Idea

Velcro is known as hook-and-loop fastener, traditionally is made of nylon thread.

What capabilities could hard velcro get us in 3D printing? Try printing velcro (perhaps multiple varieties, hook and loop, mushroom, mirrored/non-mirrored, etc.) on one of our FDM machines, build a design tool that allows adding velcro to arbitrary surfaces, and see where it takes you.

Possible Applications

In Kuo and Rawn’s paper, they made research according to the sound that is made when traditional velcros get detached from each other, and different structured velcros provide different sound measured in frequency. If we 3D print hard velcro in multiple varieties as mentioned in Idea, what sound pattern can we detect from that? How does the structure (shape, size and density) affect that?

We have seen Ried already made 3d printed hard velcro that is easily attached to a flat surface. So one side is fixed on a non-movable item (wall), the other is fixed on an arbitrary tool so that the tool can be hanged on the wall.If we want to make hard velcro in 3D printing, how much weight can we make it hold? His hard velcro can only attach to a flat surface, can we add hinge model on 3D printed hard velcro to make it attachable to curve surface? If possible, will it still maintain the functionality of velcro? (how does connector type affect that? how does it relate to surface area or curvature of the model?)

Also, can we make velcro with flexible material like TPU filament or combine both non-flexible and flexible materials?

Related Papers

By analyzing the sounds of when velcro gets detached, distinct the differences between velcros in arbitrary structures, and use this feature to create a classifier that can make acoustic labels. (Tzu-Sheng Kuo and Eric Rawn. 2020. Let it rip! using Velcro for acoustic labeling: Adjunct publication of the 33rd Annual ACM symposium on user interface software and technology. (October 2020). Retrieved June 1, 2022 from https://dl.acm.org/doi/10.1145/3379350.3416175)

Printable Velcro that is easy to hang things, probably can resist more than a kilogram of weight and it is very easy to attach and detach on a flat surface. (Erwin Ried. 2011. Printable Velcro by eried. Retrieved June 1, 2022 from <https://www.thingiverse.com/thing:12798>)

Exploration

Start with designing 3D printing hard Velcro with mushroom shape in fusion 360 first. Then test