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3D HOUSE PRINTER

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The purpose and objectives. Studying the theoretical aspects of the potential of 3D house printers, search modern interpretation of this concept.

Object of study. 3D printing systems for building houses and their potential in the modern world.

Methods and tools for research. Complex research of all major types of 3D printing machines using information sources.

Scientific novelty and practical significance of the results. Got further development of the interpretation of the concept of 3d printing in the construction of houses. The main takeaway here is that 3D printed houses are built in less time and with less material than traditional houses. Even if they have a rougher exterior, post-processing is an option just as it is for regular 3D printed objects. 3D printed houses tend to be smaller due to 3D printer build volume limits, but this is not always the case.

Research results. 3D printing refers to processes in which material is joined or solidified under computer control to create a three-dimensional object,[1] with material being added together (such as liquid molecules or powder grains being fused together). 3D printing is used in both rapid prototyping and additive manufacturing (AM). Objects can be of almost any shape or geometry and typically are produced using digital model data from a 3D model or another electronic data source such as an Additive Manufacturing File (AMF) file (usually in sequential layers). There are many different technologies, like stereolithography (STL) or fused deposit modeling (FDM). Thus, unlike material removed from a stock in the conventional machining process, 3D printing or AM builds a three-dimensional object from computer-aided design (CAD) model or AMF file, usually by successively adding material layer by layer.[2]

The term "3D printing" originally referred to a process that deposits a binder material onto a powder bed with inkjet printer heads layer by layer. More recently, the term is being used in popular vernacular to encompass a wider variety of additive manufacturing techniques. United States and global technical standards use the official term additive manufacturing for this broader sense, since the final goal of additive manufacturing is to achieve mass-production, which greatly differs from 3D printing for Rapid prototyping.

Food, water, and shelter are basic human needs, but 1.2 billion people in the world live without adequate housing, according to a report by the World Resources Institute’s Ross Center for Sustainable Cities. Today at SXSW, an Austin-based startup will unveil its approach to combat that deficiency by using low-cost 3D printing as a potential solution.

The two organizations-New Story and Icon came together to show that it’s feasibly possible to build an easy-to-replicate house in under 24 hours. They plan to take this proof-of-concept and start producing small houses for families in countries like Haiti and El Salvador. The 800-sq-ft house costs around $10,000 to build using Icon’s proprietary Vulcan printer, but the company plans to eventually bring that price down to around $4,000. Theoretically, it could soon print one of the houses in about six hours.

The Vulcan printer was also on display, in the yard next to the lot where the house was printed. Massive, but still portable, the printer excretes a custom blend of concrete that hardens as it’s printed. The concrete is laid in 100 roughly one-inch-thick strands that hold

their shape as they harden. Icon cofounder Evan Loomis told Quartz that the strength of the printed walls is stronger than cinderblocks after a few days of hardening, although the house is entirely habitable after it's been set up. After the walls are printed, New Story crew members come in and install windows, a wooden roof, basic plumbing, and electrical wiring which can be drilled right into the walls. The entire setup, including the finishing, takes under a day.

In the future, Icon would like to be able to develop robots that could automatically install the windows after the Vulcan finishing printing, and drones that could spray-paint the exterior walls. It'll explore the possibility of printing roofs as well, but the technology for suspending concrete as it prints hasn't been really feasible yet.

In theory, families could customize the design, arrange for a printer to come plop down on their land, and have a readymade house to move into a day later. Even the average delivery takes longer than that.

While the 3D printing of houses is becoming a reality with a booming construction market, we want to focus on the manufacturers of 3D printers that make this possible. Desktop 3D printers are diverse, whether they are polar machines, delta printers, or robotic arms. Capable today of extruding concrete, they make it possible to build different structures of varying complexity, from houses to bridges to skyscrapers.

Conclusions. Building a house is a process that is not only time-consuming, but also expensive. However, this could soon change. More and more manufacturers are exploring the world of construction 3D printing, also known as house 3D printing.

House 3D printers use paste extrusion to build houses. It is a similar technology to the one that FFF 3D printers use. Paste-type material, such as concrete or mud, is pushed through the house 3D printer's nozzle in layers. 3D printing in the construction industry helps save time, effort and material.

However, construction of 3D printers are not yet capable of creating a fully functional house. Indeed, only the frame and walls of the house are built– other elements, such as electricity or indoor plumbing, need to be manually installed.

Keywords: *3D printing, building, technology, engineering.*

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