Augmented Reality

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1. Camera Calibration

* We used a video of chessboard moving around.
* Used findChessboardCorners() to find corners
* Used cornerSubPix() for subpixel accuracy
* Used calibrateCamera() to calibrate camera to get the camera matrix, distortion coefficients, rotation and translation vectors

1. Markers used are in the ‘reference’ folder
2. A predefined reference object is searched in the stream if found displays a 3D model on it.

* Used SIFT to find keypoints and descriptors for the model and frame
* Used knnMatch() to find rawMatches
* Used lowe ratio test to select good matches
* Used findHomograpy() to find homography between model and frame
* Computed projection and renderd the 3D object on the detected marker
* Also found pose of camera for each frame

To run code:

‘python projectSift.py -[options]

Options:

-r to display rectangle around marker

-mo to hide the 3d model from displaying

-po **to print the pose of the camera for each frame**

1. Move the 3d object from one marker to another
   1. Detected two markers projection matrix simultaneously(p1,p2)
   2. Translated the 3d object according to rule p1[:,-1] = t\*(p2[:,-1]-p1[:,-1]) + p1[:,-1]
2. Ping pong game:
   1. Detected two projection matrices of two markers
   2. Started from marker 1 in the direction of 2.
   3. Reflected by marker 2
   4. Found expected destination projection matrix in the plane of 1 by laws of reflection
   5. Reflected by 1. The loop continues.

* Some other Images and videos are in the given link

<https://drive.google.com/open?id=12tf8pROnGQgK0eY5PpEjYrX3eo6K18W3>