November 16, 2016

BioBots to Bring Revolutionary 3D Bioprinter to the Masses with $5,000 Beta Program & Eventually Print Whole Organs

"Life is the oldest and most efficient manufacturing technology that we as people know of. It's become clear over the past several decades as scientists have engineered life to work for us, that biology is the next frontier for manufacturing. However, there is one thing missing. Doing biology today is the equivalent of computer programming 50 years ago – it's inefficient, it's slow, and the technology is only available to scientists at well-funded institutions, out of the hands of the ordinary people that could be leading this new revolution." ~ BioBots CEO Danny Cabrera to 3DPrint.com

BioBots is a company launched by Daniel Cabrera, a recent graduate of University of Pennsylvania's Engineering School, as well as Ricardo Solorzano and Sohaib Hashmi, who are staff research specialists in the Perelman School of Medicine (UPenn). The three got together to create a 3D bioprinter capable of printing in multiple body tissues. While this certainly isn't the first ever bioprinter created, Cabrera tells us that it is not the same as others on the market today.

"Employing the tool that transformed traditional avenues of manufacturing, we at BioBots are using 3D printers to engineer biology," Cabrera told 3DPrint.com. "Our 3D bioprinters employ the use of a novel extrusion process that addresses the previous technical hurdles of 3D bioprinting, as well as a biomaterials cartridge system that makes this revolutionary technology accessible to untrained users. Just imagine the kind of products that people will build now that they can plug and print living tissues. At BioBots, we are building this future, today."

The BioBot 3D printer works with both "Blue Light" and UV light. The cell solution, which contains living, growing cells as well as vasculature for nourishment, is extruded from the 3D printer in a similar fashion to how at-home fused filament fabrication (FFF) 3D printers work. However, different from your typical FFF 3D printer, once a biological material has been extruded, an ultraviolet light (or Blue Light) cures and hardens it. This occurs one layer at a time

until the desired object is printed. The objects printed can be living cell tissue or non-living scaffolds, and Cabrera tells us that over a dozen different cell types have been used with these printers so far. The unique cartridge system that BioBots' bioprinter uses, enable users to easily switch between the printing of different biological materials, almost as easily as a normal desktop printer can switch between colors.

"We have won several innovation competitions and recently received funding from DreamIt Health, a start-up accelerator program based out of Philadelphia," said Cabrera. "We are opening a Beta program with the goal of placing printers in the hands of the best experts and working with them to generate publishable data. The idea is to generate interest in this area and inform scientists about the tool we're developing through published research. We currently have Beta tester relationships in place with Dr. Dan Huh's lab at Penn, Dr. Kara Spiller's lab in Drexel, and Dr. Kevin Costa's lab in Mt. Sinai and are definitely looking to expand."

The company is also open to accepting many new Beta testers into the program. That program costs a mere $5,000 and supplies the following benefits to the testers:

- A 3D bioprinter (80um resolution) capable of extruding a variety of hydrogels (collagen, alginate, agarose, polyethylene glycol, hyaluronic acid, etc.)
- 1 Year service agreement & active development for your bioprinter
- BioBots software package
- Access to an online community of collaborators who are working together to solve tough tissue engineering, regenerative medicine, and biomaterials problems
- Having your work showcased at a number of conferences that BioBots has been invited to speak at

For those interested in joining the Beta program, they are asked to email the company for more details.

The team behind BioBots is equally as impressive as the machine itself. Cabrera has recently graduated from UPenn, where he studied computer science and biology, and won first place in the North America International Genetically Engineered Machines competition for his work on automating genetic engineering work flows and making life easier to engineer. The company's CTO has been working in the field of regenerative medicine for about 4 years, and has authored several papers on building 3D blood vessels. He actually built the first BioBots prototype from his dorm room at UPenn.

While the Beta program is meant as a way in which the company can build up their user base, solidify a community of doctors, engineers, designers, educators and students, and test out their latest version of their BioBots bioprinter, others can pre-order the printer for $25,000. The team isn't only targeting Ph.D researchers. They want these machines to be used by educators and researchers everywhere. "Our 3D bioprinters enable users to easily print high resolution biological structures – whether you're a researcher on the frontier of regenerative medicine or a high school biology teacher," said Cabrera.

While we are still far away from 3D printing working organs, the fact that BioBots offers a 3D printer capable of printing in a vast array of biological materials at a price starting as low as $5,000, means that this technology can reach the hands of virtually any researchers interested in studying the potential that it holds for the future. Other bioprinters from larger companies can cost upwards of $250,000, severely limiting access. This is wear BioBots may become quite revolutionary.

Cabrera tells us that they are working on curriculum/lesson plans to go along with their printers, so that high school students can learn about bioprinting through the use of these relatively affordable machines.

When I asked Cabrera how long he thinks it will be, before we see fully printed working organs, he told me that it isn't about the technology not being there, but rather its about researchers being able to come up with ways to use it. His guess is that within the next 10-15 years we may see the first 3D printed working organ.

What do you think? Will the BioBots 3D bioprinter lead the way in allowing researchers to fully investigate and innovate upon this technology? Discuss in theBioBots forum thread on 3DPB.com. Check out the videos below, including the first one, showing a demo of the BioBots printer using photocurable PEG.