

CMSC 22010 Final Project Proposal: 3D Scanner

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1 Objective

We aim to construct a simple laser scanner which will have the ability to scan real-world objects and produce STL representations of them, ready to be 3D-printed.

Thus, our project will have two main components: the first will be the hardware—that is, the scanner itself—which will be constructed from a combination of electronic parts and parts that we will design and 3D print. The second component is the software, which will need to:

1. Control the 3D scanner
2. Interpret the data produced by the scanner and use it to produce an STL file

2 Background and Previous Work

One possible use case for 3D printers is object replication. While it certainly is possible to design 3D models of real-world objects in CAD software, there are a number of drawbacks to this approach: it may require many iterations to get right, it may be time-consuming, and it requires a very particular set of skills. One alternative is to use a 3D scanner, which simplifies and automates the process of digitally fabricating the desired object.

3D scanners are already in wide use (see Section 4) and commercially available.¹ Moreover, there are already a number of DIY solutions readily available on the Internet (some are listed in Section 4), rendering the cost of commercially-produced 3D scanners largely irrelevant. As such, the aims of this project will be far more pedagogical than practical.

3 Technical Approach

Section 4 lists a number of references that will be useful in designing a laser scanner. The most straightforward approach appears to be a turntable on which to put the object to scan, which is able to rotate independently of the laser itself. Parts for the 3D scanner which cannot be cannibalized from our 3D printers will be designed in CAD software and 3D printed.

The biggest challenge will likely be in processing the data produced by the scanner. This can likely be done by combining information about motor positions with the other output data.

4 References

Below are some DIY guides that might serve as inspiration in our design:

- <http://www.instructables.com/id/3-D-Laser-Scanner/>
- <http://www.instructables.com/id/Build-a-30-laser/>

Other reference:

- https://en.wikipedia.org/wiki/3D_scanner
- <http://warnercnr.colostate.edu/~lefsky/isprs/1133.pdf>
- <http://www.rockini.name/research/papers/vcgscanner.pdf>
- <http://www.mdpi.com/2227-7080/2/2/76>

¹Amazon lists 39 available for purchase, ranging widely in price from under \$200 to nearly \$50,000.

5 Timeline

May 8 Design

May 15 Construction completed

May 22 Transfer of scanner data to computer

May 29 Conversion of scanner data to STL