



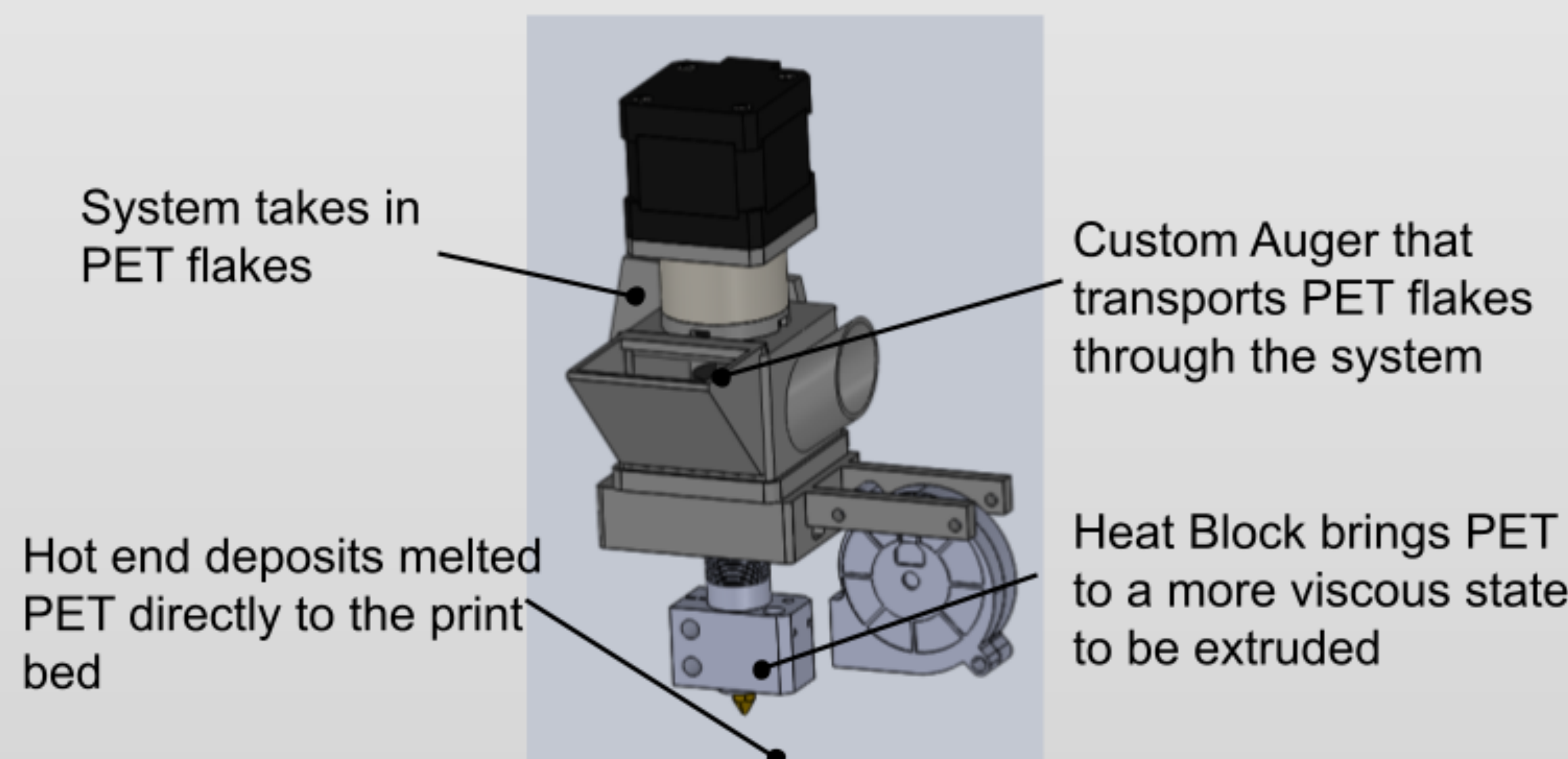
Background

3D printers have proven to be a valuable educational resource, promoting creativity and critical thinking in classrooms. However, in our target community of West Africa, it can cost up to \$100 USD for a roll of filament.

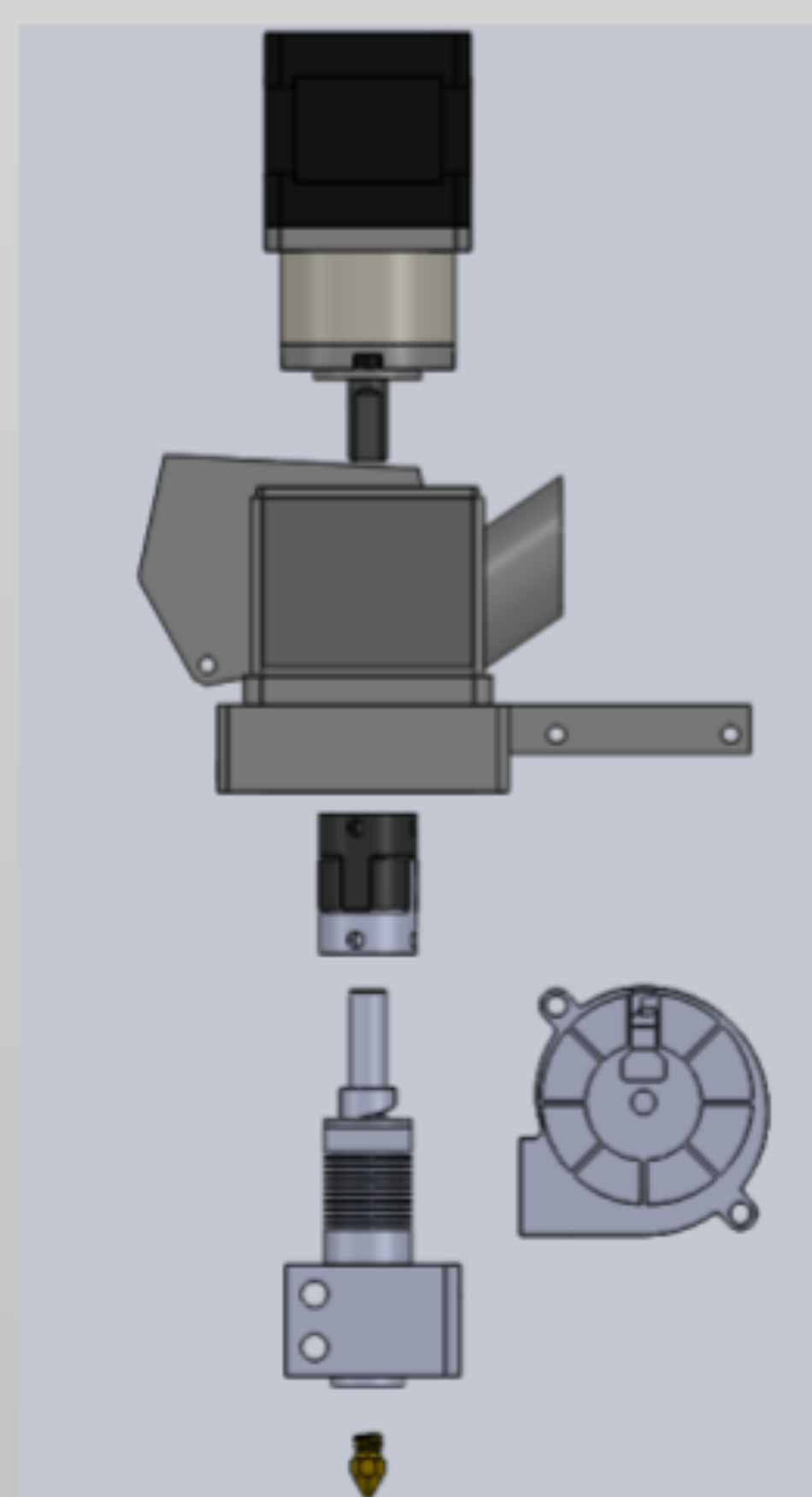
The goal of this project is to utilize commonly available recycled plastic and transform it into 3D printing filament using the Imprimante Print Head Extruder.

Overview

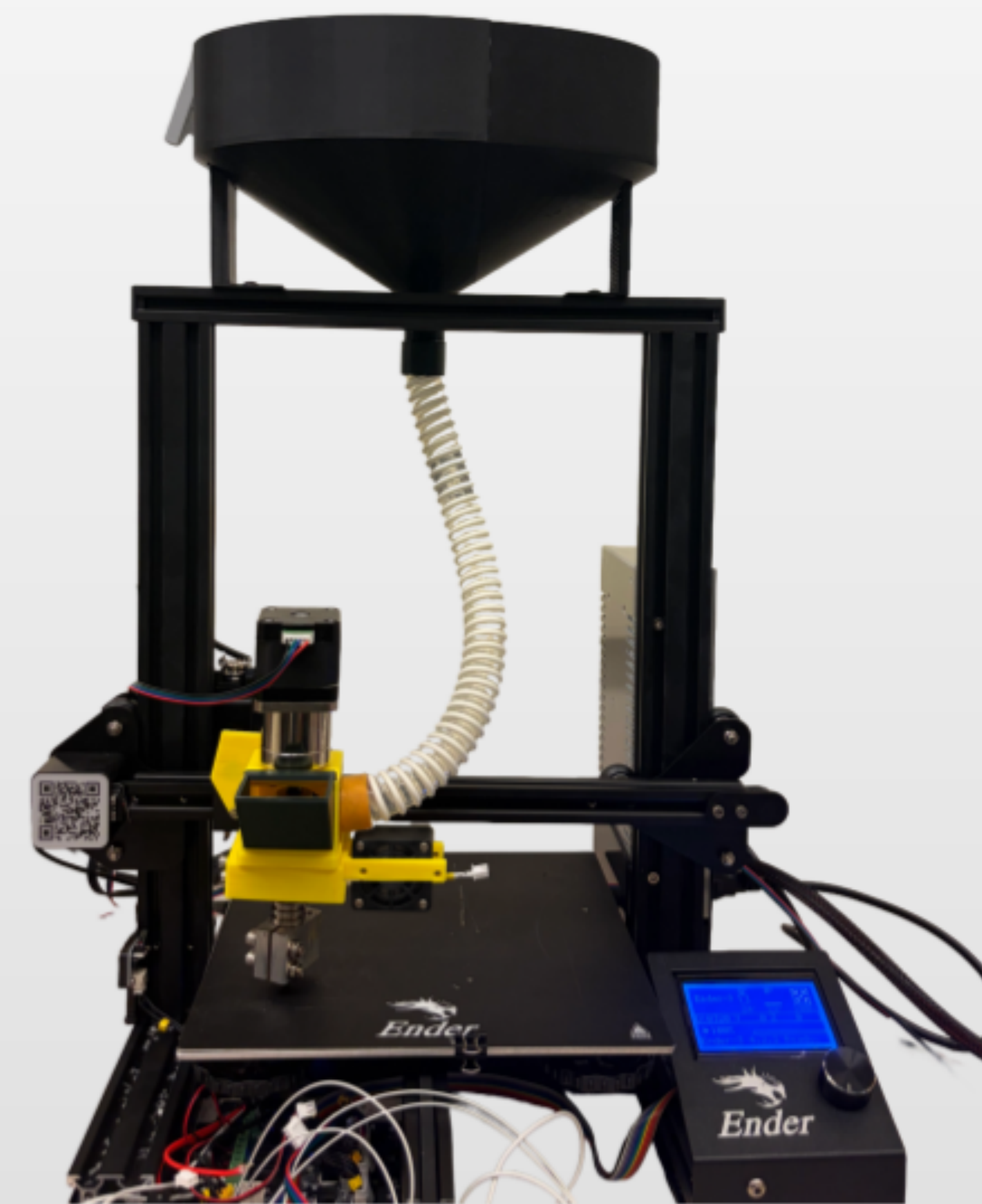
The main goal is to ensure the parts and manufacturing methods used are accessible in the target community of Mali.



Exploded View



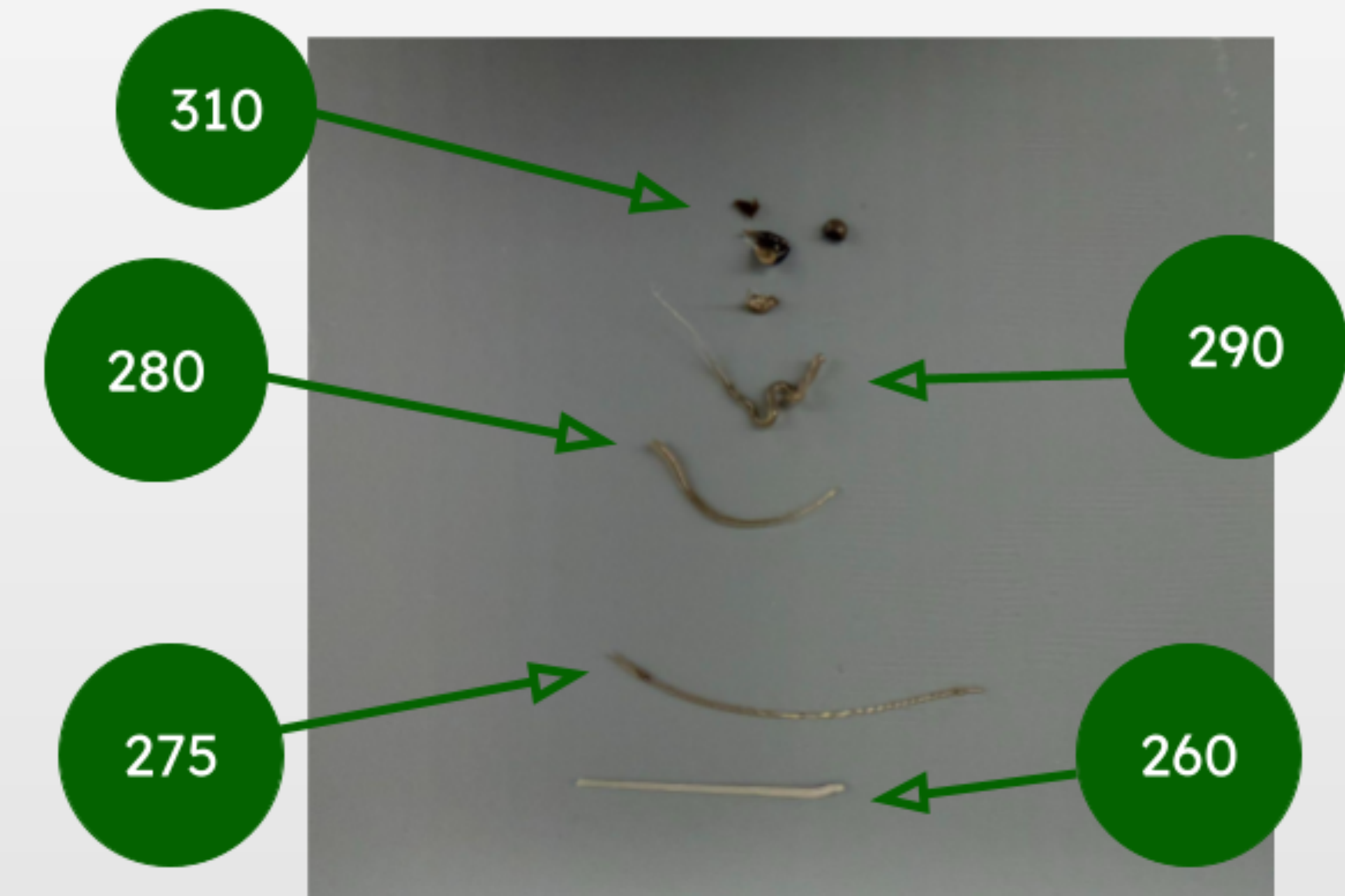
Imprimante Print Head Extruder



Key Components

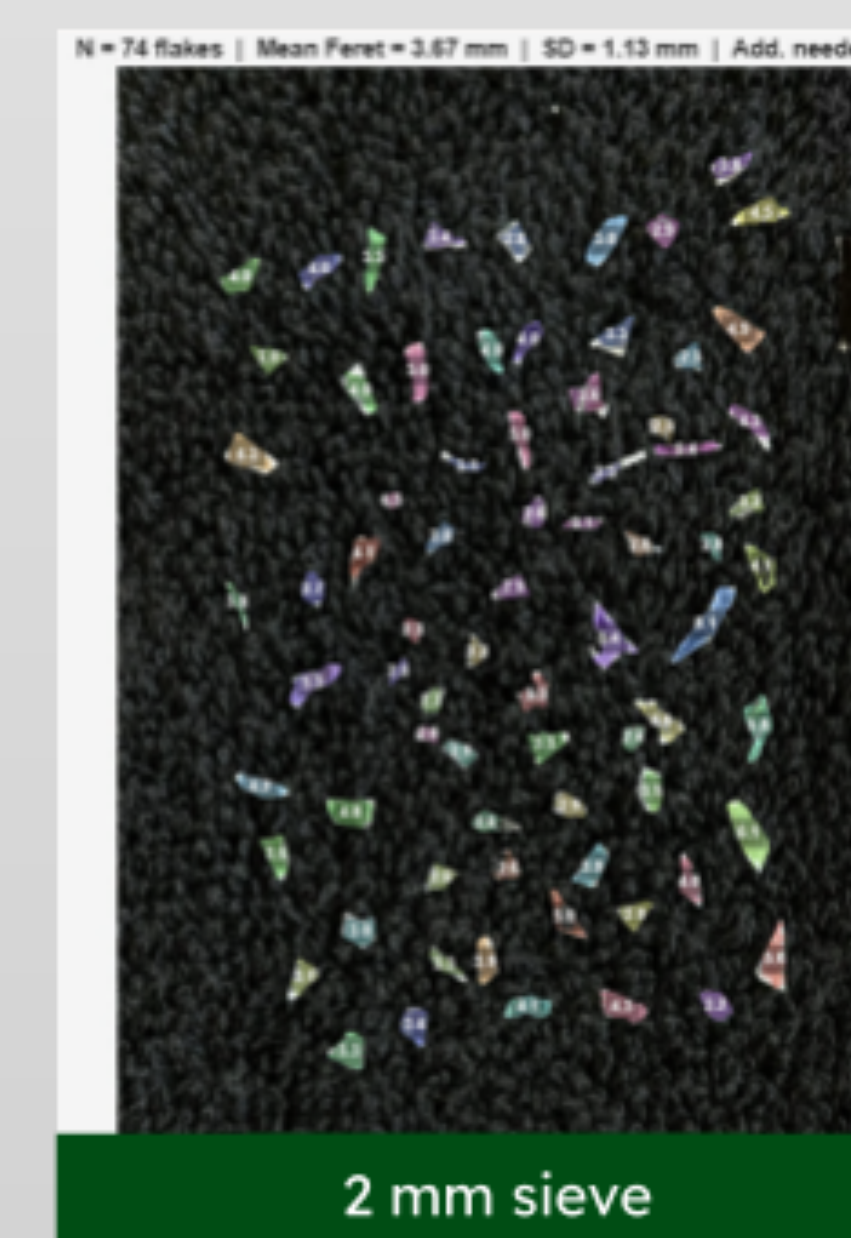
- Funnel**
 - . Fits 3.14 L of flakes (equivalent to 1 kg of filament)
 - . Sloped inner wall to prevent clogging
- Custom Brass Auger**
 - . Grooves transport flakes through heated barrel
 - . Thread pitch optimized to catch flakes
- Heated Barrel**
 - . Heat fins to disperse heat from lower portion
- Heat Block**
 - . Custom aluminum heat block
 - . Heats up to 310 C to melt PET flakes

Filament Temperature Testing



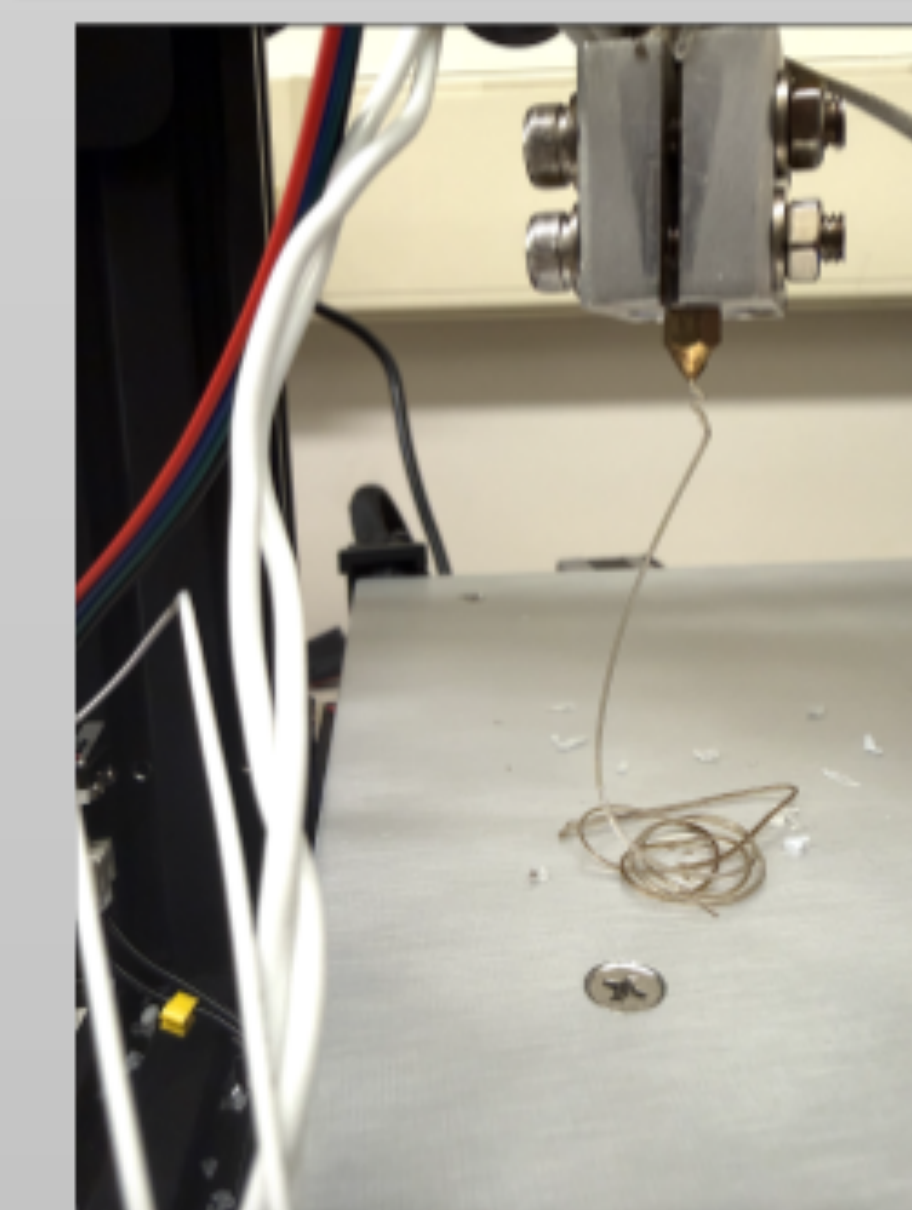
- Tested filament extrusion at different heat block temperatures
- 275 C was optimal as higher temperatures would result in nonideal viscosity and burnt filament

Flake Imaging



- Multiple flake sizes tested with system and imaged
- Flake Imaging to gauge the average flake size the print head extruder could handle
- A 2 mm manual sieve resulted in flakes with an average ferret diameter of 3.67 mm
- This system could intake flakes of this size

Results



- The device was able to extrude a line of filament out
- PET flakes of an average size of 3.67 mm can be used
- PET flakes are smoothly fed from the hopper and through the tubing

Acknowledgements:

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