

Assessing the Printer

Mentor Visit Assessment 3

Mentor: Dr. Tae-Youl Choi

Profession: Associate Professor of Mechanical and Energy Engineering at UNT

Location: UNT Discovery Park F101J, 3940 N Elm St Denton, TX 76207

Date: April 12th, 2018

Time: 2:45 pm - 4:00 pm

Assessment:

During my most recent visit with Dr. Choi, I actually managed to bring my fully assembled 3D printer to show to both him as well as his student. Going into this visit, I was eager to show the significant progress I had made on constructing the machine while also hoping that I would be able to possibly test or even print something during the visit itself. I also hoped to receive feedback and suggestions on what I could add or remove from the printer to improve it.

For the bulk of the visit, we had the printer set up in an empty conference room where I was able to adequately demonstrate the various functions of the printer such as XYZ motion as well as some of the issues I had actually run into when assembling the printer. One of these issues being that when the axes “homed” the nozzle would be hanging off the bed. I had previously tried to correct this problem by changing settings in the firmware but to no avail. Dr. Choi’s student, Mr. Jin, recommended that I add 3D printed shims on the axes as a sort of physical offset in order to make sure that the nozzle would be in the proper position when homed. During the visit I also explained how I had run into the problem of properly homing the Z axis which often homed too high for the printer to actually print properly. For this issue Mr. Jin

recommended changing some of the firmware settings in order to fix this problem. During this mentor visit we also managed to test the actual extrusion and heating function of the nozzle. Since my printer did not use an LCD display as most 3D printers used, I had to explain that I used my laptop with open-source software called “Pronterface” as well as a USB cable to both interface with and generate prints on the printer. Fortunately, Dr. Choi had provided some filament for me to use during the visit in order to test the extruder and nozzle. During this phase of testing I did run into some trouble with actually feeding the filament as I found that the PTFE tube which was located under the extruder gear was slightly misaligned and would have to be manually guided in with a tool such as a screwdriver each time when changing filaments. However, the extrusion and heating functions of the printer still worked perfectly and were able to extrude filament once guided in. For most of the visit we mainly ran through the functions of the printer as well as evaluate the various components of the printer such as the wooden fiber-board frame, the threaded rod base, and the heated bed. One of the components that Dr. Choi had noticed a problem with was actually one of the Z-axis couplings which connected the Z-axis stepper motor to the threaded rod which to him seemed quite wobbly during operation. I explained that I had haphazardly only ordered one correctly sized coupling and had to use a spare coupling from a different printer in order to simply get the machine to function while I waited for the second coupling to arrive in the mail.

Overall, I would say that for the most part, this mentor visit allowed me to update Dr. Choi on my progress with the creation stage of my 3D printer as well as to demonstrate some of the possibilities which are to come. While I was unable to actually get a physical print completed during my visit, I was able to gain substantial feedback on the structure of my printer, the

stability, and the problems I had encountered on my printer. After arriving at home that same day, I took this feedback to heart and immediately began addressing the issue of the improper “homing” location by adding a Z offset in the firmware settings as well as temporary shims using popsicle sticks hot glued to the X and Y axes until I could print 3D printed shims with the completed printer. These solutions both worked out fine in the end and were integral to getting my printer to function. I also tried to address the filament lining up with the PTFE tube which I managed to fix by taking one of the extruder springs off which relieved some of the tension on the filament into the tube. By my next mentor visit, I hope to show Dr. Choi possibly some completed prints as well as to update him on possible improvements which I may make to the printer in the weeks to come. Now that my 3D printer is complete, I can really start focusing on designing models which can serve many applications as well as ones which have a significant need. I hope to begin printing and possibly testing these parts soon and hope to do this before next mentor visit.