

“Teaching Spatial Augmented Reality: a practical assignment for large audiences”
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Spatial augmented reality: practical assignment

Project setup

1. *Assets* ⇒ *Import package* ⇒ *Effects* ⇒ *Projectors*
2. Create the following folders for your assets: *Materials*, *Meshes*, *Textures*, *Scripts*
3. Import the provided meshes in the *Mesh* folder
4. Import the provided textures in the *Textures* folder

Scene creation

1. Create two empty objects named *VirtualScene* and *RealScene* (Note: in the paper, the *RealScene* is called “Scene representing the real world”).
2. For the *VirtualScene*
 - a. Place *VirtualScene* at position (0, 0, 0), without any rotation
 - b. Add a *Plane* that represents the ground at position (0, 0, 0) with dimension 3x3x3
 - c. Create and apply to the ground a new material named *RedReflective*
 - d. Move the camera *Main Camera* in the hierarchy of *VirtualScene* at position (0, 2, -7)
 - e. Modify the attribute *Viewport Rect* of *Main Camera*: X=0 ; Y=0 ; W=0.5 ; H=1
3. For the *RealScene*
 - a. Place *RealScene* at position (35, 0, 0), without any rotation
 - b. Add a *Plane* that represents the ground at position (0, 0, 0) with dimension 3x3x3
 - c. Create and apply to the ground a new material named *GreenReflective*
 - d. Duplicate the camera *Main Camera* of the *VirtualScene*, then move it to position (0, 2, -7) in the hierarchy of *RealScene*
 - e. Modify the attribute *Viewport Rect* of *Main Camera*: X=0.5 ; Y=0 ; W=0.5 ; H=1

Exercise 1: Screen simulation

1. Add the textured mesh in the hierarchy of *VirtualScene* at position (0, 0, 0) with dimension 2x2x2, and call it *VirtualObject*
 - a. Drag & Drop the mesh into the hierarchy of *VirtualScene*
 - b. Drag & Drop textures onto the created object

2. Add a *Quad* named *RealScreen* into the hierarchy of *RealScene* at position (0, 2.5, 0) with dimension 5x5x5
3. Add a new camera named *VirtualCamera* to the hierarchy of *VirtualObject*. This camera will be used to acquire images that we want to display on *RealScreen*. Place it where you want, as long as it “sees” the object *VirtualObject*
4. Create a *RenderTexture* named *virtual_render_camera*, then attach it to the attribute *TargetTexture* of *VirtualCamera*
5. Drag & Drop *virtual_render_camera* onto *RealScreen* in order to associate them

Question : What happens if you modify the dimension of *RealScreen* to 8*5*5? How can you resolve the problem?

6. Add a new script C# named *SetAspectRatio*, then attach it to *VirtualCamera*
 - a. Follow the instructions
7. To activate the script, press the button *Play* on top of the window

Exercise 2: Projector simulation

1. Deactivate *RealScreen*
2. Reduce the light intensity of the *Directional Light* to 0.5 (in order to improve the legibility of the scene)
3. Add the diffuse mesh in the hierarchy of *RealScene* at position (0, 0, 0) with dimension 2x2x2, then call it *RealObject*. Modify its material if necessary.
4. Add a *BlobLightProjector* named *RealProjector* in the hierarchy of *RealObject*.
 - a. You can find the *BlobLightProjector* in the following :
Assets ⇒ *Standard Assets* ⇒ *Effects* ⇒ *Projectors* ⇒ *Prefabs*
5. Display the image of *VirtualCamera* with *RealProjector*
 - a. Attach the texture *virtual_render_camera* to the attribute *Cookie* of the property *LightProjector*

Question 1 : Does the projection superimpose correctly on *RealObject*. If not, how can you solve the problem?
 ⇒ You need to set the transformation between *VirtualCamera* and *VirtualObject* to the same as the one between *RealProjector* and *RealObject*

6. Copy paste the *Transform* component of *RealProjector* into the *Transform* component of *VirtualCamera*

Question 2 : Does the projection superimpose correctly on *RealObject*. If not, how can you solve the problem?
 ⇒ You need to set the intrinsic parameters of *VirtualCamera* to the same as the ones of *RealProjector*

7. Modify the *aspect ratio* and the *field of view* of *VirtualCamera* to correspond to the one of *RealProjector*