Engineering a Low Cost Bioprinter

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Bioprinting serves as a potential solution to many modern medical complications. From the broad range of organ shortages, to cancer research and drug testing, bioprinting proves its necessity in the medical world. These printers function nearly identically to a traditional Fused Deposition Modeling 3D printer and use hydrogels as a printing medium. However, due to high costs up upwards of $170,000, this technology is often unreachable and underdeveloped. In the previous years research, a 3D printed hydrogel bioprinter extrusion device was manufactured for $283. This extrusion device was evaluated and found to have a flow rate of 4.4mm to 1ml of extruded hydrogels. The current research took the previous extrusion device and redesigned the main structure. The research intended to retain a production cost of less than $400, hold higher volumes of liquids and to produce structures with a dimensional accuracy of ± 0.5mm. The previous design was updated and improved to include more precise extrusion and a higher flow rate of 72.5mm/ml. The production of the new model was able to be completed for $298. The data proves the concept of developing a functioning bioprinter for medical application for under the cost of $400.

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