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## **Photogrammetry applied to robot calibration**

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### **Abstract:**

At the University of Amsterdam a measuring system has been built that can be used for the calibration of robots, using a camera mounted in the robot hand. The system uses the fact that an object looks different from different viewing angles. Analysis of an image of a known reference plate from a certain viewpoint can result in an estimate of the location of that viewing point. But for an accurate estimate a precise model of the imaging process has to be made.

In this presentation we will make a short tour inside the camera, and will show how a marker on the reference plate is imaged onto the light-sensitive elements of the camera. With the help of the redundant information available in a series of images we can make precise estimates of the camera properties, and of the locations of the different viewpoints.

At the end we will show that we can predict the position of a marker in the image with sub-pixel accuracy, in spite of several imaging errors greater than a pixel. The location of the camera for the different images is then known with an accuracy in the order of 0.1 mm and 1 arcminute which is adequate for robot calibration.

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