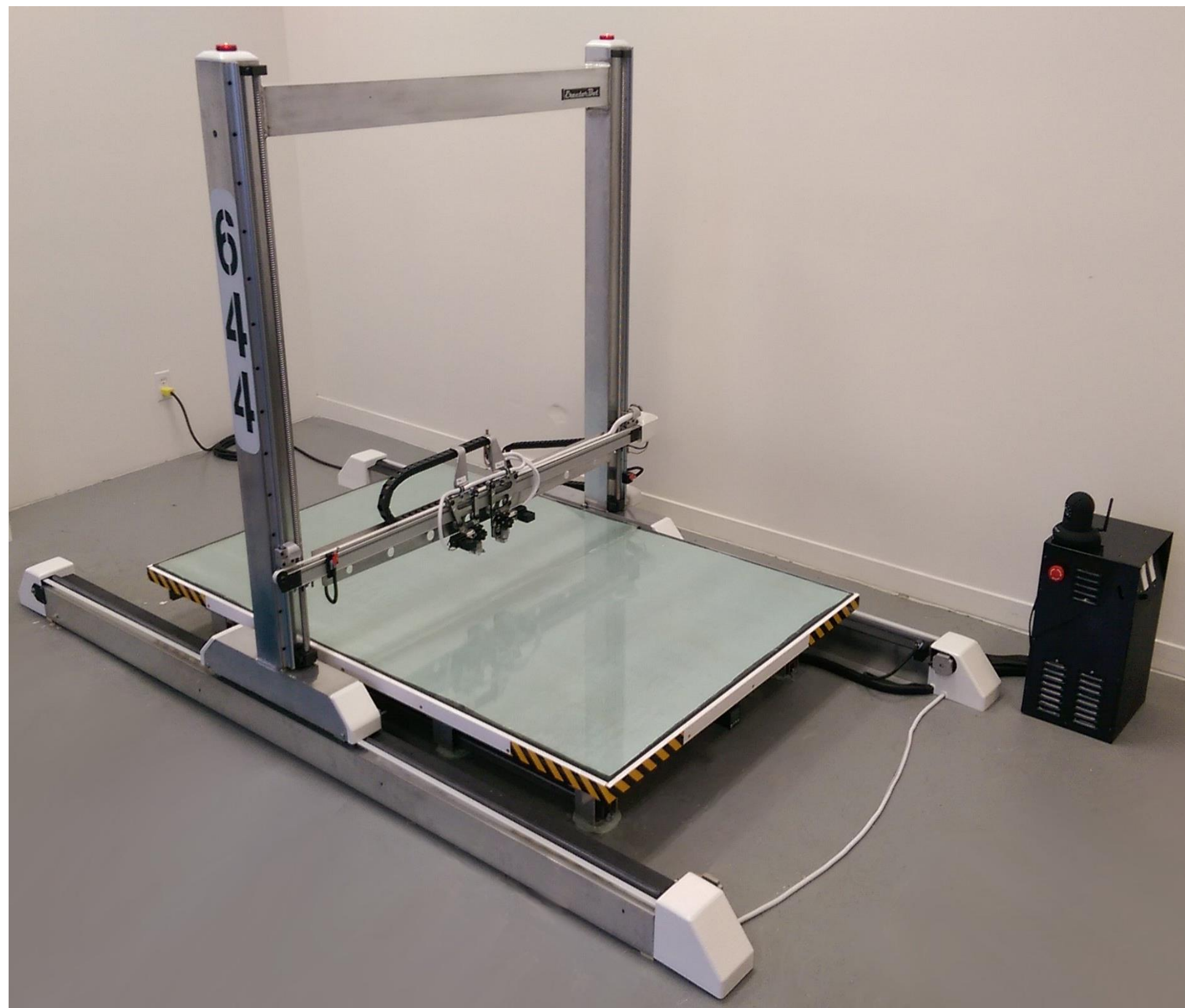


Purpose

Ingram Hall Makerspace currently has a 4x6x4ft large format 3D printer that is sitting in storage and is in need of refurbishing and optimization.



Successfully restoring this printer will have the following impacts:

- Recovery of a \$20,000 piece of equipment
- Platform for graduate students to perform research
- Optimization of the machine will lead to a teach-tool for incoming/current students on machine design

Equipment Needs

- Electrical/control box rewiring
- Updated controller and firmware
- Re-design of extruder and mounting plate
- Assessing current belts, tensioners, and screws
- Thorough documentation for future or updating the printer's capabilities
- A standard operating procedure (SOP) for printer use

Design Features & Processes

Electrical Components

Issues: The electrical control panel contained loose and disorganized wiring. The product was unusable and over engineered.

Challenges: Much of the electrical redesign was self-taught and required extensive research and understanding.

Resolution: The control box was reorganized in a visual way. Each PSU corresponds to a specific function of the printer. MARLIN was chosen as the preferred firmware.

Linear Rails (X & Y Axis)

Issues: The belts were low quality and allowed too much play causing inconsistent and low-quality prints.

Challenges: The belts we received were of a different tooth type and required new timing pulleys to optimize surface contact.

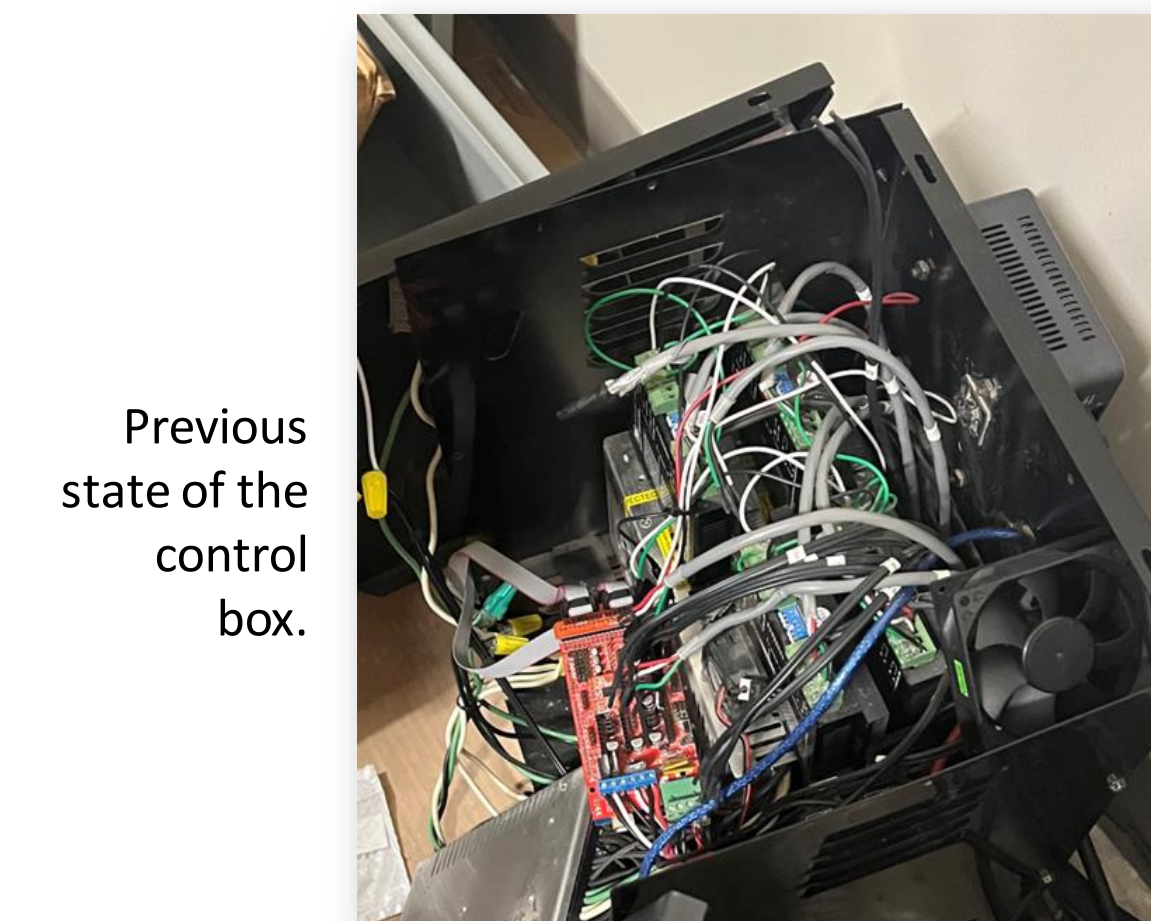
Resolution: The y-axis and x-axis underwent a belt upgrade and fabrication of proper timing pulleys.

Extrusion Assembly

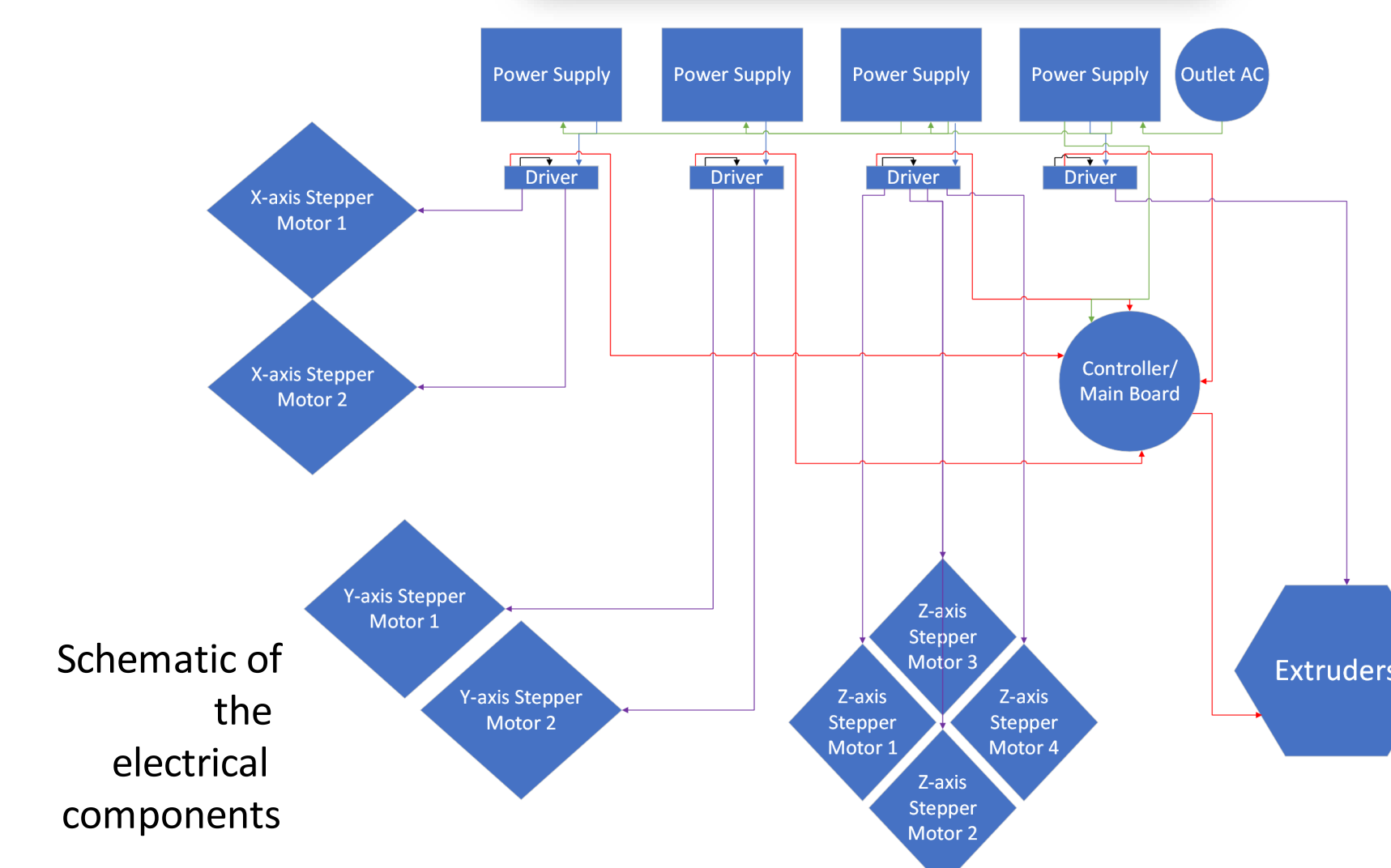
Issues: Extruder did not function properly, had poor configuration, and little upgrade flexibility.

Challenges: There is a high level of interaction with the extruder assembly. There are many dimensions and alignments in this assembly.

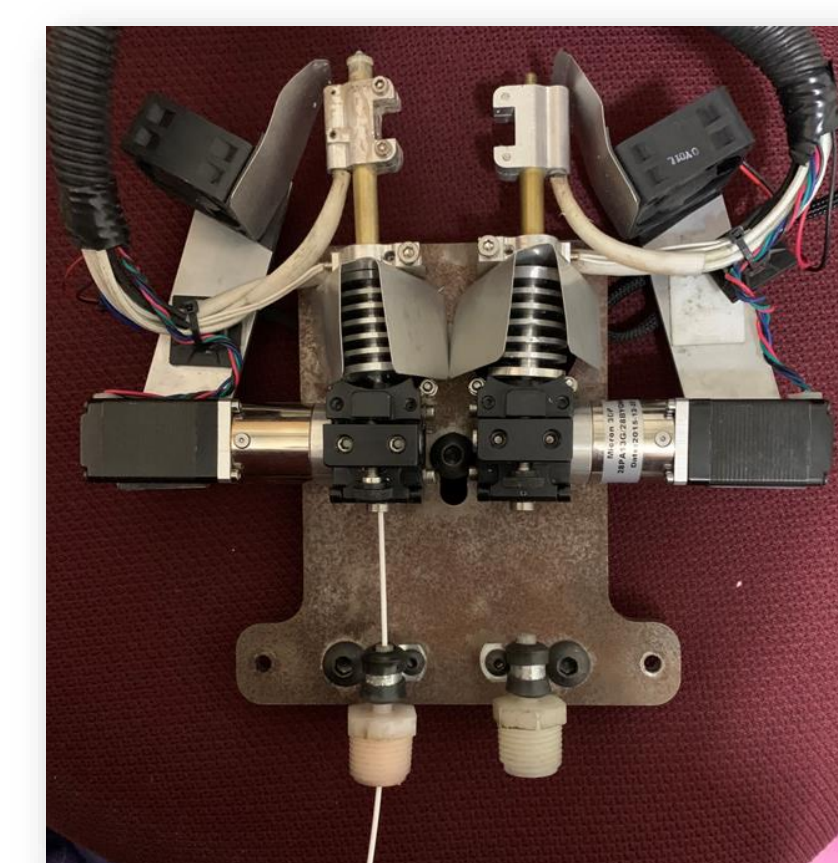
Resolution: The design was inspired by Prusa LulzBot and allows users to disassemble the extruder at varying intensities.



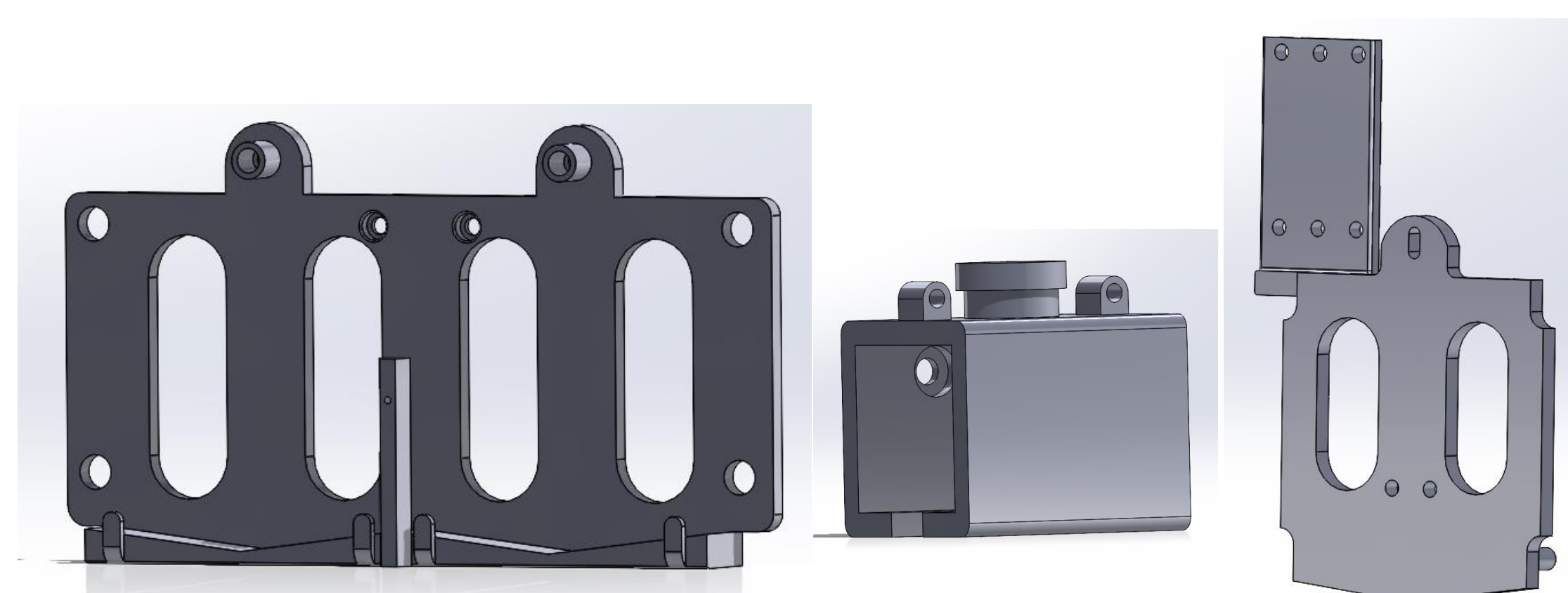
Previous state of the control box.



Schematic of the electrical components



Former extruder set up (left) and the redesigned extruder mounting system (right)



Extruder enclosure, mount, and linear rail fixture designs.

Future Plans

Next Semester Goals

- Functional Heated Print Bed
- Y-rails & Z-axis Fully Attached
- Upgraded Sensors

Stretch Goals

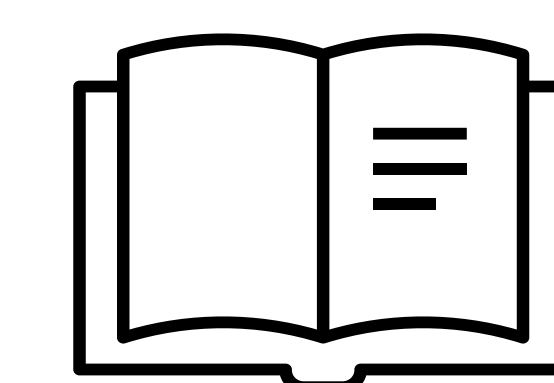
- Print Bed Leveling
- Universal Extruder
- Additional Electrical Safety Features

Standard Operating Procedure

The standard operating procedure will help create a safe guideline for using the printer.

Cataloging for the Future

Having a detailed catalog of all work done to the printer can create a valuable understanding of the machine's history.



Team Members



Acknowledgements

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