

F25.26: Optimization of a 3D Ceramic Printer to Create Objects for Artistic Display and Engineering Student Learning

Overview

Additive manufacturing using plastics and filaments is an established field. However, 3D printing using ceramics or other mixed materials (e.g., concrete) is still growing. The technology to print ceramic artistic and engineering objects for learning and public display has not been available at scales large enough to make objects the size of bowls, plates, and decorative objects; desktop 3D printers are unable to produce things at a human scale. Thus, the next step in the evolution of ceramic printing is to incorporate larger machines meant for printing at the scale of structures. NAU recently acquired a 3D concrete and ceramic printer (each material has its own machine arm and extruding hardware), which allows for large creations, from artistic sculptures to full-size structures. A student intern will support integration of multiple types of required software with the new hardware, establishment of best practice printing techniques, and optimization of a printable ceramic mixture design.

What the student will DO and LEARN

A student intern will work directly with faculty members, undergraduate students, and graduate students who are actively using the 3D concrete printer to learn how the technology works and then apply their skills to printing with ceramics. It is envisioned that a student intern will learn how to integrate the web-based proprietary user interface with student-created STL files and modern slicing technology; success in this step can lead to printing objects with pre-packaged ceramic mixture ingredients. A student intern will work to establish the best-practice printing techniques by learning and recording how the machine moves around the available space, how the printed objects are transported to and from the laboratory, and how the machine and space should be cleaned to maintain proper printing functionality. After completion of the two prior steps, a student intern may work with the faculty member and a graduate student to optimize a printable ceramic mixture design using materials available locally.

Additional benefits

Students involved in this internship will benefit from learning how to create ceramic objects using cutting edge technology. This advantage may lead to more employment-related discussion with regional employers, and it will establish that the student is an active and responsible learner who can adapt and flourish in a diverse and fast-paced environment.

Additional qualifications

Beneficial but not required: experience with filament, resin, or plastic-based 3D printers and the required software.

This position is partially-funded by NAU's LSAMP program, so acceptance to this position is contingent upon [LSAMP-eligibility](#)

Time commitment

6 hrs/week for 30 weeks