sdmay19-03: 3D Metal Printer - Phase II
EE/CprE/SE 491 Weekly Report 3
September 24 - October 7
Client/Advisor: Dr. Bigelow

Team Members

Thomas Waters — *Team Lead, Computer Engineer*
Ariel Rizhsky-Yakobson — *Computer Engineer*
Jacob Gosse — *Electrical Engineer*
Alvin Rymash — *Electrical Engineer*
Carter Cahill — *Software Engineer*
Armand Hernandez — *Software Engineer*

Summary of Progress this Report

During this reporting period, we focused on getting the 3D printer to communicate with a computer. The computer engineers and software engineers were working together to get the printer to communicate with a personal laptop. We made sure that all the cables were correctly connected and the stepper motors were working. We went through all the code files to make sure that the ports matched to the port that the 3D printer is connected to. The electrical engineers worked on making a list of all the sensors required to monitor the 3D printer. We did an inventory check to note what sensors/components are required for the future. We also researched on different cameras to place inside the vacuum chamber for monitoring. This camera needs to be a specific camera that can withstand a hard vacuum and is less sensitive to temperature. The material the camera is made off will play a big role in determining whether it will withstand a vacuum chamber.

Pending Issues

Our biggest issue is getting the 3D printer to communicate to the computer. There were port issues within the code that needs to be fixed.

Alvin Rymash and Jacob Gosse (Electrical Engineers): Before researching we thought it would be a fairly fast process to get a camera working in a vacuum chamber. However, after talking to Lee Harker in the ETG department, there were a lot of factors that came up. Not a lot of camera can work in vacuum chambers because a lot of cameras are made of plastic. We need to consider the material of the camera in order for it to withstand vacuum chambers. Another factor is the temperature range we are working at. Since we are working with lasers, the vacuum chamber will be relatively hot and this can be an issue if we do not have the right camera in mind.

Plans for Upcoming Reporting Period

Our plans for the upcoming week is to set up a meeting the mechanical engineers who are also working on this project to talk about the roller that will be placed on the bed of the printer. We will be setting up a meeting the them in the lab to go through what the 3D printer needs to get it running. The software and computer engineers will be working with the code and contacting tech support as there are issues with the computer in the lab. The electrical engineers will continue to design a way to view the 3D printer when it is placed inside the vacuum

chamber.

Computer Engineers
Thomas Waters: Setting up a meeting with the mechanical engineers to work on the roller as this will be one of the most important part of the printer. It will be responsible for rolling the stainless steel powder onto the bed for the laser to etch.
Ariel Rizhsky-Yakobson: Assisting Thomas with the roller and going over national standards to make sure the 3D printer meets the standards.

Electrical Engineers
**Jacob Gosse:** Continue to design a way to view the 3D printer from outside the vacuum chamber.
Alvin Rymash: Talk to Ames Lab regarding cameras in vacuum chamber as not many cameras are able to operate in vacuum chambers. Some ways that may work to overcome this is a fiber optic chamber where the camera will be placed outside of the vacuum chamber rather than inside.

Software Engineers
Carter Cahill: He will be working on fixing the software to run the 3D printer. There are port issues that needs to be fixed and he will be working on those and hopefully get the printer to communicate with a computer.
Armand Hernandez: He will be contacting tech support in order to get compiler programs on the lab computer. He will be working alongside Carter to fix the code as there are a lot of codes to go through.

Below is a picture of a block diagram for our upcoming weeks and what we have to work on:
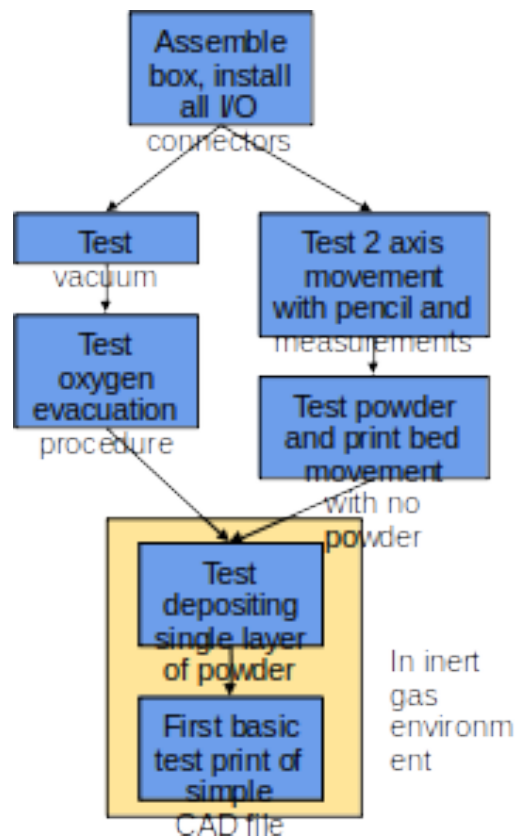
Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Thomas Waters	Going through the code to find mistakes	8	23
Ariel Rizhsky-Yakobson	Helped with going through the code	7	15
Jacob Gosse	Made sure that all the wires were connected properly, did an inventory check on all sensors that are available and researching on the camera	9	25
Alvin Rymash	Made sure the wiring in the vacuum chamber were correctly labeled, inventory check on the sensors and researching on camera options	9	23
Carter Cahill	Went over the code and contacted tech support to get the lab computer to communicate with the 3D printer	8	22
Armand Hernandez	Assisted in finding mistakes in the code and making sure all ports are in sync with the code	9	25