# SINGLETACT MOUNTING METHODS

1. Introduction

There are a number of ways to integrate SingleTact sensors into your application, but deciding on the best method is not always straightforward. Challenges may be faced with sensor positioning, electronics mounting, and/or connections to your controller. This application note covers several different methods for achieving optimal sensor placement.

The SingleTact anatomy consists of three main parts: the SingleTact sensor, the SingleTact electronics, and the communication interface for reading out the pressure data. There are mounting considerations to each part that will be covered in this note. Below, a 15mm SingleTact sensor and a standard electronics board is depicted.

| SingleTact Sensor | Electronics | Communication Interface |
| (8mm or 15mm) | (Standard or USB) | (I^2C, Voltage, or USB) |
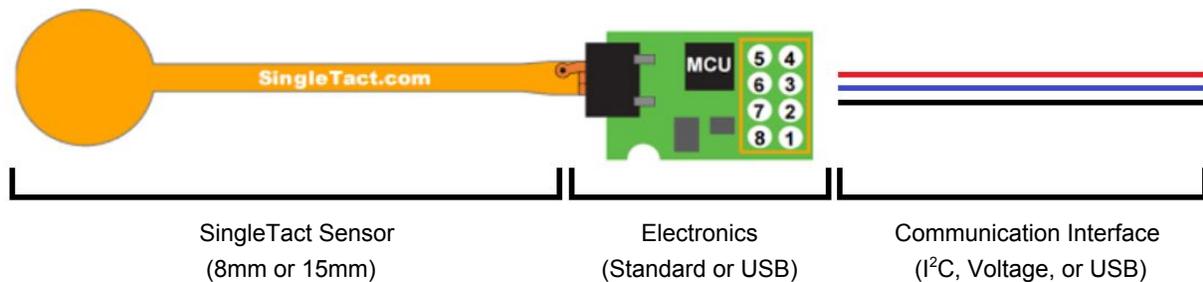
2. Sensor Mechanical Considerations

The construction of the SingleTact sensor consists of a top electrode, a sensor dielectric, and a bottom electrode, sandwiched together with adhesive. Therefore, it is best to avoid applying shearing forces to the sensor, and instead applying direct forces perpendicularly and evenly across the sensor head.
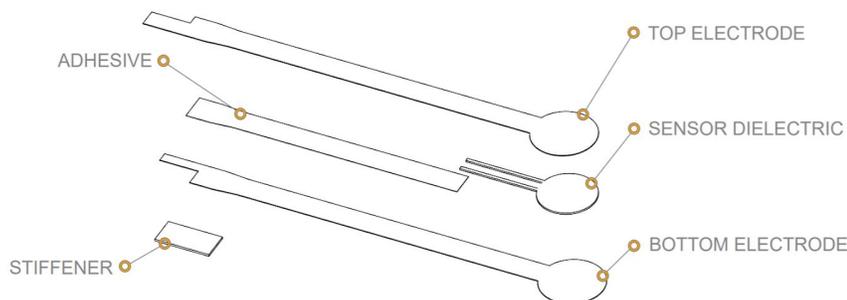
Another action to avoid is bending the sensor if possible, because when bent, one electrode will be in compression while the other will be in tension, and this causes shearing to occur between the two electrodes. If bending is necessary to fit the sensor into your application, keep the circular portion (the active sensing region) as flat as possible, while applying the bend along the tail end of the sensor. Keep the bend radius greater than 3 mm.

3. Mounting the SingleTact Sensor

The SingleTact sensor is the first and most critical component to position and mount, due to its orientation requirements. Before beginning, now is the time to consider whether the selected sensor properly suits your application, or if some modifications are required. Visit SingleTact's Sensor Selector page and click on the "What size should I get?" button for more information. If your load distribution is awkward or uneven, you may need to consider designing a custom load distributor for your application before moving on to mounting.

Another consideration is moisture - if your application will be exposed to moisture or perspiration, use or create some sort of polyurethane sheath to encase the sensor in beforehand. This could be as simple as using a sandwich bag or a trading card sleeve. You could also use a heat sealer to develop a custom encasement solution.

Double-Sided Tape

There are a number of methods for mounting the SingleTact sensor: double-sided tape, single-sided tape, and glue. Custom enclosures and other fastening methods are also possible, but will not be discussed here. Double-sided tape is a good solution for easily mounting a sensor to a project. It is best to use a thin but strong tape, as a more spongy tape will interfere with sensor performance.

1. Begin by connecting the SingleTact sensor to the SingleTact electronics.
2. Cut a small piece of double-sided tape (just enough to cover the head of the sensor) and place it on the sensor head, bottom side.
3. Remove the protective backing from the double-sided tape, and mount the sensor. Take into consideration where the electronics will be mounted afterwards.

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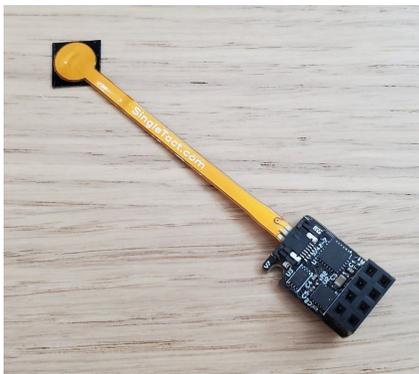
Single-Sided Tape

Single-sided tape follows a similar mounting procedure as above, but there are some considerations to keep in mind regarding the type of tape used. Stiff tapes like packaging tape is not recommended in most applications, as it can adversely affect the sensor readings by adding unnecessary rigidity to the mount; opt instead for more conforming tapes like PTFE or PVC tape. These flexible tapes will also conform better to abnormal geometries than rigid tapes would. In the two images below, the left shows a stiff clear tape, and the right shows PTFE tape.
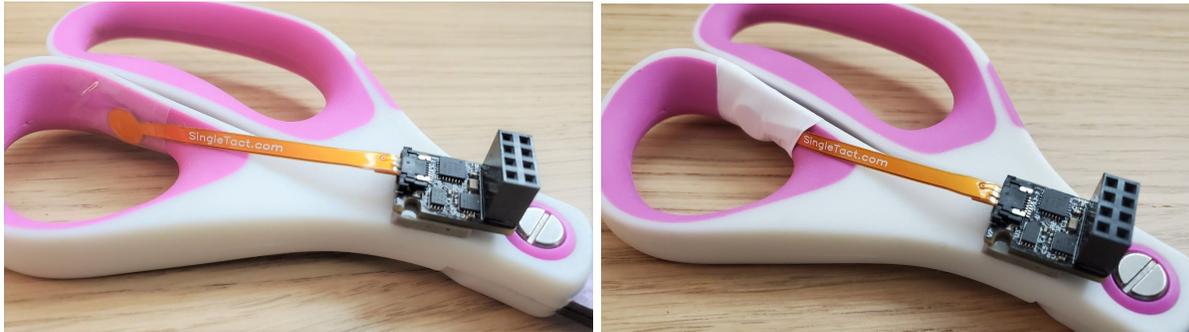
Glues

Quick-setting glues such as hot glue or epoxy should be considered only when the use of tape is not suitable. Applications where the SingleTact sensor needs to be positioned in a narrow slot makes the use of tape difficult or impossible, as the tape will catch or prevent the sensor from being inserted. For a sensor to be placed into such a position, glue allows the user to position the sensor as desired, and then it sets once in place.

For best results with glue, apply just enough glue to the center of the sensor head to create an even layer over the surface. Once hardened, the glue will act as a force distributor, as shown in the left image below. Avoid using an excessive amount, as the glue may curl around the sensor and create a depression, as depicted exaggeratedly in the right image below. Instead of exerting pressure on the sensor itself, the application ends up exerting pressure on the hardened glue around the sensor, which is non-ideal.

One major drawback of glue is that the sensor is likely unsalvageable once mounted. If the sensor needs to be removed afterwards, the user risks damaging the sensor or the device the sensor is glued to.

Lastly, do not use any glues that outgas such as super glue, as this will damage the surface / internals of the SingleTact sensor or make it brittle.

4. Mounting the SingleTact Electronics

The SingleTact electronics come in two forms: standard electronics, and USB electronics. If you are using standard electronics for your application, be aware that the standard electronics feature 0.1" through-hole header pins, which means you will have to take into account the protruding pins on the underside of the board. The USB electronics board on the other hand is essentially flat. Other than this difference, mounting these electronics is similar and relatively simple, and there are two suggested methods for doing so: double-sided tape, and screw mounting.

Double-Sided Tape

While a thin double-sided tape is recommended for the SingleTact sensor mounting, a thicker double-sided tape is optimal for mounting SingleTact electronics. The purpose is two-fold: a thicker tape will allow the rigid electronics board to conform to uneven surfaces better, and will allow the pins on the standard electronics board to clear surfaces easier. Position the electronics so that there is little to no stress on the sensor.

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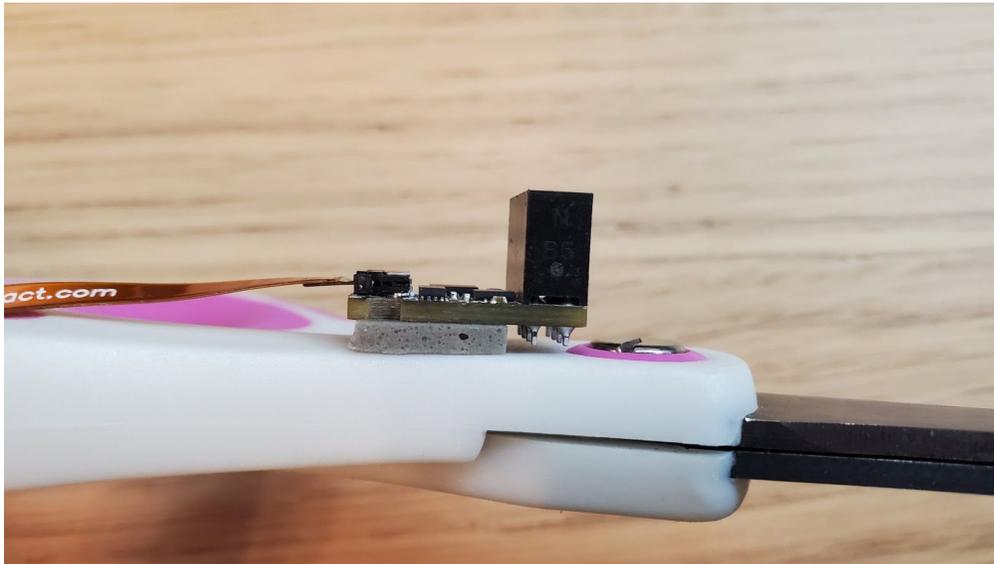
Screw Mounting

Both the standard electronics and the USB electronics boards feature screw hole cutouts, which can be used for mounting the boards to devices that accept screws (wood, plastic, sheet metal, etc). As with the double-sided tape solution, keep in mind the clearance of the through-hole pins on the standard electronics board. In the image below, a #2 thread-forming plastic screw is used to mount a standard electronics board to a 3D-printed device. Note that the board overhangs to allow the through-hole pins to clear the surface and allow for a flat mount.
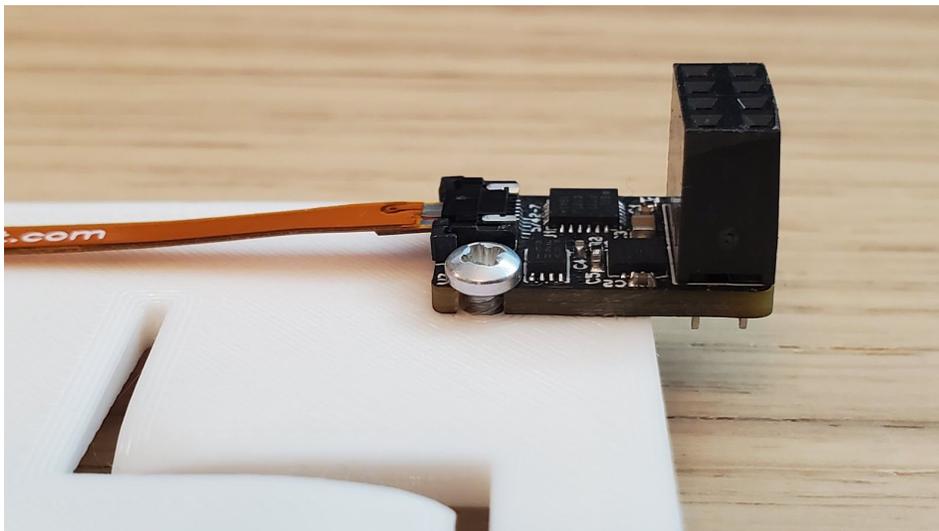

Tip: If your application has moving parts, such as the scissor example in the images above, try to mount the electronics on the same moving piece as the sensor to minimize movement along the length of the sensor.

5. The Tail Extender

The tail extender offers much more mounting flexibility to the user, and not just because of the 6" of extra length. The tail extender is able to bend and conform to an application much better than a SingleTact sensor alone would, since the tail extender is 67% thinner than the SingleTact sensor, and is therefore less prone to breakage. This also allows the user to position the sensor and electronics almost exclusively of each other, and transfer the mechanical strain away from either end.

In the application example below, a SingleTact sensor is mounted to the plunger head of a dispenser, while the electronics is mounted on the cap end. Ideally, the sensor and electronics would both be mounted together on a moving part, but when the mounting surface is as small as this, sometimes it is not possible to do so. In this configuration, when the plunger is depressed, this action creates a bending force across the length of the SingleTact sensor, and puts strain on the FFC connector of the electronics board. This motion also puts considerable stress on the contact end of the sensor and stiffener.
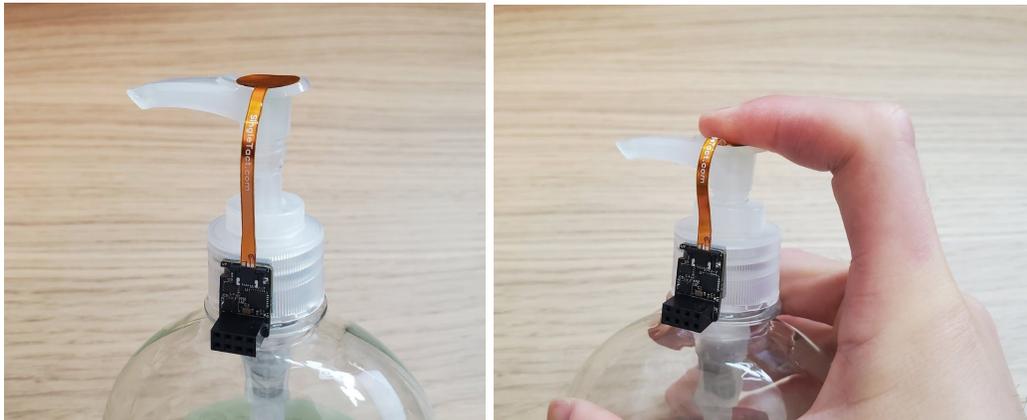

With a tail extender, much of the mechanical stress and strain mentioned above is alleviated. The SingleTact sensor experiences much less flexing and bending, and those forces are instead transferred across the tail extender that connects to the electronics mounted off below.

6. Communication Interfaces

There are three formats of data output: I2C, voltage, and USB. The first two formats are available on the standard electronics board in the form of 0.1" header pins. A major cable routing consideration is that the female pin header block is perpendicular to the surface of the board, so the wires will protrude considerably from the surface of your device. In contrast, with the third format (available on the USB electronics board), the USB data exits parallel to the plane of the board, allowing for a much lower profile installation. See the comparison photo below with the standard electronics in the background and the USB electronics in the foreground. If your application requires a low-profile installation, consider using the USB interface instead.
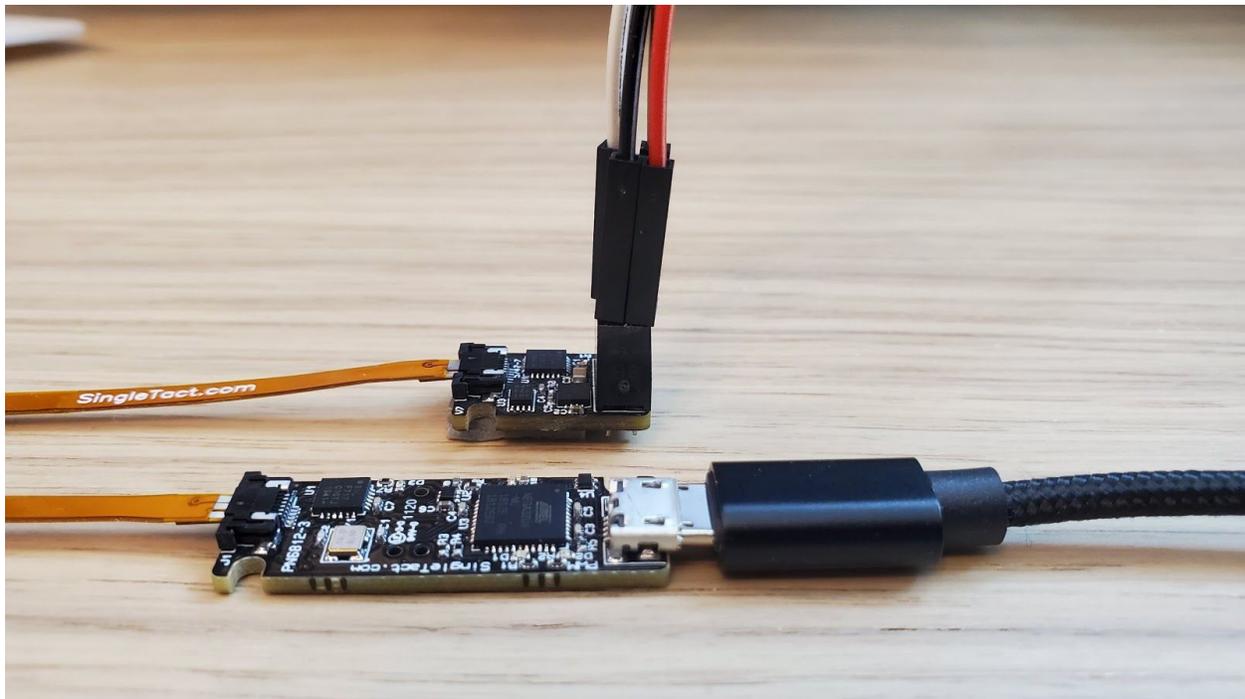
Mounting either cable interface is straightforward as long as common sense is followed. Here is a short list of recommendations:

- If movement is expected, fasten the cable(s) with tape or zip ties to prevent accidental removals and create strain relief.
- Use cable management clips to route longer cable runs to your controller.
- If using standard electronics, ensure that the pins do not pull out accidentally.
- Place electronics in a location that allows the connections to avoid accidental catching.