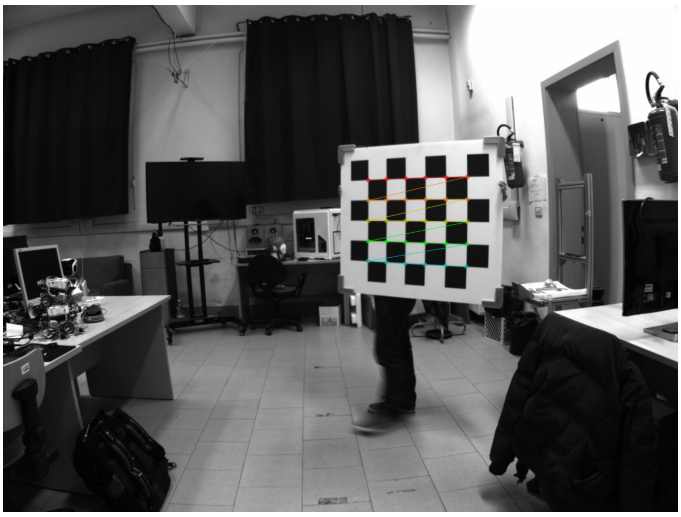
Laboratory report (Camera calibration and rectification) - Luca Dolci 1234008
The flow control of the program follows the standard worflow of the camera calibration and image rectification process:

0. Input parsing and parameters setting: the program computes the calibration using some checkerboard photos. The first thing that the program does is to ask the user the directory under which the photos are saved (in png format). After this, the program ask again the user to input some checkerboard proprieties: the number of (inner!) rows and columns of the checkerboard and the size of the checkerboard's squares (in meters). It it possible to set some flags as well as the monitor's size as command line arguments in this format:

   ```
   ./lab2 debug screen_height screen_width
   ```

   where `debug` is a 0-1 flag for visualization of the checkerboard images during corners detection, `screen_height` and `screen_width` are the dimensions of your monitor (to adapt the visualization).

1. Checkerboard corners detection: the corners detection is performed by the `findChessboardCorners()` function. Then, if enough corners are detected, the detection is refined using the `cornerSubPix()` fucntion. The coners detection can fail if some corners are not present or if the checkerboard is physically far from the camera (this also depends on the photo's spatial resolution). In this step, apart from the corners 2D points, also the 3D points are computed using the `find3Dcorners()`and saved. If debug mode is activated, the result of a detection is the seguent:

2. Camera calibration: the calibration is performed by the `calibrateCamera()` function that, given the points detected in step 1, produces the camera matrix and the radial and tangential distortion parameters.

3. Reprojection error computation: this can be done by projecting the 3D point computed in step 1 with the camera matrix computed in step 2 (using the `projectPoint()`

function). The reprojection error for each photo is computed as the sum of the euclidean distances from corners and projected points. Then the best and worse photos (in term of reprojection error) are find and their name are printed.

4. Rectification: given the camera matrix and the distortion coefficents, two maps are computed using the `initUndistortRectifyMap()` function. Also, a new camera matrix is computed but it is not necessary because only the two maps are needed by the `remap()` function in order to perform the rectification. The final result is the seguent: