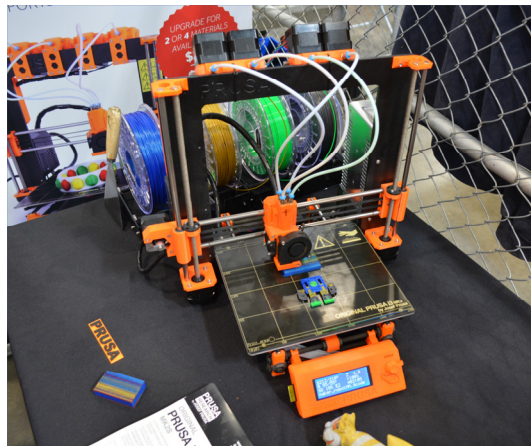




Prusa i3 MK2.5 Printer

As the world's leading 3D printer since 2016, the Prusa i3 3D printer (with MK2.5 upgrade) can print with four different materials simultaneously. The multiple material feeders, with only one hotend, allows for simple calibration, and it is unique from all other available systems. The upgrade kit includes a rebuilt extruder, multiple sensors for ease of access, and a new magnetic MK52 heatbed with replaceable spring steel print sheet. These features will allow us to print models with more precision and ease (Prusa, 2018).



By adjusting the length of time to print, we can make objects smoother, and details more enhanced. The longer an object takes to print, the higher quality the end product will be.

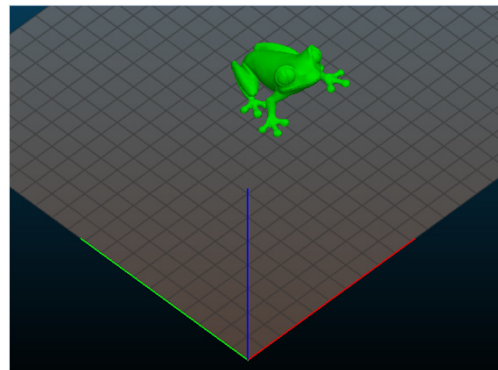


Research Motivation

Physical 3D models provide a representation of computer models that can be held and manipulated. The 3D models can be generated from images captured by a drone. This project also allows us to learn how to operate a four-color 3D printer.

Constructing a Model

To produce a 3D model, one starts with G-code; it is a language containing commands to move parts within the printer. G-code consists of G- and M-commands that have an assigned movement or action. G-code is created using a slicing program, such as Slic3r. This software controls the printer along three axes (X, Y and Z) to build 3D figures.



GIS and 3D Printing

3D geospatial models will revolutionize the way we communicate with, and use, GIS data. These models allow us to quickly, affordably, and more effectively communicate issues related to the landscape and environment. Examples of current uses of 3D models in GIS include geologic analysis, real estate, military strategizing, and city planning. Physical versions of these models, created by 3D printing, allows for simple, hands-on communication.

Drone Project Applications

Images of landforms (including the rock on the campus Quad) are acquired by drone technology. The images are processed using Agisoft Photoscan to create accurate volumetric models of the landforms. The models may be placed on a map using ArcGIS Pro software, or 3D models can be built with the Prusa i3 MK2.5 Multi-Material printer. The first model to be built will be the rock on the central campus of Johnson State College. Then we will use the drone to capture images of the rock chutes at Smuggler's Notch, and gulleys in fields caused by soil erosion, in order build 3D digital models that display rock falls and volume loss due to soil erosion. It is also our intention to build 3D models of our favorite mathematical functions.



Using drone technology is one way to monitor and evaluate environmental problems including rock falls at Smuggler's Notch, landslides in Jeffersonville, and soil erosion in Vermont's fields. This use of the technology, coupled with 3D printing, is the future of environmental monitoring. Learning how to code and use drones is the start of a larger scale initiative to monitor and assess environmental issues in the state of Vermont.

Reference

Prusa (2018). *Original Prusa i3 MK3 kit*. Retrieved on 24 April 2018 from <https://shop.prusa3d.com/en/3d-printers/180original-prusa-i3-mk3-kit.html>