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Support Structure Generation for 3D Printing

An optimized algorithm minimizes 3D printing support structure volume, significantly reducing material consumption and print time without compromising product integrity.

Three-dimensional printing starts from the bottom and progresses continuously, layer-by-layer, to the top. Printers need to connect overhangs or disconnected parts with the lower parts of the object or the ground in order to print. Since the support material is printed first and discarded later, optimizing its volume can lead to significant material and print time savings.

Researchers at Purdue University have developed a method to reduce the volume of support structures required by 3D printers based on common Fused Deposition Modeling (FDM) technology. While reducing the necessary volume of support material, this method does not compromise the structural integrity of the final product in any way. Using this approach, the input 3D model is first oriented into a position that requires minimum support. Then the points on the input that require support are detected. For those points, the supporting structure is progressively built while attempting to minimize the overall volume of the support structure. The resulting structure has a tree-like shape that effectively supports the overhangs. The algorithm has been tested on MakerBot 3D printers and results were compared to existing software solutions from 3D printing. Results showed that this technology reduced print time by an average of 29.4 percent and the amount of material by 40.5 percent.

Advantages:

-Reduces print time

-Reduces amount of material

Potential Applications:

-Manufacturers of 3D printers

Technology ID

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Category

Buildings, Infrastructure, & Construction/Construction Robotics & 3D Printing

Robotics & Automation/Simulation, Digital Twins, & Industrial Automation

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View online

-3D printer users

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