

Assignment on Virtual Reality and Physically-Based-Simulation - Sheet 4
Michael Cegielka, Dominik Veverka
16.01.2025

Exercise 1

- a) **interaction task:** assemble blocks into an individual structure
interaction metaphor: move VR-Controllers through the real environment, pick up blocks on the virtual table with the grab-button, position block in the 3D-Environment, block snaps in place if placed on top of another block, if block placed above the giant 20x20-Plate the block will be mounted after releasing the grab-Button on the VR-Controller

b) **Implementation of current metaphor:**

Grabbing Blocks

- Each block can be picked up with the VR controller by holding the grab/trigger button

Snap-to-Block Behavior

- If a grabbed block is brought near the top of another block and the studs, it auto-snaps and aligns one stud, two studs, or all four studs-
- The snap behavior sometimes doesn't lead to the intended alignment

Merging Blocks

- If two or more blocks are snapped together, they become part of one merged actor
- After merging, the blocks can not be pulled apart

Placing on the Large Base Plate

- There is a large 20×20 base plate on the table
- If the bottom of a block (or merged group of blocks) comes near a desired position on the base plate while grabbed, releasing the grab button will snap it onto the base plate
- Blocks placed on the base plate cannot be removed nor moved once placed, but they can be extended by snapping additional blocks onto them

Block Availability

- Only a certain number of blocks are available and once they are all used, no additional blocks can be spawned

c) Advantages and Disadvantages:

- + Grabbing is intuitive
- + snapping is mostly convenient
- + placement on base plate is relatively easy
- merging and placing blocks is permanent
- sometimes misalignment of blocks (Snapping and placing)
- fixed amount of blocks

d) Point with Laser Beam at block, hover laser and press “Grab”-button, the block follow the end of the laser beam, move laser with the VR-Controller to the desired location, release “Grab”-Button to place the block

Instead of grabbing a block with a hand movement through the 3D-Environment, the user would point at a block with a laser out of the VR-Hand/Controller or cast a ray cast. Selecting a block would be achieved by positioning and hovering the ray cast at the block and “grabbing” it by pressing the Grab-Button.

As the ray cast follow the wrist rotation of the user, the positioning of the block onto the base plate would be achieved with less physical and more precise movement.

Point with VR- controller to Block, click “Grab”- button, point to Direction- Button, click on direction, click on “End Placement”- button

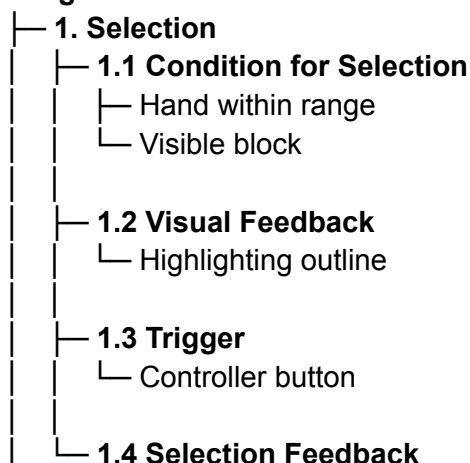
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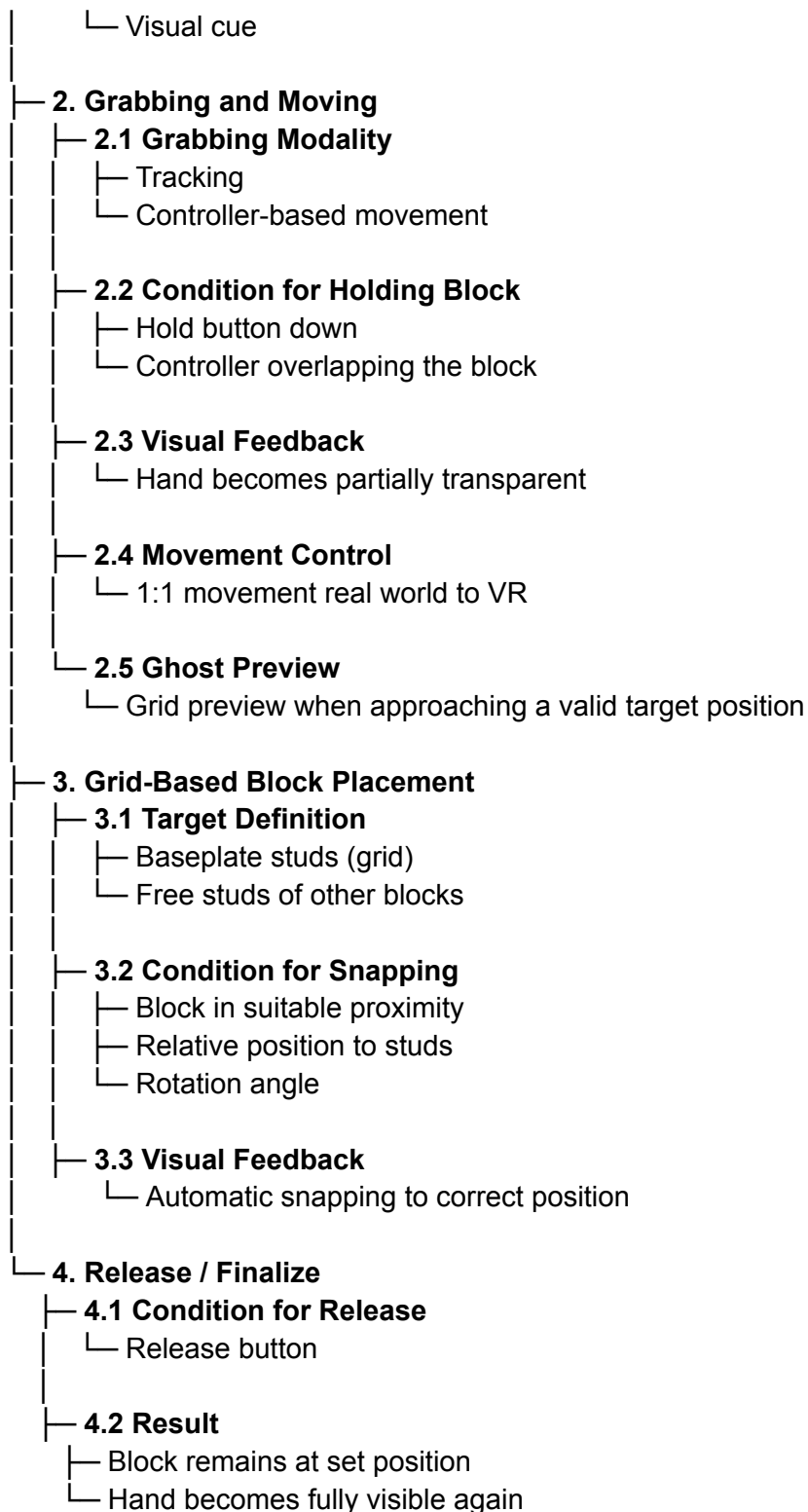
Clicking on a block reveals an UI with 6 buttons each for a direction the block can move to. (North, East, South, West, Up, Down) Each according press moves the Block into the given direction and another controller input confirms the placement.

Exercise 2

a) Draw a nearly complete taxonomy (or decomposition) for the interaction task.

Navigation





(b) Describe the interaction metaphor you plan to implement and list in bullet points the advantages and disadvantages of your planned interaction metaphor.

We plan to implement a metaphor, in which the user receives more direct feedback from the system. As the VR-Hand approaches a block on the table, the block sensors the hand and changes its color to indicate that the specific block can be grabbed. As the block is grabbed the VR-Hand turns partially transparent in order to let the user have a clean view for placing and positioning the block at a given place without visual cluttering. As the block is being moved near another block or the base plate, a ghost snaps to the closest possible position and serves as a preview where the block will be placed, if the grab button is no longer held.

Note: We were not able to implement the ghost preview function.

- + Grabbing is intuitive
- + snapping is convenient
- + placement on base plate is relatively easy
- + preview allows relocation
- merging and placing blocks is permanent
- fixed amount of blocks

c) We plan to implement a highlight function as a selection preview. Meaning, when the hand approaches a placeable block on the table, the block is being highlighted to indicate a possible grab by the user. Afterwards the hand is being set partially transparent, to highlight the block indirectly by reducing visual cluttering around it.

At the end a ghost preview highlights the nearest possible snap position of the block.

Note: We were not able to implement the ghost preview function.