Designing Mounts for In-Situ Powder Bed Fusion Monitoring

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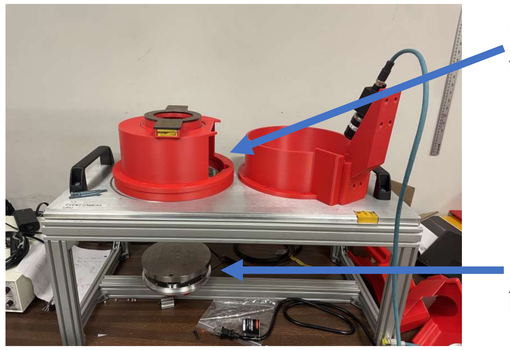
Abstract

Aiding the powder bed fusion monitoring design, I helped design a cylindrical camera mount using a 3-D modeling software called Onshape. After several iterations, I prototyped a test-printed mount and the final design awaits printing. Additionally, I wrote a Python script to automate file transfers for an event camera that eases the organization process. All of the code and designs are saved and documented using GitHub, a cloud-based file management system.

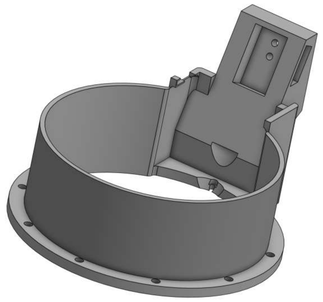


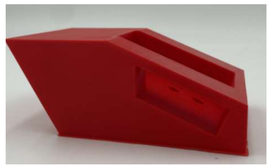
Introduction

Powder Bed Fusion is a promising form of additive manufacturing because of its accuracy and mechanical strength. These capabilities make it ideal for industries such as the aerospace or automotive manufacturing. However, the process is time-consuming, and the powder is expensive. These problems can be worsened if the print fails, leading to even more time and material waste. We decided to implement a monitoring system to counteract these problems. By using cameras and getting the data, we could analyze defects during the process or end the print early before wasting further materials.

Designing the Mount

- Original mount not integrated into the main cylinder holder
  - Fastening screws were also awkward, since there was side panels
- First design integrated it on the main frame and made a cutout to easily fasten screws
  - No flushing for the screws
  - Cutout proved to be even more awkward





Python Script

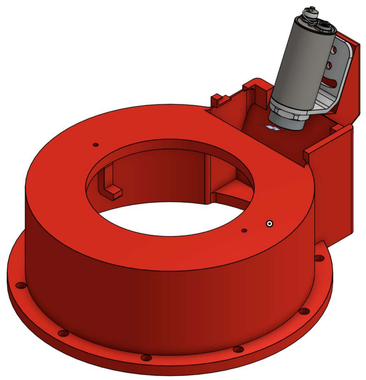
- Manually converting data and organizing it is really tedious
- Developed a python script to do this in the powershell
  - Takes a .raw file from the data
  - Runs an executable to convert .raw into a .csv file
  - Automatically places into a specified file

```
import subprocess
import os
```

- subprocess used to execute commands on the powerline
- os used to find files

Designing the Mount v2

- Completely removed the sides
- Added flushing
- Added a frame for a telescoping cover
- Final design awaiting printing



Conclusion and Future Work

- Improves the sustainability of powder bed fusion
- Code and cylindrical mount provides the support system needed for future work
- Can be used for further research into powder bed fusion manufacturing
  - Analyzing data collected from the thermal camera
  - Developing code to terminate the printing process given enough errors
- Some minor improvements for my design could include optimizing the amount of material used, cutting down printing time.

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