

Virtual “Whiteboard”

Midterm Presentation

Computer Vision
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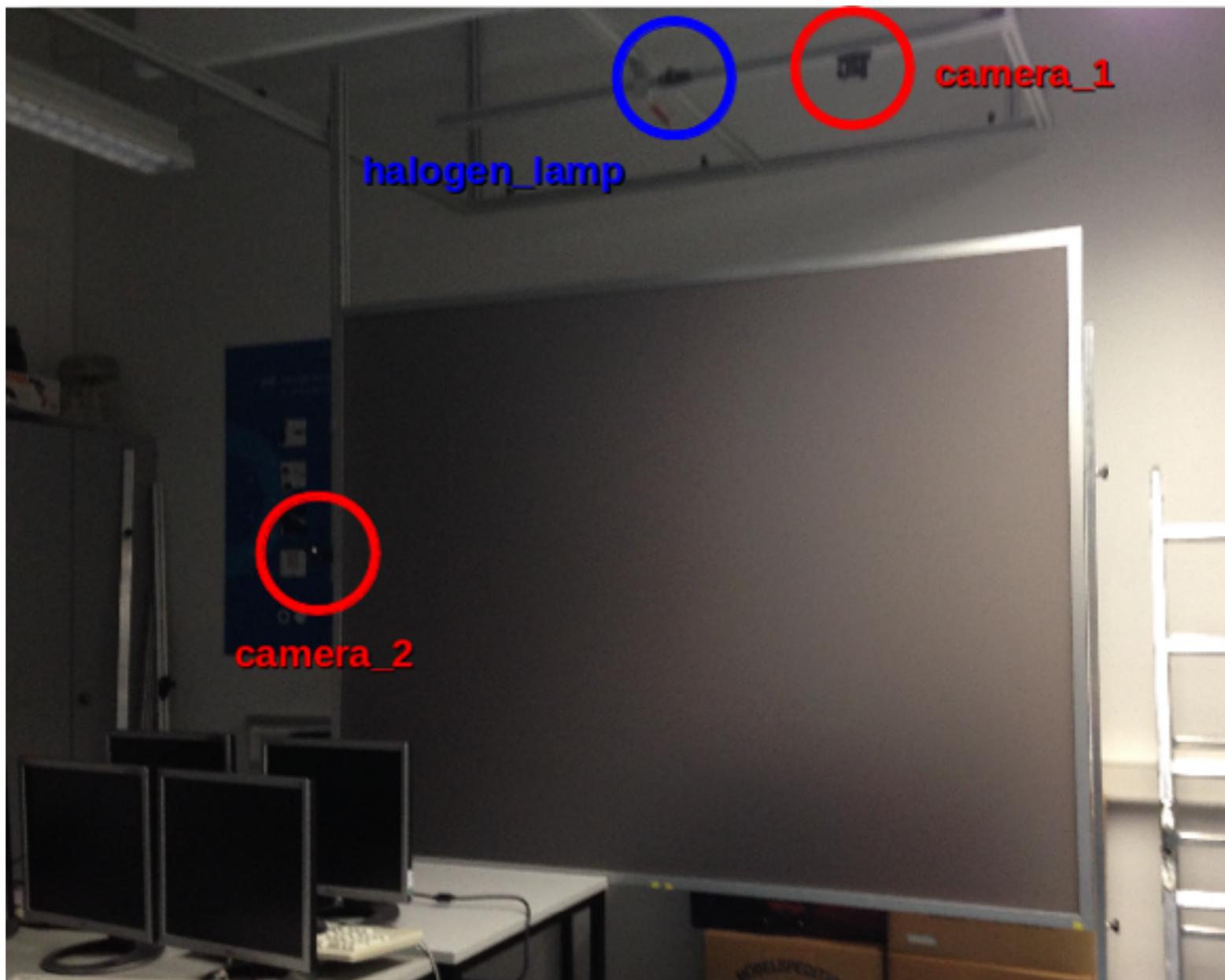
Objectives

Design a vision system able to recognize the strokes made with a marker in a flat surface and to transform the strokes into drawings for later projection.

Design, calibrate and synchronize an orthogonal array of two cameras in order to capture videos simultaneously of a scene from different perspectives.

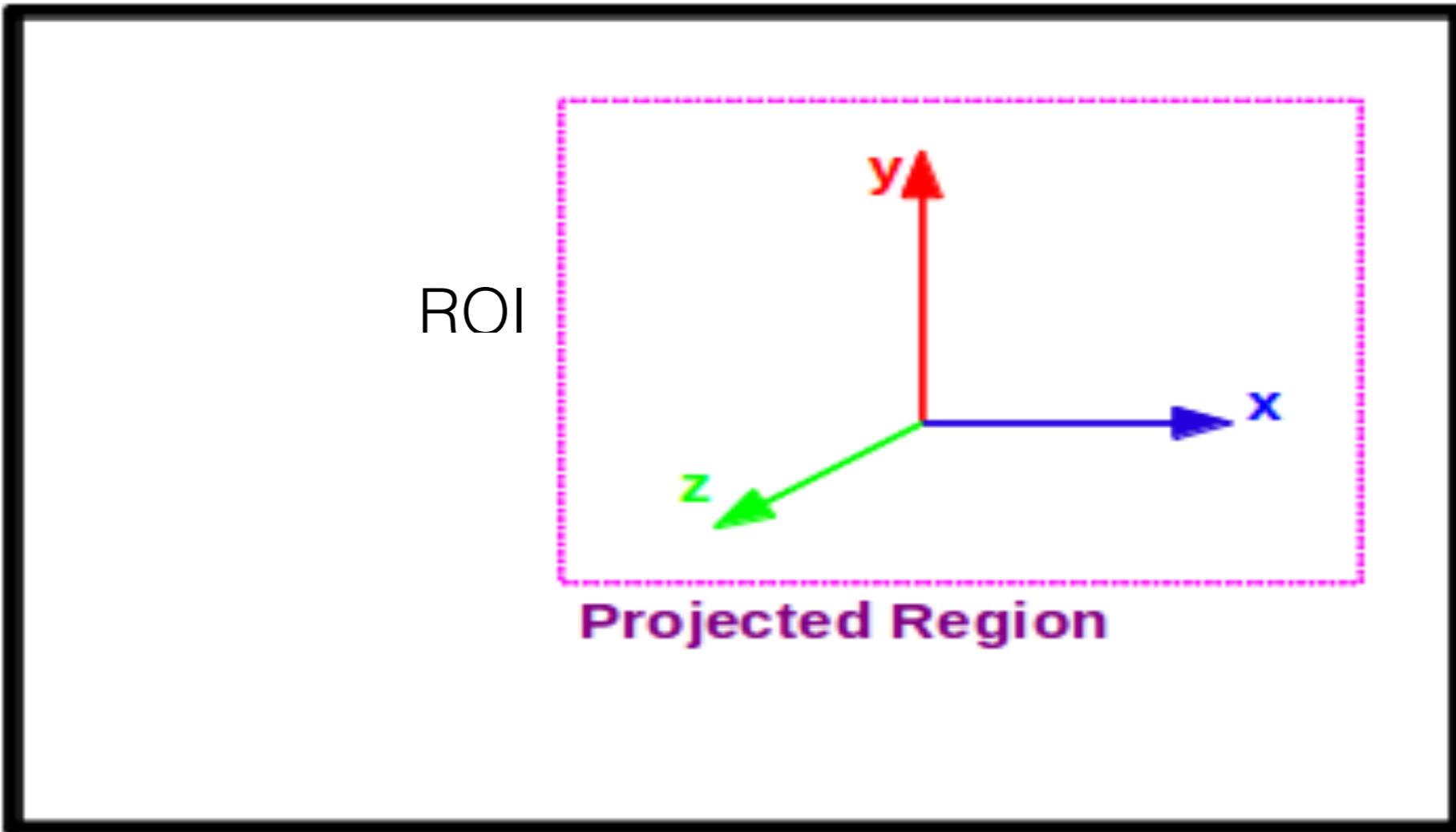
Process two videos from different perspectives in order to detect strokes performed by a pre-defined marker.

Simulate a whiteboard by drawing the detected strokes and later projecting the draws into a screen for visualization.

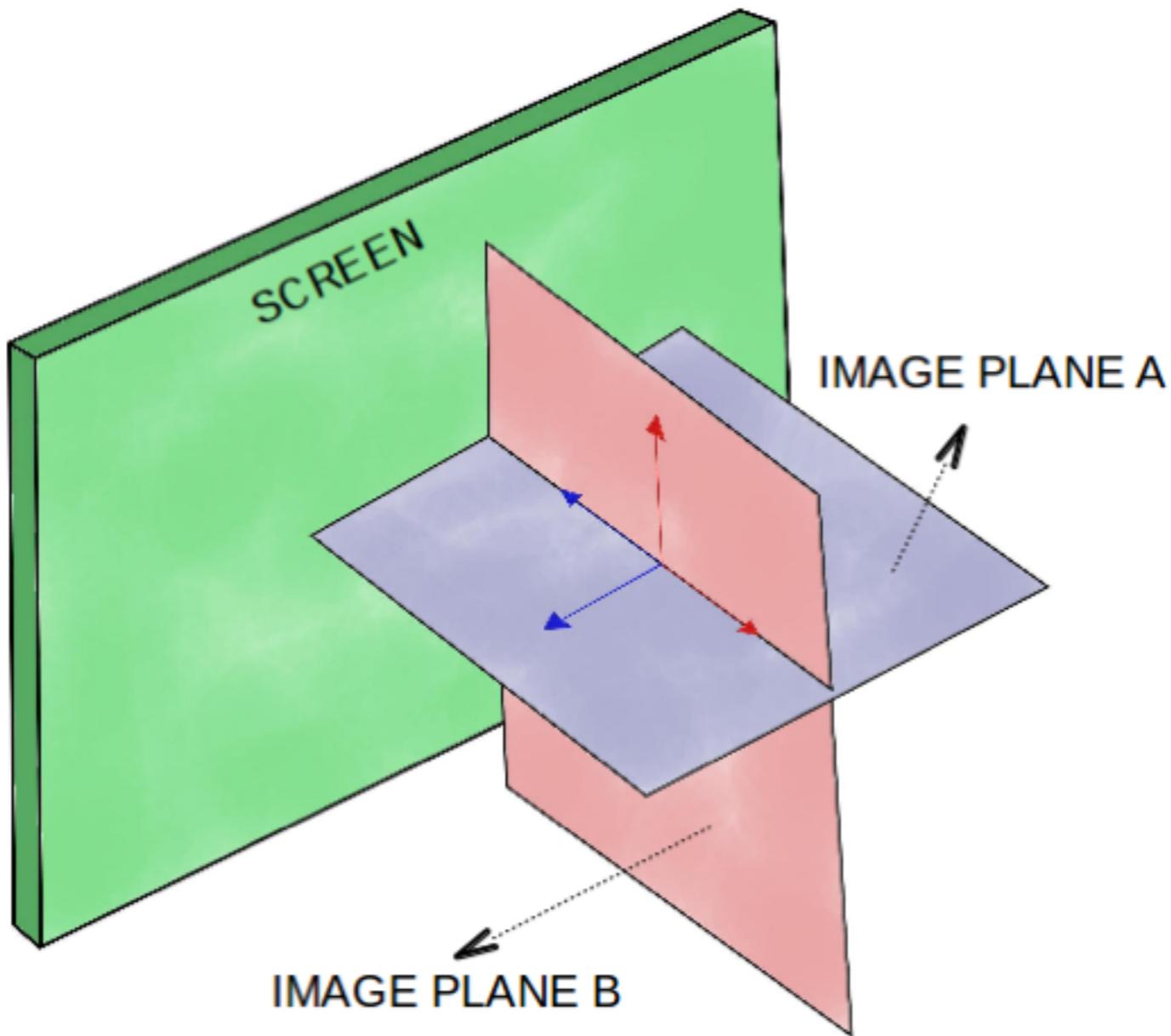


Description

Glass Screen
Black-board

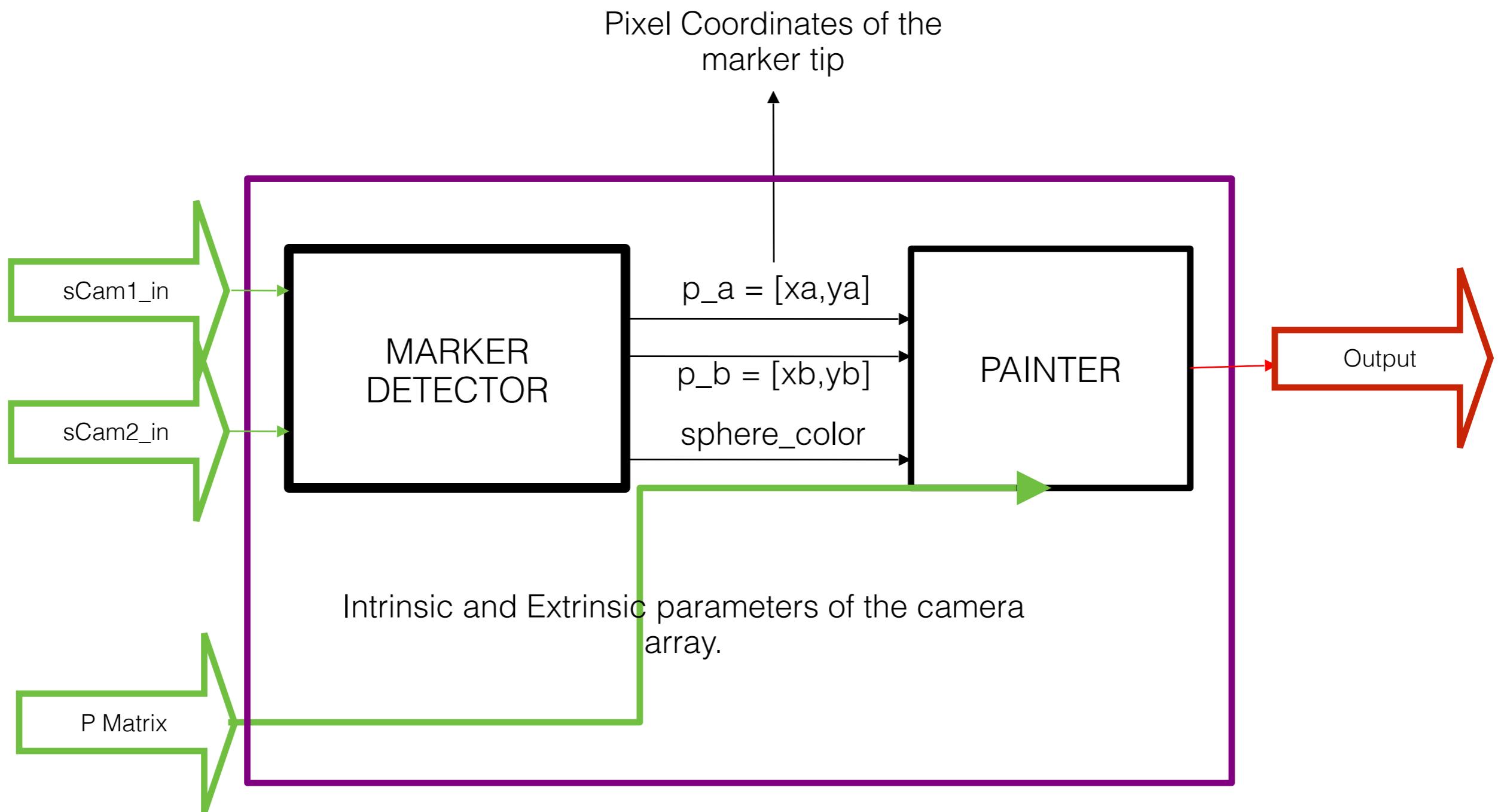


Description

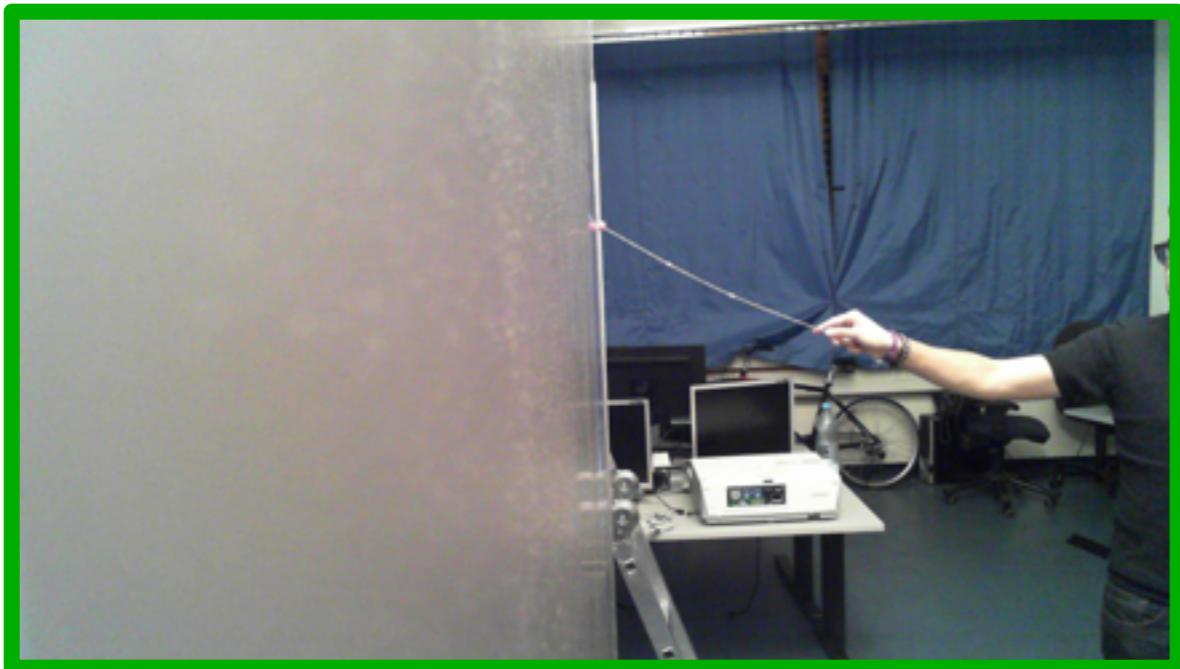


Description

System Description



Input

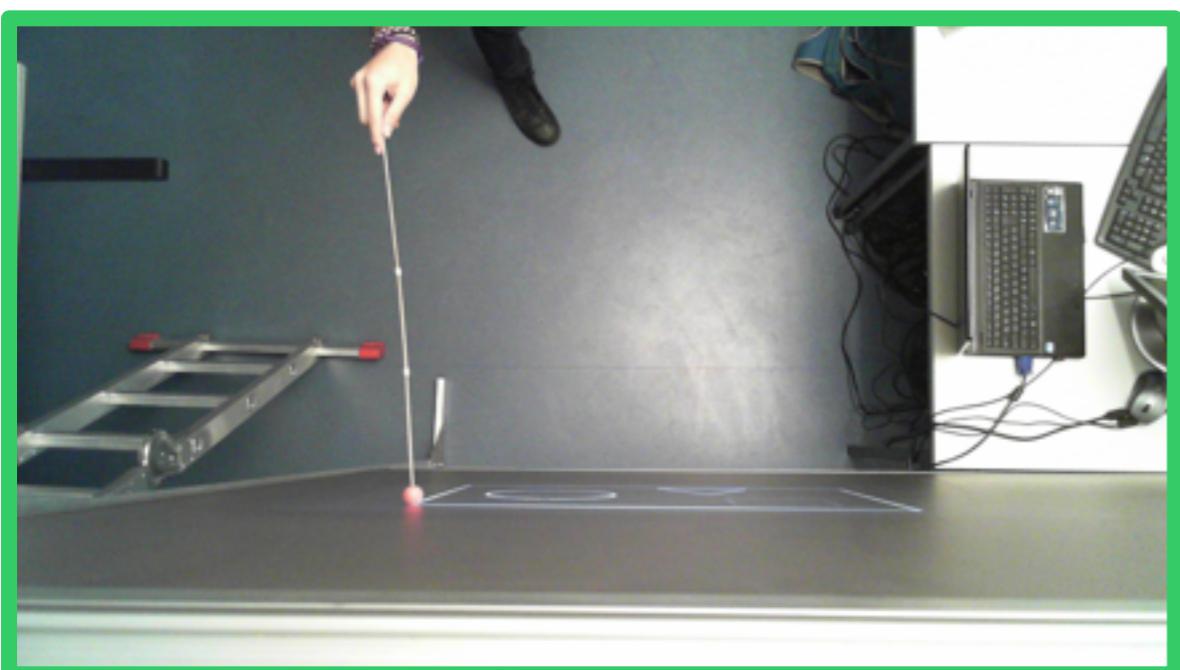


Resolution: 1920x1080

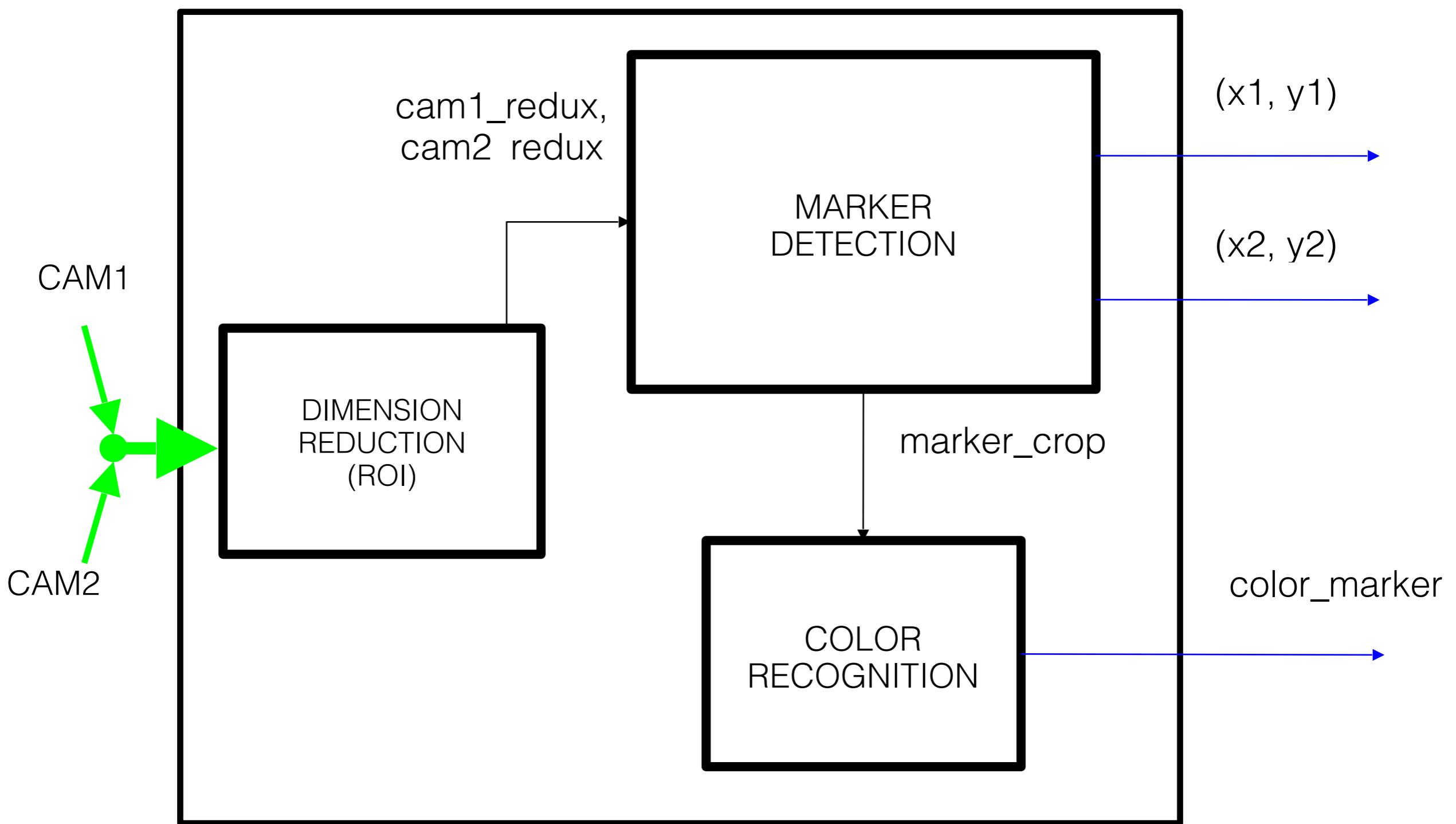
Offline Design:

50 frames (images) per view.

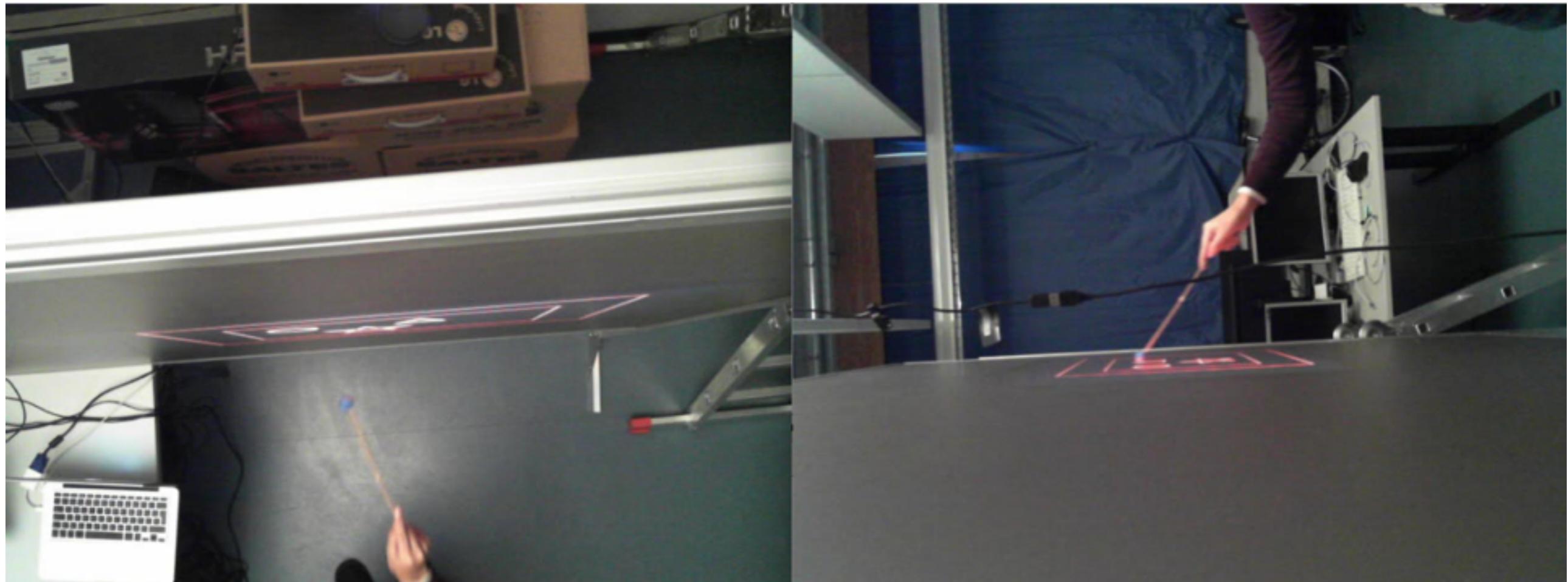
3 sessions “recorded”, with three different colored markers (r,g,b).



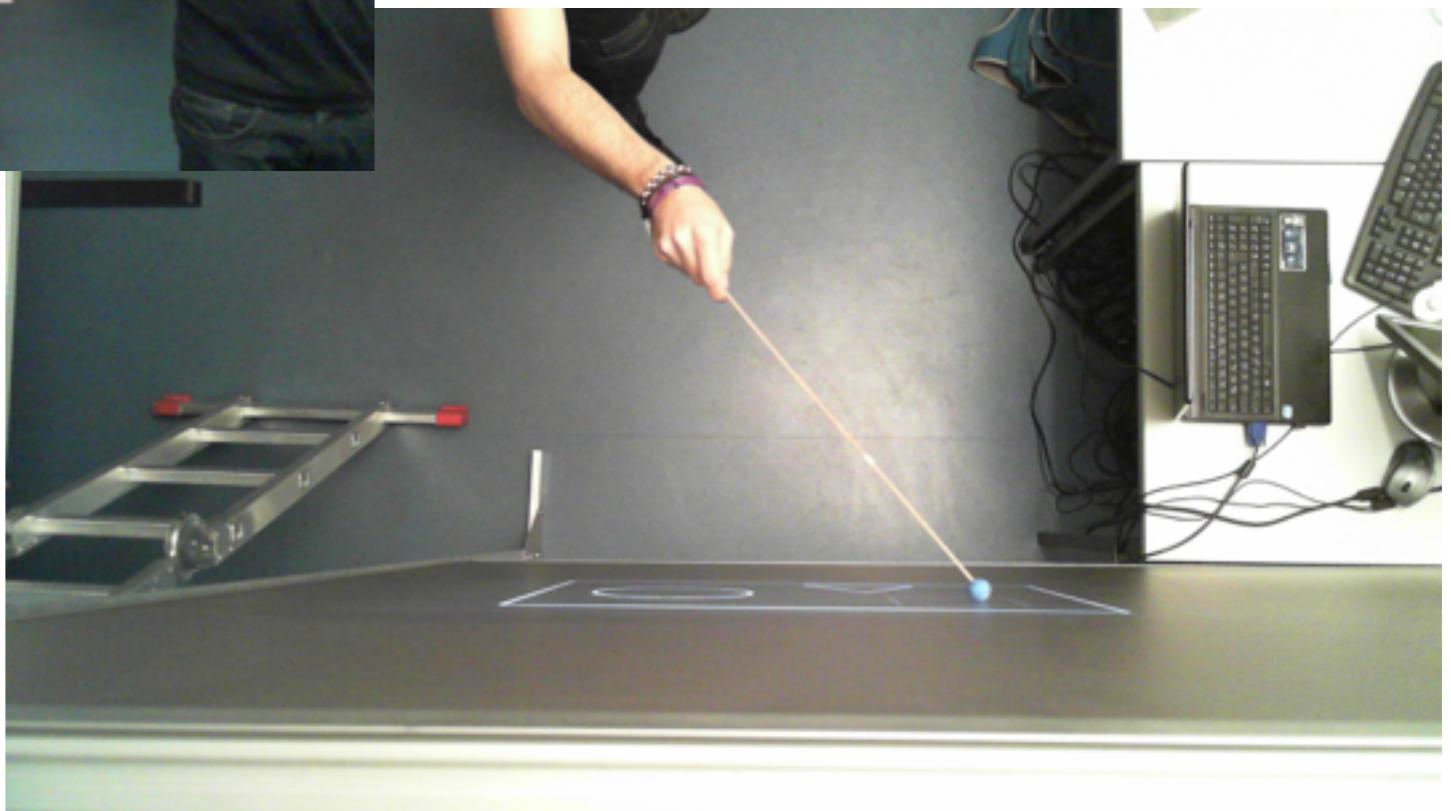
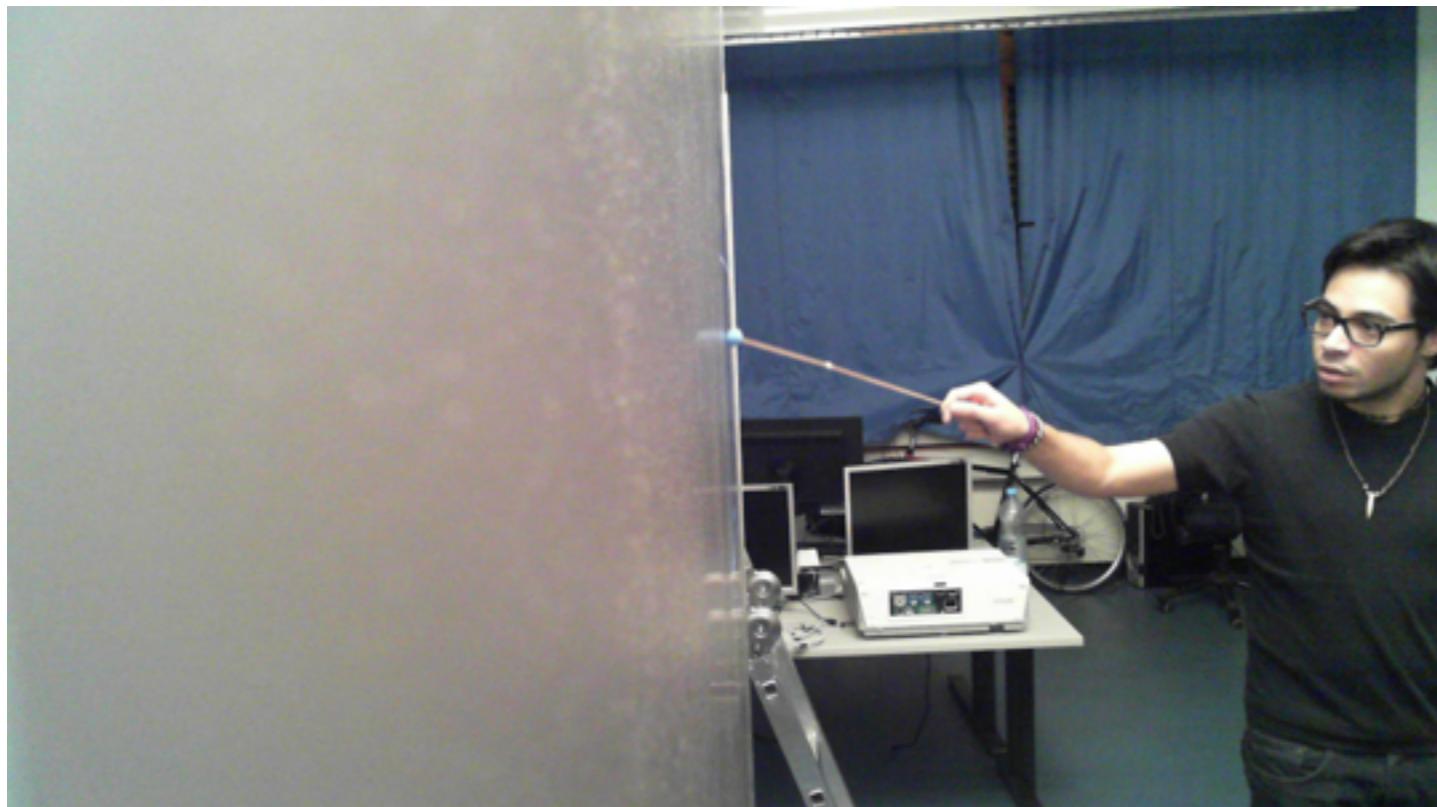
Marker Detector System



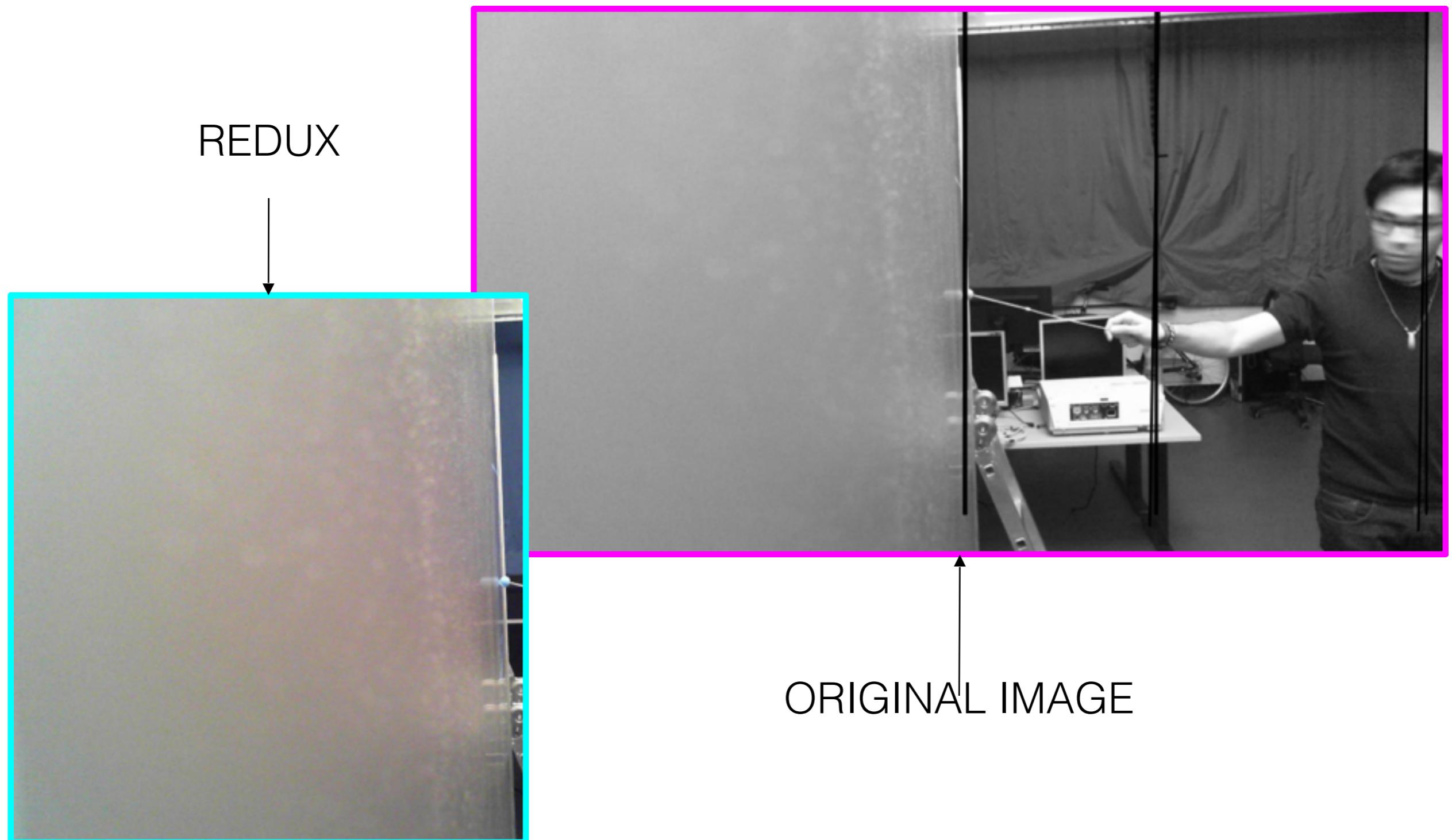
Data Capture Synchronization



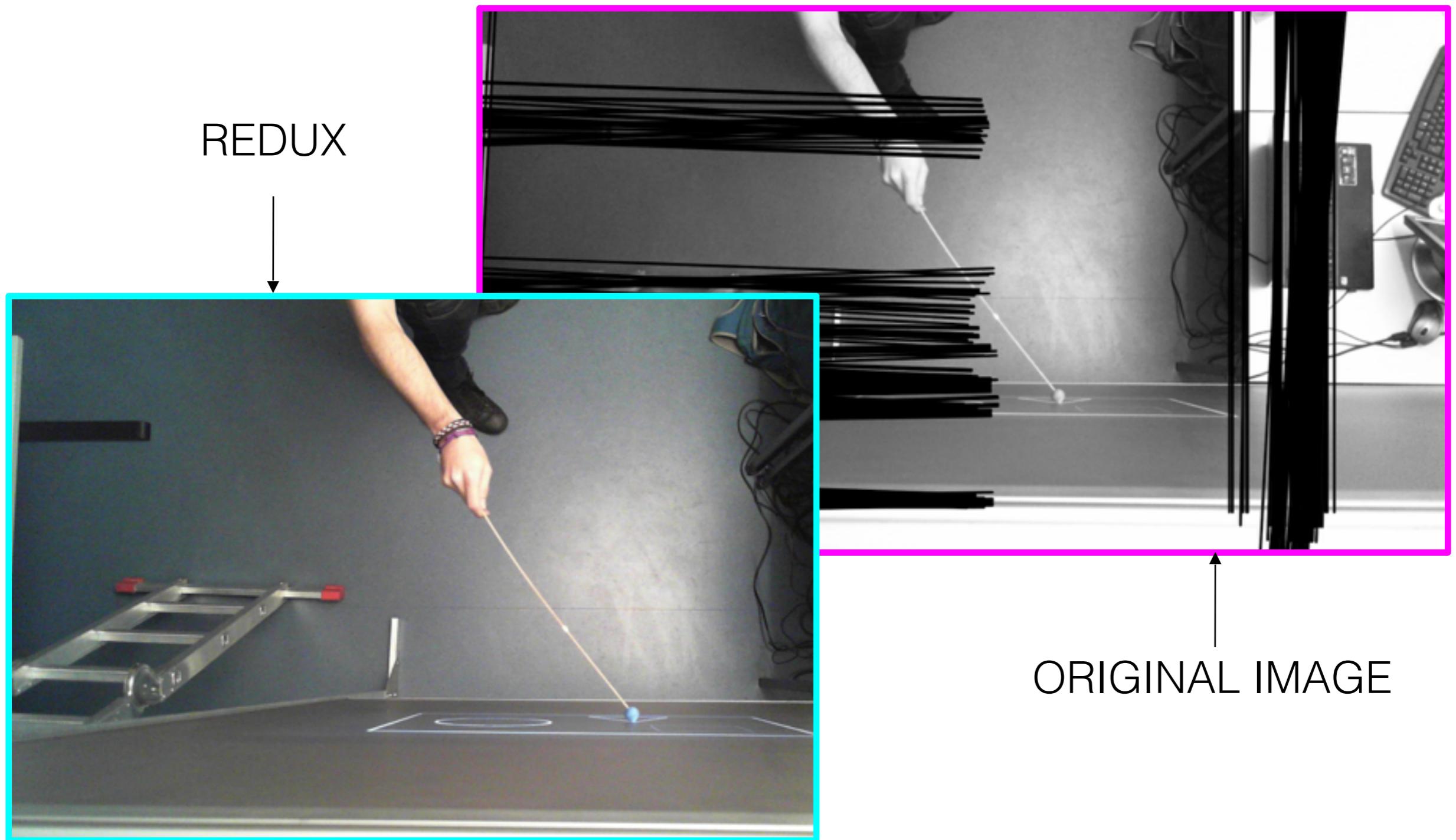
Data Synchronization



Dimension Reduction Hough Line Transform

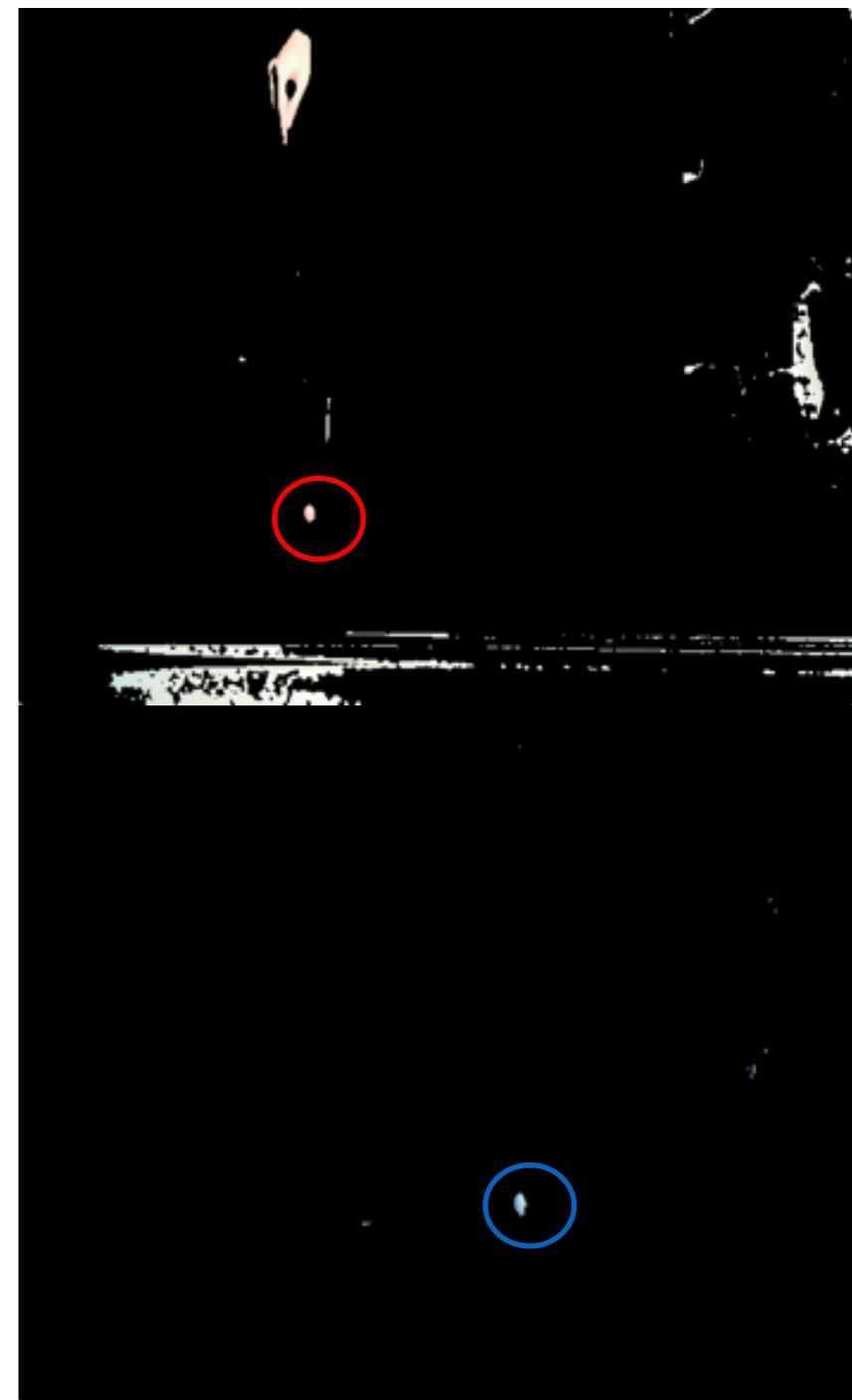
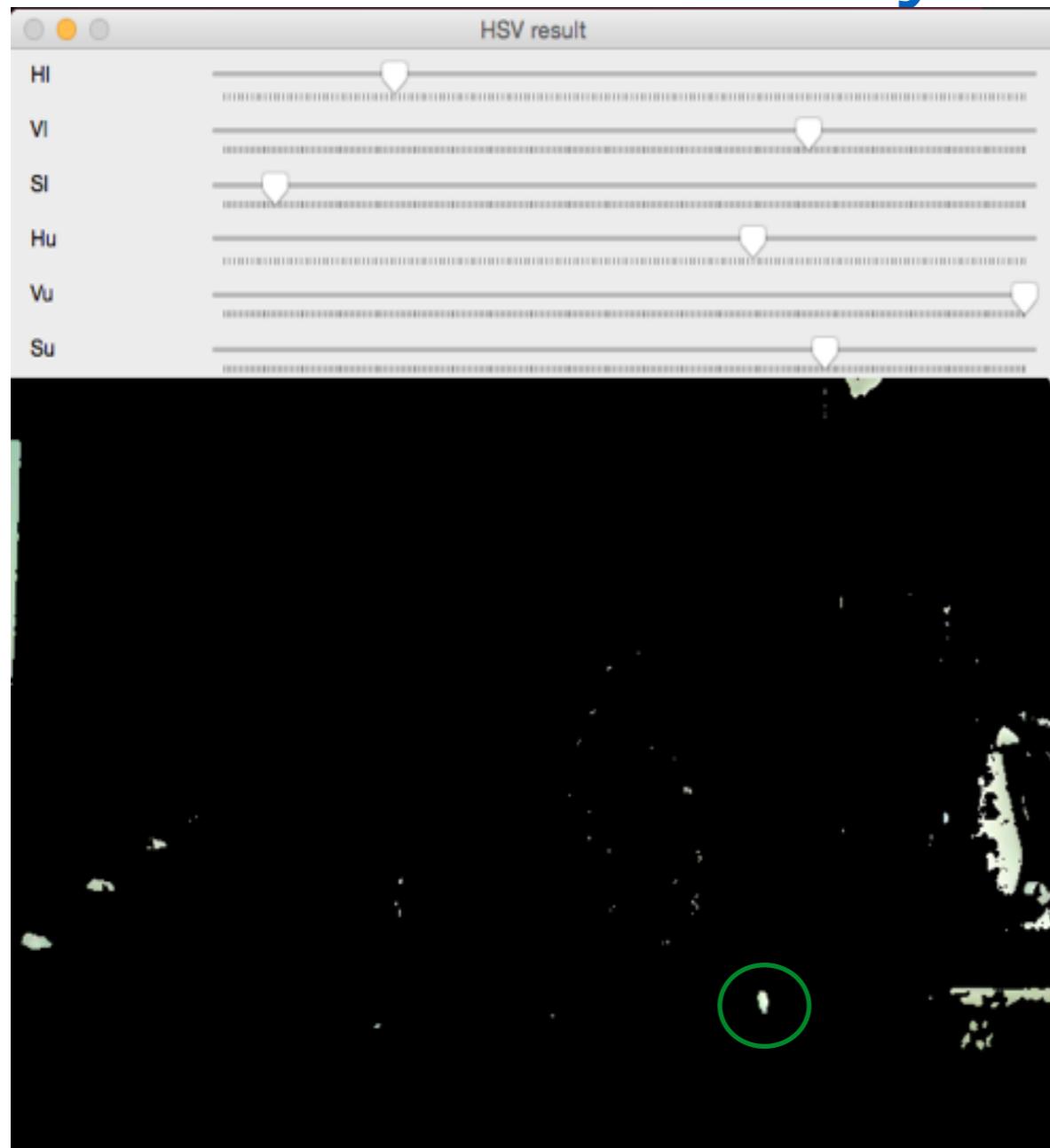


Dimension Reduction Hough Line Transform



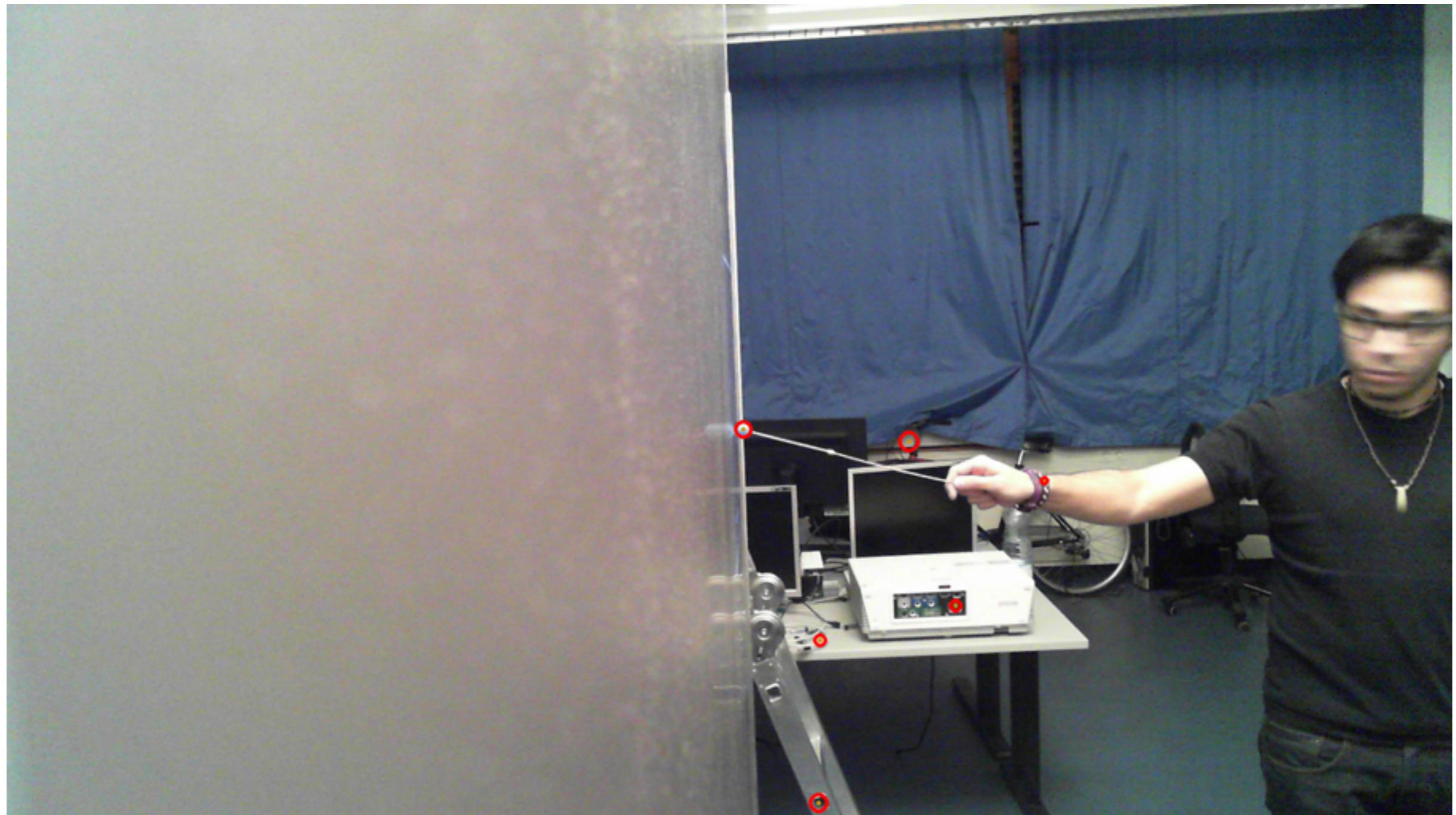
Marker Detection (1)

By Color



Marker Detection (2)

Hough Circle Transform



Improvements

- Canny thresholds.
- Hough Line Transform thresholds.
- Apply morphological operations (open, close).
- Try out probabilistic Hough Line Transform.
- If the above don't work, we will implement a manual selection of the ROI.

What Is Next

- Color recognition [Argentina].
- Marker pixel-coordinates extraction [Nicolas].
- Multiple view camera calibration [Argentina].
- Marker world-coordinates transformation and merge [Nicolas].
- Point re-projection [Nicolas].
- On-line capture and processing [Argentina].

Bigger Risk

On-line demo won't work due to hardware limitation.

Capture of images is already a multi-thread process.
Processing the images and updating the output may not be
achievable in parallel.

SOLUTION:

Record a session, feed this to the system (off-line demo).