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October 28, 2004

I/O Brush V.2 for AEC – Handling Instructions

The new version (v.2) has several physical improvements over the last version:

- The **aluminum rings** replace the previous plexi rings (this will tolerate much more physical pressures)
- The **brass inner legs** that attach to the wooden case (secures the inner ring to the wooden case)
- The **removable inner parts** (the screws on the wooden case both secure the inner parts and allow easy access to them)

1. Removing the inner parts from the brush

Step 1: Remove the white LED ring

You may need to use tweezers (pinzette) to hold the wires. Be careful not to pull the wires too much/hard.

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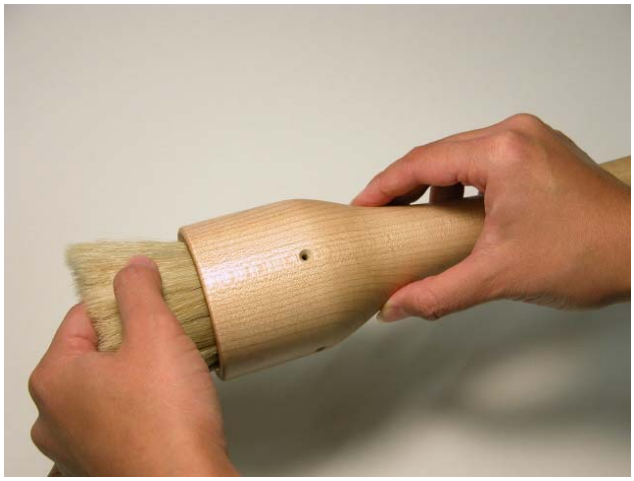
Step 2: Remove the screws from the wooden case

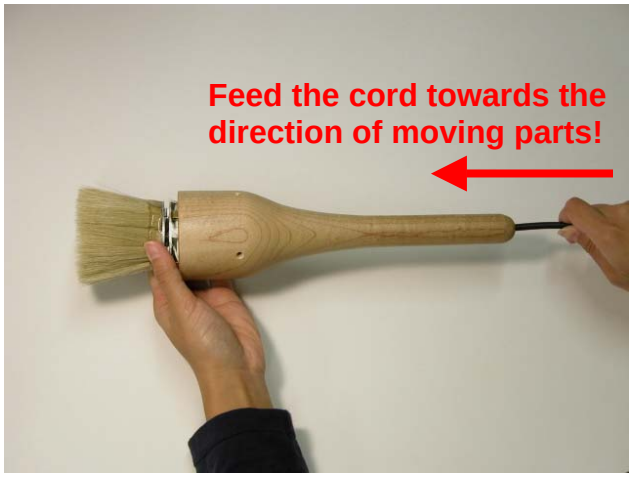
Be careful not to loose the screws!

Step 3: Carefully wiggle out the content.

Please do not pull hard at once, but slowly pull the content out.



Please also make sure to **feed/push the cord from the back as you are pulling.** You could otherwise unplug or tear the inner wires accidentally!



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Slowly pull out the content as you feed the cord from the back…

Step 4: Detach the bristle/hair ring from the inner ring.

There are 4 small bolts each with tiny interlocking nuts (2 nuts on each bolt). Each nut & bolt has “thread locker” on it making it tight. You may need to access the bolt from the back and hold the nuts with thin pliers.

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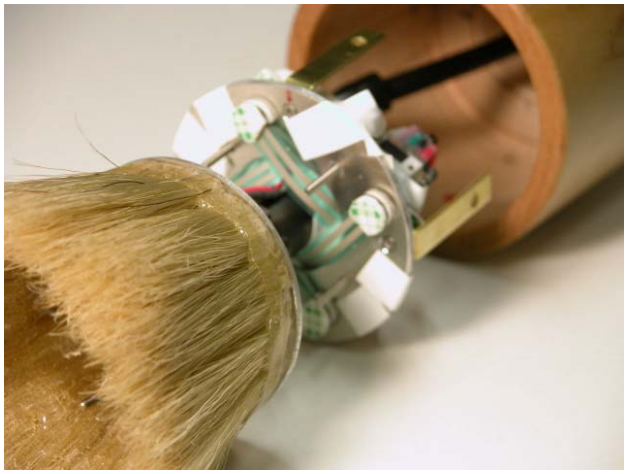
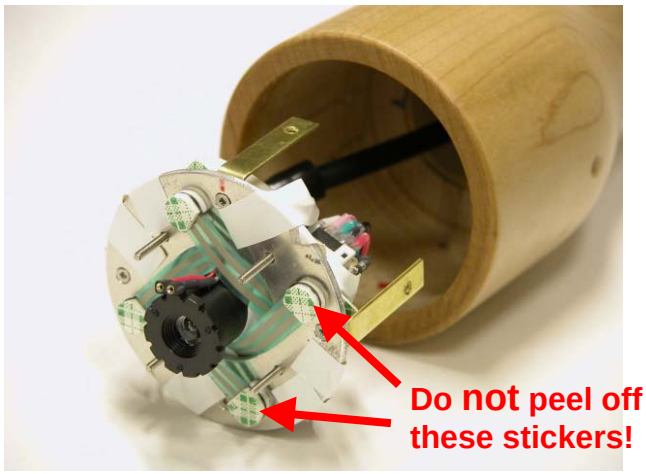
Once you remove the nuts from the bolts, you can remove the bristles/hair ring from the inner ring.



The force sensors are attached to the surface of the inner ring with a strong double-sided tape. Even though both sides of the sensors have double-sided tape, one side is for the “cushioning” purpose only. In other words, do not peel off the stickers on the outer side. The sensors should be only attached to one side (the inner ring).

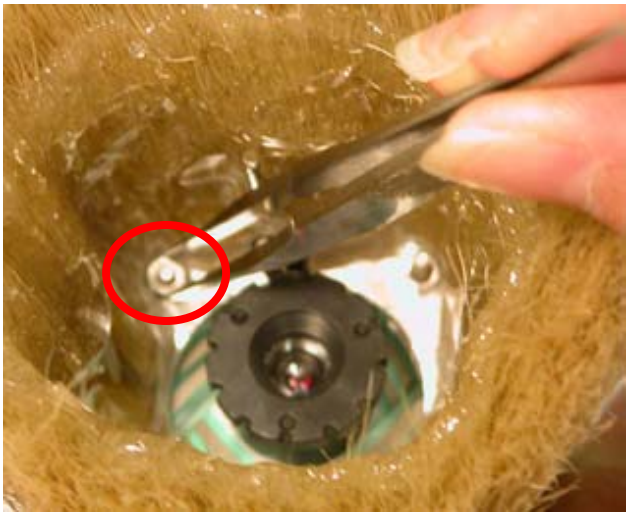


2. Putting back the brush together

Step 1: Attaching the bristle/hair back

Very important! The inner and outer aluminum rings must be **loosely** held together. So when you are screwing those tiny nuts back on the 4 bolts, you should **not** screw them all the way. When you screw the nut all the way, **go back about one turn** to make it loose. When you feel that it’s almost too loose, that’s good. It really should be that loose! (Otherwise, the sensors

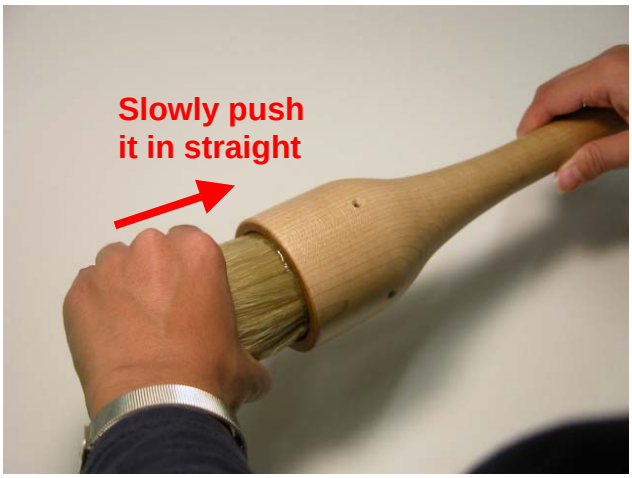
will be pressed permanently and will have an elevated baseline. This means that even when there is no pressure on the bristles, the sensor values will be far from zero.)



Each bolt should have **two** nuts locking each other. This is to prevent the nuts from moving up and down, or coming off. These nuts should be tight and have some sort of "thread locker" to make them tight and unmovable without tools.

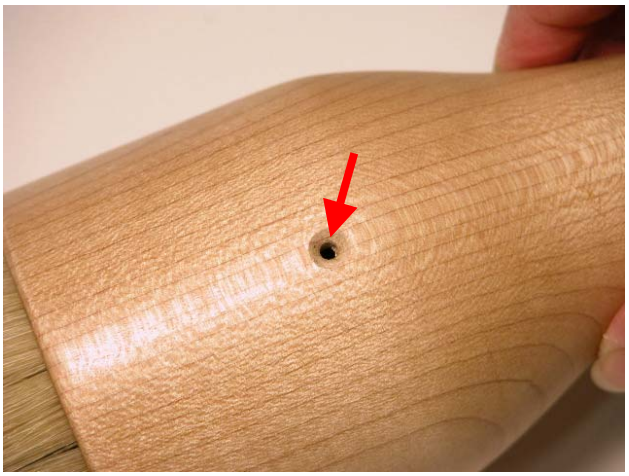
Step 2: Slowly push the part back inside the brush

Look at the alignment (please follow the markings inside [i.e. 1, 2, 3 & 4]). And slowly push it in straight.



Make sure that the hole in the brass leg inside matches the wooden hole out side.

If not matched, you could bend the brass leg inside by screwing the bolt in.



Step 3: Put the screws back on the brush

Please make sure that the screws are straight!

Step 4: Put the LED ring back on

Please follow the color markings. You may need to use tweezers (pinzette).

Step 5: Placing LED

The LED ring should wrap around the camera. Make sure the LED ring does **not pull or press on the force sensors** underneath. It should also **not dangle**. Place the LED ring under the horizontal metal screw (covered with epoxy) so that it does not dangle.

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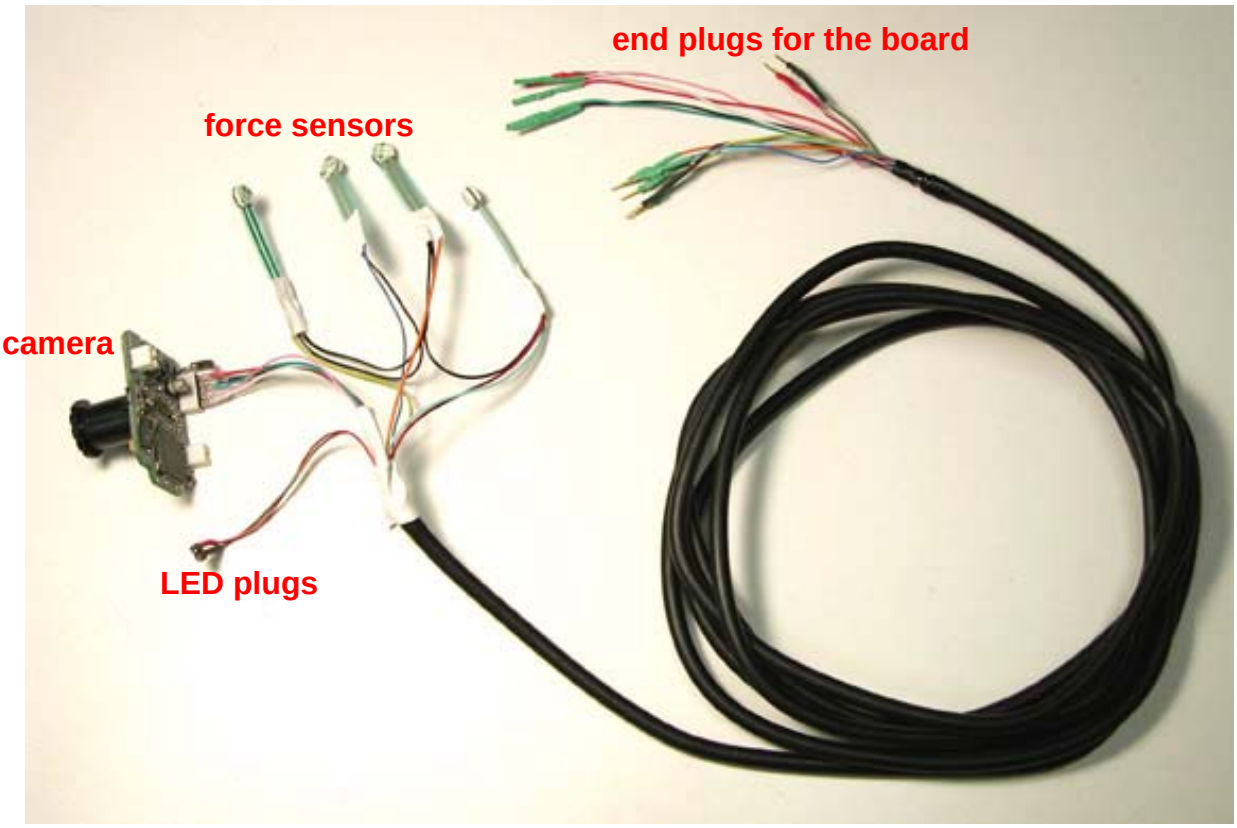
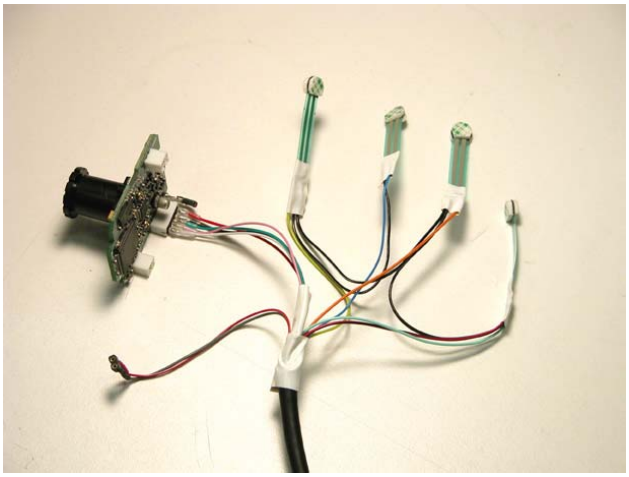
3. The I/O Brush inner components

Here we show you the components inside:



The **camera**, **LED plugs**, and **force sensors** must be neatly encased inside of the brush (see the pictures below).



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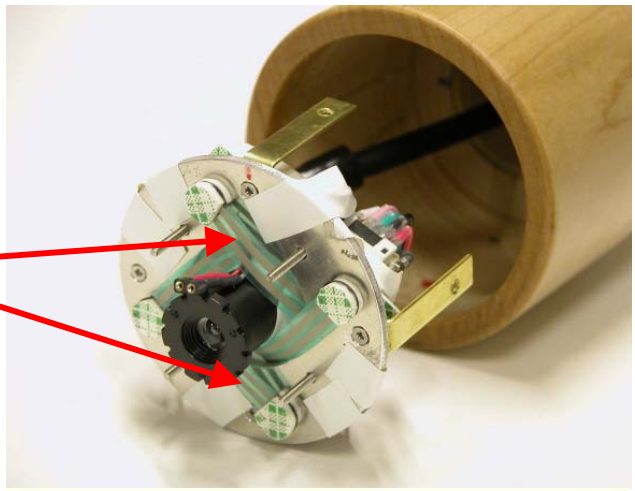
The force sensors must be secured on the inner aluminum ring without being bent. If the sensor's film-strip is bent or is moving around, it interferes with the sensor reading.

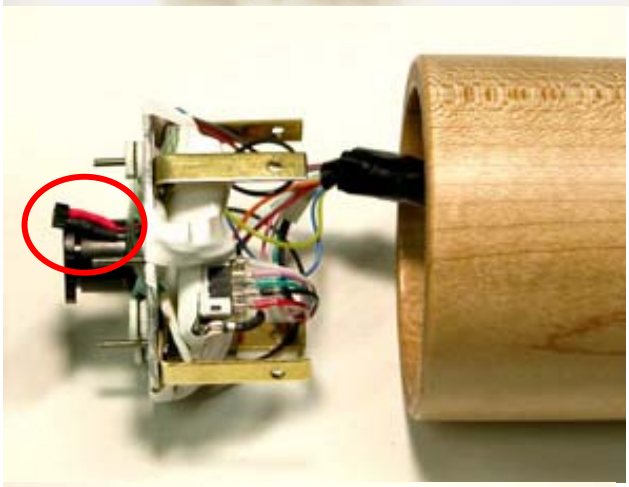
These green film-strips should be straight without bending.



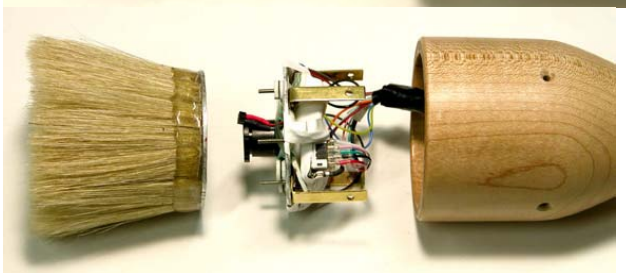
The **tips** of the force sensors are attached to the aluminum ring with the double-sided tape.

The **ends** of the force sensors should be taped to the aluminum ring with vinyl electrical tape.

The LED plugs should sneak out of the middle hole along the camera, between the sensors. But the LED plugs should **not be pressing or moving** the force sensor strips.



The camera should be also taped down to the ring with the vinyl electrical tape.



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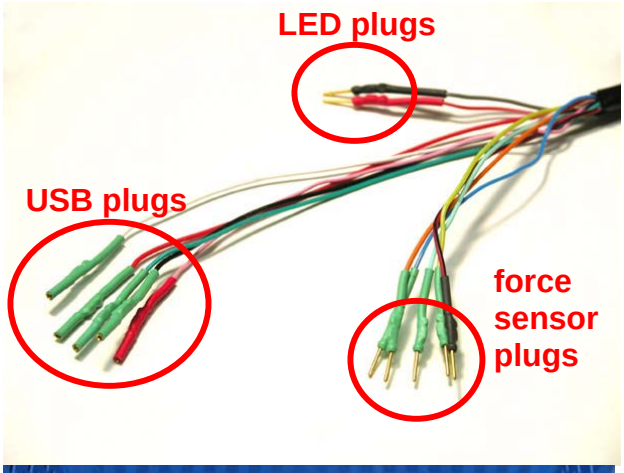
Finally, please follow the color code of the shrink-wrap when connecting the ends of the wire.



Once the ends of the cable are connected to the board, the wires should be taped down to the box so that they will not be accidentally unplugged!

Thanks!

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