APPLICANT 8 – 3D PRINTER (Home Project)

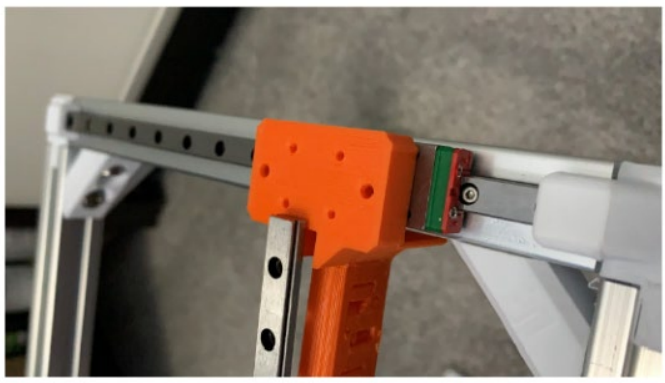
What does/did your project aim to achieve? **Please write up to a maximum of 300 characters**
I have built 2 3D printers, and used industry leading brands, but they all have many issues. For example, almost every current 3D printers on the market can't detect failed prints that have peeled off the platform or can't correct for motor mis-positioning, which results in time wasted. Furthermore they are big and loud, and small printers have abysmal print areas. My printer aims to solve this with smart camera-based software and a small footprint (20x20x20) that does not sacrifice print area.

Please describe and explain your project making clear and direct reference to your supporting documentation. **Please write up to a maximum of 1000 characters**
Initially, I had to make decisions like what kinematics to use and what the printer frame should be made out of. After designing and thinking through, I decided to use a CoreXY kinematic, as this has the least part movement. Furthermore, I needed a light but sturdy frame and decided to use 2020 aluminium extrusions, as it was cheap and lightweight. I also had to decide what controllers to use as there are many types, which all boast their own advantages. The third picture shows the kinematic.

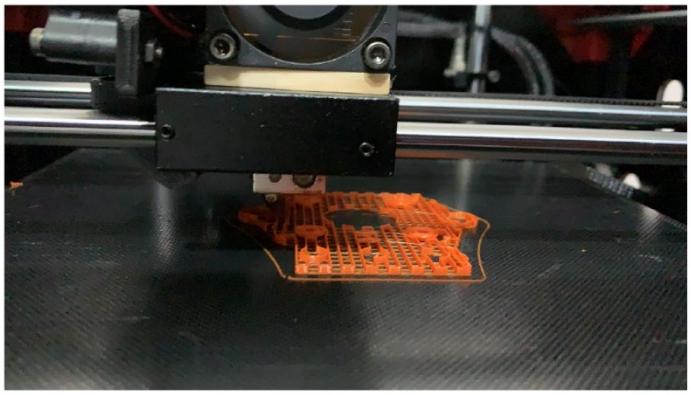
What have been the successes and failures of you project so far? **Please write up to a maximum of 500 characters**
I had to alter the original design quite a lot as after producing the parts (with 3D printing) I realized they were too flimsy or too complicated to produce. These would either not be cost effective in the long run, or would contradict one of the the main aims of being accurate, simple and affordable to make. The first picture shows the problem of part shrinkage and picture 2 shows support printing, which takes a lot of time. I eventually redesigned this part.

What lessons of an engineering nature have you learnt from working on this project? **Please write up to a maximum of 500 characters**
I learnt that in engineering, the easiest and most efficient way to do something is the best way. Things that get over-complicated are hard to maintain and can lead to problems down the line. Furthermore, I have a deeper understanding in both designing structural parts for my printer, and also the software side (Pic 4+), how the code and firmware affects the operation of the printer and how to optimize software functions and routines to allow the printer to work without faults and glitches (Pic5).

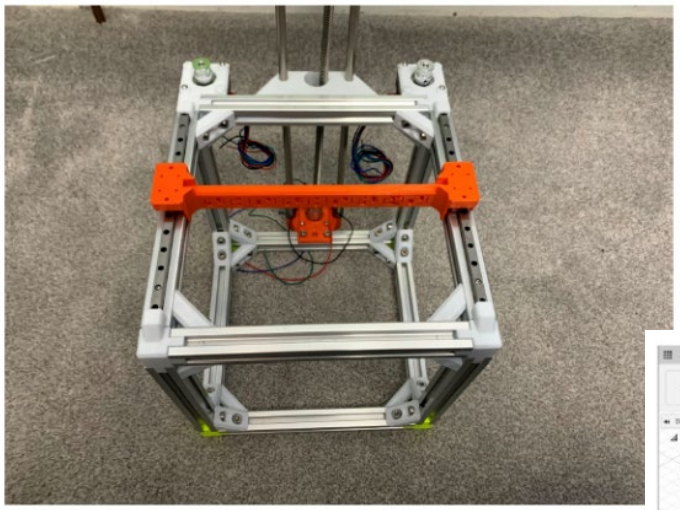
VISUAL EVIDENCE



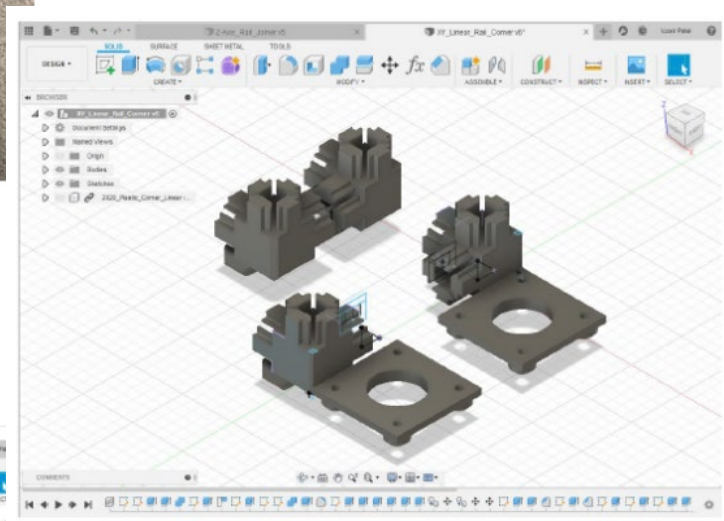
Above: the part is undersized due to plastic shrinkage, I learned to deliberately oversize the printed parts in order to compensate.

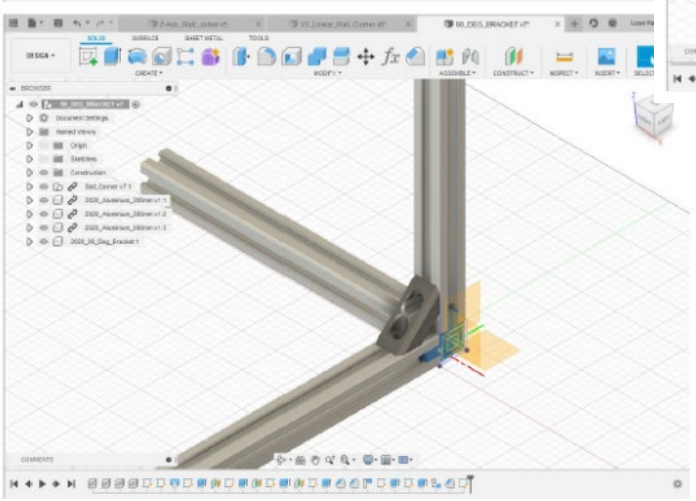


Above: 3D printing the parts for my 3D printer, on another 3D printer.



Above: Current built progress of the printer. (Many parts designed but yet to be fabricated)





Above: CAD Designs for different parts of the printer. (All designed in Fusion 360 with use of parametric parameters for easy adapting)

MARKER'S COMMENTS

All images are referred to in this applicant's text, together with concise, relevant annotation on the illustrations themselves and this is an important point as it helps the marker better understand the project.
One image shows the "current build progress". Remember, you will submit your Arkwright application in January and many applicant's projects will not be completed at that stage. Consider telling the marker what you anticipate as your next steps.
The 'successes and failures' section is a high quality response, dealing with such things as changes in design due to strength issues, along with simplicity and cost of production. This applicant has clearly linked lessons learnt to engineering, which is very good.