

# Printing Houses in Auroville, India

## Andrea Mott & Grant Ross

### with Minvayu

## Abstract

University Of Dayton ETHOS program sent two students to Auroville, India. They worked with Minvayu, an organization who primarily deals with developing and implementing wind turbines for irrigation and power consumption. Their project, however, was to build a 3D delta printer to reduce time and labor costs for large construction projects. Most parts of the printer were designed and assembled including: columns, extruder, carriage system, and the rail system. The completed printer was not assembled during the 11 weeks the students were present. Once completed, the printer will be capable of constructing homes from cob, a cheap and readily available material.

## Introduction

- 3D printing is a technology that has high up front costs, but unlimited design opportunities. India has a strong need for affordable housing, especially due to its increasing population and poverty. 3D printing can be used to create houses out of cob.
- A large space is needed to house a 6m high delta 3d printer.

## Project Description

### Printer

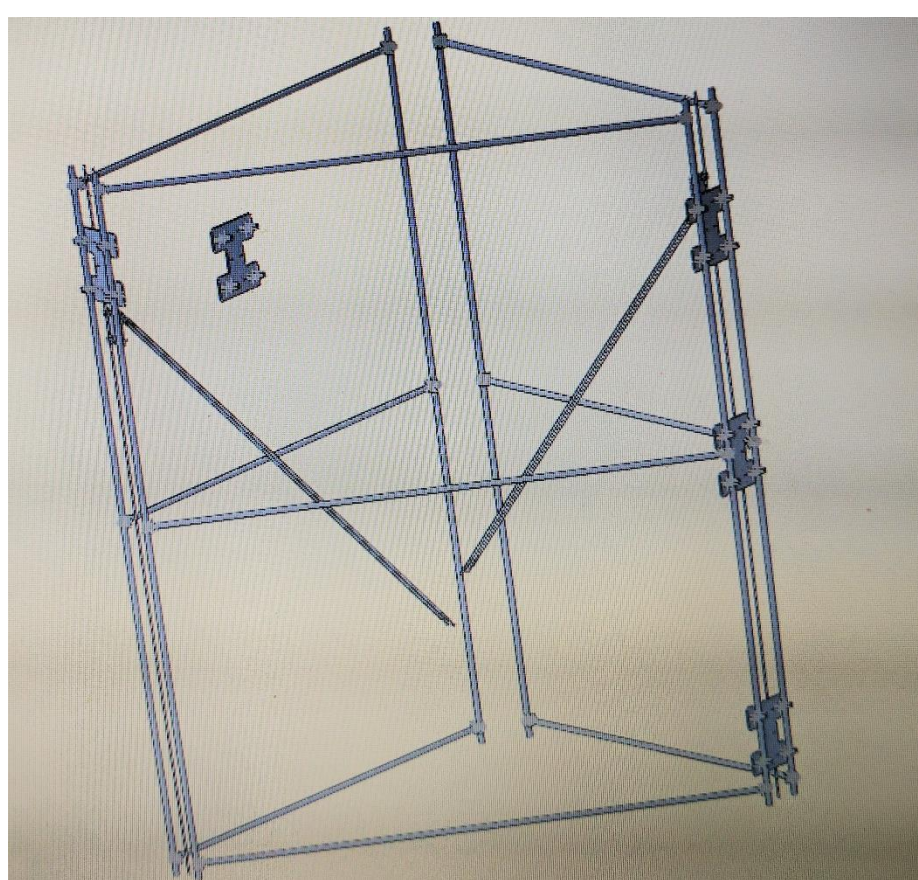
- Chose a delta printer configuration, which ensures a tighter tolerance when printing
- Designed initially for plastic with the future capability of printing cob
- Designed and created the mechanical and structural components of the 6m high 3D printer
  - Includes: Extruder, arms, column supports, rail, carriage, counter weight, covering rain tarp, and more

### CNC

- Built a stand for a CNC to ensure stability and precision when milling
- Modified and troubleshot CNC mill to create exact parts out of wood for the printer

### Upgrade Workshop

- Cemented and welded storage gates for safe storage
- Raised an 8 meter high tarp structure that would protect the workshop and printer from the sun



**Figure 1:** CAD Assembly of Printer's delta design



**Figure 2:** ETHOS team member (Andrea Mott) working in the workshop

## Results & Discussion

### Printer

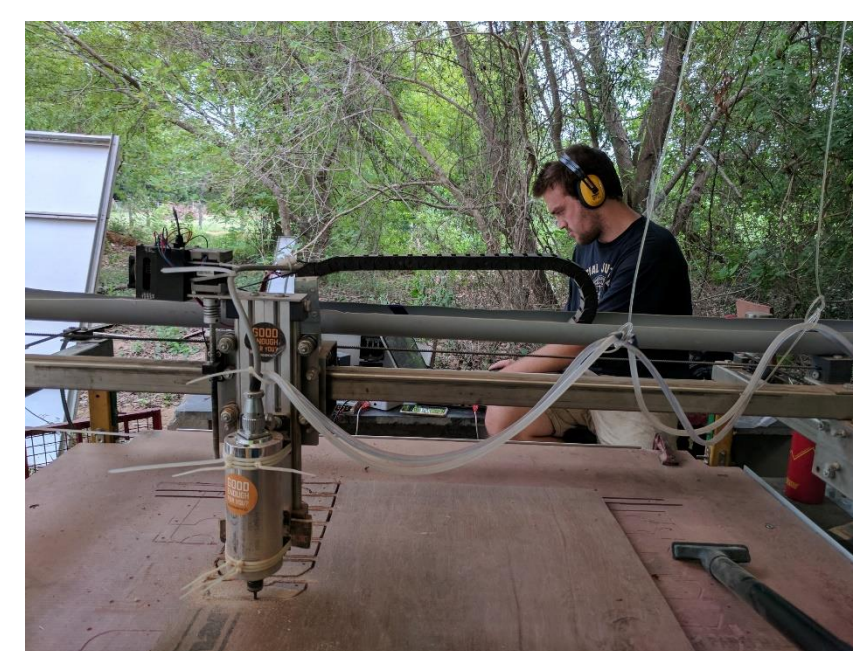
- Finished the design and production of all parts necessary for complete assembly of printer for plastic extrusion
- Waiting on timing belt to fully assemble printer
- Assembled all three columns with counter weight and rail system
- Created a plausible solution for rain cover

### Workshop

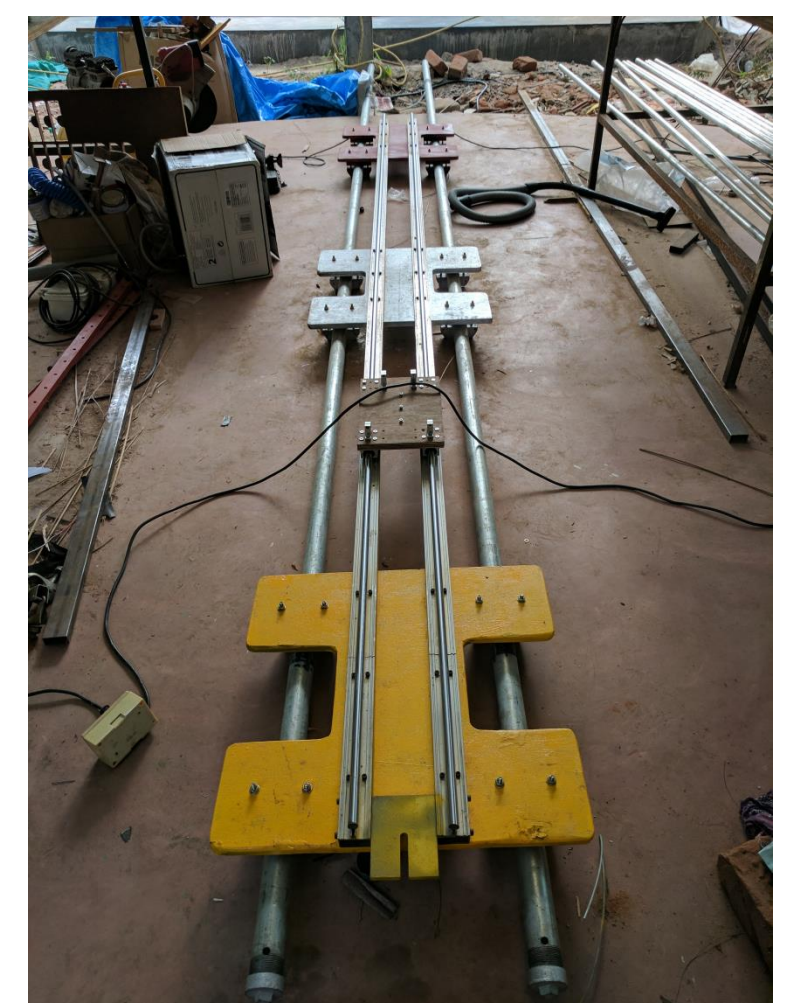
- Completed sun tarp installation
- Finished storage gates

### CNC

- Milled over 230 wooden parts
- Troubleshot problems and achieved tighter tolerances



**Figure 3:** ETHOS team member (Grant Ross) working on CNC machine.



**Figure 4:** Column and rail system



**Figure 5:** Extruder



**Figure 6:** Workshop construction

## Recommendations

- The structure will need to be raised and assembled once all parts arrive.
- Software and electrical aspects of the printer will need to be completed to allow the printer to operate.
- The design will need to be modified to adapt to cob printing.

## Acknowledgements

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