

MotoMaker : a robot FDM platform for multi-plane and 3D lattice structure printing

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ABSTRACT

Additive manufacturing is a process to fabricate three-dimensional (3D) objects usually by joining a material layer by layer. The layer by layer joining process simplifies the fabrication method by slicing the 3D object into stacks of 2D contours. The layers are combined in a single build direction to form the 3D object. In this research, a six degrees of freedom robot arm is integrated with a fused deposition modeling system for multi-plane and 3D lattice structure printing applications. The integration processes in developing the platform are discussed including the robot arm platform, extruder system, software architecture, toolpath generation, 3D lattice generator, and extruder calibration. Use of the system offers unique advantages over a conventional Cartesian 3D printer platform which is limited to single-plane layering for the printing of 3D objects. Test cases are performed to demonstrate the capability of the robot arm fused deposition modeling platform for multi-plane object printing and 3D lattice structure printing.

KEYWORDS

Multi-plane FDM, Robot arm 3D printer, 3D lattice structure

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