Solderless Unibody Switch
DESIGN RATIONALE

Introduction

The Solderless Unibody Switch is a simple switch that enables the user to easily activate a button. This device is suitable for users with limited dexterity and finger movement. The unique design of the single-piece print and few electronic components enables the maker to build the device without the use of a soldering iron, allowing the device to be more accessible and buildable for makers.

Requirements

Must:

- The assembly of the device must be possible without a soldering iron
- The device components must be affordable and easily accessible
- 3D printed unibody design must be able to flex enough to press the switch button
- The 3D printed unibody design must be able to be printed in one piece

Should:

- The 3D printed unibody design should not require support material

Ideation

Crimping: To see if crimps would be able to make a reliable switch connection without the use of a Crimp Tool, or heat gun (i.e., no specialized tooling).

3D Printed Unibody Design: Experimentation with 3D printed unibody design to see if the idea was feasible.

Prototyping

Crimping:

- This demonstrates that the base plates for both the Light Touch & Raindrop can be easily modified for use with this crimped approach
- Found assembling each of the crimps onto the wire first much easier to manage compared to starting with them on the switch
- Important to ensure the crimps are supported and contained within the body of the switch to ensure the longest service life possible
- Crimps provide a very solid element to use a tie strap with, so also gives a pretty solid, and clean looking wire retention method

3D Printed Unibody Design:

- Removes the pain point of needing to find a hinge, or print small hinge parts

- Remains fairly low force, and design can be tweaked to reduce baseline forces from the body if needed
- Added super glue between the switch component and the 3D Printed body as an added control/retainment
- The legs on the opposite side of the switch are also mechanically retained under a small lip at the front of the base plate for additional control/retainment
- Limited stroke length, and low strain on the body
- Adding a curl upwards on the top end portion of the 3D printed switch body would allow for easier more reliable pressure to be applied to the switch inside

Testing

- Printed in both PLA and PETG, which both worked
- If the switch slides from under your finger when you push the button, which it was found to stay in place
- Looping the cable where the twist tie is helping to reduce the strain on the crimp if the cord is pulled or twisted with daily use
- If the twist tie wrapping under the switch destabilized the device and caused it to rock side to side
- A larger circular surface area
- A small chamfer around the edge in contact with the print bed to reduce elephant foot
- Sharp corners on the front edge could be reduced or even chamfered to help break the edge
- An opportunity to reduce the height of the front edge so a user doesn't have to lift their finger as far

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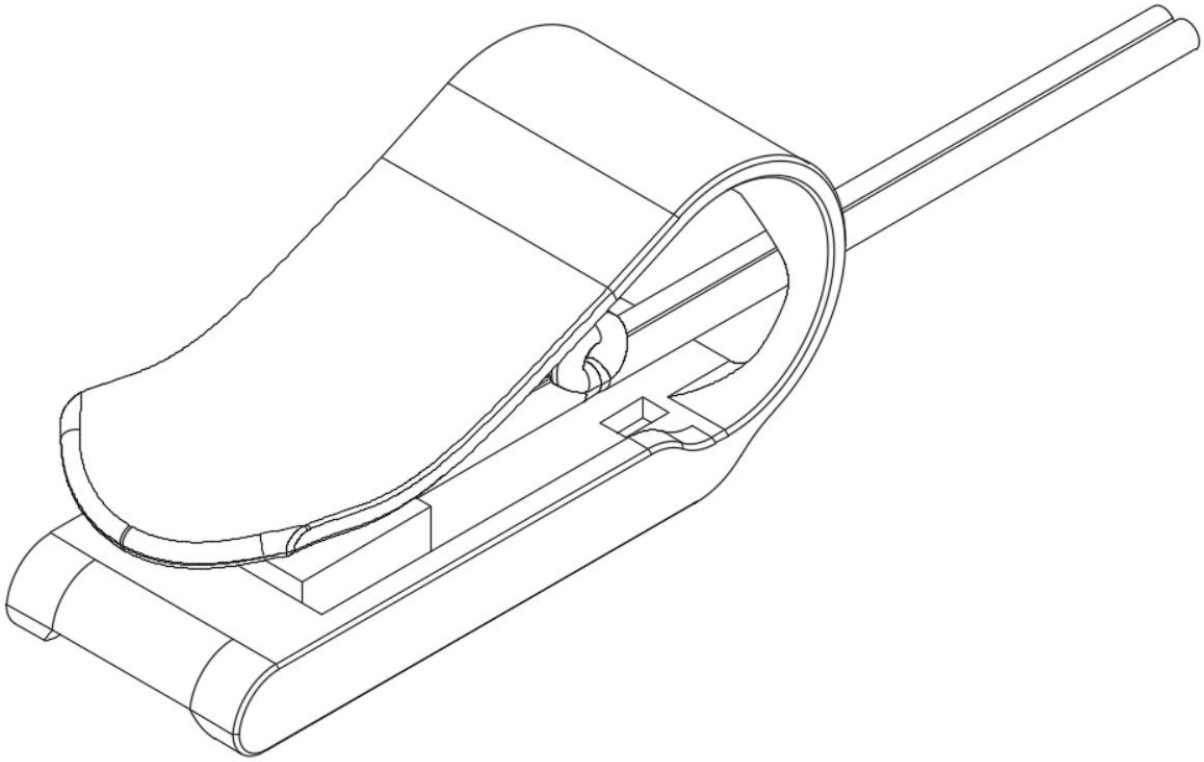
Final Design



Opportunities for Improvement

- Could consider a two-part option to separate out the activation surface (more print orientation options, different colors, etc.)

Credited Resources Used in Development

Makers Making Change. (October, 2021). Solderless Unibody Switch.
https://makersmakingchange.com/forum/topic/solderless-unibody-switch/