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Team F: ADD_IN

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ILR10

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I - Individual progress

My initial goals the past two weeks were to do tests on the printer and implement fixes whenever necessary, but since the firmware was not totally functional yet I had to adapt slightly my objectives, so I worked on putting the homing switch and making the mount stronger, and also on the locating feature optimization.

1.1 Homing switch:

To add the opto-slot sensor I made the newest iteration of the mount, which is shown in figure 1. I also took that chance to increase the mount's thickness in all areas that were showing flexibility and I printed it in 100% infill. The result was a surprisingly strong mount that should hold much better.
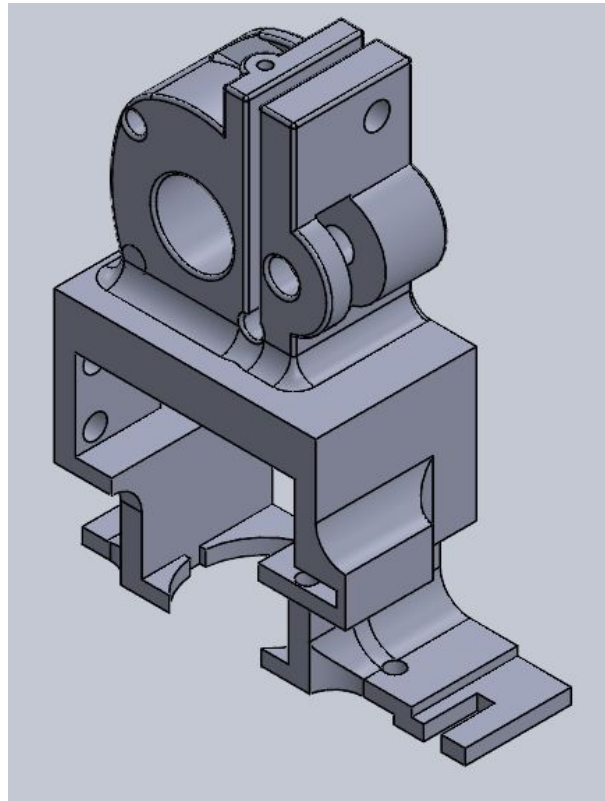

Figure 1: Final mount iteration

And it allows to just slide in the sensor so it is easy to replace without the need to remove the encoder wheel beforehand.

I also reprinted the original Makergear extruder motor mount, a 3D printed part that comes with the printer and that I hadn't modified before, with 100% infill because it was responsible for some of the flexibility in the nozzle. The result is now I believe rigid enough for our use.

1.2 Locating feature

In order to determine the best locating I designed and printed the test part that is shown in figure 2. It is consisting of 3 variance of identical double slots for a square part. After printing it I placed the part in the locating feature to evaluate how repeatable the placement is. The goal of that part was to confirm my initial intuition that a locating feature with a finite number of contact points printed as corners would do better at both locating the item and making it easier for the operator to place it. The middle feature is just exactly the same size as the item, but because the print finish is never perfect, it is very hard, sometimes impossible to place in the item without moving the part, and if the part is moved on the print bed it would lose adhesion and the print can be considered as failed at that point. As for the 3rd feature, the one on the right, it is also the same form as the item with 0.5mm clearance on each side, and in this situation it is possible to place the item but there was some small room, making it unreliable.
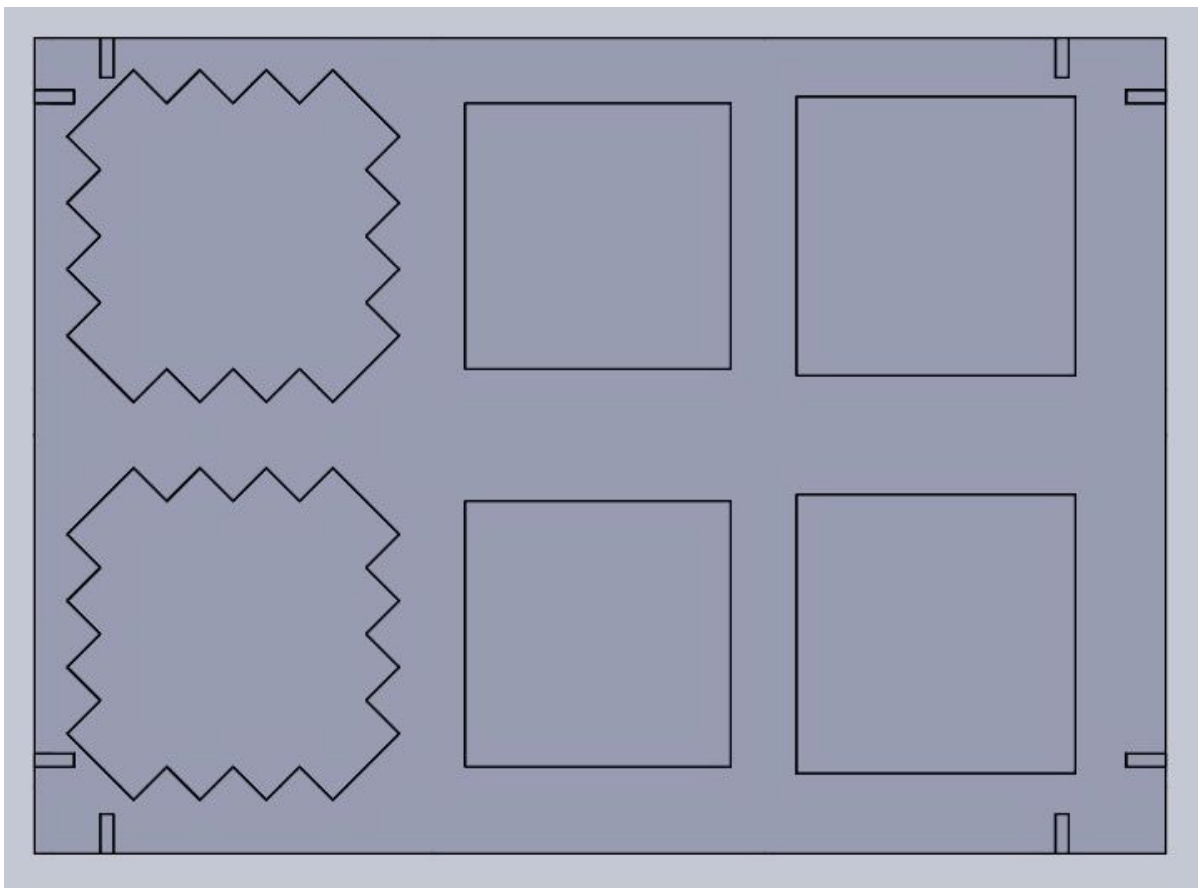
Figure 2: Locating feature test

Another reason why the feature on the left of figure 2 is better, apart from not over constraining the part, is that when a printer prints a straight line, some filament expends on the sides, especially if there were some imperfections in previously printed adjacent lines, but that is not an issue on corners. That means that corners (the only thing in contact with the COTS item here) tend to be more precisely placed and have less deformations.

Now further testing will have to be done on our actual printer, so that we can check how it does after resuming a print, and if the COTS item placement is defined well enough to avoid collisions.

1.3 Fixing the jamming issues:

On the night before the PR, the jamming issue happened again, so I spent the better part of that night figuring out the reason, and it was the fact that the insulator we added was sliding down gradually, pushed by the friction of the filament. So we are now making a new insulator, and after testing if it is still unreliable we will re-machine the barrel to hold it.

II - Challenges

The main challenge this week was the jamming issues, which slowed down progress on the firmware side, and the fact that the firmware was not ready and the printer is jamming is not let us do more advanced testing, so we are now working everyday to fix these issues and get back on track with our schedule. Also the Mosfet for the heater bed burned down on our board, so we replaced it with one we salvaged from the backup board (which was already not fully functional). So to mitigate risks going forward we ordered a new backup board.

III - Teamwork

These past two weeks, Nikhil and Astha again worked a lot of fixing the bugs in the firmware. They also made the changes for the firmware to work on the newer printer, since it was not working before. And Dan finished machining his nozzle and the mount for the new printer which looks great. We should be able to start working with it this week.

IV - Future Plans

My future plans are first to permanently fix the jamming issues. After I place the new insulator I will do extensive testing, and if it jams again we will have to re-machine the whole barrel tube. Nikhil and Astha are working on Firmware and are very close to fixing all the bugs,

once that is done I will be able to test continuously the fully integrated system, on both printers since the second printer is also almost finished.