



Introduction

- In the field of additive manufacturing (AM) new developments are moving at a fast pace.
- The current technologies in AM are all fixed to a closed working envelope that limits the printing size. The way to work around this limitation is to make AM mobile
- With the TechBot it is now possible to make a entire tabletop or hardwood floor into your working envelope.
- The TechBot is equipped with a in house designed syringe extruder that will be filled with materials from multiple industries.

Literature Review

- MIT’s Mobile Concrete Printer [1]
- University of Arkansas Mobile Plastic 3D Printer - [2]
- 3&D Robotic Printer – Mobile liquid polymer extruding 3D printer [3]
- Addibots– Mobile ice repairing robots [4]

Design Criteria

There were multiple criteria taken into consideration when coming up with a preliminary design. Some key items taken into consideration:

- Be unrestricted in the X and Y axis.
- Keep the cost below \$500.
- Make it a possible D.I.Y. kit.
- Be able to print a variety of paste-like materials.
- Be able to run G code.

Design of Experiments

Key parameter categories to be considered:

- Material
- Printer Settings
- Print Results

Chosen Variables

Print Speed	Flow Rate	Material Density
Travel Speed	Infill	Extrusion Rate
Layer Dislocation	Layer Height	Final Dimensions

Results

- Currently the TechBot is producing good results printing common shapes and the Tennessee Tech “T” shape.
- Material viscosity is the most important variable to the syringe extrude correctly.



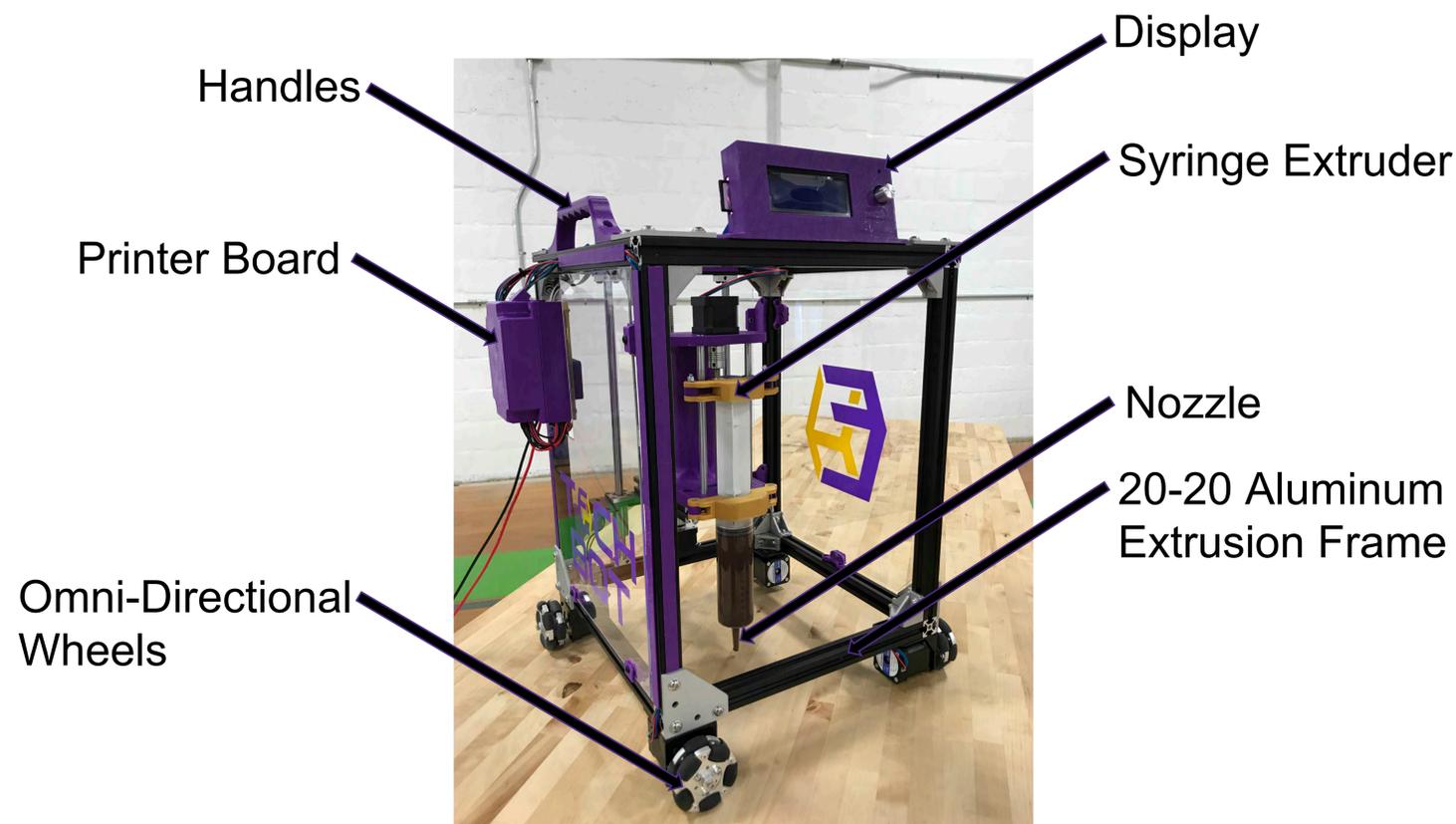
Conclusion

The TechBot is currently printing one layer shapes, and after more material research it will be printing multilayer objects with the use of less viscous pastes.

For the near future, there are several different research opportunities that revolve around the TechBot:

- Using the TechBot mobile multitasking platform to develop a mobile tape applicator for multipurpose gyms. This will result in a quick and precise method to convert a multipurpose gym floor from a basketball court to volleyball court.
- The TechBot platform can also be used to incorporate a fast drying paint extruder to paint team logos onto arena floors. During sport tournaments the TechBot could paint both team logo onto arena floor within minutes. This paint can be removed with the appropriate dissolver.
- Another application for the TechBot platform is in the construction industry to extrude grout between tile gaps.

The Current State



References

- [1] D. Chanderler, “3-D printing offers new approach to making buildings,” MIT News Off., 2017.
- [2] L. G. Marques, R. A. Williams, and W. Zhou, “A Mobile 3D Printer for Cooperative 3D Printing 2 . Mobile Printer Design,” Solid Free. Fabr. Symp., pp. 1645–1660, 2017.
- [3] A. Wheeler, “The mobile 3&d 3d printing bot: the proof is in a cycle of,” 3D Printing Industry, 2014.
- [4] Benedict and R. Flitsch, “3D printers on wheels? Addibots autonomous mobile robots to take 3D printing down a new road,” 3ders, 2015.
- [5] S. Saunders, “NTU Singapore Researchers Develop Mobile 3D Printing Concrete Collaborative Robots,” 3DPRINT, 2018.