Tangible 3D modeling of coherent and themed structures - DTU Orbit (08/11/2017)

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We present CubeBuilder, a system for interactive, tangible 3D shape modeling. CubeBuilder allows the user to create a digital 3D model by placing physical, non-interlocking cubic blocks. These blocks may be placed in a completely arbitrary fashion and combined with other objects. In effect, this turns the task of 3D modeling into a playful activity that hardly requires any learning on the part of the user. The blocks are registered using a depth camera and entered into the cube graph where each block is a node and adjacent blocks are connected by edges. From the cube graph, we transform the initial cubes into coherent structures by generating smooth connection geometry for some edges of the graph. Based on an analysis of the cube graph, we identify subgraphs that match given graph templates. These subgraph templates map to predefined geometric refinements of the basic shape. This, in turn, allows the user to tangibly build structures of greater details than the blocks provide in and of themselves. We show a number of shapes that have been modeled by users and are indicative of the expressive power of the system. Furthermore, we demonstrate the scalability of the tangible interface which appears to be limited only by the number of blocks available.

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