

Introduction to Augmented Reality

Note:

This is the last exercise sheet for this course. There will be *NO* further tutorial. Thus, you have plenty of time to be creative for your project. We will discuss your proposals and developments in the next upcoming exercises.

Exercise 17 (P) Multi-Marker Tracking

Extend your marker tracker so that the poses of at least two markers are tracked simultaneously. Render a snow-woman (or whatever) on the second marker. Let the snowman and the snow-woman always look at each other, regardless of the poses of the two markers.

Exercise 18 (P) Something fancy

Using the solution of the last exercise, implement some *fancy* application. Be creative! You might let snowman and snowwoman have a snowball fight, for example. You may find the following effects useful:

- *Marker Fusion*: To improve the robustness of the augmentation, you may want to use all five markers and combine them in a marker cube. For pose calculation, the marker which is visible (best) can be used. To achieve this, first determine the transformations between the markers themselves. Keep in mind that you have to combine a translation and a 90° or 180° rotation. Multiply this transformation with the corresponding pose to get the final pose of the snowman. Find a suitable way to combine the information from several markers, e.g. take the first one available (or use a Kalman filter).
- *Occlusion*: In order to improve the realism of our augmentation, the marker should occlude parts of the snowman when viewed from below. You have to create an "invisible" model of the marker which should be rendered before the snowman, but only into the depth buffer. This will cause those parts of the snowman behind the cube to disappear. Use the function `glColorMask()` to disable the color buffer before drawing the cube and re-enable it afterwards.
- *Cast an Object*: Given origin and target, a simple cast movement can be described by a parabola. Look the formula up in any reasonable physics formulary and use it for interaction between the snowwoman and the snowman.

Have fun developing your project!