

Making in the Library

BY SARA GONZALEZ

BELOW: Student gives the “thumbs up” to using the 3D-printed fishing line created by the GRiP technology club.

LEFT: Samples of 3D printed hands.



When undergraduate Jessica Bergau wanted to start a club at UF to build prosthetic hands for children, her first step was to come to Marston Science Library to ask about partnering with the library’s 3D service. Her initiative fit perfectly with the library’s desire to support both students and outreach to the local community. The library provided free 3D printing for her new club, GRiP (Generational Relief in Prosthetics) and now,

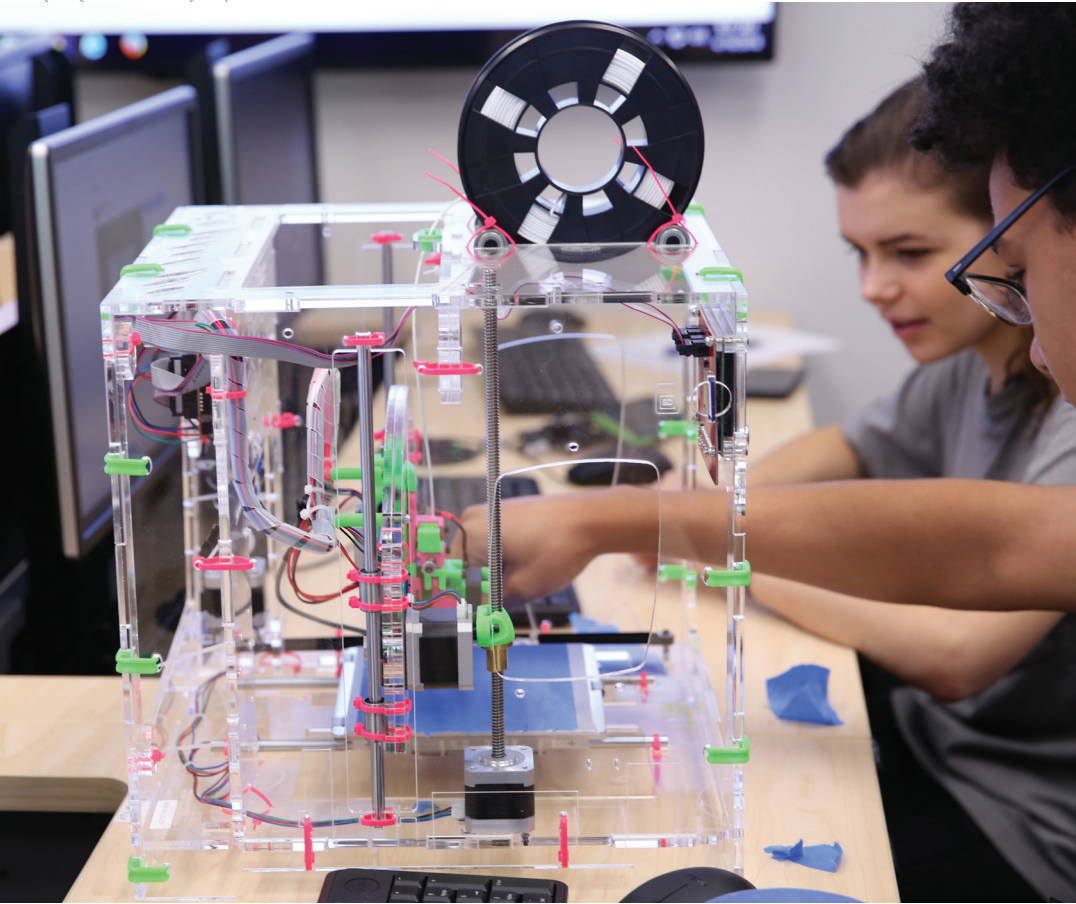
almost 4 years later, GRiP is over 100 members strong who creatively design and 3D print colorful hands for children and teenagers. This partnership is just one example of the impact that the Library enables by providing the UF community open access to maker technologies.

A dramatic transformation began in Marston Science Library approximately five years ago, as the introduction of 3D printers, scanners, and a renovation of the first floor led to a new emphasis on supporting student collaboration, innovation, and experiential learning.

The Library now serves thousands of students each semester, and has become a high profile resource to the UF community. In addition to their use, the active virtual reality lab and 3D printers attract large campus tour groups several times a day.

This merging of collaboration space and technology has fostered a culture of making that welcomes all students, no matter their skill level, to explore and create. This made Marston the natural spot to host Swampacks, a student-organized hackathon





LEFT: Students from Sara Gonzalez's class, *Exploring 3D with Building, Modeling, and Printing* (UF Honors Program) work on their 3D printed 3D Printer.

to research and develop VR/AR experiences that focus on illustrating and solving societal problems. Students can check out VR headsets such as Oculus Rifts, Microsoft HoloLens, and the HTC VIVE to both play and develop new programs.

Marston's 3D technology provides the tools for our students and researchers to push the boundaries in fields such as archaeology and anthropology where specimens are rare and extremely fragile. Brittany Mistretta, a PhD student in Museum Studies, spent a summer with the

Grenada National Museum cataloging the museum's archaeology collections to create an online version of their permanent Amerindian exhibition. She brought along a 3D Structure scanner, borrowed from the Library, and 3D captured specimens and objects that she can now continue to examine digitally and reproduce using the 3D printers.

Sometimes abstract or complex concepts can be readily understood if rendered into a physical object that can be handled and manipulated. The Library's 3D printers have been a draw to instructors who have printed models such as chemical molecules, brains, and viruses for their students' benefit. Alexandra Skrivanek, a PhD student in Geology, recently printed a 2'x2' model of Florida to use with a digital sandbox for a large public

that draws university students from all over the southeast. This 36-hour event takes over the first and second floors where almost 600 students alternate coding and building with sleeping under the tables. Students take advantage of the numerous power outlets, strong wi-fi, and expansive tables to build both hardware and software. The winning entry from the 2018 Swamphacks was Wi-Fido, a mobile app and network adapter to identify security issues in home networks.

Marston's first floor is known as the Collaboration Commons, an entire floor of group-friendly tables, study rooms, and computer labs that also houses MADE@UF, a lab devoted to virtual and augmented reality. This space is home to the student club GatorVR and the VR for Social Good initiative, a multi-disciplinary collaboration

outreach event at the Florida Museum of Natural History. Children and their parents were drawn to the sandbox as Alexandra used the model of Florida to illustrate how climate change could affect Florida's coastline as sea levels rise.

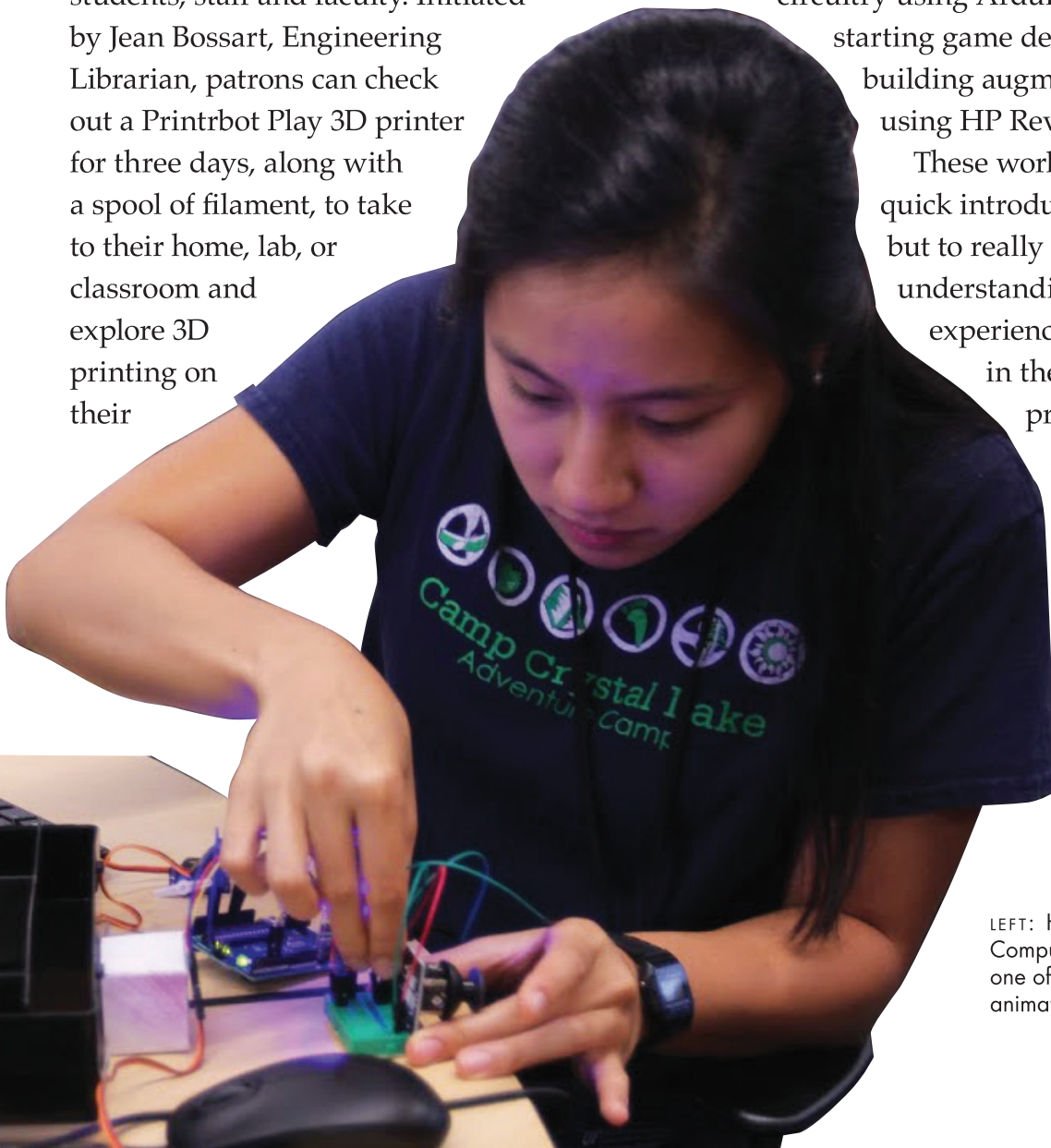
Technologies such as 3D scanning and virtual reality may be emerging right now but are expected to become an important skill in the near future and ones that UF students need to develop expertise in. Marston is meeting this need for students by not only providing access to the technology but also the workshops and training that are essential to developing expertise.

Marston Science Library was the first academic library in the nation to circulate 3D printers to students, staff and faculty. Initiated by Jean Bossart, Engineering Librarian, patrons can check out a Printrbot Play 3D printer for three days, along with a spool of filament, to take to their home, lab, or classroom and explore 3D printing on their

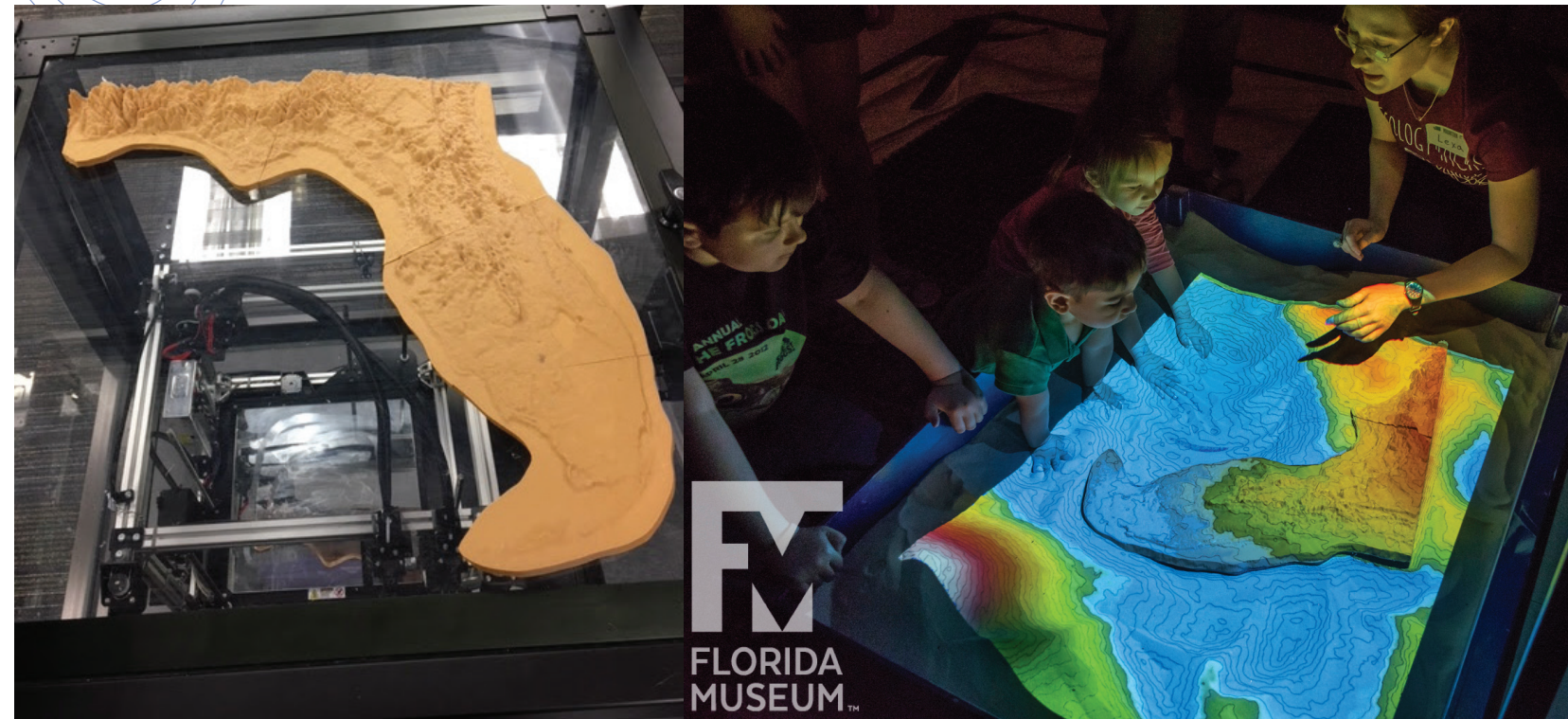
own. Cost of 3D printing can be a large barrier to some students, especially when rapidly iterating to invent and finalize a design. Students can now try printing smaller versions by themselves and then, once satisfied with the model, can submit it for printing in a larger size on the library 3D printers.

One of our major goals is to ensure that all students, not just engineering or computer science, feel comfortable with exploring these maker technologies. Regular workshops are taught in the library and open to the UF community and the public. Topics for these one-hour sessions range from an introduction to 3D printing, basic 3D modeling, beginner circuitry using Arduino microcontrollers, starting game design using Unity, and building augmented reality experiences using HP Reveal.

These workshops give students a quick introduction to this technology but to really develop a firm understanding, they need hands-on experience. A new credit course in the Honors Program provides undergraduate students the opportunity to build 3D printers from scratch. Held in the science library, Dr. Sara Gonzalez developed this team-based course to welcome students with no prior experience and teach them both basic construction skills



LEFT: High school student from the Gator Computer Program summer camp uses one of the library's Arduino kits to build an animatronic.



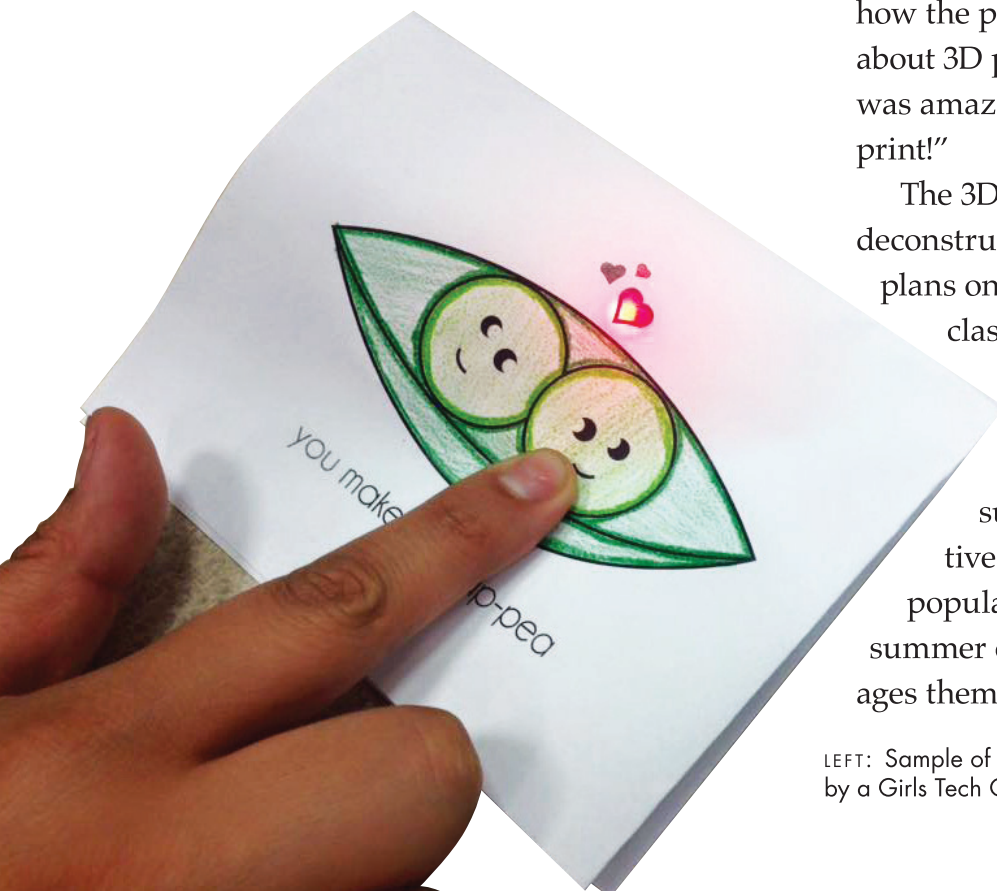
along with 3D modeling and scanning. Students reacted with immediate enthusiasm to the class, with enrollment filling within two minutes after registration opened. Near the end of the semester, Aubree Stillmann expressed her pride at completion of her 3D printer. "I loved seeing our 3D

printer come together! I did not have experience with 3D printing before, so I was not sure how the parts would fit together to make a 3D object. It was great working with my group to build the printer and learn how the pieces were put in place. I learned a lot about 3D printing and really enjoyed my class. It was amazing to watch our printer make the first print!"

The 3D printer kits are designed to be easily deconstructed after the class is over and Gonzalez plans on teaching both the semester-long class again along with an all-day build workshop in the summer.

Outreach to local K-12 schools to introduce maker technologies and support their teachers is a major initiative for Marston, along with its highly popular Girls Tech Camp. This week-long summer camp for middle school girls encourages them to explore STEM careers through

ABOVE: Young students view a projected display on a 3D printed "digital sandbox" map of Florida.



LEFT: Sample of LED "light-up" card created by a Girls Tech Camp student.

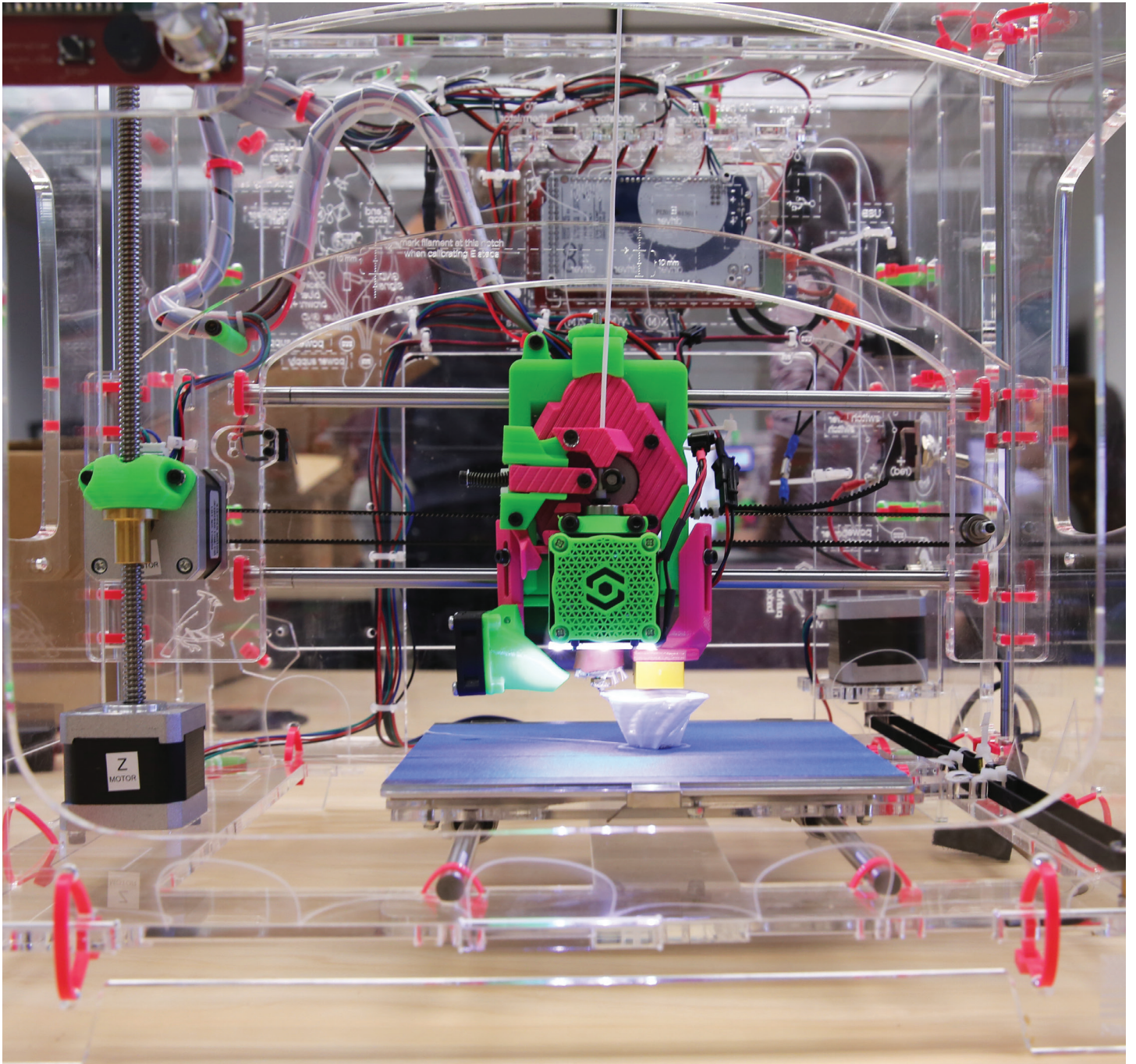
introductions to coding, 3D printing, video production, and augmented reality. The girls meet UF researchers and become comfortable in navigating an academic library. Now in its 3rd year, Marston held another fun week for the 2018 camp of developing tactile books, augmented children's stories, and competitive recitations of Pi.

Inspired by the enthusiastic response from patrons, librarians in Marston are continuing to explore new maker technologies to enable student projects, faculty research, and teaching. In the upcoming year, students will be able to check out 360° cameras and a tool library to encourage repair and reuse of devices. Our goal is to provide the tools necessary to enable UF students and faculty to build the future.



ABOVE: Some of the participants and teachers at 2017 Girls Tech Camp.

LEFT: UF student experiments with and experiences Virtual Reality.



Students in *IDH 3931: Exploring 3D with Building, Modeling, and Printing*, taught by librarian, Dr. Sara Gonzalez, built this Jellybox 3D Printer from scratch.