

ROB-UY 3203: Robot Vision Group Project Description

Instructor: Dr. Chen Feng

Phase 1: Measuring 3D information from 2D images (15 points)

There are two sets of 2D images taken by the same camera, as given to you in the two folders attached (named “A” and “B”).

Based on what you will learn from Week2 to Week5, you are required to calculate the following quantities based on these two sets of images, given that the side length of the AprilTag in folder “B” is 150.1 mm as shown in Figure 1:

1. what is the length (L), width (W), and height of the box (H)? (6 points)
2. what is the diameter (d) and the height of the soldering wire scroll (h)? (4 points)

You must provide a PDF report to describe how you have calculated the asked quantities. (5 points).

Note:

- **Deadline: 03/23 before class. Late submissions will cost you 1 point per day.**
- **Group size:** no more than 3 students per group; 1-person-group is OK but not encouraged.
- This report could be printed from your ipython notebook for solving this problem.
- You should *describe your solution clearly and concisely with texts explaining your steps.*
- If you only submit codes without explanations, you will lose all the 5 points for the report.
- Feel free to use any APIs to help you. But do not “copy & paste” online functions directly.

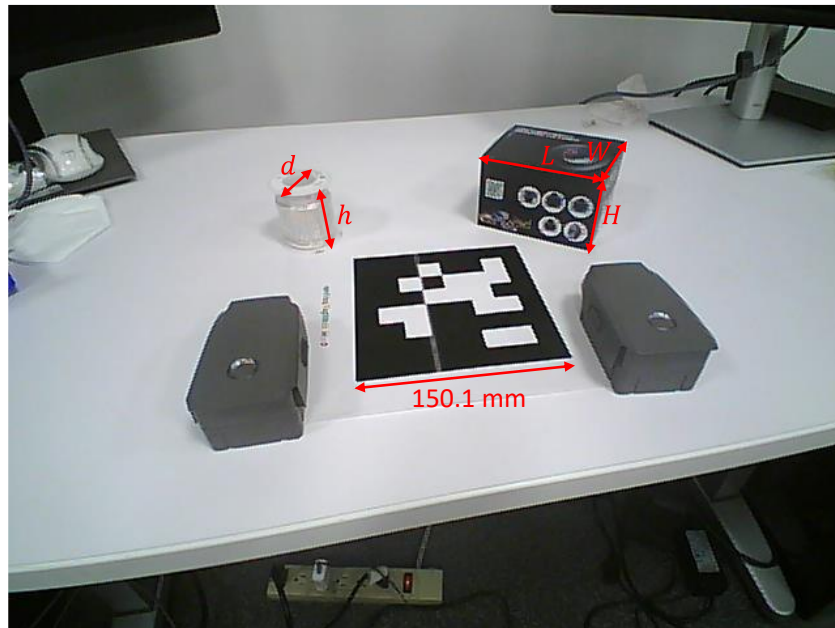


Figure 1 An example image from folder “B”, the given and asked quantities are annotated on the image.

Phase 2: Extension on Phase 1 (10 points)

Now you have solved the phase 1 problem, you have built yourself a code base that has the functionality to compute 3D information from 2D images. However, lots of aspects of this functionality could be extendable:

1. You might want to connect your solution with topics that you will learn between Week8 to Week13, to make your solution more automatic, or easy to use;
2. Or you might want to evaluate it more comprehensively on your own dataset to better understand its pros and cons.
3. Or you might want to create an animated tutorial to explain how 3D reconstruction works, like [videos in this YouTube channel](#).

Please think about any one or more directions to extend your phase 1 solution. Submit a video (maximum-3min-per-person) of your group's phase 2 effort and outcome, along with slides, codes and other materials as supporting information. The video will be rated as "Excellent/Good/Fair/Poor" by a committee composed of me and my PhD students jointly.

Note:

- **Deadline: 05/02 before class. Late submissions will NOT be accepted in Phase 2.**
- **Group:** you can regroup if you are not satisfied with the group collaboration in phase 1. But still, each group size should not exceed 3 students.
- **The video is the main resource for each reviewer to rate your phase 2 project.**
- The video (suggested format: mp4) should contain your audio presentation (you can use powerpoint or similar software to record it). Max video file size=500Mb.

Phase 3: Online Symposium (5 points)

Your submitted video will be posted on a dedicated slack channel for everyone in this class to comment and ask questions. This online symposium will last for a week, from 05/03-05/09. Your active participation in this symposium will earn yourself the final 5 points for the course project. This includes asking questions to others' videos, and answering questions for your own video. If you do not participate in this event, you will lose these 5 points.