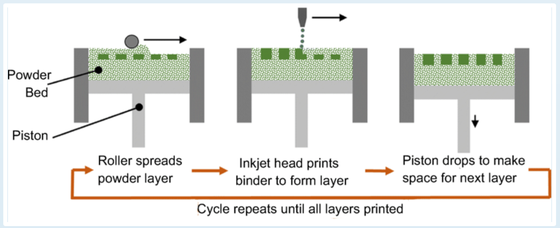
Educationally Focused Illustrations of 3D Printing Technologies

Project Engineers: Cara Rossetti, Cecilia Espadas, Elisa Fritzsche, Jake Mattis, VJ Taverna, Drew Deffenbaugh

Sponsor: Dr. Xiayun Zhao

PITT | SWANSON ENGINEERING

What is Binder Jet 3D Printing?



1. Powder Deposition
2. Powder Distribution
3. Binder Deposition
4. Repeat Steps 1-3

Background

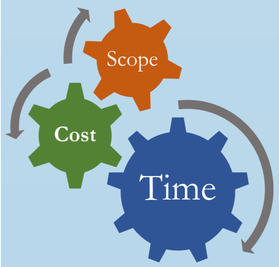
The Carnegie Science Center hosts the 2-Day AIM3DP Boot Camp to introduce advanced manufacturing, machine learning, and measurement science to middle school and high school students

Design Goals

The printer will:

- ✓ teach BJP steps
- ✓ engage students
- ✓ produce simple layers
- ✓ be portable

Challenges



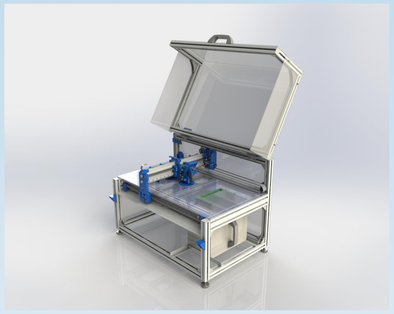
Time and cost constraints necessitated a significant scope modification.

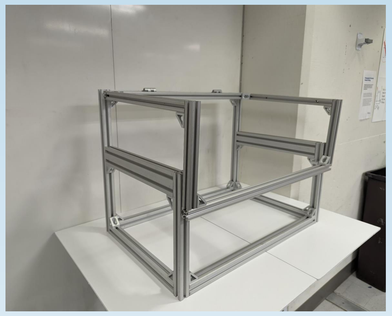
Objective

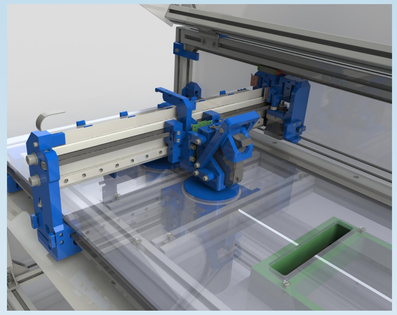
Design binder jet 3D printing resources for use in an educational intervention on additive manufacturing

Modified Oasis Design

Solid-Model Rendering & Completed Base Frame

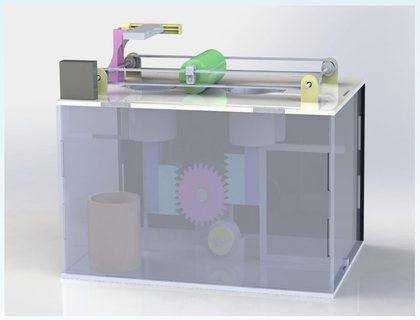


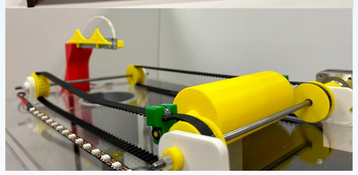


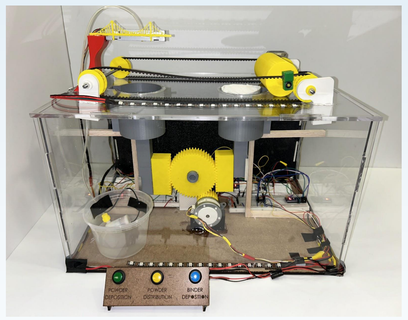


Interactive Demo Printer

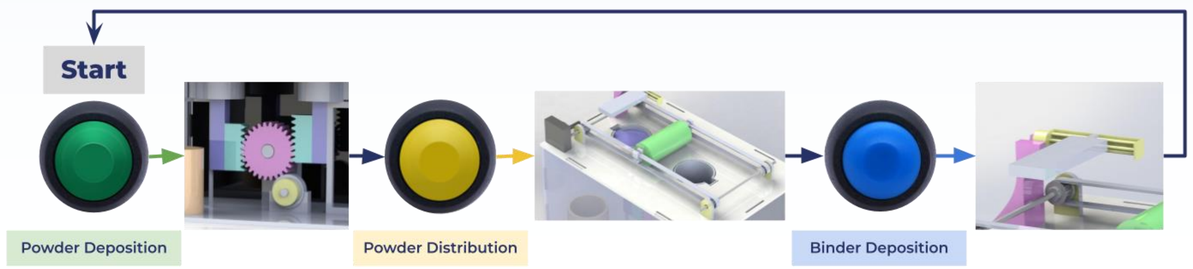
Solid-Model Rendering & Completed Mechatronic Educational Tool





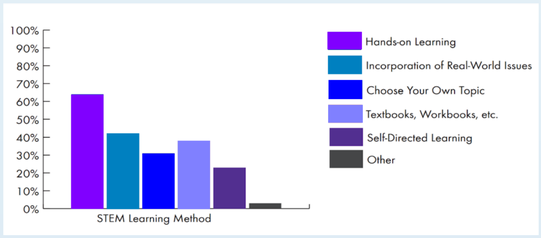


The Interactive Demo Printer offers a unique alternative to learn binder jet printing by producing simple layers at the push of a button. Each button correlates to a different subsystem (shown below) that actuates and lights up when pressed.



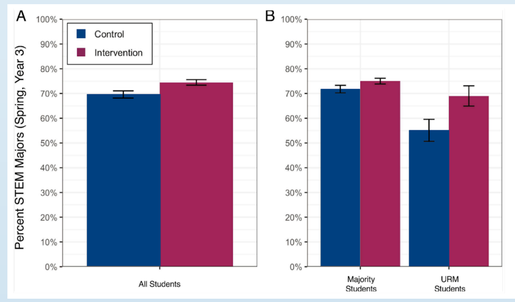
The Impact of STEM Education

Most-Impactful STEM Teaching Methods



Hands-on learning has the greatest impact on students for STEM education.

STEM Intervention Impacts



Educational interventions have considerable effects on underrepresented minority (URM) students.

Educational Videos

K-5 Lesson | 6-12 Lesson | Demo Build

Future Work

Manufacturing	Finish manufacturing brackets and other 3D printed parts needed to complete entire frame
Integrate Software	Integrate hardware and software to modified Oasis frame previously built
Present at Summer Camp	Present at two-day 3D-printing bootcamp aimed at STEM education to K-12 students

Acknowledgements

Dr. Xiayun Zhao ▪ Dr. David Schmidt

Mr. Andy Holmes ▪ Ms. Heather Manns

Ms. Kelly Wodnicki