Name(s)	Project Number
Tyler Bodenhamer	**S0305**

Project Title

Engineering a 3D Printer Built with Recycled Computer Parts

Abstract

Objectives
My design objective is to build a quality 3D printer out of recycled computer parts, for less than $75. The 3D printer will be evaluated by comparing a 3D printed object to the same object printed on a commercially available 3D printer.

Methods
Three recycled CD-ROM drives were used for the X, Y, and Z-axis movement of the printer, along with a recycled CPU power supply. An Arduino Uno and stepper motors boards controlled both the CD-ROM drives and a rewired 3D pen extruder. Open-source programs were used to draw a 3D object, create the G-code, and then to 3D print the object. The printer settings were tested and calibrated to make the 3D printer work. A variety of shapes were printed to test quality, ease of use, and maximum print size. An identical object was printed on a commercial printer for comparison.

Results
I successfully built a functioning 3D printer for only $70.11 that can print multiple different shapes. Building and calibrating the printer took a lot of trial and error to get the printer to work well. Also, the G-code had to be edited for each object design printed. The control of the 3D pen was limited and using it as the PLA extruder was the biggest challenge to the quality of the print. The maximum 3D print size was 37 x 40 x 25 mm.

Conclusions
I was able to successfully build a functioning 3D printer for less than $75, which is much less than the cost to buy one. The final 3D print was not as crisp as the same object printed on a commercial printer, however, I believe that the print quality could be improved with further modifications. This 3D printer was very challenging to build but it shows that the basic fundamentals of 3D printing are simple to understand.

Summary Statement

I built a functioning 3D printer for less than $75 by using recycled computer parts, an Arduino Control board, and open-source software.

Help Received

I researched and built the 3D printer myself. Mr. Gonia, my engineering teacher, helped me print a comparison object on the 3D printer at my school.