

CamSchnappr

Jan 8, 2013

CamSchnappr is a interactive mapping application entirely inspired by MAPAMOK, created by Kyle McDonald at the YCAM Interlab. With Kyle publishing the source code for MAPAMOK, we had a chance to look at it and convert it into TouchDesigner 088. For the original tool and source have a look here: <https://github.com/YCAMInterlab/ProCamToolkit/wiki/mapamok-%28English%29>

Kyle describes the significance of the tool as the use of openCVs cameraCalibrate to calibrate a projector via a model of the to be mapped structure instead of using a checkerboard. With TouchDesigner 088's integration of Python, we were able to implement the same functionality into a standalone tool which lets you map complex structures in a small amount of time.

What it does:

If you have a physical 3D structure plus a virtual 3D model of that structure, you will be able to project a rendered virtual model onto that physical structure perfectly-aligned. You will be selecting points of your 3D Model and align them with the real world positions as you see them on the projector output.

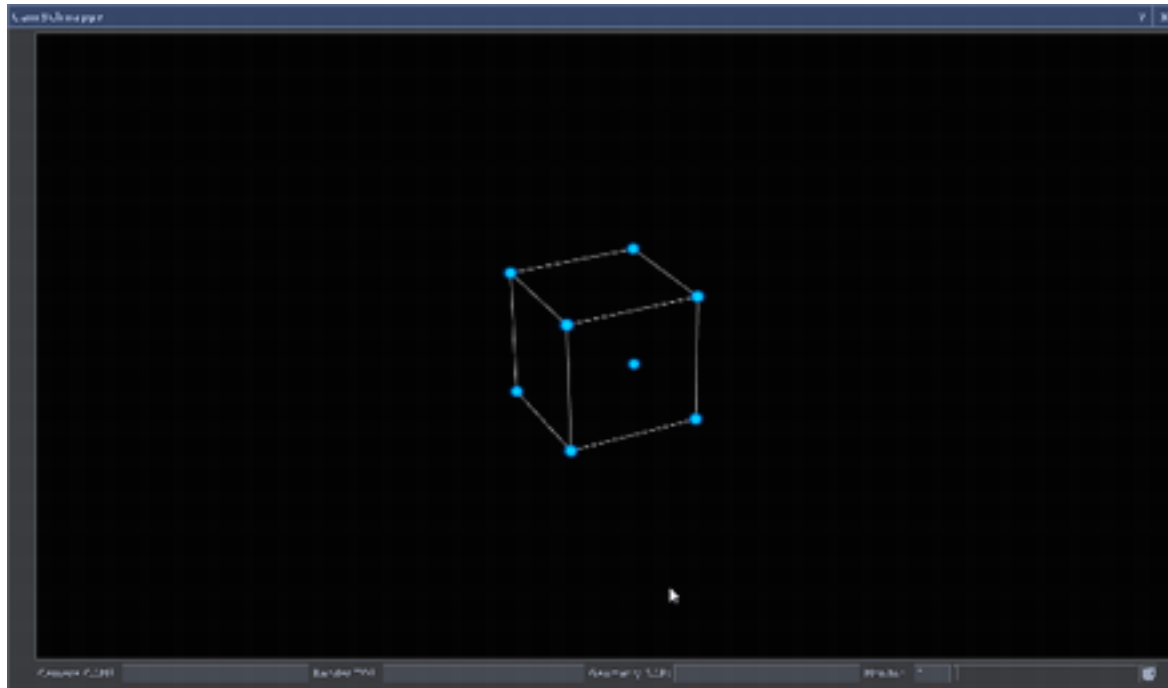
Using your 6 or more alignment points, CamSchnappr will compute the position, rotation, scale and viewing angle of a specified TouchDesigner Camera component used for the rendering. Internally, an openCV function called calibrateCamera will be run and the "intrinsic and extrinsic" of the camera will be calculated and stored in the Camera component.

What you need:

- TouchDesigner 088
- a recent version of CamSchnappr
- a projector
- a physical structure to project on
- a 3D Model of the to-be-mapped structure

Interface:

Open the latest CamSchnappr.toe, right-click on the CamSchnappr Component and select “View”:



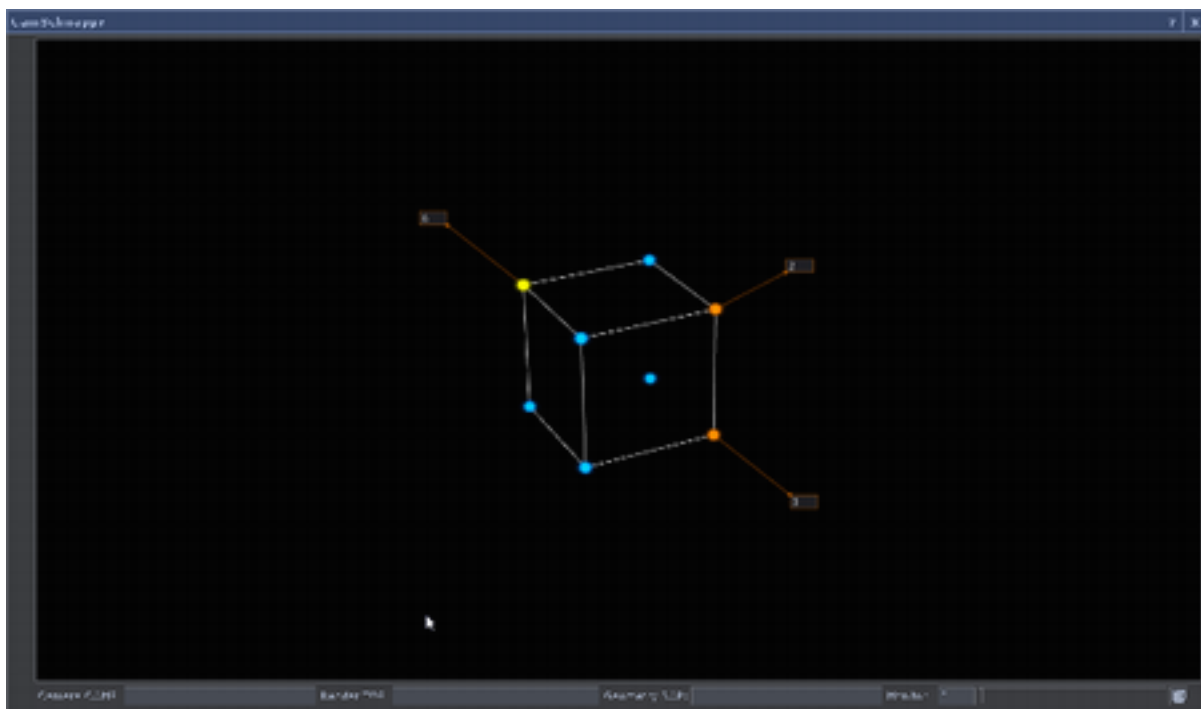
The initial interface will show an interactive viewport with a default geometry and some input elements at the bottom.

The Viewport:

You can interact with the viewport as follows:

- left-mouse click and drag to tumble
- middle-mouse click and drag to zoom
- right-mouse click and drag to pan
- h to home the geometry
- select points by left-mouse clicking on the blue spheres (blue sphere turns yellow, inactive selected points are orange)
- make selected points active by left-mouse clicking on orange spheres
- de-select points by right-mouse clicking onto spheres
- tab to cycle through selected points

When you select points a little flag with the point number will be displayed:



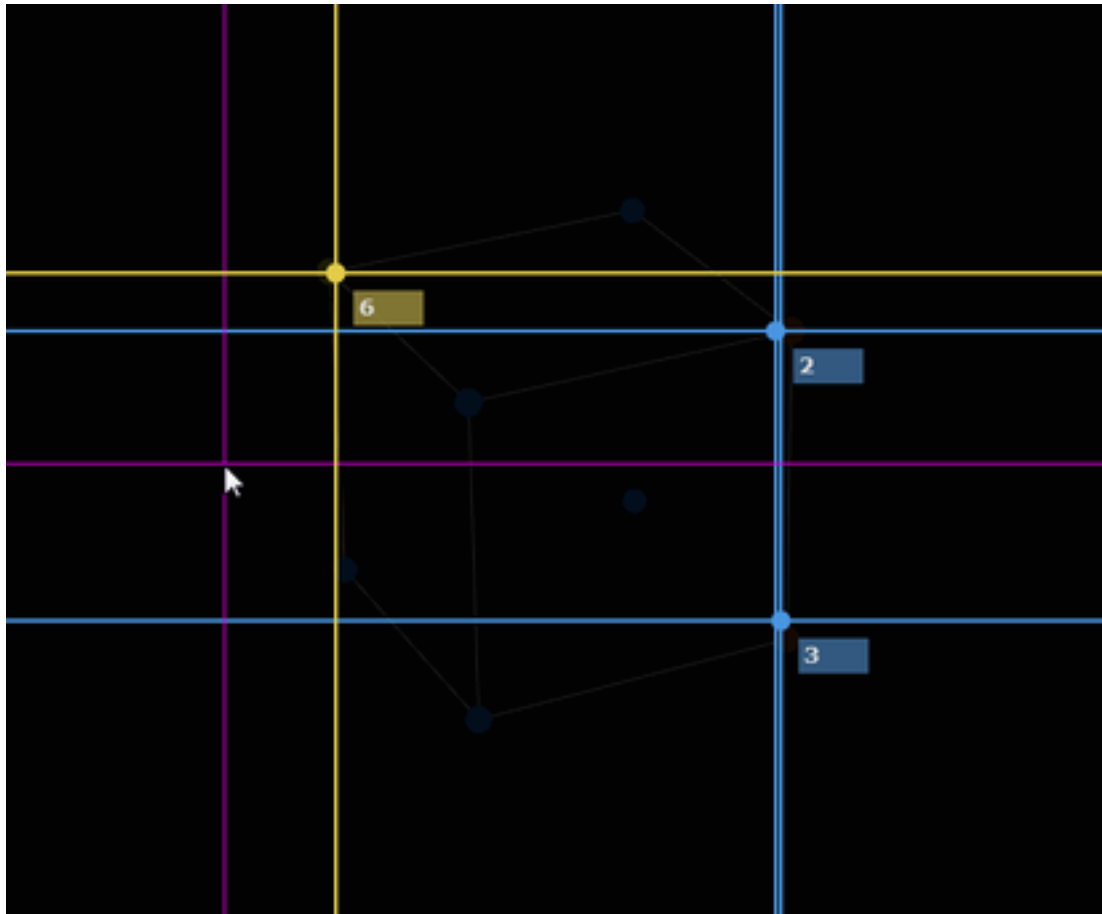
Below the viewport are separate controls to specify

- an external Camera COMP
 - Initially an internal default camera will be used for the mapping, yet normally you would want to use your own Camera COMP. Be advised that all of your camera settings will be overwritten by the application.
- an external Render TOP
 - You will want to also drag in your own Render TOP to be used by the CamSchnappr. The application will change the resolution of the your Render TOP to the projectors output resolution.

- an external SOP
 - Drag your own SOP (surface operator) into this field. From testing on a decent machine good results were achieved with geometries of up to 200 points but a considerable slowdown when using the viewport occurred. Yet, if you minimize the number of points of the geometry you want to map, it all should be fine. In the end the result is saved in the camera and you can disable or delete the CamSchnappr Component entirely.
- an output Monitor selector
 - select the output Monitor number here. Depending on which Monitor you choose, the resolution of your specified render will be adjusted to match that resolution.
- a button to enable the fullscreen Monitor output and Mapping Viewport.

The Mapping Viewport

Once you selected the correct output Monitor on the Monitor Selector, click the Fullscreen Output Button



The interface is quite simple:

- a pink crosshair indicates your current cursor position on the screen
- a blue crosshair with number indicates an inactive point previously selected to be mapped in the main Viewport
- a yellow crosshair with number indicates an active point previously selected to be mapped in the main viewport

The numbers beside each point correspond to the numbers of the selected points in the main viewport

You can drag points to their real-world position on the screen or use the arrow keys on the keyboard. For faster movement, use shift+arrowkey to move points.

Tab will cycle through the available points.

A faint outline will show the virtual model representation.

Workflow

- Create a simple render setup with the model of the object you want to map onto.
- Right-click on CamSchnappr and select view.
- Drag your Camera COMP onto the *Camera COMP* field at the bottom of the CamSchnappr Viewport.
- Drag your Render TOP to onto the *Render TOP* field at the bottom of the CamSchnappr Viewport.
- Drag the SOP containing the geometry of the to be mapped object onto the *Geometry SOP* field at the bottom of the CamSchnappr Viewport.
- Select the number of the output your Projector is connected to via the *Monitor* selector at the bottom of the CamSchnappr Viewport.
- Open the Mapping Viewport by clicking the *open projection output* button, if somehow the output now overlays your main viewport, just hit escape and select a different Monitor Output number via the Monitor selector at the bottom of the CamSchnappr Viewport.
- In the main viewport align the geometry to the camera so it's similar to what the projector sees.
- Select a point in the main viewport and move it in the mapper viewport to the corresponding position on the real world object.
- Repeat the last step for at least 6 points total.
- After you have aligned 6 points, the camera should be calibrated and you should see the projection mapped onto the object.
- If everything is correct you can disable the CamSchnappr or delete it. The Camera Calibration values are saved inside your Camera COMP as 2 Table DATs.
- CamSchnappr can be run on multiple render setups making it possible to calibrate multiple projectors or multiple objects.

