



# easy\_handeye: hand-eye calibration for humans

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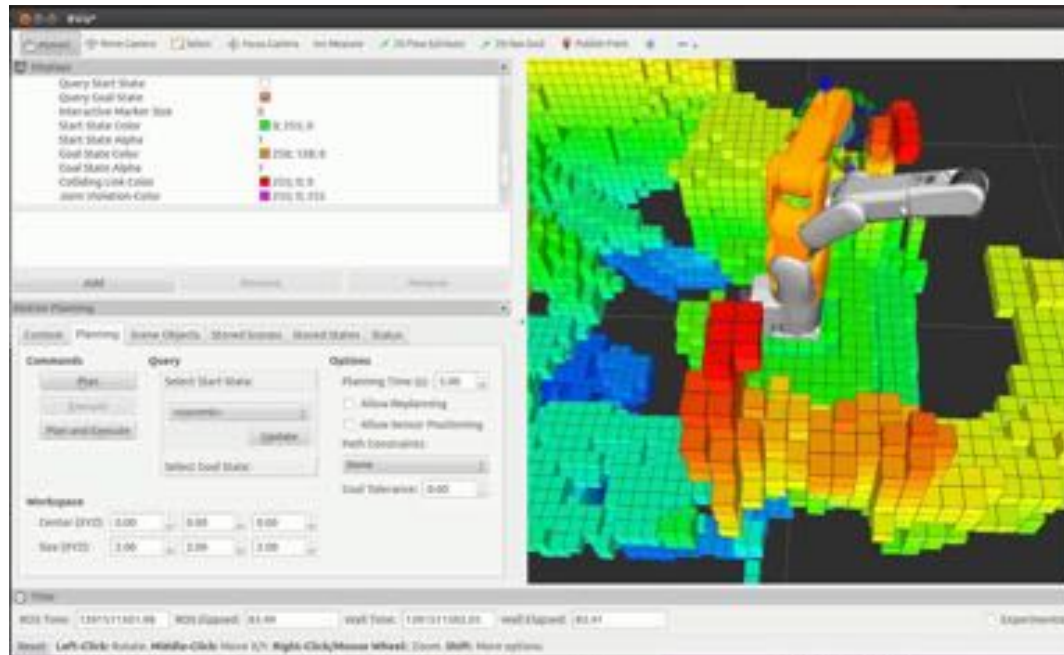
# Precise sensing requires precise calibration



<https://www.youtube.com/user/campTUM>



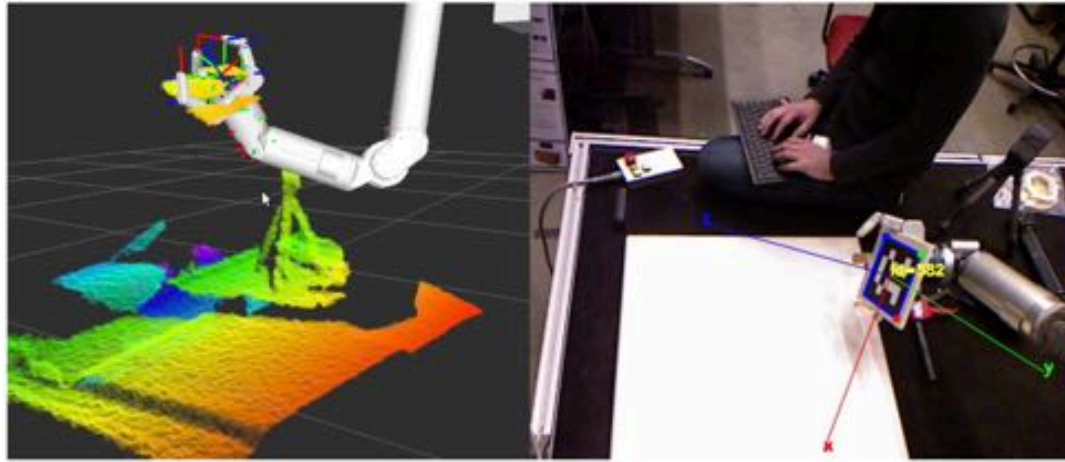
# A familiar example: MoveIt! and RGBD



<https://www.youtube.com/watch?v=oVQiLIBRSHw>

# Inspiration: jhu-lcsr/aruco\_hand\_eye

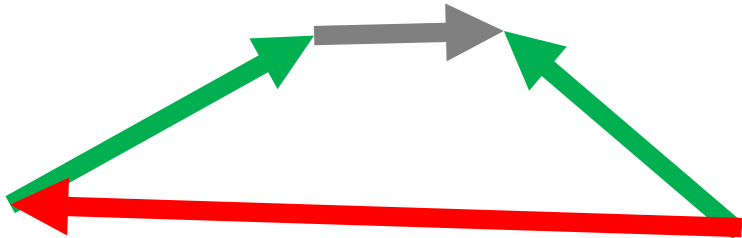
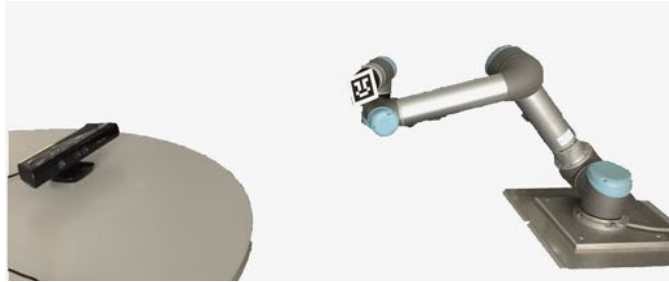
## ARUCO / VISP Hand-Eye Calibration



[https://github.com/jhu-lcsr/aruco\\_hand\\_eye](https://github.com/jhu-lcsr/aruco_hand_eye)

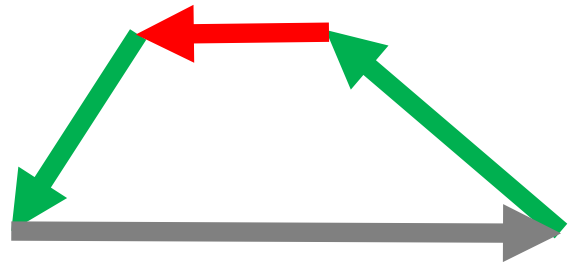


# eye-on-base vs eye-in-hand



Measured

Unknown



Not used

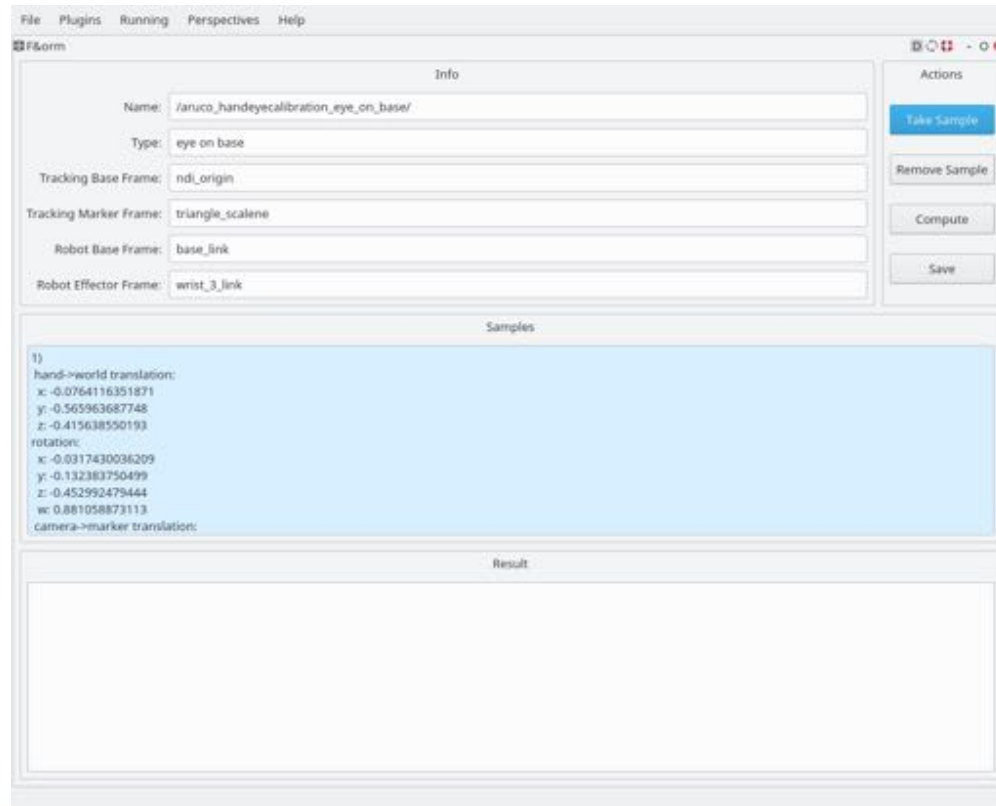


# Hand-eye calibration in one launch include

```
<launch>  
  <include file="$(find easy_handeye)/launch/calibrate.launch">  
    <arg name="eye_on_hand" value="false" />  
    <arg name="robot_base_frame" value="base_link" />  
    <arg name="robot_effector_frame" value="ee_link" />  
    <arg name="tracking_base_frame" value="camera_link" />  
    <arg name="tracking_marker_frame" value="marker1" />  
  </include>  
</launch>
```



# Calibration GUI



The screenshot shows a software window titled "Form" with a menu bar (File, Plugins, Running, Perspectives, Help) and standard window controls. The main area is divided into three sections:

- Info:** A form with five input fields:
  - Name: /aruco\_handeyecalibration\_eye\_on\_base/
  - Type: eye on base
  - Tracking Base Frame: ndi\_origin
  - Tracking Marker Frame: triangle\_scalene
  - Robot Base Frame: base\_link
  - Robot Effector Frame: wrist\_3\_link
- Actions:** A vertical column of buttons on the right side:
  - Take Sample (highlighted in blue)
  - Remove Sample
  - Compute
  - Save
- Samples:** A large light blue area containing the following text:

```
1)
hand->world translation:
x: -0.0764116351871
y: -0.565963687748
z: -0.415638550193
rotation:
x: -0.0317430036209
y: -0.132383750499
z: -0.452992479444
w: 0.881058873113
camera->marker translation:
```
- Result:** An empty rectangular box at the bottom.



# Hand-eye calibration in one launch include

```
<launch>  
  <include file="$(find easy_handeye)/launch/calibrate.launch">  
    <arg name="eye_on_hand" value="false" />  
  
    <arg name="robot_base_frame" value="base_link" />  
    <arg name="robot_effector_frame" value="ee_link" />  
  
    <arg name="tracking_base_frame" value="camera_link" />  
    <arg name="tracking_marker_frame" value="marker1" />  
  </include>  
</launch>
```

```
<launch>  
  <include file="$(find easy_handeye)/launch/publish.launch" />  
</launch>
```





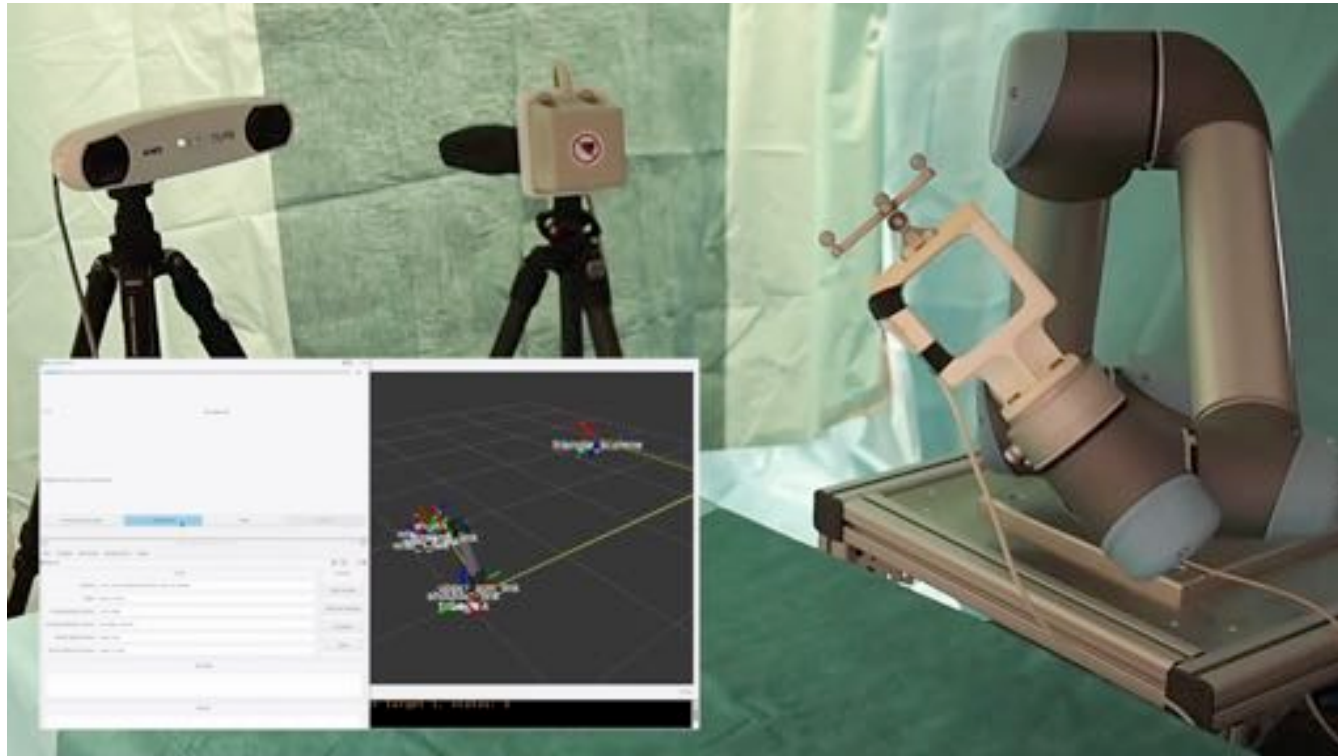
# Can I have many calibrations?

```
<launch>
  <include file="$(find easy_handeye)/launch/calibrate.launch">
    <arg name="eye_on_hand" value="false" />
    <arg name="namespace" value="robot_to_kinect" />
    <arg name="robot_base_frame" value="base_link" />
    <arg name="robot_effector_frame" value="ee_link" />
    <arg name="tracking_base_frame" value="camera_link" />
    <arg name="tracking_marker_frame" value="marker1" />
  </include>
</launch>

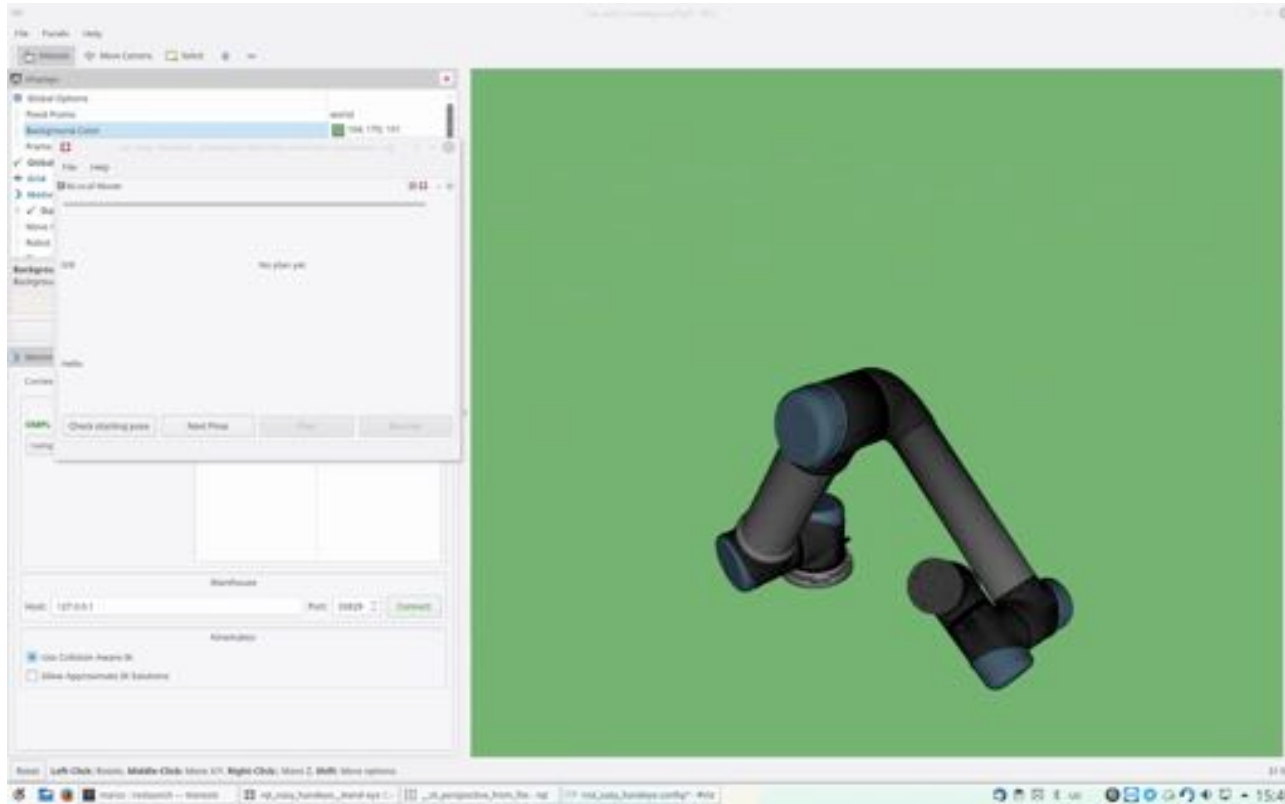
<launch>
  <include file="$(find easy_handeye)/launch/publish.launch">
    <arg name="namespace" value="robot_to_kinect" />
  </include>
</launch>
```



# Do I have to move the robot myself?



# Can I trust the automatic motion?



# Thank you for your attention!

easy\_handeye: [https://github.com/marcoesposito1988/easy\\_handeye](https://github.com/marcoesposito1988/easy_handeye)

iiwa\_stack: [https://github.com/SalvoVirga/iiwa\\_stack](https://github.com/SalvoVirga/iiwa_stack)

tf\_bag: [https://github.com/marcoesposito1988/tf\\_bag](https://github.com/marcoesposito1988/tf_bag)

Youtube channel: <https://www.youtube.com/user/campTUM>

