs - MonoDevelop-Unity". The menu bar includes "File", "Edit", "View", "Search", "Project", "Build", "Run", "Version Control", "Tools", "Window", and "Help". The toolbar shows a play button, a dropdown menu set to "Debug", another dropdown menu set to "Unity Editor", a build status indicator showing "Build: 0 errors, 9 warnings", and a search bar with the text "Press 'Control+', to search".

The Solution Explorer on the left shows a project structure with folders for "References", "3rdParty", "Scripts", "BvhLib", "Common", "X3DLib", and "StreamingAssets". Under "X3DLib", there is a sub-folder "X3DNode" containing several .cs files, with "X3DViewer.cs" selected.

The main editor window displays the code for "X3DViewer.cs" at "PlayAnimation ()". The code is as follows:

```
64 void BvhMatchJoint()
65 {
66     List<X3DNode> listX3DNode = m_cX3DLib.GetX3DNodeList();
67     X3DHanim cHanim = (X3DHanim)listX3DNode[0];
68
69     for( int i = 0; i < m_cBvhLib.m_nJointCount; i++ )
70     {
71         for( int j = 0; j < cHanim.GetSegmentList().Count; j++ )
72         {
73             X3DSegment cX3dSegment = (X3DSegment)cHanim.GetSegmentList()[j];
74             if( (string.Equals( cX3dSegment.GetSegment(), "sacrum" ) && string.Equals( cX3dSegment.GetSegment(), "l_thigh" ) && string.Equals( cX3dSegment.GetSegment(), "l_calf" ) && string.Equals( cX3dSegment.GetSegment(), "l_hindfoot" ) && string.Equals( cX3dSegment.GetSegment(), "l_middistal" ) && string.Equals( cX3dSegment.GetSegment(), "r_thigh" ) && string.Equals( cX3dSegment.GetSegment(), "r_calf" ) && string.Equals( cX3dSegment.GetSegment(), "r_hindfoot" ) && string.Equals( cX3dSegment.GetSegment(), "r_middistal" ) && string.Equals( cX3dSegment.GetSegment(), "pelvis" ) && string.Equals( cX3dSegment.GetSegment(), "l_upperarm" ) && string.Equals( cX3dSegment.GetSegment(), "l_forearm" ) && string.Equals( cX3dSegment.GetSegment(), "l_hand" ) && string.Equals( cX3dSegment.GetSegment(), "r_upperarm" ) && string.Equals( cX3dSegment.GetSegment(), "r_forearm" ) && string.Equals( cX3dSegment.GetSegment(), "r hand" ) && string.Equals(
```

BVH Mocap Animation

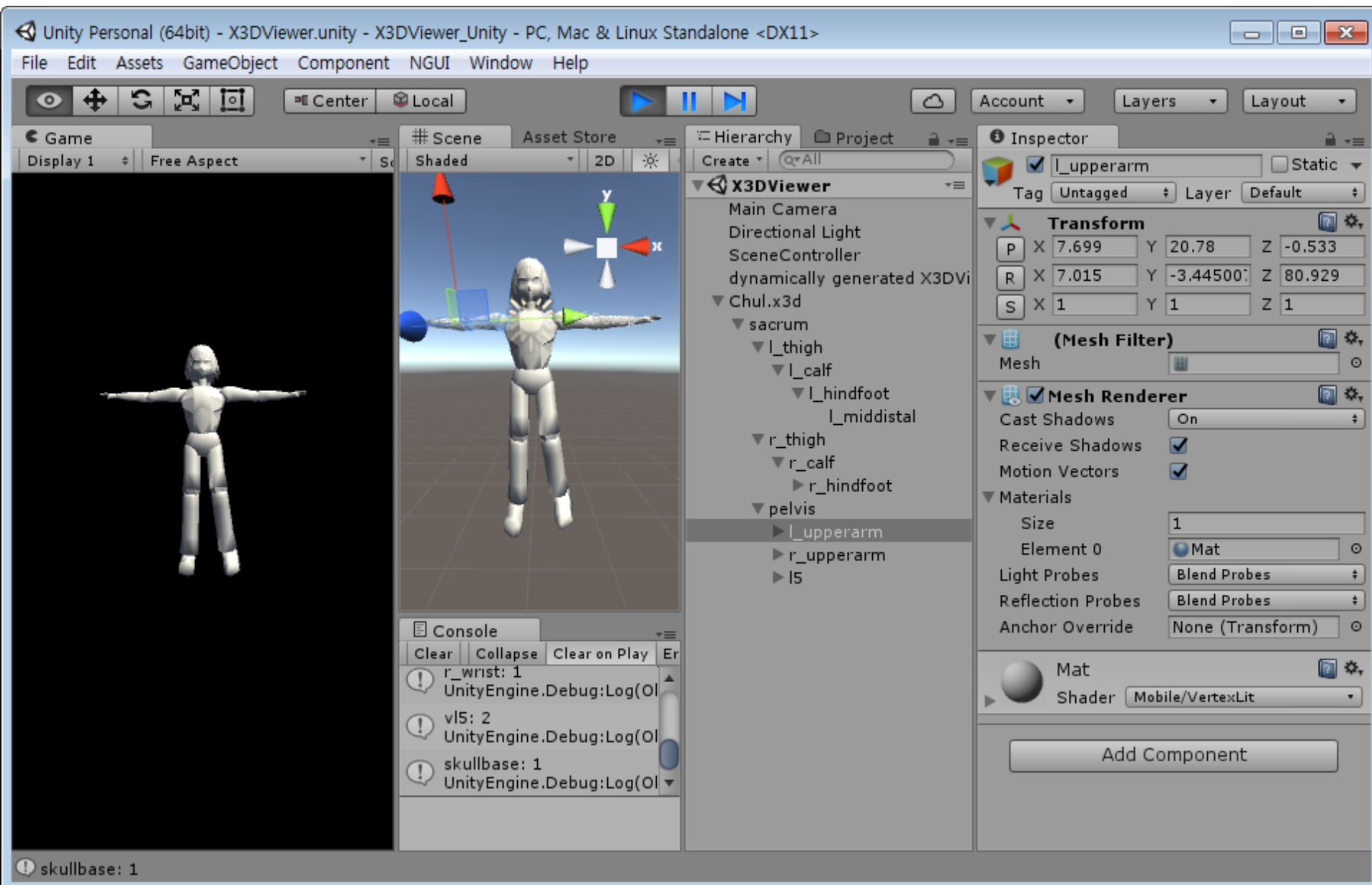
The image shows a screenshot of the MonoDevelop-Unity IDE. The window title is "Assembly-CSharp - Scripts#X3DViewer.cs* - MonoDevelop-Unity". The menu bar includes File, Edit, View, Search, Project, Build, Run, Version Control, Tools, Window, and Help. The toolbar shows a play button, a dropdown menu set to "Debug", and another dropdown menu set to "Unity Editor". A search bar contains the text "Press 'Control+,' to search".

The Solution Explorer on the left shows a project structure with folders: References, 3rdParty, Scripts, BvhLib, Common, X3DLib, and StreamingAssets. Under X3DLib, there is a folder X3DNode containing several .cs files. X3DViewer.cs is selected.

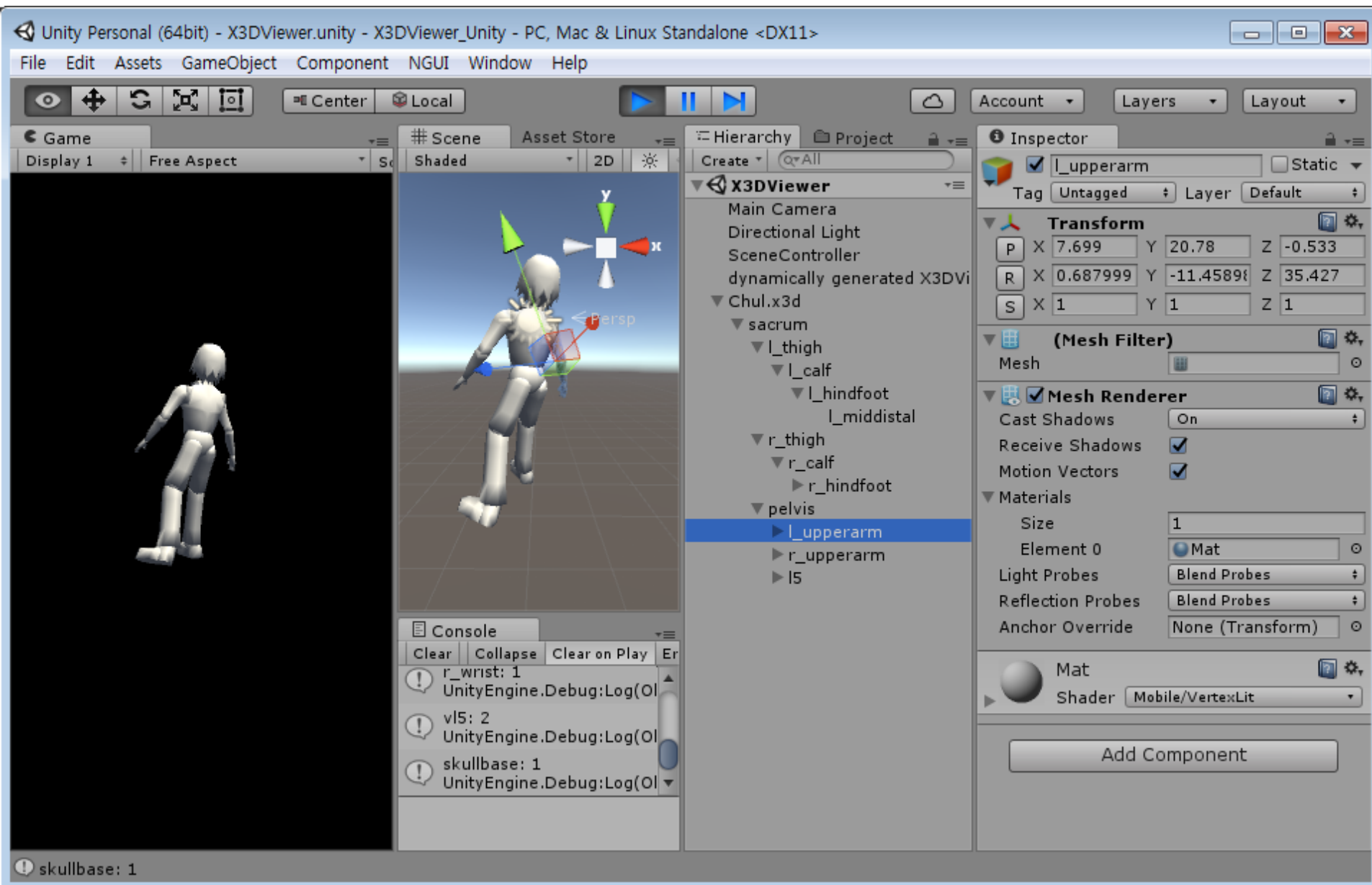
The main editor window shows the code for X3DViewer.cs, specifically the PlayAnimation() method. The code is as follows:

```
100 private void PlayAnimation()
101 {
102     m_nAnimationFrame++;
103     if( m_nAnimationFrame >= m_cBvhLib.m_cFramesData.m_nFrames )
104     {
105         m_nAnimationFrame = 0;
106     }
107     List<X3DNode> listX3DNode = m_cX3DLib.GetX3DNodeList();
108     X3DHanim cHanim = (X3DHanim)listX3DNode[0];
109
110     for( int i = 0; i < m_cBvhLib.m_nJointCount; ++ i )
111     {
112         BvhLib.MotionData cMotionData = m_cBvhLib.m_listMotionData[i];
113         BvhLib.FramesData cFrameData = m_cBvhLib.m_cFramesData;
114         int nMatchHanim = m_cBvhLib.m_listMotionData[i].m_nMatchHanim;
115         List<X3DSegment> listSegment = cHanim.GetSegmentList();
116
117         if(listSegment.Count <= nMatchHanim)
118         {
119             continue;
120         }
121
122         X3DSegment cX3dSegment = listSegment[nMatchHanim];
123         if( cMotionData.m_listChannels[1] - cMotionData.m_listChannels[0] == 5 )
124         {
125             float fX = cFrameData.m_listFramesRotation[m_nAnimationFrame][cMotionD
```

Display Unity BVH Mocap Animation (1)



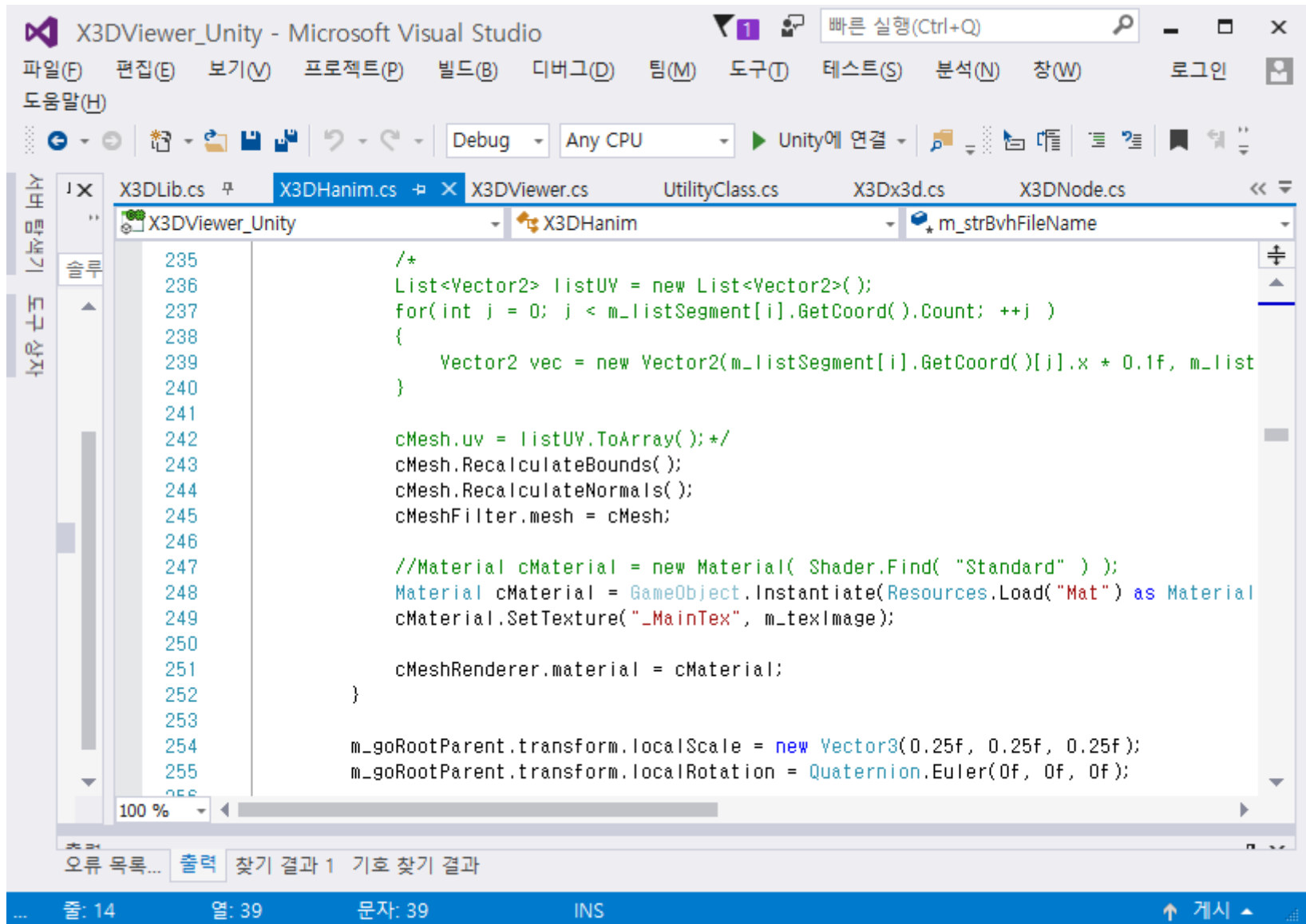
Display Unity BVH Mocap Animation (2)



Load Multiple H-Anim Characters

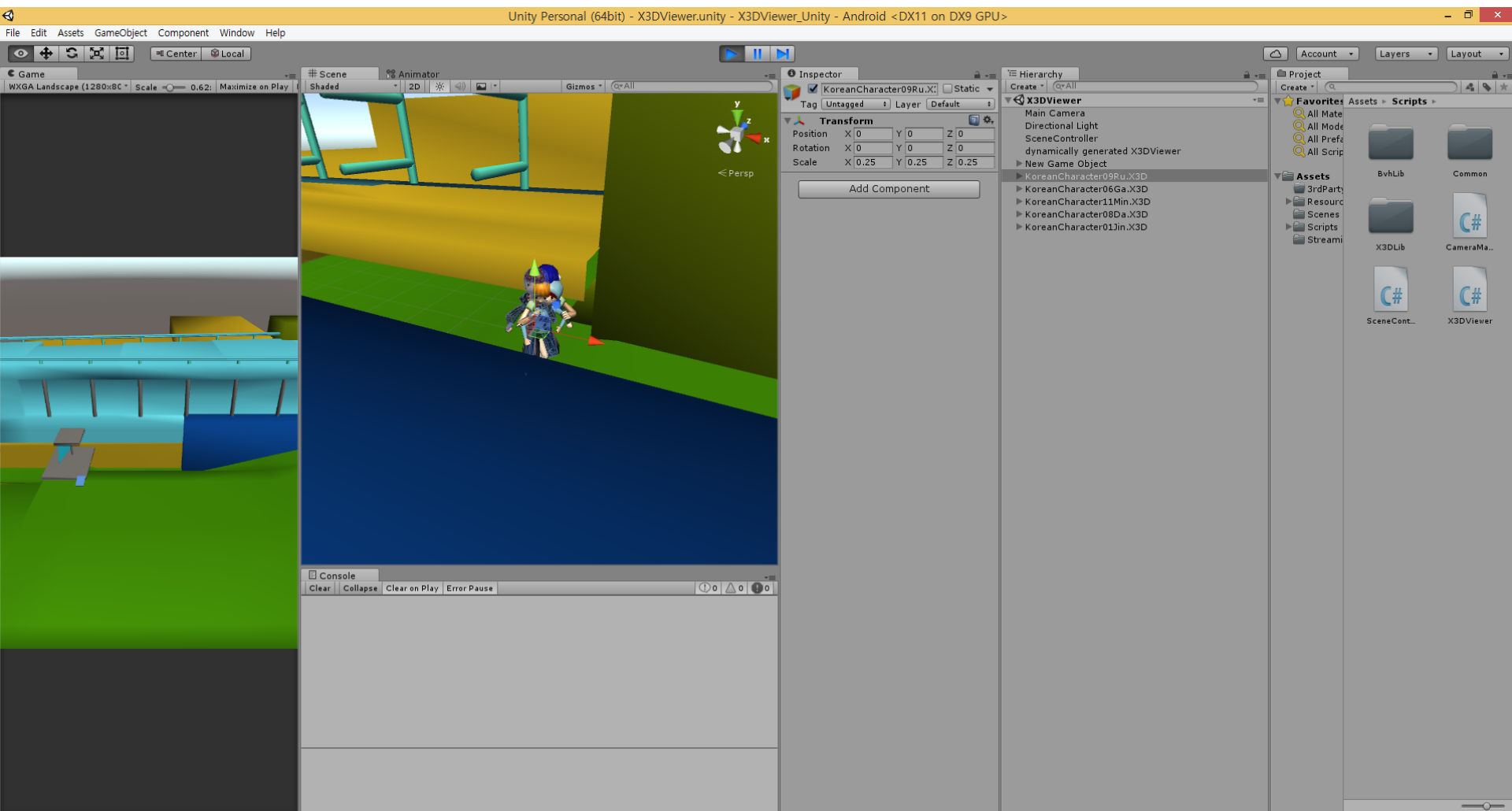
```
X3DViewer_Unity - Microsoft Visual Studio
빠른 실행(Ctrl+Q)
파일(F) 편집(E) 보기(V) 프로젝트(P) 빌드(B) 디버그(D) 팀(M) 도구(T) 테스트(S) 분석(N) 창(W) 로그인
도움말(H)
Debug Any CPU Unity에 연결
X3DLib.cs X3DViewer.cs UtilityClass.cs X3Dx3d.cs X3DNode.cs KoreanCharacter01Jin.X3D
X3DViewer_Unity X3DViewer Init()
참조 1개
18 public void Init()
19 {
20     m_strFileName = "KoreanCharacter01Jin.X3D";
21     m_strBvhFileName = "197_a.bvh";
22
23     LoadHanim();
24
25     m_cX3DLib.LoadX3D("IT8.x3d");
26     //m_cX3DLib.LoadX3D("meetingroom.x3d");
27 }
28
29 참조 1개
30 private void LoadHanim()
31 {
32     m_cX3DLib.LoadHanim(m_strFileName, m_strBvhFileName);
33     m_cX3DLib.LoadHanim("KoreanCharacter09Ru.X3D", "198_a.bvh");
34     m_cX3DLib.LoadHanim("KoreanCharacter06Ga.X3D", "Dance.bvh");
35     m_cX3DLib.LoadHanim("KoreanCharacter11Min.X3D", "199_a.bvh");
36     m_cX3DLib.LoadHanim("KoreanCharacter08Da.X3D", "200_a.bvh");
37 }
100 %
오류 목록... 출력 찾기 결과 1 기호 찾기 결과
... 줄: 25 열: 23 문자: 23 INS ↑ 게시
```


Transform Texture and Size

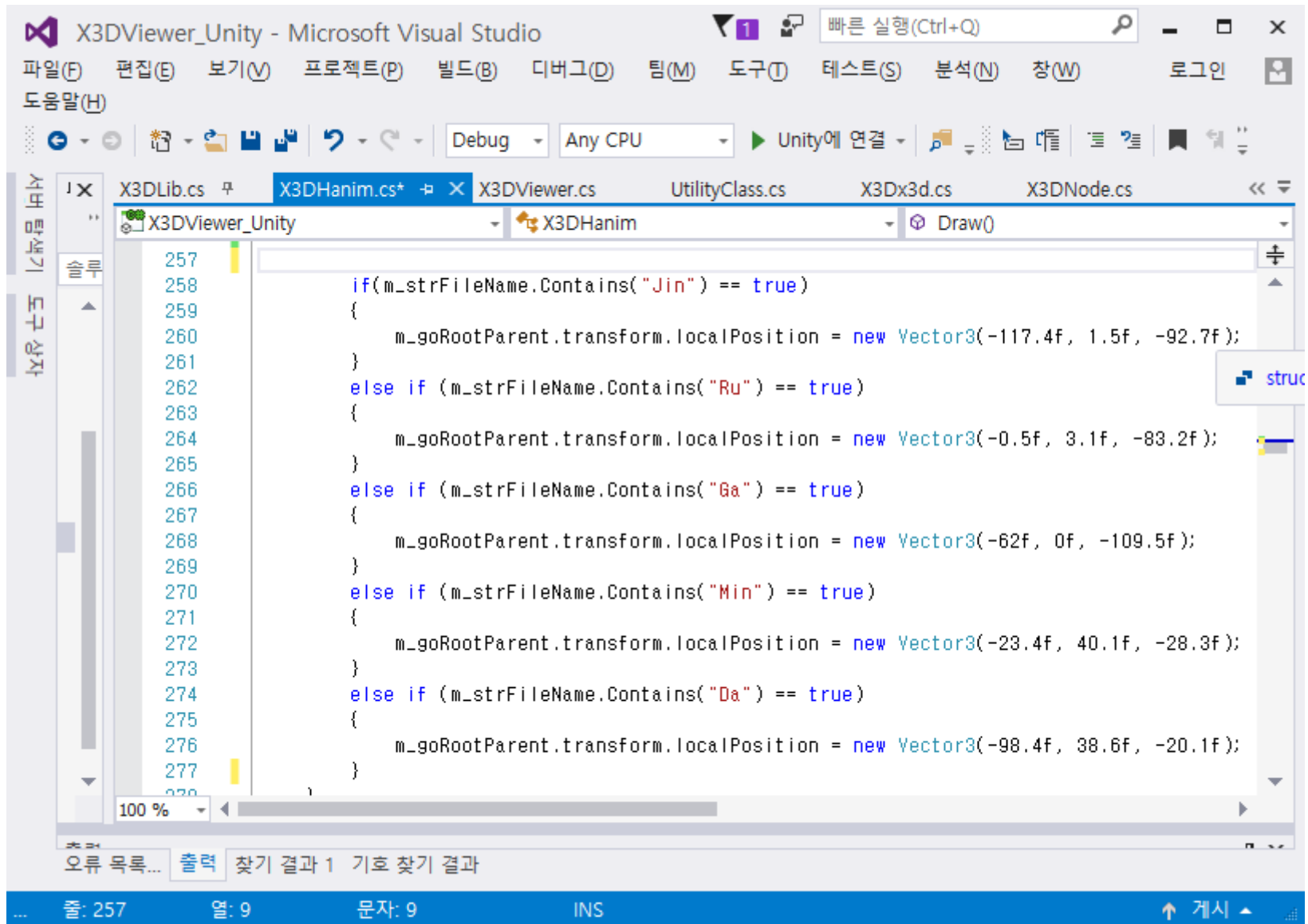


```
X3DViewer_Unity - Microsoft Visual Studio
빠른 실행(Ctrl+Q)
파일(F) 편집(E) 보기(V) 프로젝트(P) 빌드(B) 디버그(D) 팀(M) 도구(T) 테스트(S) 분석(N) 창(W) 로그인
도움말(H)
Debug Any CPU Unity에 연결
X3DLib.cs X3DHanim.cs X3DViewer.cs UtilityClass.cs X3Dx3d.cs X3DNode.cs
X3DViewer_Unity X3DHanim m_strBvhFileName
235 /*
236 List<Vector2> listUV = new List<Vector2>( );
237 for(int j = 0; j < m_listSegment[i].GetCoord().Count; ++j )
238 {
239     Vector2 vec = new Vector2(m_listSegment[i].GetCoord()[j].x + 0.1f, m_list
240 }
241
242 cMesh.uv = listUV.ToArray();*/
243 cMesh.RecalculateBounds( );
244 cMesh.RecalculateNormals( );
245 cMeshFilter.mesh = cMesh;
246
247 //Material cMaterial = new Material( Shader.Find( "Standard" ) );
248 Material cMaterial = GameObject.Instantiate(Resources.Load("Mat") as Material
249 cMaterial.SetTexture("_MainTex", m_texImage);
250
251 cMeshRenderer.material = cMaterial;
252 }
253
254 m_goRootParent.transform.localScale = new Vector3(0.25f, 0.25f, 0.25f);
255 m_goRootParent.transform.localRotation = Quaternion.Euler(0f, 0f, 0f);
256
100 %
오류 목록... 출력 찾기 결과 1 기호 찾기 결과
줄: 14 열: 39 문자: 39 INS 게시
```

Load Another H-Anim Character



Adjust H-Anim Coordinates

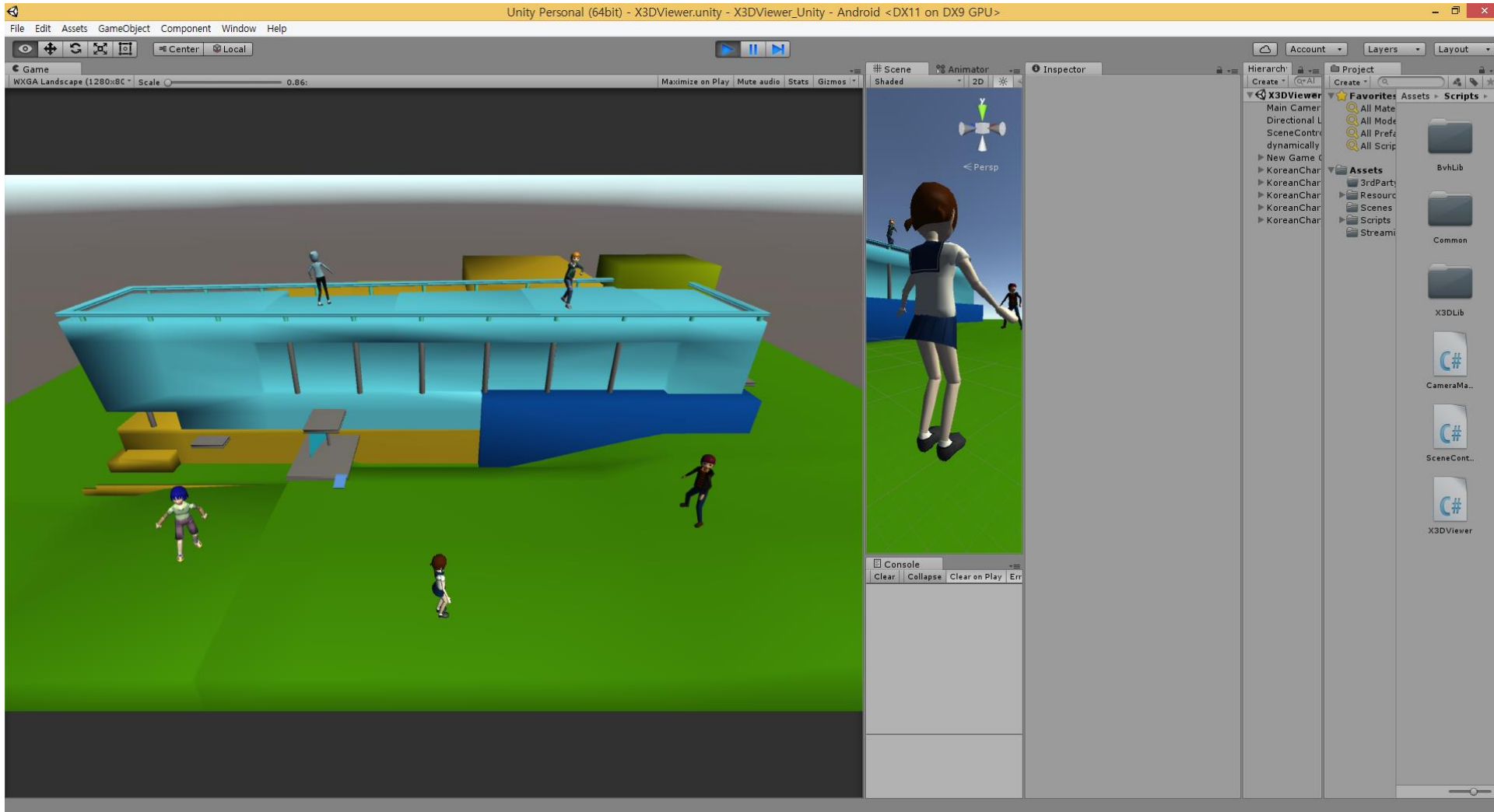


The screenshot shows the Visual Studio IDE with the following details:

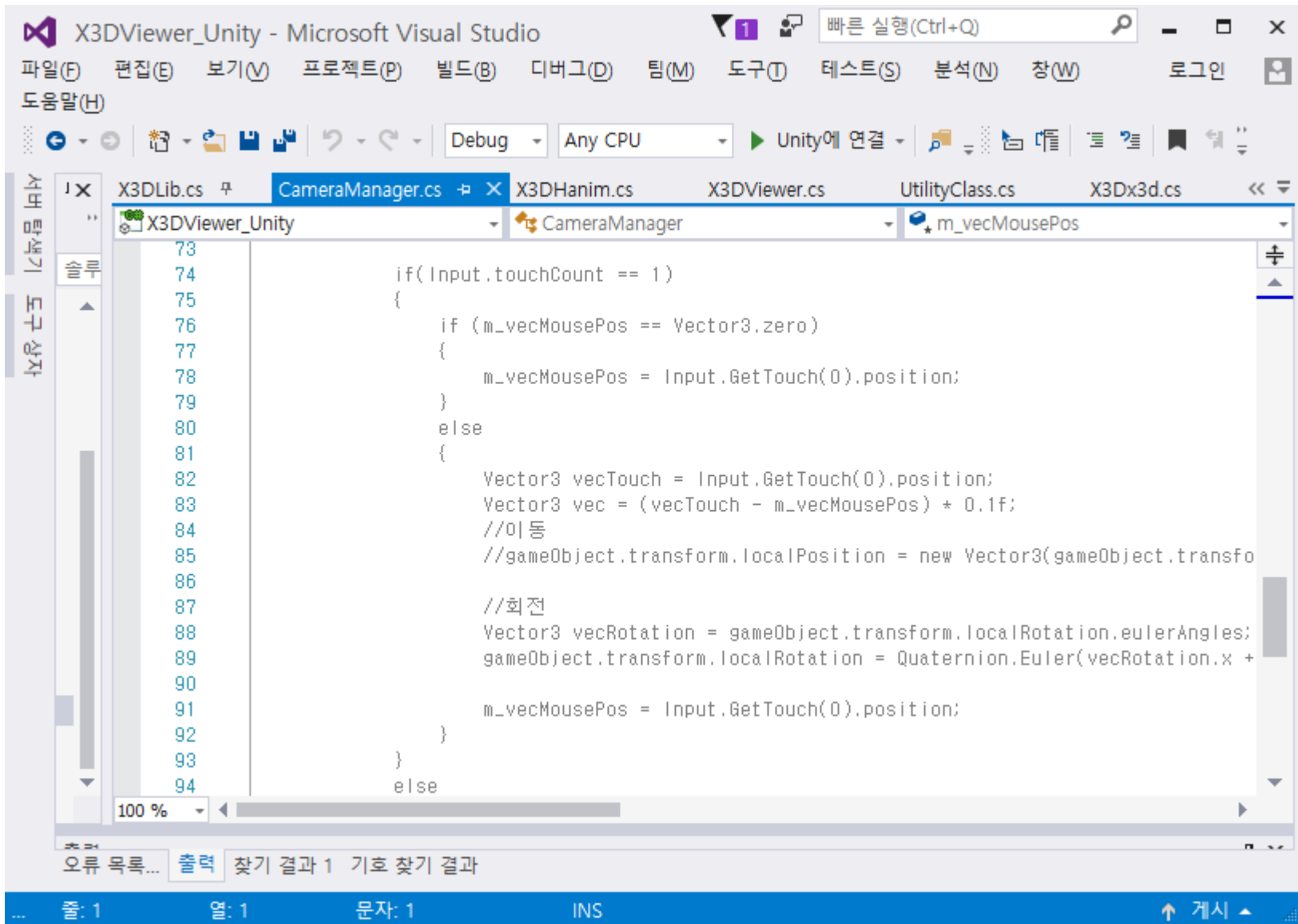
- Title Bar:** X3DViewer_Unity - Microsoft Visual Studio
- Menu Bar:** 파일(F) 편집(E) 보기(V) 프로젝트(P) 빌드(B) 디버그(D) 팀(M) 도구(T) 테스트(S) 분석(N) 창(W) 로그인
- Toolbar:** Includes buttons for file operations, a 'Debug' dropdown, 'Any CPU' target, and a 'Unity에 연결' button.
- Solution Explorer:** Shows a project named 'X3DViewer_Unity' with a sub-project 'X3DHanim'. The 'Draw()' method is selected.
- Code Editor:** Displays the following C# code in 'X3DHanim.cs':

```
257  
258  
259  
260     m_goRootParent.transform.localPosition = new Vector3(-117.4f, 1.5f, -92.7f);  
261  
262     else if (m_strFileName.Contains("Ru") == true)  
263     {  
264         m_goRootParent.transform.localPosition = new Vector3(-0.5f, 3.1f, -83.2f);  
265     }  
266     else if (m_strFileName.Contains("Ga") == true)  
267     {  
268         m_goRootParent.transform.localPosition = new Vector3(-62f, 0f, -109.5f);  
269     }  
270     else if (m_strFileName.Contains("Min") == true)  
271     {  
272         m_goRootParent.transform.localPosition = new Vector3(-23.4f, 40.1f, -28.3f);  
273     }  
274     else if (m_strFileName.Contains("Da") == true)  
275     {  
276         m_goRootParent.transform.localPosition = new Vector3(-98.4f, 38.6f, -20.1f);  
277     }  
278
```
- Output Window:** Shows '오류 목록...' (Error list) and '출력' (Output) with search results.
- Status Bar:** Shows '줄: 257' (Line: 257), '열: 9' (Column: 9), '문자: 9' (Character: 9), and 'INS' (Insert mode).

Results of Loading Multiple H-Anim Characters



Rotate X3D Camera



```
X3DViewer_Unity - Microsoft Visual Studio
빠른 실행(Ctrl+Q)
파일(F) 편집(E) 보기(V) 프로젝트(P) 빌드(B) 디버그(D) 팀(M) 도구(T) 테스트(S) 분석(N) 창(W) 로그인
도움말(H)
Debug Any CPU Unity에 연결
X3DLib.cs CameraManager.cs X3DAnim.cs X3DViewer.cs UtilityClass.cs X3Dx3d.cs
X3DViewer_Unity CameraManager m_vecMousePos
73
74     if(Input.touchCount == 1)
75     {
76         if (m_vecMousePos == Vector3.zero)
77         {
78             m_vecMousePos = Input.GetTouch(0).position;
79         }
80     }
81     else
82     {
83         Vector3 vecTouch = Input.GetTouch(0).position;
84         Vector3 vec = (vecTouch - m_vecMousePos) * 0.1f;
85         //이동
86         //gameObject.transform.localPosition = new Vector3(gameObject.transfo
87
88         //회전
89         Vector3 vecRotation = gameObject.transform.localRotation.eulerAngles;
90         gameObject.transform.localRotation = Quaternion.Euler(vecRotation.x +
91
92         m_vecMousePos = Input.GetTouch(0).position;
93     }
94     }
95     else
```

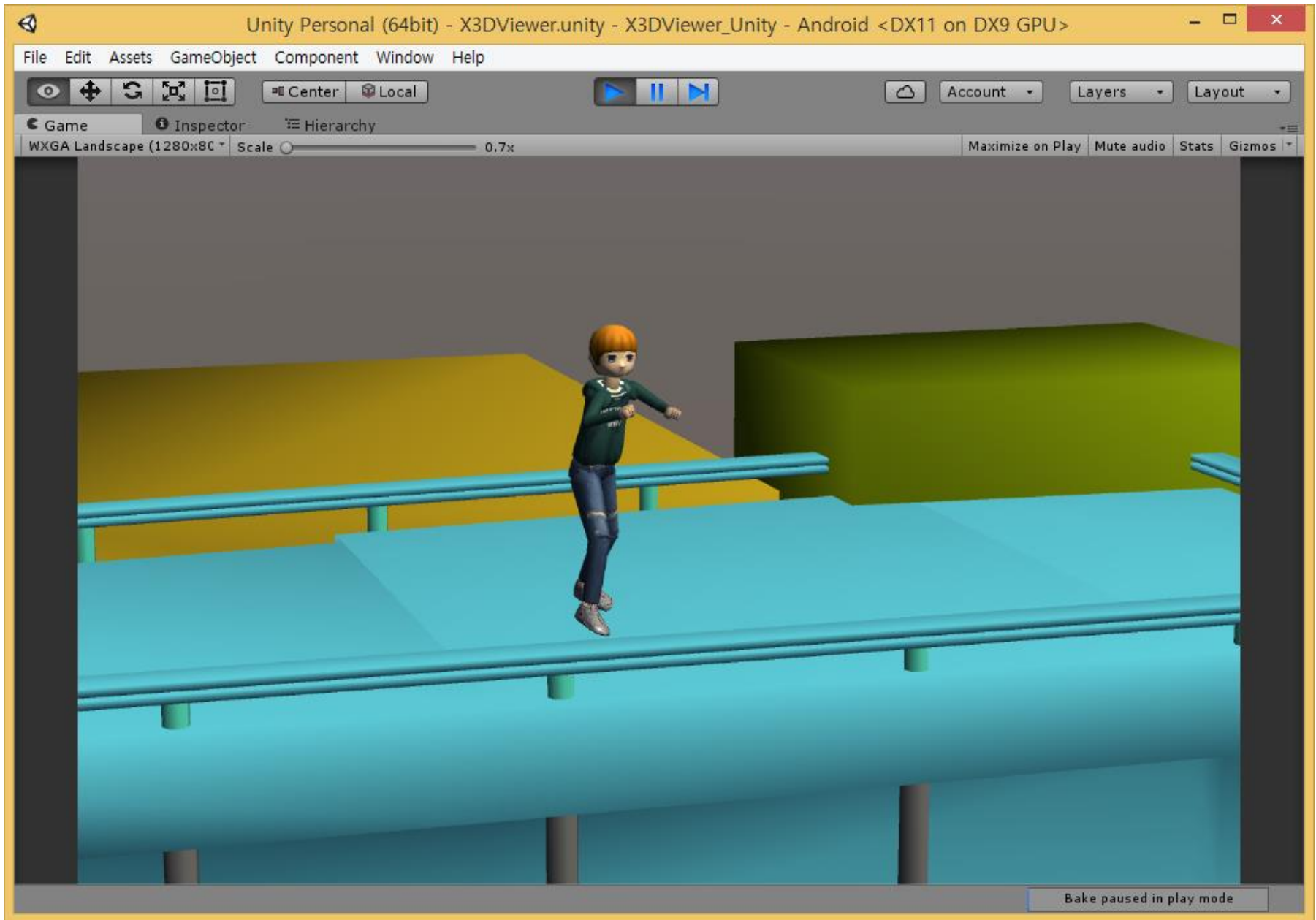
오류 목록... 출력 찾기 결과 1 기호 찾기 결과

줄: 1 열: 1 문자: 1 INS ↑ 게시

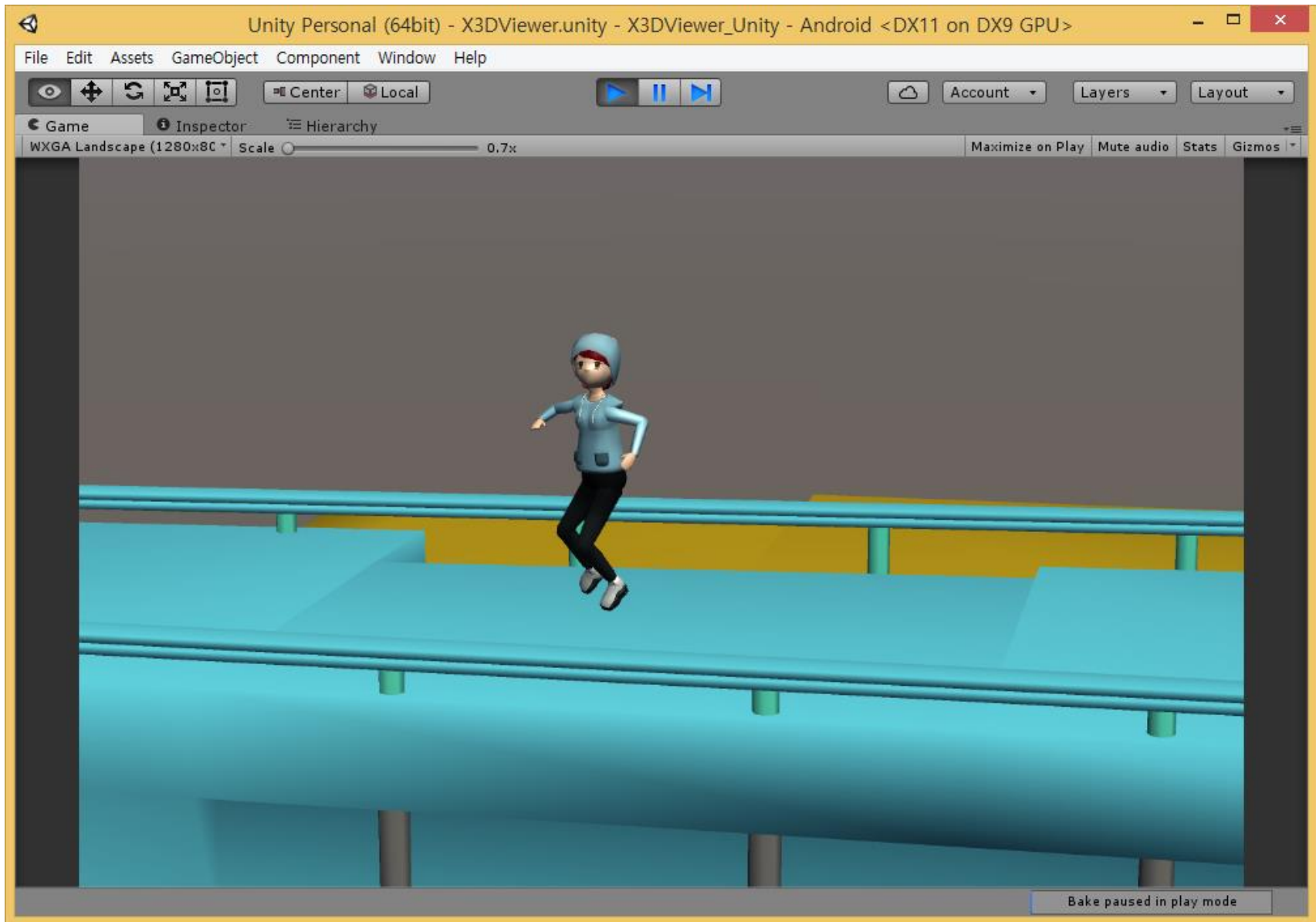
Adjust X3D Camera FOV

```
X3DViewer_Unity - Microsoft Visual Studio
빠른 실행(Ctrl+Q)
파일(F) 편집(E) 보기(V) 프로젝트(P) 빌드(B) 디버그(D) 팀(M) 도구(T) 테스트(S) 분석(N) 창(W) 로그인
다음말(H)
Debug Any CPU Unity에 연결
X3DLib.cs CameraManager.cs X3DHanim.cs X3DViewer.cs UtilityClass.cs X3Dx3d.cs
X3DViewer_Unity CameraManager m_vecMousePos
43 }
44 #elif UNITY_ANDROID
45     if (Input.touchCount == 2)
46     {
47         if(m_fTwoTouch == 0)
48         {
49             m_fTwoTouch = Vector3.Distance(Input.GetTouch(0).position, Input.GetTouch
50         }
51     else
52     {
53         float fDistance = Vector3.Distance(Input.GetTouch(0).position, Input.GetT
54
55
56         float fFov = m_cCamera.fieldOfView - ((fDistance - m_fTwoTouch) * 0.1f);
57
58         if (fFov < 10)
59             fFov = 10;
60         else if (fFov > 80)
61             fFov = 80;
62
63         m_cCamera.fieldOfView = fFov;
64
100 %
오류 목록... 출력 찾기 결과 1 기호 찾기 결과
줄: 1 열: 1 문자: 1 INS ↑ 게시
```

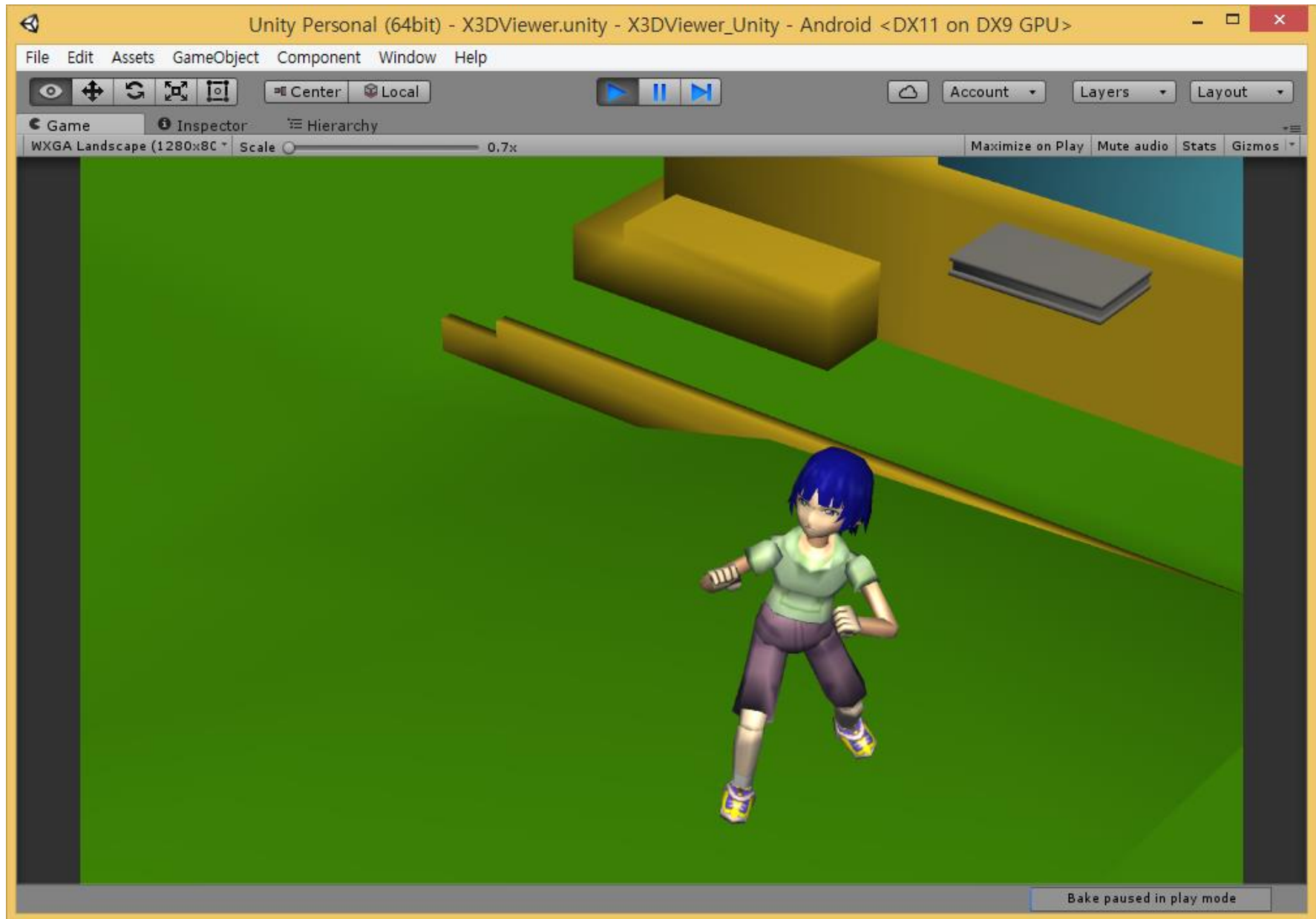
Screen Touch for Camera Rotate and Zoom (1)



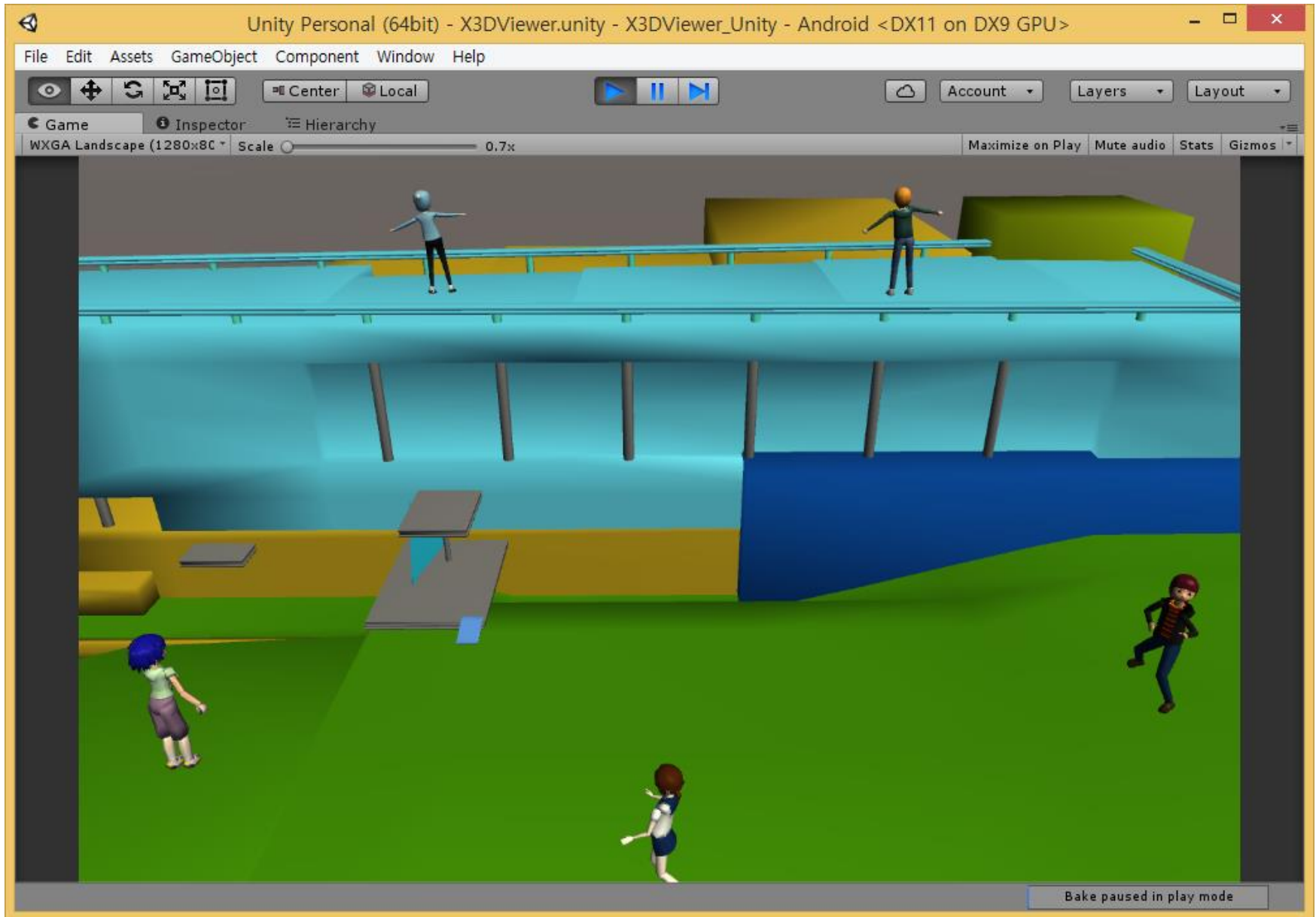
Screen Touch for Camera Rotate and Zoom (2)



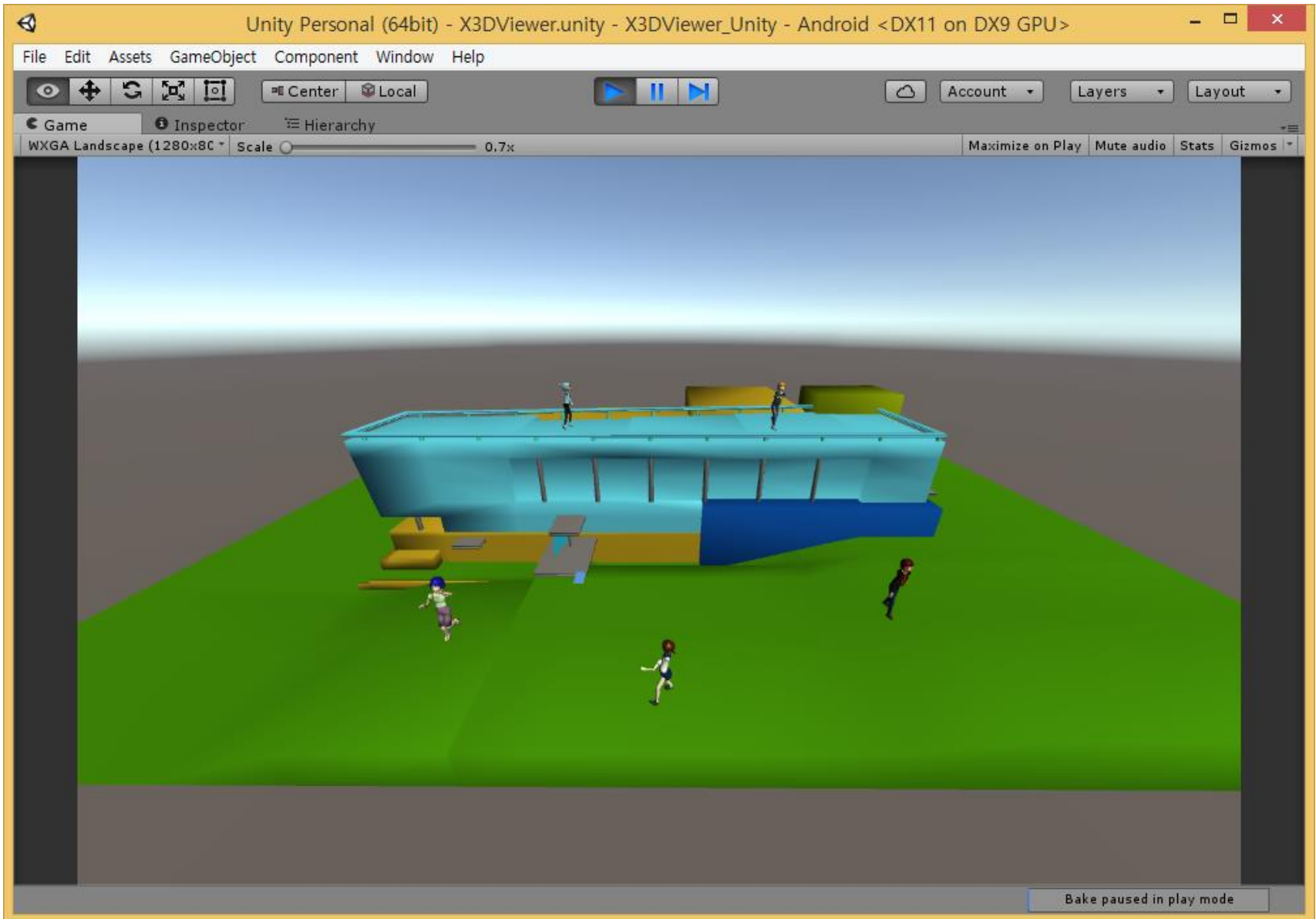
Screen Touch for Camera Rotate and Zoom (3)



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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