

MODUL 5 – Using Cameras

A. COMPETENCY

- Student may be able to implement any angle of camera in the scene.
- Student may be able to make some of angle camera transitions.
- Student may be able to make a scene capture in frame.

B. GUIDANCE

1. Start your activity with a pray
2. Read the instruction carefully
3. Do your worklab passionately and honestly
4. You may ask to the lecture if something is not clear

C. TIME ALLOCATION: 4 hours

D. THEORY

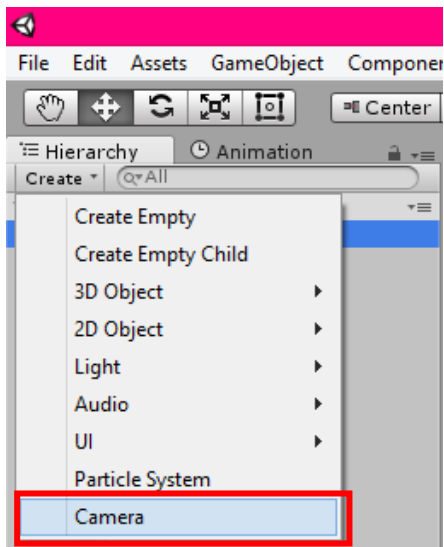
Camera is a very important component in Unity especially for 3D object. One of the factor is a different in angle of 2D and 3D object, 2D object is only be seen from one angle, but 3D object can be seen from any angle. Beside that, 2D object only uses two coordinates (x and y), but 3D object uses three coordinates (x, y, and z). This week will explain about some techniques to set camera angle and exploits any camera feature in Unity, such:

- Camera view from another angle in main scene, in one game scene there is a camera scene which has many angle.
- Camera angle movement to allow user to set all scene by different camera angles.
- Screen capture in a frame which allows player to take a picture from main camera angle.

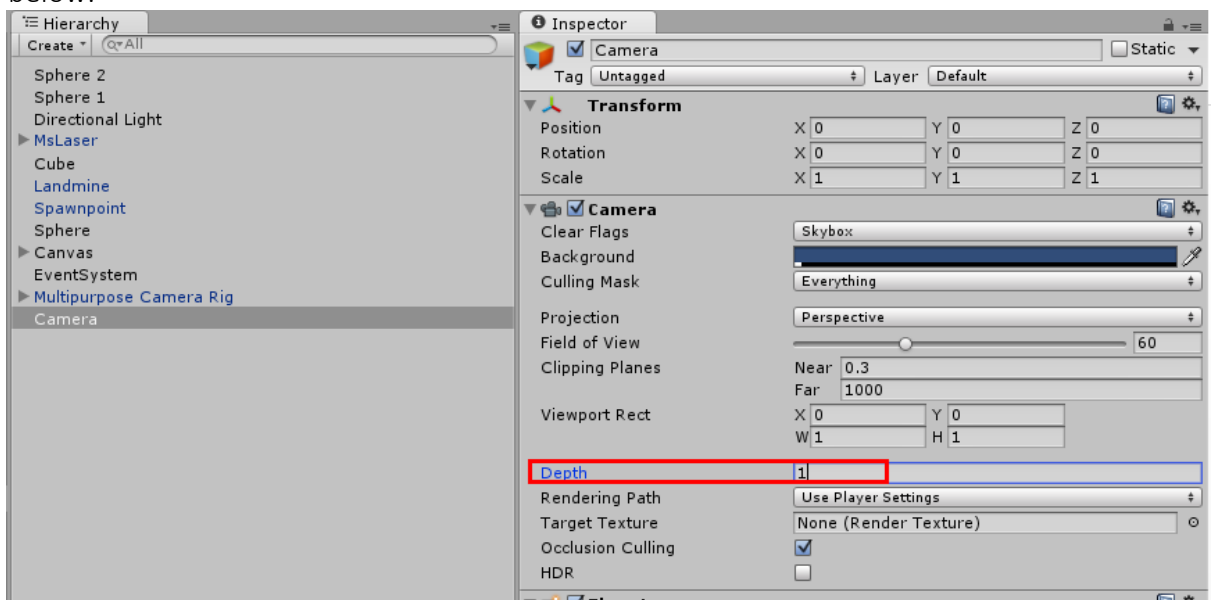
E. ACTIVITY

1. Camera view from Another Angle Perspective In A Scene

1. Create a new 3D Project in Unity.
2. Import *BasicScene* package into Assets.
3. At **Project View**, open *BasicScene* then animation character and another objects will appear.
4. Add new **Camera** into the scene by **Create** menu on **Hierarchy**, Go to **Create** → **Camera**.



5. Select **Camera** at Hierarchy, at Inspector menu, set “Depth = 1” as this illustration below.



6. In **Project View**, create a new C# script named *PictureInPicture* with this following code.

```

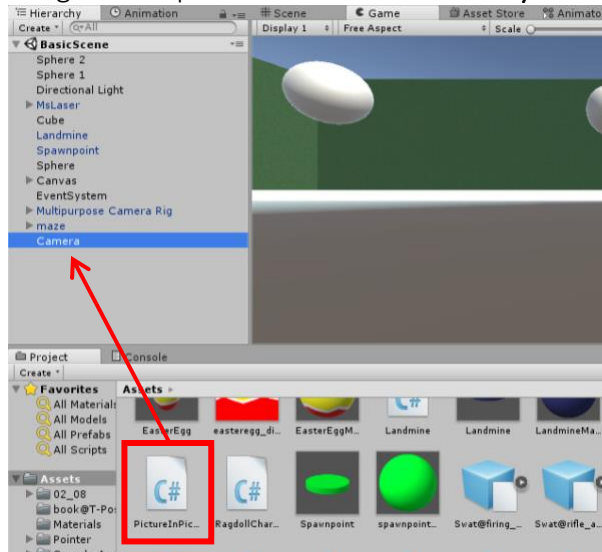
using UnityEngine;

public class PictureInPicture: MonoBehaviour {
    public enum hAlignment{left, center, right};
    public enum vAlignment{top, middle, bottom};
    public hAlignment horAlign = hAlignment.left;
    public vAlignment verAlign = vAlignment.top;
    public enum UnitsIn{pixels, screen_percentage};
    public UnitsIn unit = UnitsIn.pixels;
    public int width = 50;
    public int height= 50;
    public int xOffset = 0;
    public int yOffset = 0;
    public bool update = true;
    private int hsize, vsize, hloc, vloc;

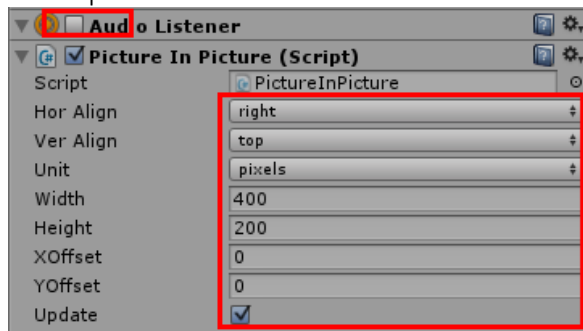
    void Start (){
        AdjustCamera ();
    }
    void Update (){
        if(update)
            AdjustCamera ();
    }
    void AdjustCamera(){
        int sw = Screen.width;
        int sh = Screen.height;
        float swPercent = sw * 0.01f;
        float shPercent = sh * 0.01f;
        float xOffPercent = xOffset * swPercent;
        float yOffPercent = yOffset * shPercent;
        int xOff;
        int yOff;
        if(unit == UnitsIn.screen_percentage){
            hsize = width * (int)swPercent;
            vsize = height * (int)shPercent;
            xOff = (int)xOffPercent;
            yOff = (int)yOffPercent;
        } else {
            hsize = width;
            vsize = height;
            xOff = xOffset;
            yOff = yOffset;
        }
        switch (horAlign) {
            case hAlignment.left:
                hloc = xOff;
                break;
            case hAlignment.right:
                int justifiedRight = (sw - hsize);
                hloc = (justifiedRight - xOff);
                break;
            case hAlignment.center:
                float justifiedCenter = (sw * 0.5f) - (hsize * 0.5f);
                hloc = (int)(justifiedCenter - xOff);
                break;
        }
        switch (verAlign) {
            case vAlignment.top:
                int justifiedTop = sh - vsize;
                vloc = (justifiedTop - (yOff));
                break;
            case vAlignment.bottom:
                vloc = yOff;
                break;
            case vAlignment.middle:
                float justifiedMiddle = (sh * 0.5f) - (vsize * 0.5f);
                vloc = (int)(justifiedMiddle - yOff);
                break;
        }
        GetComponent<Camera>().pixelRect = new Rect(hloc,vloc,hsize,vsize);
    }
}

```

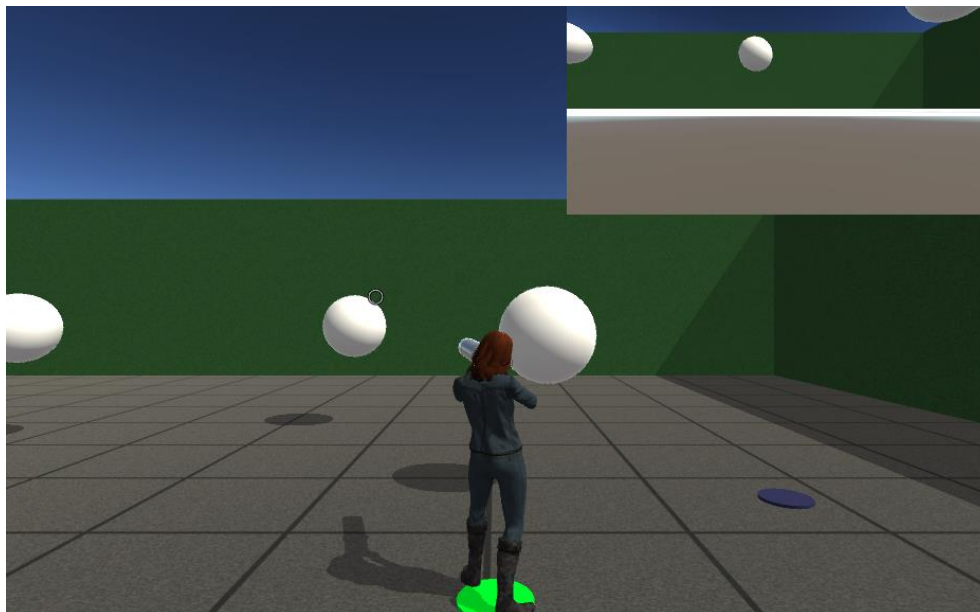
7. Drag this script into **Camera** at **Hierarchy**.



8. Select **Camera** then at **Inspector**, uncheck **Audio Listener** component then change some parameters in *PictureInPicture* as illustration below:

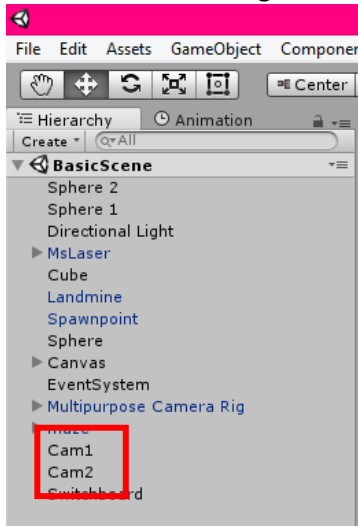


9. Run your project. Scene layer will appear from different angle at top right edge of scene.



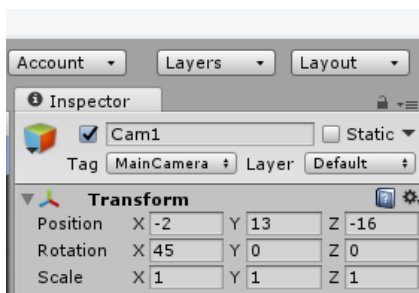
2. Make Any Camera Angle Movement

1. Create a new 3D project in Unity.
2. Import *BasicScene* package into Assets.
3. In **Project View**, open *BasicScene* then animation character and another objects will appear.
4. Add two new **Cameras** into scene by **Create** menu on **Hierarchy**, Go to **Create** → **Camera**. Then change the name to **cam1** and **cam2**.

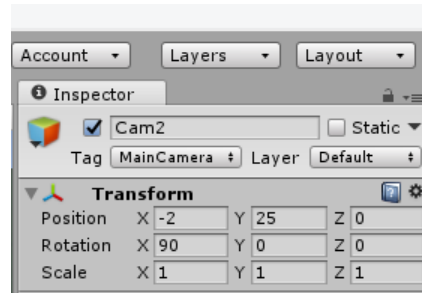


5. At **Inspector**, change the camera position at **cam1** and **cam2** like the illustration below.

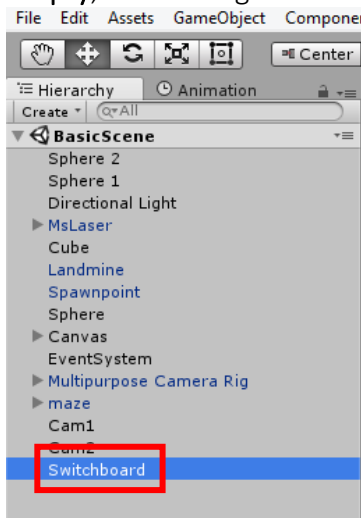
Cam1:



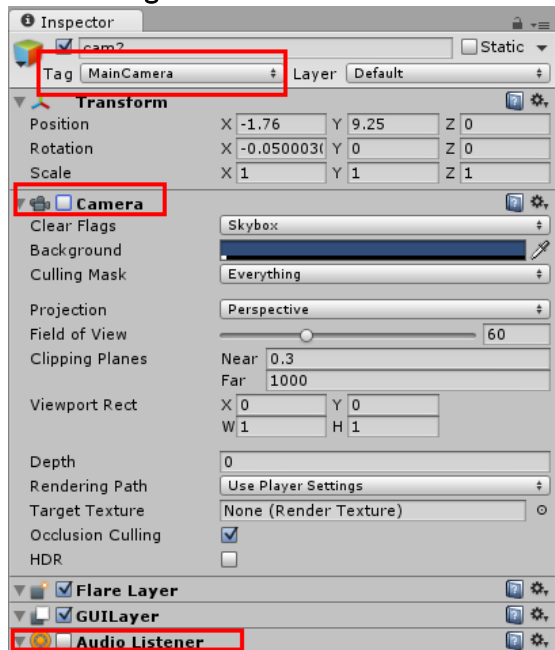
Cam2:



6. Create a new **GameObject** by **Create** menu at **Hierarchy**. Go to **Create** → **Create Empty**, then change the name to **Switchboard**.



7. At Inspector of **cam1** and **cam2**, uncheck **Camera** dan **Audio Listener** component. Set column **Tag** to be **MainCamera**.



8. Create a new C# script named *CameraSwitch* by following this code below.

```
using UnityEngine;

public class CameraSwitch : MonoBehaviour {
    public GameObject[] cameras;
    public string[] shortcuts;
    public bool changeAudioListener = true;

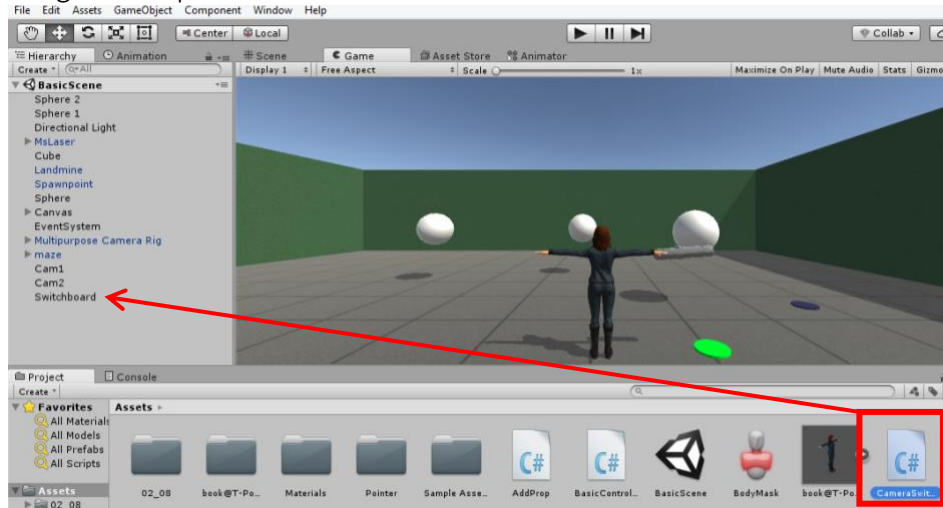
    void Update () {
        if (Input.anyKeyDown) {
            for (int i=0; i<cameras.Length; i++) {
                if (Input.GetKeyDown (shortcuts [i]))
                    SwitchCamera (i);
            }
        }

        void SwitchCamera (int index) {
            for(int i = 0; i<cameras.Length; i++){
                if(i != index){
                    cameras[i].GetComponent<Camera>().enabled = false;
                    if(changeAudioListener)

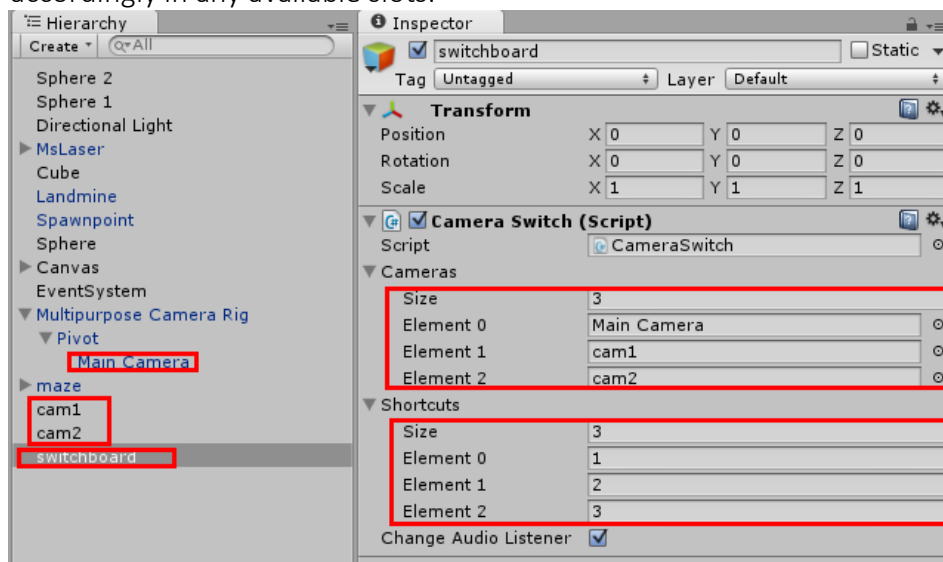
                    cameras[i].GetComponent<AudioListener>().enabled = false;
                } else {
                    cameras[i].GetComponent<Camera>().enabled = true;
                    if(changeAudioListener)

                    cameras[i].GetComponent<AudioListener>().enabled = true;
                }
            }
        }
    }
}
```

9. Drag this script to **Switchboard**.



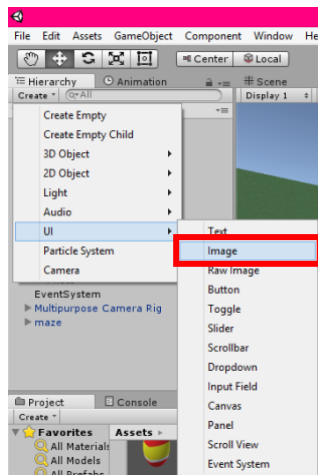
10. At **Inspector**, set **Cameras** and **Shortcuts** size with “size = 3”. Then, drag point some GameObjects (**Main Camera** (in **Multipurpose Camera Rig** → **Pivot**), **cam1**, and **cam2**) to every slots in the **Cameras** accordingly. Then at **Shortcuts** type 1, 2, and 3 accordingly in any available slots.



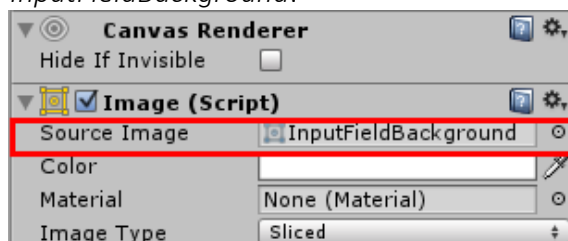
11. Run your project, then try to press 1, 2, and 3 keys on your keyboard, see the change of main camera angle.

3. Screen Capture in Frame

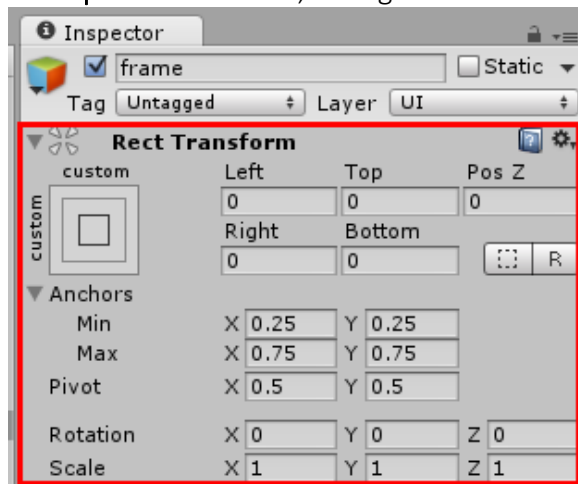
1. Create a new 3D Project in Unity.
2. Import BasicScene package into Assets.
3. In **Project View**, open *BasicScene* then animation character and another objects will appear. It also includes **Canvas element** for **UI elements**.
4. Create an **UI Image** from **Create** menu at **Hierarchy**, Go to **Create** → **UI** → **Image**. **Image** component will appear at **Canvas** then change the name to **frame**.



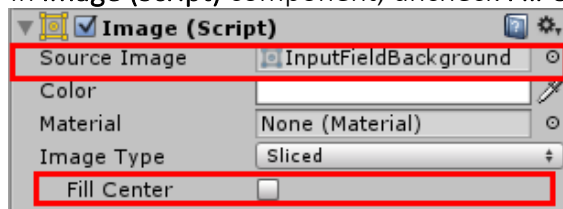
5. Select **frame** at Hierarchy, in **Image (Script)** at Inspector, set **Source Image** column to **InputFieldBackground**.



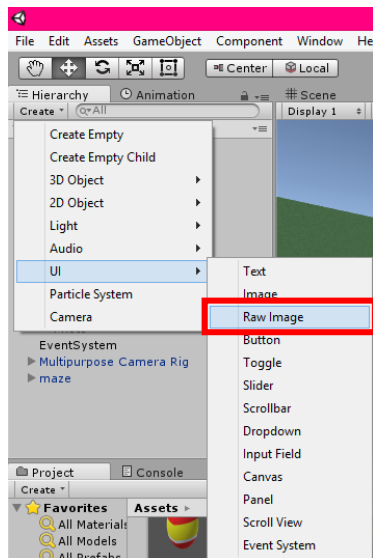
6. At Inspector on **Frame**, Change **Rect Transform** as illustration below:



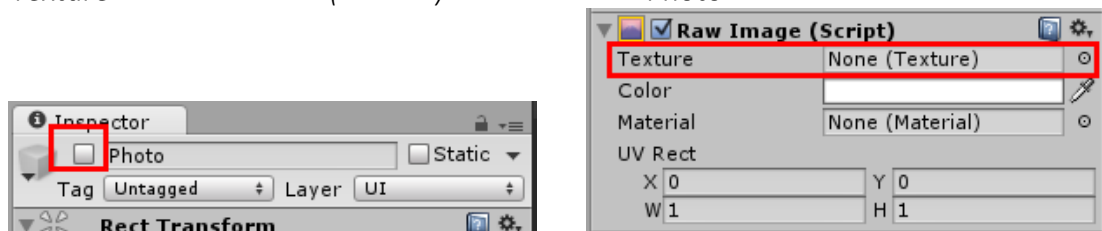
7. In **Image (Script)** component, uncheck **Fill Center**.



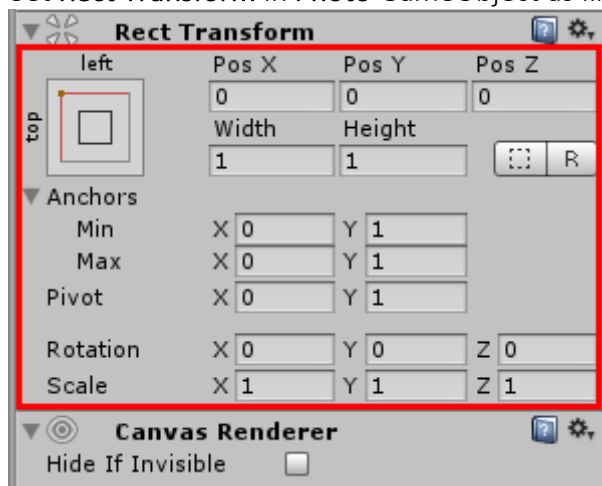
8. Create UI Raw Image from **Create** menu in **Hierarchy**, Go to **Create** → **UI** → **RawImage**. Change the name to **Photo**.



9. At Hierarchy select **Photo**, in Inspector find **Raw Image (Script)** component then set **Texture** column to *None (Texture)*. Then uncheck **Photo** column.



10. Set **Rect Transform** in **Photo** GameObject as illustration below:



11. Create new C# script C# named *ScreenTexture* with this following code.

```

using UnityEngine;
using UnityEngine.UI;
using System.Collections;

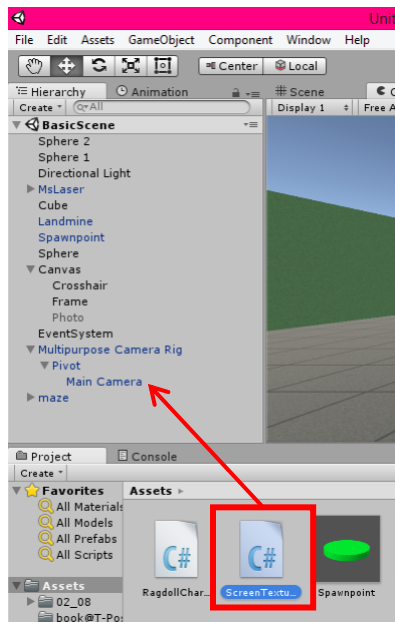
public class ScreenTexture : MonoBehaviour {
    public GameObject photoGUI;
    public GameObject frameGUI;
    public float ratio = 0.25f;

    void Update () {
        if (Input.GetKeyUp (KeyCode.Mouse0))
            StartCoroutine(CaptureScreen());
    }

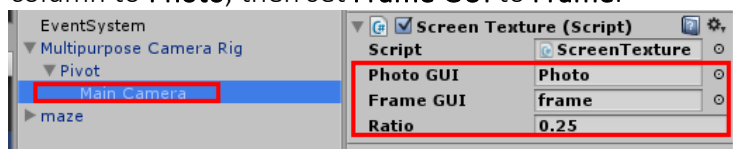
    IEnumerator CaptureScreen () {
        photoGUI.SetActive (false);
        int sw = Screen.width;
        int sh = Screen.height;
        RectTransform frameTransform =
frameGUI.GetComponent<RectTransform> ();
        Rect framing = frameTransform.rect;
        Vector2 pivot = frameTransform.pivot;
        Vector2 origin = frameTransform.anchorMin;
        origin.x *= sw;
        origin.y *= sh;
        float xOffset = pivot.x * framing.width;
        origin.x += xOffset;
        float yOffset = pivot.y * framing.height;
        origin.y += yOffset;
        framing.x += origin.x;
        framing.y += origin.y;
        int textWidth = (int)framing.width;
        int textHeight = (int)framing.height;
        Texture2D texture = new Texture2D(textWidth, textHeight);
        yield return new WaitForEndOfFrame();
        texture.ReadPixels(framing, 0, 0);
        texture.Apply();
        photoGUI.SetActive (true);
        Vector3 photoScale = new Vector3 (framing.width * ratio,
framing.height * ratio, 1);
        photoGUI.GetComponent<RectTransform> ().localScale = photoScale;
        photoGUI.GetComponent<RawImage>().texture = texture;
    }
}

```

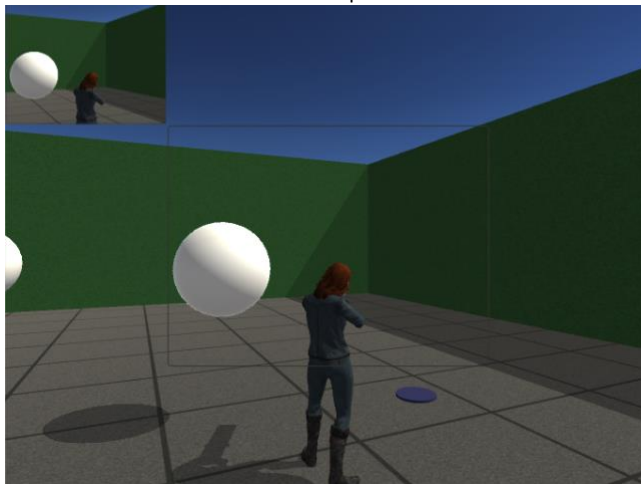
12. Drag this Script to **Main Camera** located in **Multipurpose Camera Rig** → **Pivot**.



13. Go to **Inspector** in **Main Camera**, find **Screen Texture (Script)** script then set **Photo GUI** column to **Photo**, then set **Frame GUI** to **Frame**.



14. Run your project, you may do a screen capture by left clicking on mouse. The result will be shown at the left top corner of scene.



A. ASSIGNMENT

1. Create a new 3D Unity Project which exploits 3 cameras!

--- GOOD LUCK ---