Sensors and Sensing
Homework 2

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Task 2

For the second task let us use Matlab because there is built-in application for camera calibration using chessboard. Implementation is adapted from this source:

https://www.mathworks.com/help/vision/ug/measuring-planar-objects-with-a-calibrated-camera.html

First, let us calibrate our camera with disabled auto-focus using built-in application in MATALB using photos of chessboard. Just upload all images and it will calibrate automatically. After that we can import intrinsics and ixtrinsics parameters of camera directly into workspace.

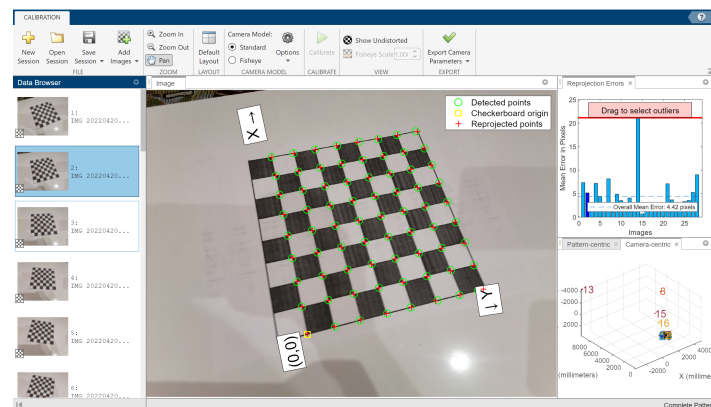Figure 1: Camera calibration.

After that we read image with our object near chessboard and undisort it to be able to measure size of the object.
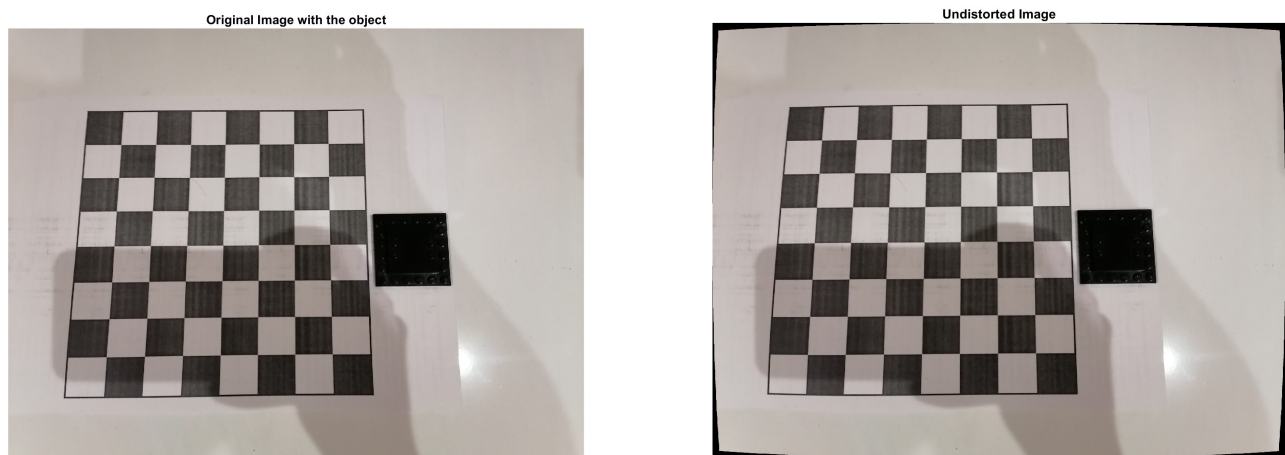

Figure 2: Original and undistorted image.

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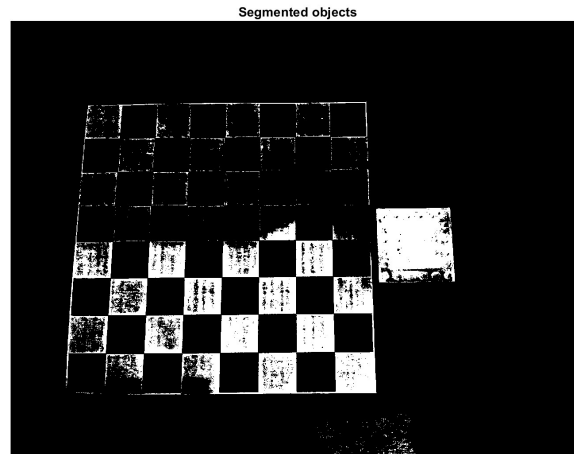Now let us convert image HSV color space to find our object on the image.

Figure 3: HSV color space.

After that knowing areas of white areas and after couple tries we can identify what area our object has and we can draw approximate corners around it.
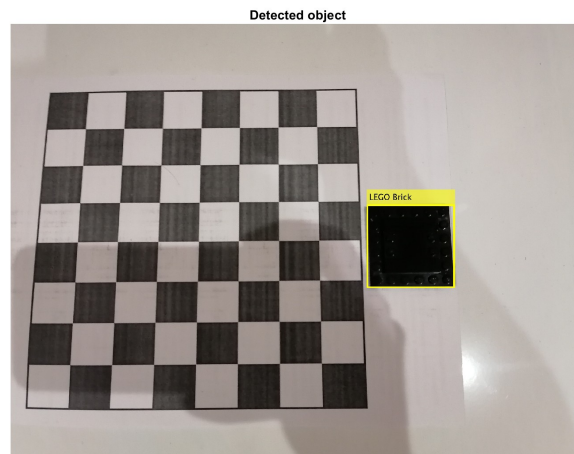

Figure 4: Detected object.

Now we are ready to estimate object's size. To do that we need to find real size of chessboard knowing size of cell which is $23.5mm$ and we have to convert detected square size to the world coordinate frame.

After that we compute size of the object and we get close result which differ only by couple millimeters. Since we use LEGO brick as an object, we can find its official size which is $48mm$ and we get $48.89mm$ and $51.35mm$, so the difference is only $1 - 4mm$ which is really good result.