# CGR 2025 Lab 1: Augmented Photograph

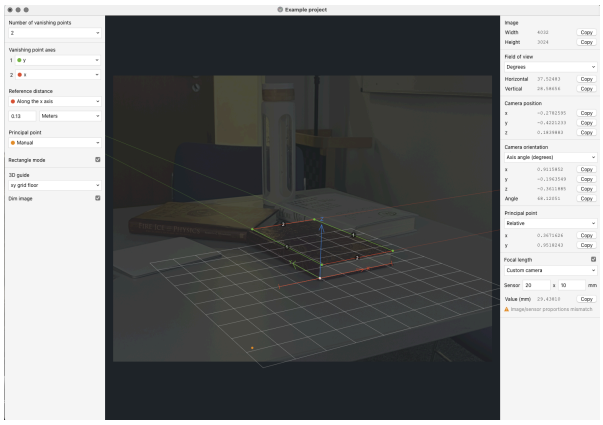
**Duration:** 1 hour
**Tools:** FSpy, Blender, FSpy add-on, your phone camera.

### Objective

In this lab, you will learn how to use your phone camera and Blender to align a 3D scene with a real-world photograph. You will take a photo, estimate its perspective using FSpy or the Perspective Plotter add-on, import that setup into Blender, and composite a simple 3D object onto your photo

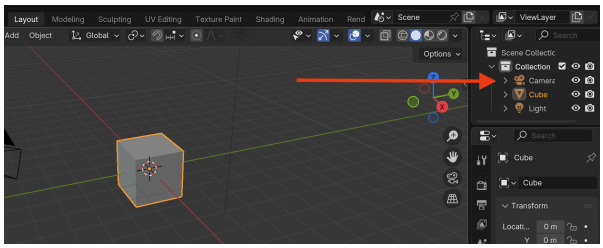
Before beginning with the following procedure, ensure that you have completed setup.

## Procedure

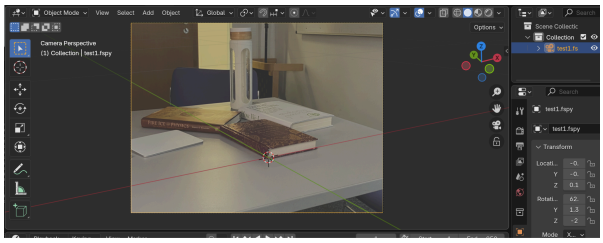
| | |
|---|---|
| Step 1: Capture a Reference Photo (5 minutes)<br><br>• Use your phone camera to take a photo of a scene setup on a desk that has clear perspective lines (e.g. add objects with simple shapes like books, boxes, etc)<br>• Ensure the photo has straight edges that you can use for calibration.<br>• Transfer the photo to your computer.<br><br>Your reference pic MUST BE UNIQUE. |  |
| Step 2: Load the Photo in FSpy (10 minutes)<br><br>• If using **FSpy**, open the photo in the FSpy application and set up the perspective lines (X, Y, and optionally Z axis).<br>• Export the `.fspy` file. |  |

Step 3: Import into Blender (10 minutes)

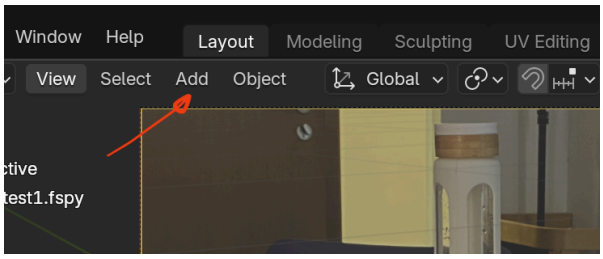
- Open a new blender project file.



- Delete existing objects by right-clicking on the them in the scene collection and choosing Delete. You should delete the default camera, light and cube

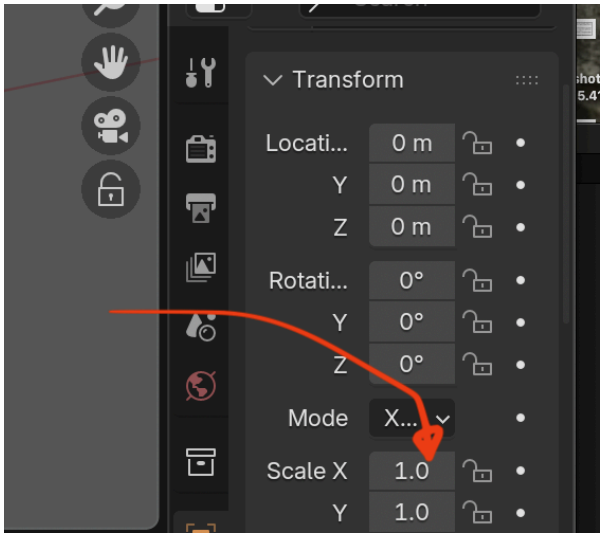


- Use **File → Import → FSpy Project**, select your `.fspy` file, and the camera will be automatically aligned.



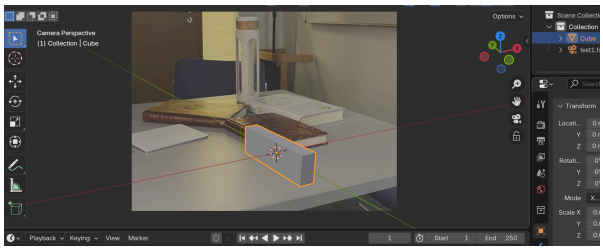

- Then add an object to the scene. Say a cube, by clicking on 'Layout' to make that the active workspace. Then **Add->mesh->Cube**

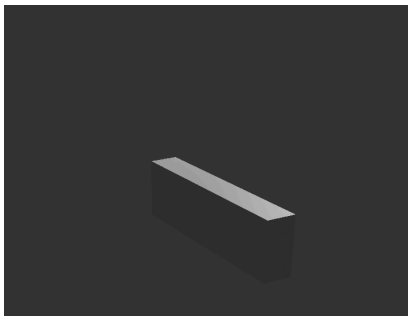
- This cube is so big that it clutters your view. So scale it down using its transform section on the right.




- Now, before we render the cube, we need to add a light.
**Add->Light->Point**

- Then we can render the image by hitting F12 or via the menu. If the resolution of the image is very high, you might need to zoom out to see the rendered image. But wait, the rendered image only has a boring cube! In order to juxtapose this onto the photo as background, we need to perform what is called 'compositing'.





*The rendered image after adding a cube, scaling it, adding a point light and moving the light as desired.*

Step 4: Render and Composite the 3D Scene in Blender (15 minutes)

a. Set up rendering

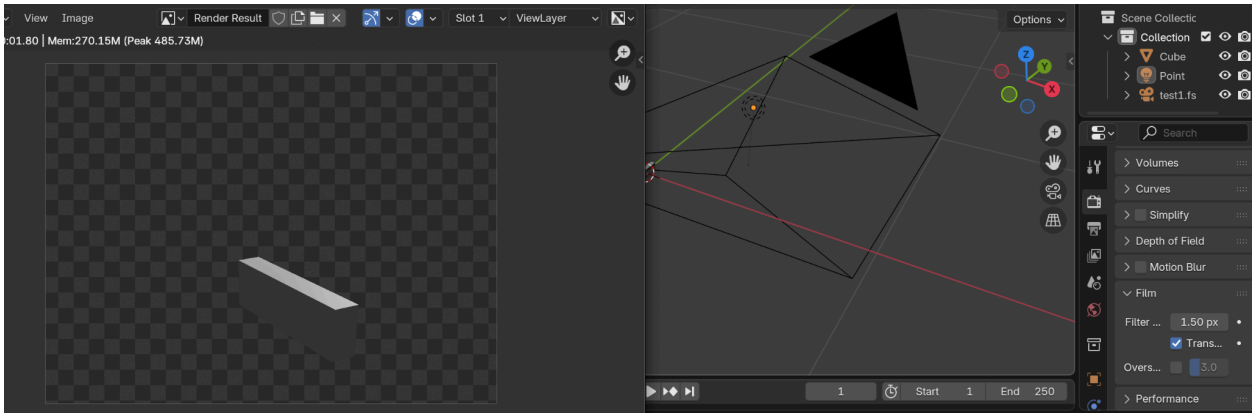
- Go to the **Render Properties** tab (camera icon).
- Choose your render engine: **Eevee** (helps fast preview).
- Set the output resolution to match your photograph. To begin with, set a low resolution. Once you have tuned everything you can render a high-resolution version.

b. Enable transparent background for compositing

- In **Render Properties** → **Film**, check **Transparent**.
- This ensures only your 3D objects render, with no solid background.

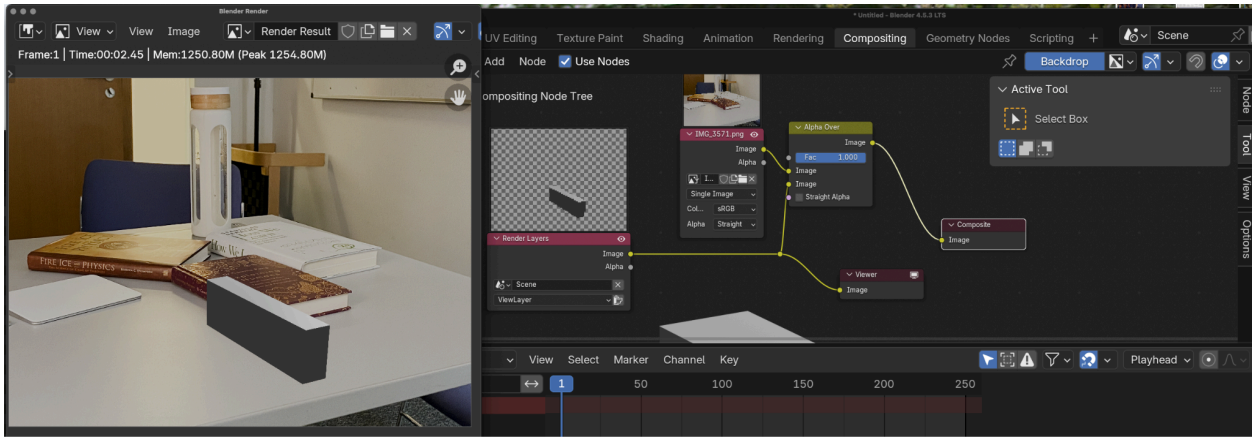
c. Render the scene

- Press **F12** or go to **Render** → **Render Image**.
- Save the render in **PNG (RGBA)** format, which supports transparency.




d. Composite the render with the photograph inside Blender (optional)

1. Switch to the **Compositing workspace** (top of the Blender window).
2. Enable **Use Nodes**.
3. You will see a **Render Layers** node connected to a **Composite** node.
4. Add an **Image node** (Shift + A → Input → Image) and load your original photo.
5. Add an **Alpha Over node** (Shift + A → Color → Alpha Over).
6. Connect the **Image node (photograph)** to the background input of the Alpha Over node.
7. Connect the **Render Layers node (your 3D render)** to the foreground input.
8. Connect the **Alpha Over node output** to the **Composite node**.
9. Press **F12** again to render. You should now see your 3D object composited into the photo.

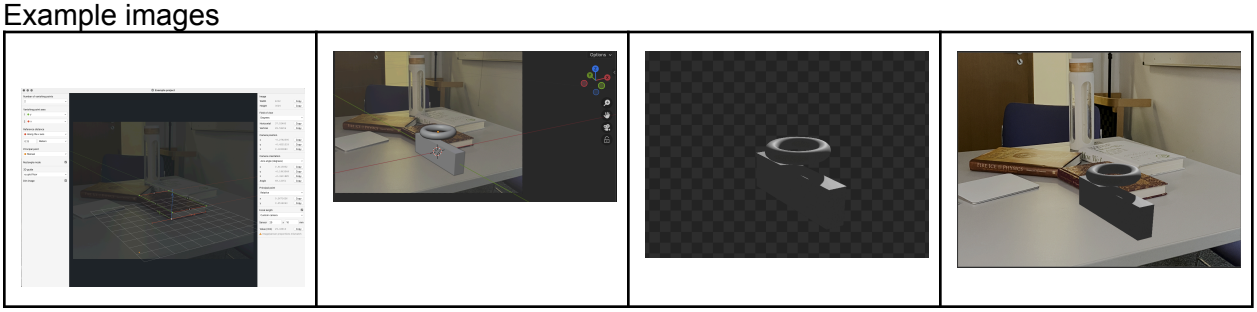



# Assessment

A different scene will be setup on a desk during each lab session and assessment will be on results obtained on that setup. By the end of the lab, each student should produce and present via 4 slides. The marking will be as follows:

1. A screenshot of the of .fspy window containing a photograph taken with their phone, with camera calibration; (1 mark)
2. A blender scene with virtual objects (at least two different shapes); (1 mark)
3. A rendered image of virtual objects (transparent background, Step 4c); (1 mark)
4. A final composite image showing a 3D object integrated into the photo; (1 mark)
5. A two-minute presentation of the above 4 slides. (1 mark)

Example images



# Setup and Installation

## FSpy

FSpy is a free, open-source tool for camera matching and perspective calibration. You'll also need the **Blender FSpy Importer add-on** to bring camera data into Blender. You can get FSpy from here. There is also a 'Tutorial' tab on that page.

### Windows

- Download the latest `.zip` file for Windows.
- Extract the `.zip` to a folder of your choice (no installer required).
- Inside the extracted folder, double-click **fspy.exe** to launch the application.

### macOS

- Download the latest `.dmg` file
- Open the `.dmg` file and drag **fSpy.app** into your **Applications** folder.
- If macOS blocks the app (unidentified developer warning), right-click **fSpy.app** → **Open**, and confirm.

### Linux (e.g. DICE machines)

- Download the **AppImage**
- Make the AppImage executable:
  ```
  chmod +x fspy-x86_64.AppImage
  ```
- Run the program with:
  ```
  ./fspy-x86_64.AppImage
  ```

## FSpy Blender Addon (slightly different across versions)

- Download the Blender add-on `.zip` from here
- Open Blender and go to **Edit** → **Preferences** → **Add-ons**
- Click **Install…**, select the `.zip` file, and click **Install Add-on**
- Enable the add-on by checking the box next to **Import-Export: fSpy format**.
- You can now import `.fspy` projects using **File** → **Import** → **fSpy (.fspy)**.