



MID-POINT PROGRESS PRESENTATION

3D PRINTED HAIR

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QUICK RECAP

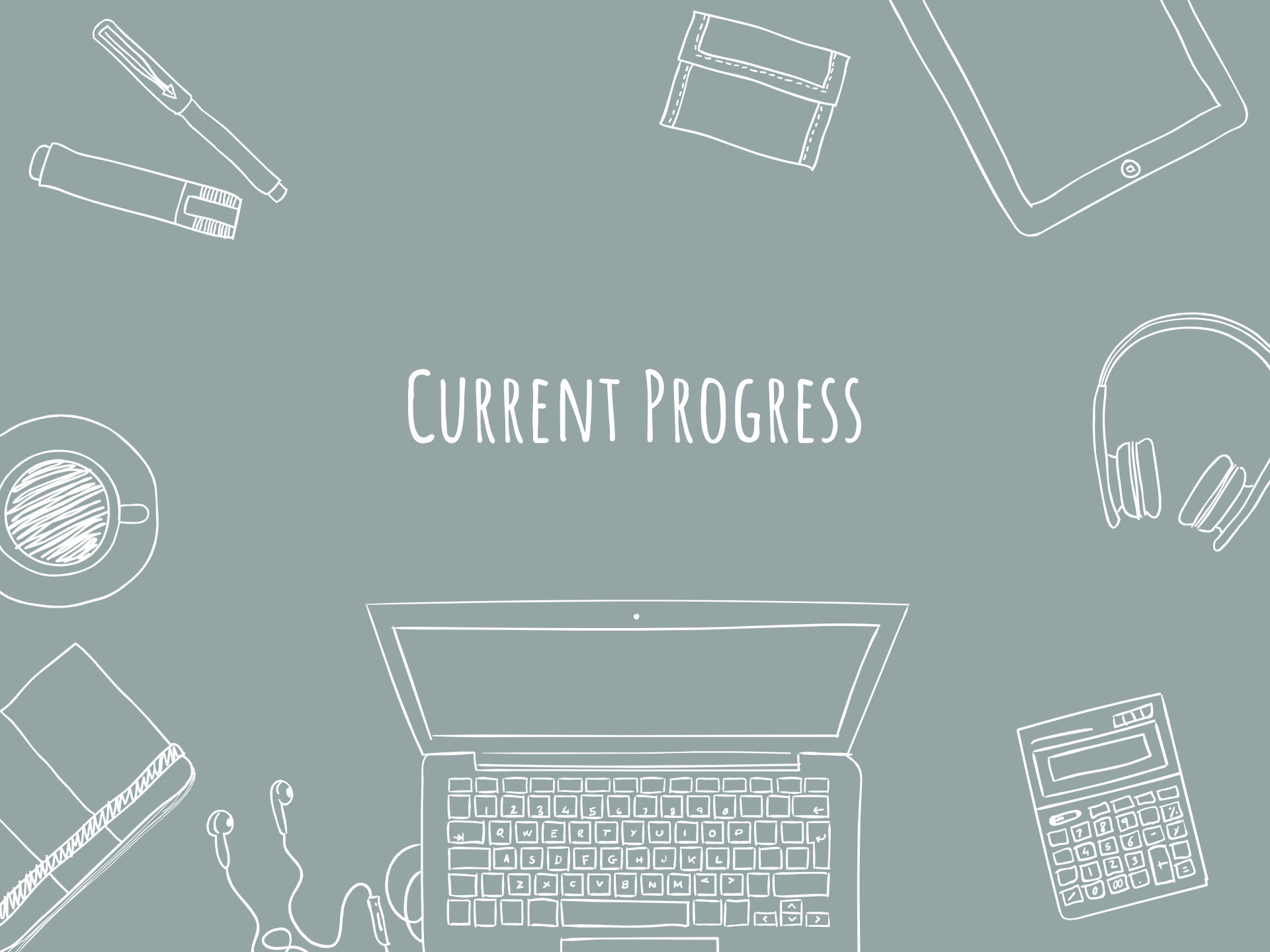


PROJECT OVERVIEW



- Modelling and fabrication of hair on FED 3D printing objects
- Automation of hair generation
- User uploads .stl file, selects areas to be hairy, and downloads .stl file ready for printing
- Add-on on CAD software Blender

CURRENT PROGRESS



BLENDER -- STL FILE EDITING

Editing STL file in Blender

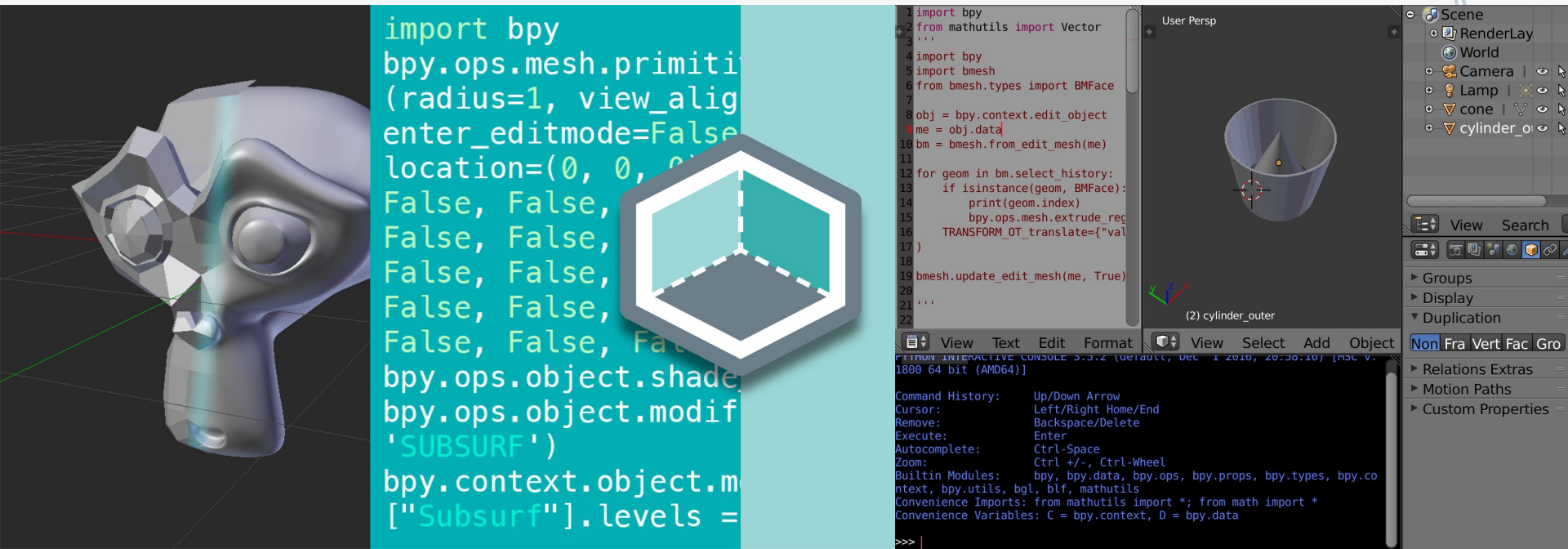
- Editing STL file directly not feasible
- Alternative approach: import STL file, edit as blender file, then export as STL again
- Automate via Python scripting



BLENDER -- PYTHON SCRIPTING

Blender scripting for automation

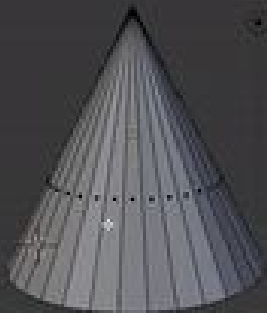
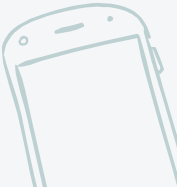
- Creating geometry (e.g. support structure)
- Constructive solid geometry (e.g. difference)
- Calculating object size via bounding box
- Auto-adjusting geometry parameters





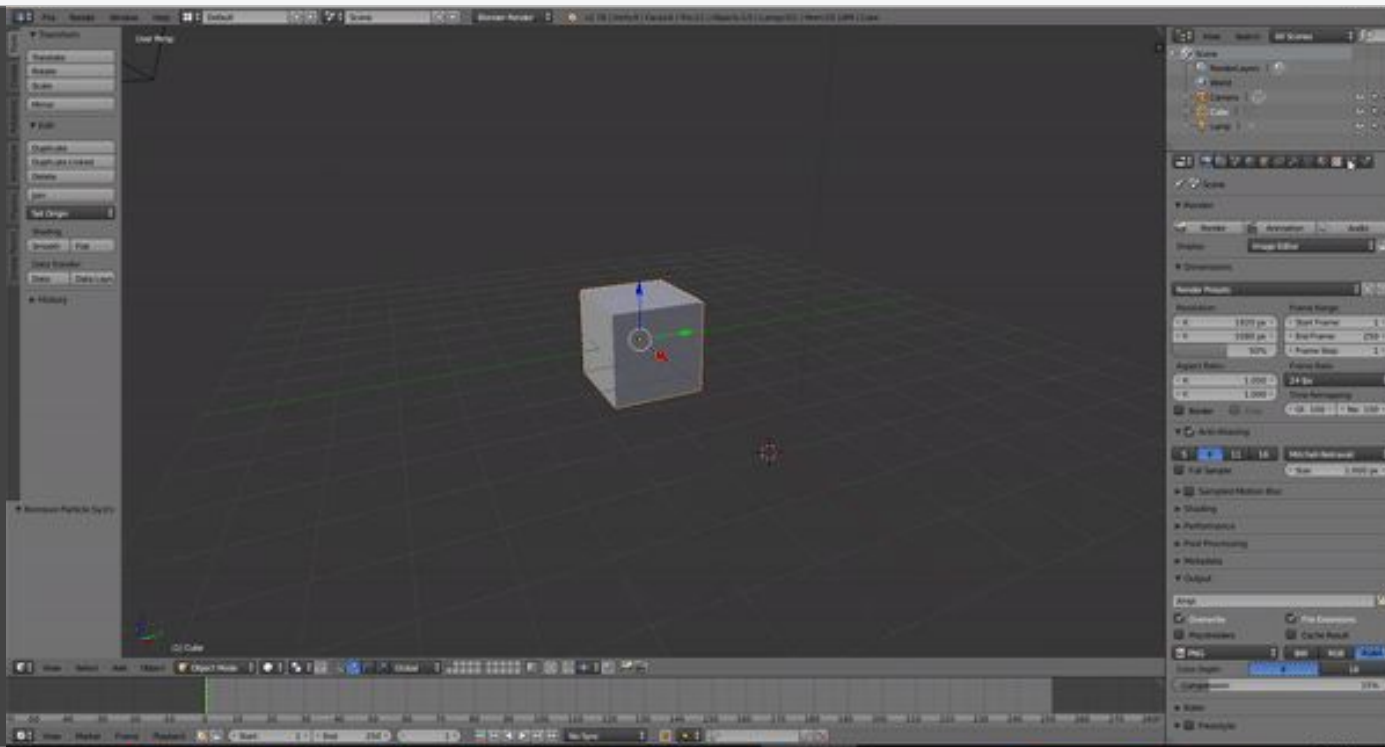
BLENDER -- VERTEX/FACE/EDGE SELECTION

- Individual selection (slow, accurate)
- Bulk selection (fast, may include unwanted selections)



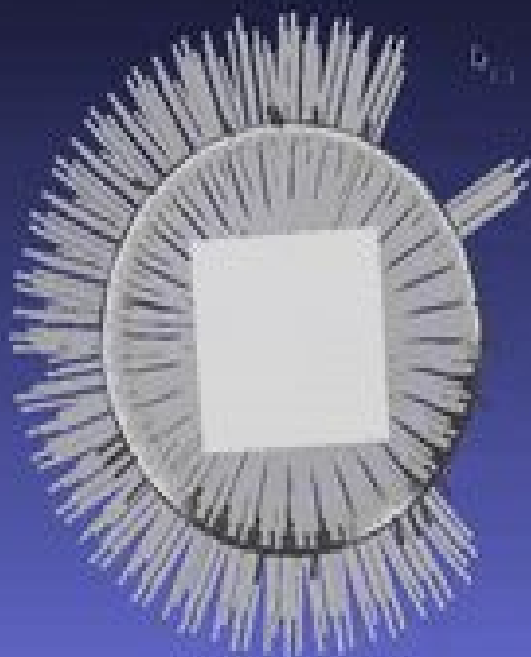
BLENDER -- HAIR GENERATION

- Emitter/Hair Particle Effect
- Use modifier to convert to mesh
- Customisable length, thickness and number of hairs



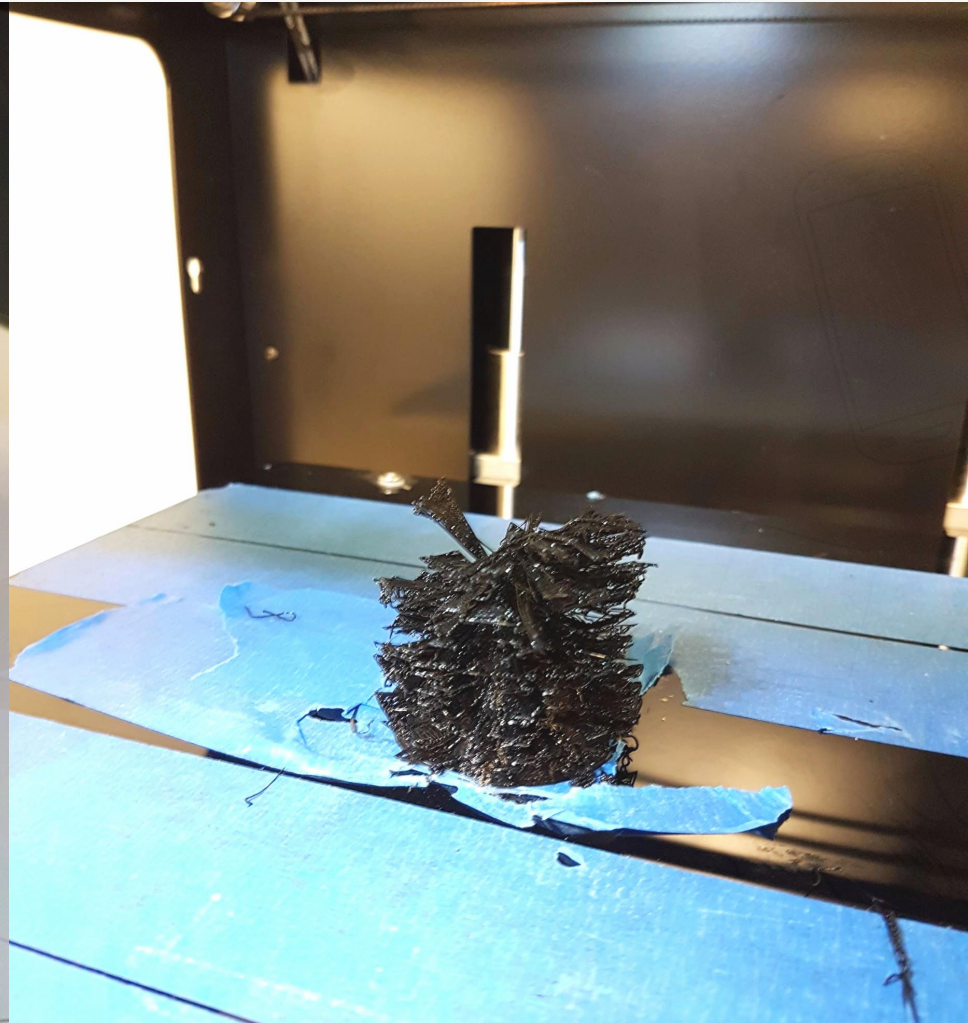
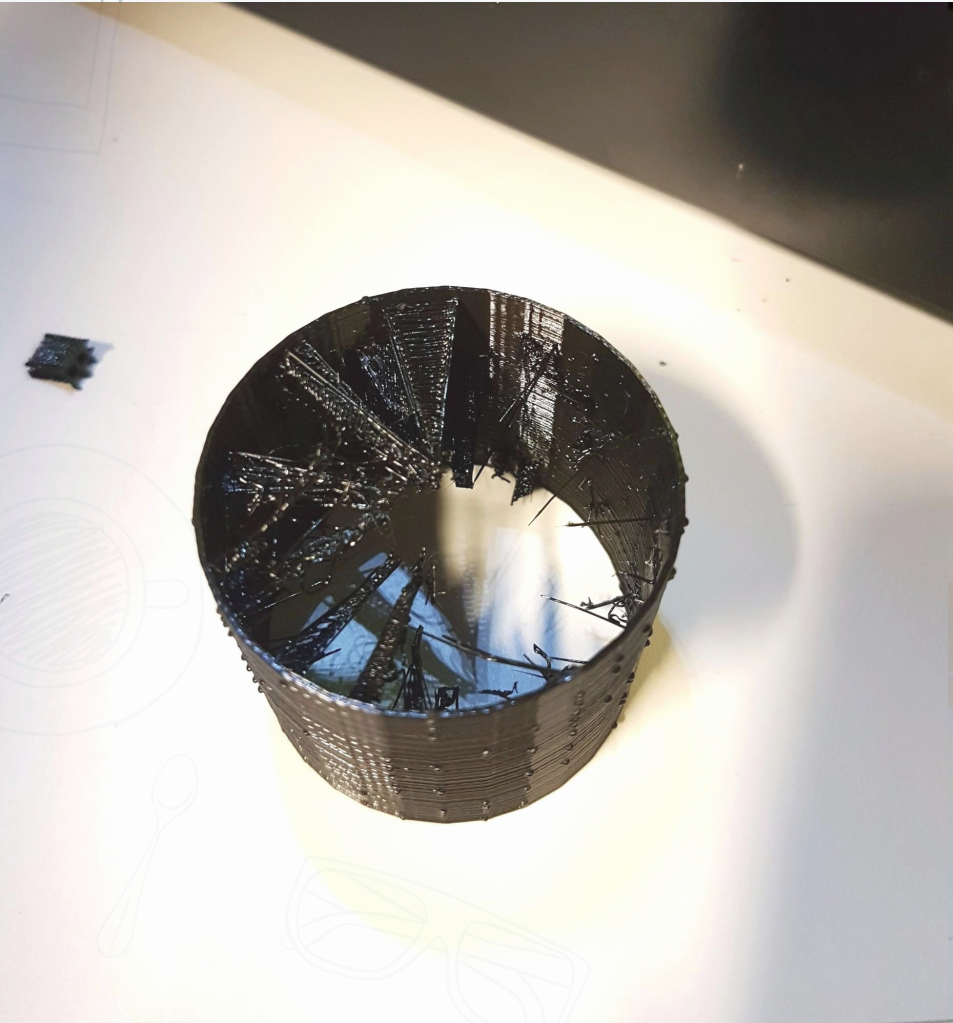


MESHLAB CLEANUP

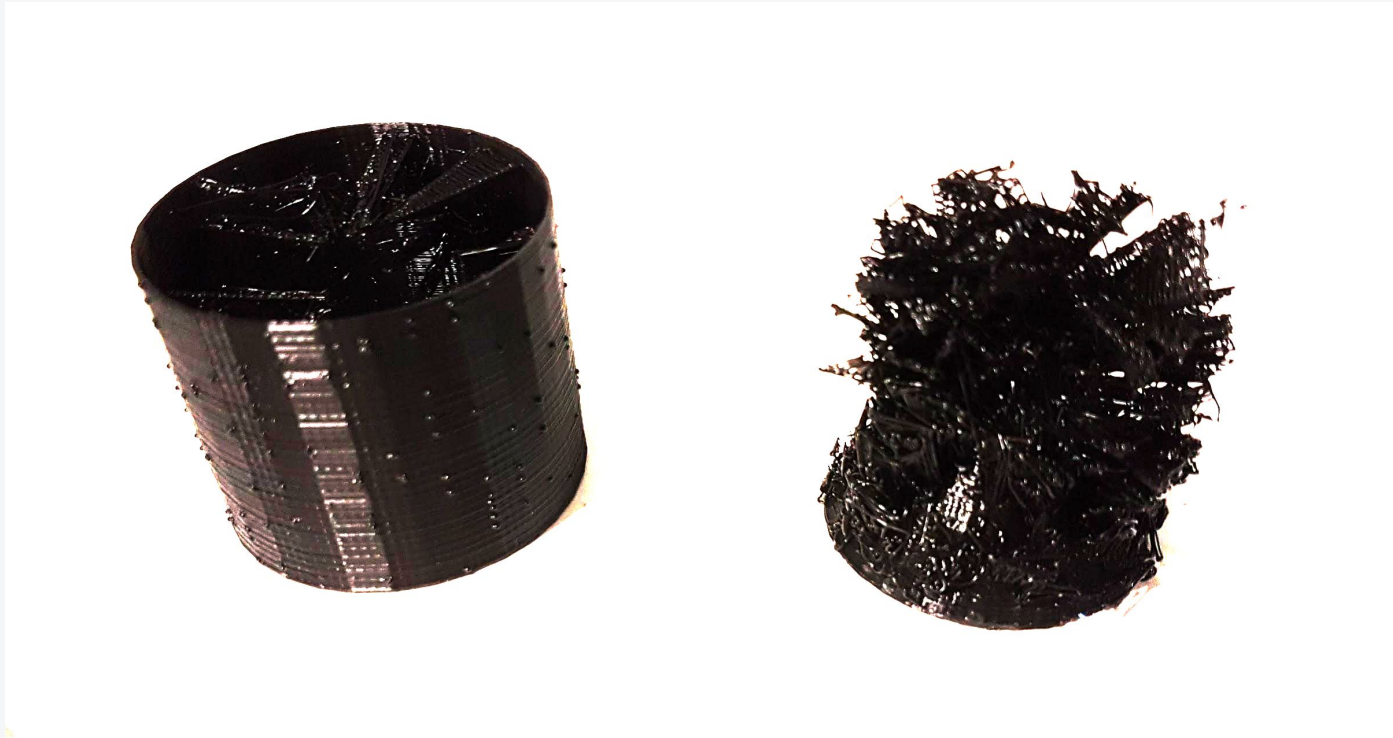


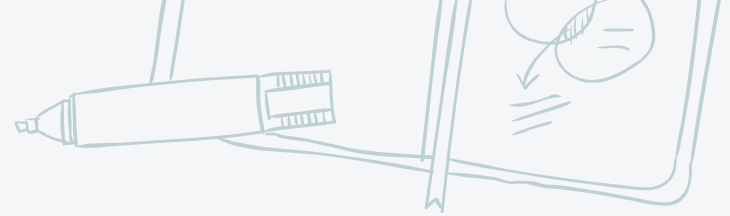


3D PRINTING TEST RESULTS

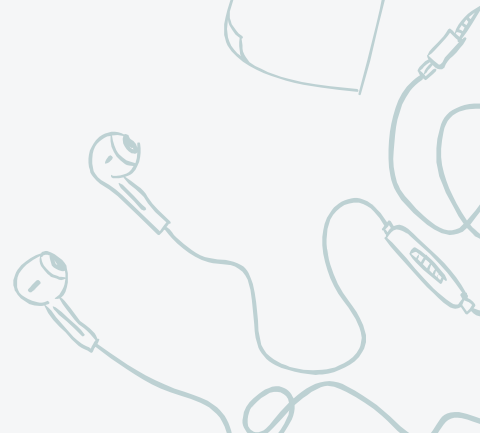


3D PRINTING TEST RESULTS





3D PRINTING TEST RESULTS



PROBLEMS FACED





PROBLEMS FACED

- Determining support structure thickness
- Determining hair fiber thickness
- Separating individual hair fibers in slicing software
- Printing hair near sharp corners
- Removing 3D print from printer bed

FUTURE TASKS





FUTURE TASKS

- Obtain pointers to selected vertices/ faces of objects
- Automatically generate hair on selected support cylinder
- Only generating hair at specified faces
- Hair generation for different geometries/objects
- Automate mesh cleaning process



THANKS!
ANY QUESTIONS?





REFERENCES

- <https://stackoverflow.com/questions/25437171/edit-a-stl-file-using-python-blender-library>
- http://www.mertl-research.at/ceonwiki/doku.php?id=software:kicad:3d_package_with_blende
- <https://blenderartists.org/forum/archive/index.php/t-227726.html>
- <https://blender.stackexchange.com/questions/40247/extrude-a-mesh-by-region-using-python-script>
- <http://blenderscripting.blogspot.com/2016/04/getting-index-indices-of-selected-faces.html>
- <https://vimeo.com/20963790>
- <https://docs.blender.org/api/2.78b/>
- <https://blender.stackexchange.com/questions/8459/get-blender-x-y-z-and-bounding-box-with-script>
- <https://blender.stackexchange.com/questions/70373/how-to-convert-hair-particles>
- <https://blender.stackexchange.com/questions/539/snap-object-on-top-of-surface-of-other-object>
- <https://cgi.tutsplus.com/tutorials/modeling-a-modern-interior-scene-in-blender--cg-15294>