Engineering a Low Cost, UV Crosslinking Hydrogel Bioprinter

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In order to propose a solution to the issues of organ shortages and a new method for cancer testing, among others, the idea to engineer a low-cost hydrogel 3D bioprinter was brought about. The printer functions in near parallel to that of a standard Fused Deposition Modeling 3D printer. Using hydrogels with cells added to them, the hydrogel can be pushed through a screw driven syringe plunger attached to a 3D printer frame. To produce the printer a Creality Ender 3 3D printer was obtained. The screw driven hydrogel extruder was design in Solidworks and 3D printed on a Creality CR-10s. The Creality Ender 3 was modified to fit the custom extruder assembly and then attached to the X-axis gantry of the device. Once the hydrogel is laid on the printing plate it will be cross linked with a UV light. The printed structure was compared to the model designed in Computer Aided Design software and evaluated for dimensional accuracy. The printer could be produced for under four hundred dollars USD. The total price of the device was 283 dollars. The flow rate was found to be a 4 mm turn on the stepper motor for 1ml of extruded hydrogel. From this it can be established that it is possible to engineer a 3D bioprinter that can be applied to medical practices.

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