



CALIFORNIA STATE SCIENCE FAIR 2017 PROJECT SUMMARY

Name(s) Ashwin Viswesvaran	Project Number S0325
Project Title The Making of a Maker: How I Built My 3D Printer	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Main aim of my project was to create a 3D printer mostly using recycled computer parts. Another objective was to do this within a budget of \$150. Functionally, the goal was to be able to print a 16mm cube perfectly (within the margin of error) without any issues.</p> <p>Methods/Materials Two DVD drives and a Floppy drive from old computers provided the 3 stepper motors and the housing needed to drive the X, Y and Z-axes of the printer. Other off-the-shelf 3D printing parts include the hotend, extruder and the Arduino Mega 2560 microcontroller which was paired with RAMPS 1.4 controller board.</p> <p>The hardware specs allowed for a max print volume of 34x34x16mm. The hotend with 200C rating allowed PLA plastic to be extruded.</p> <p>Open source Marlin firmware and Open source Repetier 3D printing software were used as well.</p> <p>Results The printer works by receiving a 3D model from a file and slicing it into multiple layers which are created one at a time with appropriate movement of X and Y axes. When a layer is done, Z axis moves up a layer high to start the next layer. This meant obtaining a close enough alignment of the three axes perpendicular to one another and printing surface parallel to the resting surface.</p> <p>After many cycles of calibrations both at the Marlin firmware level and the Repetier 3D printing software level to map the physical distances to motor steps, I was able to print a near perfect 16mm cubes realizing my set objective.</p> <p>Conclusions/Discussion In conclusion, my project was a success as I was able to print several other objects with very high resolution beyond the set objective of printing a 16mm cube. The printer design is very versatile and will allow some easy modifications to meet my future needs. The project clearly demonstrated to me that not all highly advanced technologies have to be expensive or complex to build or use if right design principles are applied while creating them.</p>	
Summary Statement I built a fully functional 3D printer using some old computer parts, some off-the-shelf parts and a budget of \$150.	
Help Received I obtained useful tips from my mentor Dr. Wilmot. My father helped me with the needed complex woodwork & tuning.	