The Dostoevsky 3D Printing Project

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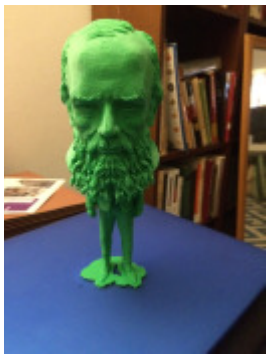
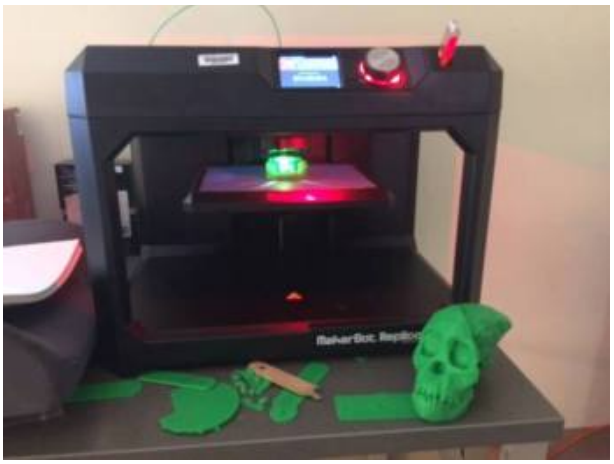
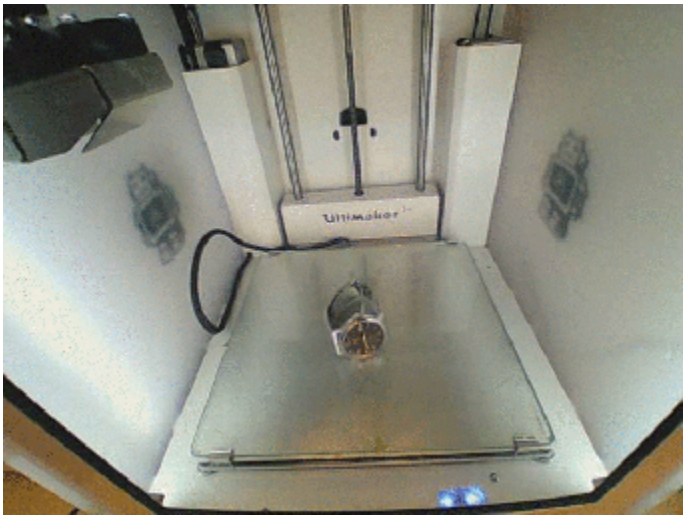
by Michael Marsh-Soloway



The Dostoevsky 3D printing project grew out of a series of energetic conversations with Carol Apollonio and Brian Armstrong at the 2016 ASEEES Conference in Washington D.C. The bobble head that we devised would serve not only as a prize at the 2017 Duke-UNC Dostoevsky Games in Durham, but also as a prospective merchandise offering for the North American Dostoevsky Society. These items can be manufactured by anyone with access to a 3D printer.

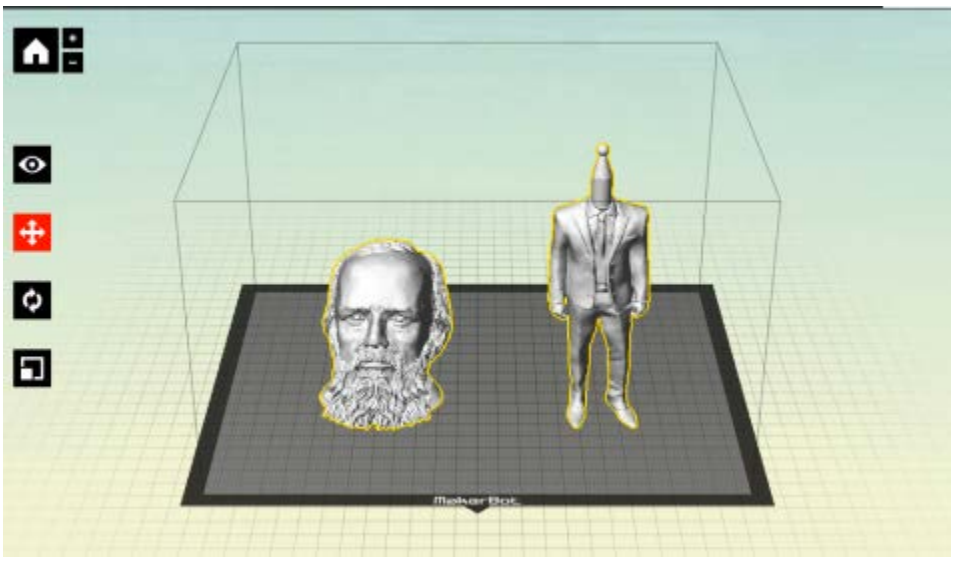


Carol and I collaborated on the production of the Dostoevsky model. She printed the models using more than 30 Ultimaker printers at the Innovation Co-Lab Studio at Duke, and then I used a series of MakerBot printers in UVa MakerSpaces (which you can see to the right). Printing the model at two universities allowed us to divide the assembly and manufacture of the removable components. Specialists in the humanities have only recently started utilizing 3D resources, and these tools hold great potential for enhancing the study of artifacts, symbols, and spaces. The objects that Carol and I produced were made with a biodegradable, corn-based PLA plastic, which we selected as the cheapest and most easily obtainable material. Eventually, however, we may experiment with a range of other material compositions, including sand, chocolate, and various metals.
It is not advisable to manufacture edible models in a printer that has been used primarily for plastic productions. Small pieces of plastic could contaminate the finished product. ChocEdge, and Cocojet are two companies exploring culinary applications of 3D printing technology for chocolate, but it seems likely that the cheese, butter, and caramel industries will soon follow suit. In the medical sciences, doctors have started loading 3D printers with cell tissue to manufacture bodily organs. Thomas Boland of Clemson University was one of the first researchers to replicate organ structures with cells via 'bioprinting' procedures.



Depending on the size of the model, each Dostoevsky bobble head takes between two to ten hours to print. Users can adjust the size of the associated bobble head parts as their given 3D printer will

permit. The Ultimaker printers at Duke University are equipped with a small camera that records a short time-lapse video of the manufacturing process, and users can opt to receive this video as a GIF file via an automated email message when the object is completed (ours is to the right of this text). Despite the long duration of each job, once the printing has started, the Ultimakers and Makerbots are safe to leave running unattended. In total, we printed 17 Dostoevsky figures in different colors that were given to students, game organizers, and guest judges.



The most time-intensive process of 3D printing is the preparation of the associated component files. To print a 3D object, users need to develop their models as an STL file — Standard Tessellation Language. Although there are several 3D file types that can be processed by different printers, STL is the most common and universally recognizable format. The 3D printers construct the desired model layer by layer. The extruder melts the plastic into a molten noodle of sorts, and the final form appears as the material hardens after cooling. With irregular shapes, the plastic will sometimes drip over the sides of the model, but the resulting shards and columns can be easily removed with an awl or pliers. While users can download expensive programs to develop and modify STL files, Carol and I developed the Dostoevsky bobble head using only free and open-source tools. We used the following resources and steps to facilitate this process.

1. There are several dozen reputable online repositories of 3D models. This blog post by Bulent Yusuf compiles the most popular sites, and rates their overarching functionality. Carol and I eventually used a Dostoevsky bust that we found on Thingiverse as the basis of the bobble-head. If we had not been able to find the open-source Dostoevsky model, we could have created our own file. Users can build 3D models from scratch using the free website, TinkerCad. Alternatively, while there are few memorials to Dostoevsky in the U.S., we could have generated a 3D model of our own by asking colleagues in Russia to photograph statues of the author with their cellphones. There are several apps, including 123D Catch, Trnio, and ItSeez3D, which employ the technique of photogrammetry to create a 3D model by photographing a given object from different angles. As yet another possibility, there are other digital tools like Smoothie 3D that allow users to approximate a 3D model from a 2D image.

2. Using TinkerCad, I ‘remixed’ the open-source Dostoevsky bust, removing the head from the torso and pedestal, and placing a cylindrical hole in the base of the neck. Next, I found an open-source bobble-head torso on Thingiverse. Since we designed the Dostoevsky bobble head during the U.S. presidential elections, the most readily available bodies were those belonging to Hillary Clinton and Donald Trump. The Hillary Clinton action figure came with a pearl necklace and high-heeled shoes, so we opted instead to use the Trump Though few people noticed or thought to inspect the files closely, it is not coincidental that the hands on the bobble head are disproportionally smaller compared to the rest of the body.

3. Special modifications were made to the largest bobble head model that would serve as the trophy for the Dostoevsky Games. We mounted the body on a rectangular pedestal bearing the inscription, ‘Champions The 2017 Dostoevsky Games’. Radislav Lapushin appears to the right holding the trophy. In retrospect, I should have tinkered more carefully with the fitting, because shortly after showing the audience the prize, the head of the model became detached, which provided a closing note of humor to the full day of intellectual discussion, performances, analysis, and debate. Printing the head and body as two separate pieces allowed the bobble head to move up and down, but the pieces can also be conjoined in a static model.

Since successfully producing the bust and bobble heads in various sizes, we have returned to our initial premise of the movable Dostoevsky action figure, as well as a range of other ‘remixed’ products. These more elaborate items could include mugs, showerheads, doorstops, coat hooks, vases, or even mock images of the author mounted on dinosaurs, animals, and cartoon characters. Here is a rough list of 3D objects that we’ve considered combining with the head of the author. Feel free to print one for yourself, and stay tuned for future product announcements!

Michael Marsh-Soloway earned his PhD in Russian literature at the University of Virginia in 2016 with a dissertation entitled "The Mathematical Genius of F.M. Dostoevsky: Imaginary Numbers, Non-Euclidean Geometry, and Infinity." He is a specialist in Russian literature, history, and linguistics. Currently, he serves as the Coordinator of the UVA Arts & Sciences Language Lab, and he soon hopes to publish his dissertation as an academic monograph.