

Intro: Stroke Sensor

This sensor takes some time to make. Repeatedly threading, stitching and cutting thread. But the result is quite effective and you can vary the design of the sensor in order to detect different kinds of stroke. See illustration for variations in stroke sensor design.

Various techniques could be applied to create this kind of "stroke sensor" such as knitting or crocheting loop stitch or rug knotting techniques. This Instructable shows how to stitch conductive 117/17ply silver plated nylon thread and a more resistive 66 Yarn 22+3ply 110 PET thread into neoprene in order to create a "stroke sensor". The rubberiness of the neoprene creates enough friction so that the threads will not come loose when stroking. Meaning you don't have to knot each individual hair. It is important to use these particular threads as thicker conductive threads tend to curl when repeatedly stroked and thus don't work for the stroke sensing anymore.

The publication *DIY Wearable Technology* also contains information on this sensor and can be downloaded from:

>> <http://plusea.at/downloads/DIYWearableTec.pdf>

HOW TO GET WHAT YOU WANT:

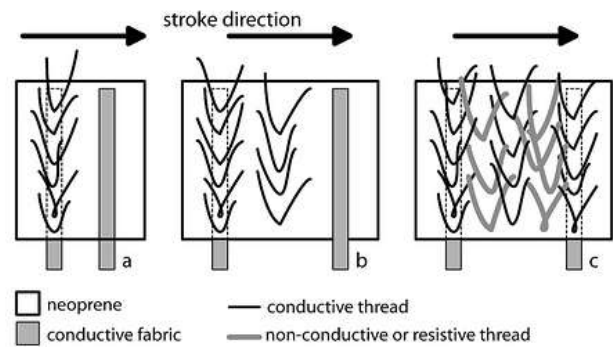
Loop stitch technique post >> www.kobakant.at/DIY/

Stroke sensor post >> www.kobakant.at/DIY/

VIDEO



CLICK TO PLAY VIDEO 



Step 1: Materials and Tools

MATERIALS

For sensor:

- * Conductive thread- Silver Plated Nylon thread, 117/17 2ply
 - * Resistive thread - 66 Yarn 22+3ply 110 PET
- both from LessEMF: lessemf.com/fabric.html
- * Stretch conductive fabric
 - * Fusible interfacing

For circuit:

- * 1.5 mm thick neoprene with polyester jersey laminated to either side from SedoChemicals: www.sedochemicals.de
 - * LilyPad sewable LED
 - * Sewable coin cell holder
- both from Sparkfun: www.sparkfun.com/commerce/product_info.php
- * 3V coin cell

TOOLS

- Sewing needle
- Scissors
- Iron



Step 2: Material preparations

Cut out a piece of neoprene as large as you want the sensor to be. Cut two strips of stretch conductive fabric with fusible interfacing adhered to one side and fuse them opposite ends of the back side of the neoprene. See photos for reference.



Step 3: Thread needle, stitch, cut

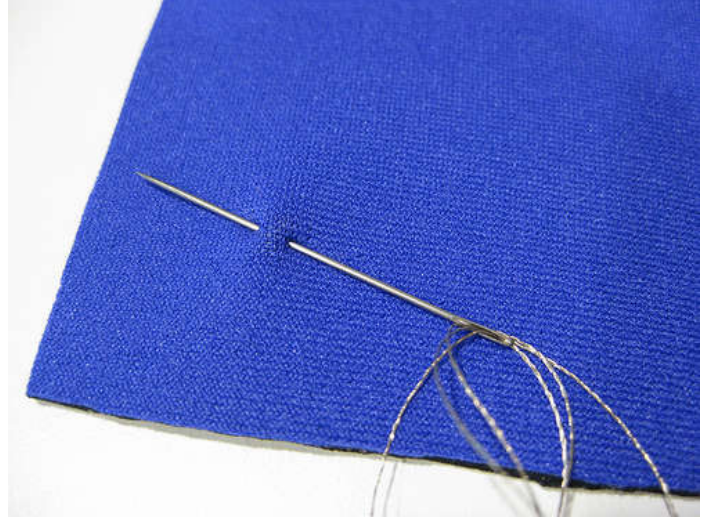
Thread a sewing needle with the conductive thread and take it double-double, so that two strands of thread are going through the needle hole. This is a way to save time and effort since you'll be able to stitch four threads in one go. Of course you can also stitch a single thread at a time.

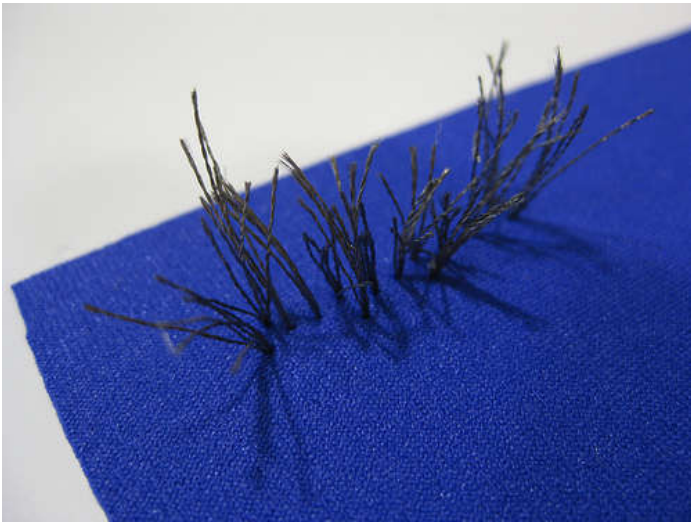
Start by stitching through from the front side of the neoprene where the conductive fabric is adhered to the back. Make sure the thread goes all the way through the neoprene and makes contact with the conductive fabric before coming out the front again. Then cut all four threads to roughly equal lengths - depending on sensor design - about 2-3cm.

Repeat this over and over again until both conductive fabric strips have "hairs" connected to them. See photos.

Now thread the resistive thread the same way and repeat the same technique over again but this time fill the surface area in between the two conductive thread/fabric strips. See photos.

When you are finished with this, your sensor is finished, in order to see results continue with step three. or simple use alligator clips, an LED or a multimeter or an analog to digital converter to read sensor values.





Step 4: Complete circuit

Your sensor is done, but by connecting an LED and a battery you can see how it works. Connect as follows, sewing with conductive thread:

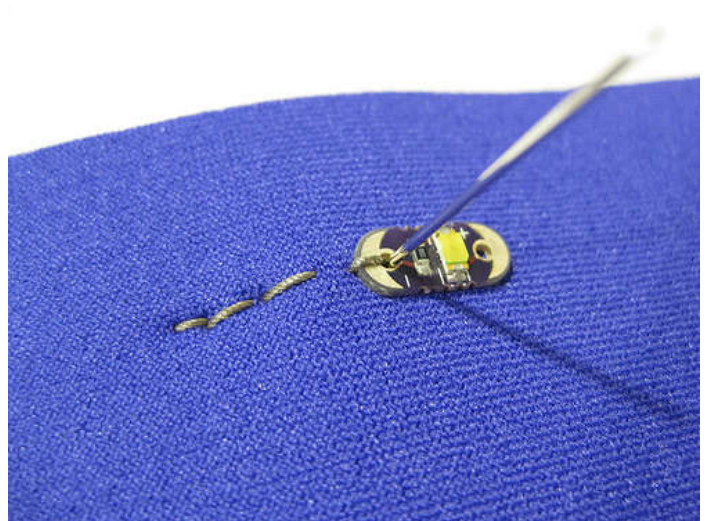
End of one of the conductive fabric strips -- to -- Negative LED lead

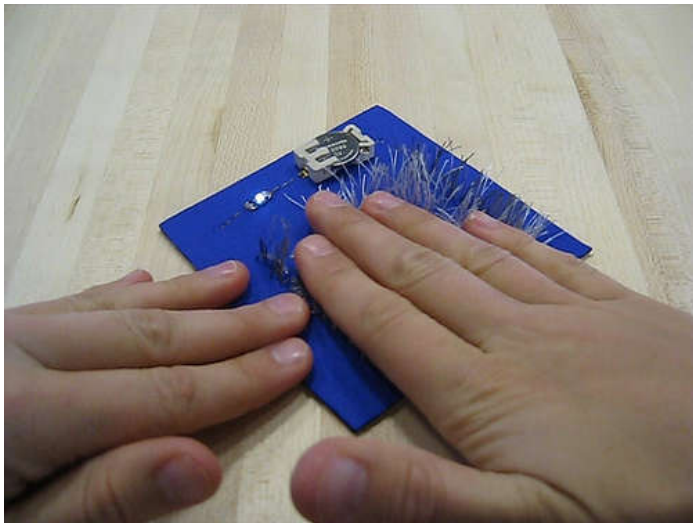
Positive LED lead -- to -- Positive battery holder lead

Negative battery holder lead -- to -- End of the other conductive fabric strip

Now when you stroke the sensor you will see how the LED lights up brighter the greater the surface you stroke and the harder you stroke.

Enjoy!

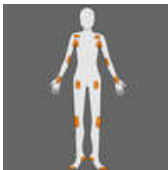




Related Instructables



Neoprene Bend Sensor IMPROVED by Plusea



Puppeteer Motion-Capture Costume by Plusea



Conductive Thread Pressure Sensor by Plusea



Full Demonstration of all LilyPad components by quasiben



Neoprene LED Light Pouch by Plusea



Flexible Fabric Pressure Sensor by Plusea

Comments

26 comments [Add Comment](#)



Arbitror says:

This is a neat idea, but what are some functional uses for it?

Jan 11, 2010. 4:54 PM [REPLY](#)



learningmasters says:

furby s xD

Jan 9, 2011. 12:44 PM [REPLY](#)



DIY-Guy says:

Combine this with the electronics for a "knock sensor" and you've got a silent coded entry system.

Electronic input device for stroke victims, no pun intended. Or Cerebral Palsy victims.

Teddy bears that "know" when they're being loved.

Over-limit sensors for closet doors, drawers, etc.

Couch pillows that heat up when you lean against them (and no knobby little bumps to poke you in the spine!).

So... if you really need more ideas, email me. But otherwise, you're welcome for the free ideas that can only entertain someone who does not build such things. (sigh)

Plusea, another hit with this one! Go for it!

Jan 12, 2010. 11:18 PM [REPLY](#)



swetambri says:

how it can be used with stroke victims?

May 17, 2010. 9:55 AM [REPLY](#)



DIY-Guy says:

Each patient is a little different, but many people have limited control of movement. Some C. P. and stroke patients may not have fine motor control but still can make large movements or medium distance motions. Imagine not being able to control a joystick very well, but still being able to poke/push/shove/ or stroke a general area on a sensor pad. Instead of four tiny directions which require delicate motor control, a user might still be able to swat at a much larger target.

It's the difference between a thumb-stick in a laptop computer versus a "dance pad" sensor as big as your chest... maybe even worn as a vest on the chest.

Naturally each patient might need to have their own macros recorded for their specific abilities. There's a new job description waiting for the nurse or therapist with Arduino programming skills, "Patient mobility interface programmer" and "Active-prosthesis interface customizer."

Swetambri, did that help at all? :)

May 17, 2010. 7:11 PM [REPLY](#)



swetambri says:

grt , thanks

May 18, 2010. 3:36 AM [REPLY](#)



chaosrob says:

A robotic, interactive 'pet'. Make it purrrrr, get annoyed if stroked in wrong direction, a dogs leg that goes crazy when a specific spot is scratched, etc. Very cool idea.

Jan 12, 2010. 9:39 AM [REPLY](#)



OverSaltedFry says:

You could make it into a rug i guess

Jan 12, 2010. 3:49 AM [REPLY](#)



corey_caffeine says:

make it say ouch when stepped on?

Jan 21, 2010. 1:34 PM [REPLY](#)



strangebike says:

I work in a preschool and to be honest it could be great for kids to roll walk on or generally do kiddy things on with some kind of attachment to a sound or light generator could be a great fun learning experience for the kids. would start some conversations. Great idea over salted fry

Jan 14, 2010. 6:19 AM [REPLY](#)



oddmidge says:

Put it in the right places so you can make someone 'light up'. Or for creepy people on the train...

Jan 11, 2010. 7:39 PM [REPLY](#)



DIY-Guy says:

Creepy people on the train? How about a "Don't touch me or my shirt will taze you bro!" (self defense system to prevent unwanted touching).

... now if we can just get those conductive threads to do double duty with a high voltage source... without frying part of itself, or the legitimate owner.

Jan 12, 2010. 11:25 PM [REPLY](#)



Arbitror says:

That's not creepy...

Jan 11, 2010. 8:04 PM [REPLY](#)



oddmidge says:
You have a better use?

Jan 11, 2010. 9:47 PM [REPLY](#)



silverbyte says:
the idea is awesome, rather than turning LED on, you can make a circuit turn on and off when you pet it... like a cat purring... or whatever, this has tons of use...

Jan 12, 2010. 9:51 AM [REPLY](#)



spike shadows (secret agent man) says:
Same thing I was thinking

Jan 11, 2010. 5:31 PM [REPLY](#)



silverbyte says:
read my post on oddmidge / same response to you.
simple idea, can be applied in 1000 different ways... use your imagination

Jan 12, 2010. 9:52 AM [REPLY](#)



Lasrin says:
This is brilliant!!

Jan 12, 2010. 11:12 AM [REPLY](#)

The uses spring to mind!
A robot with arrays of these would be able to detect contact.
A amputee could feel the wind (with a neural interface) over their prosthesis.
A carpet of these would allow for a security system to detect an intruder, without a detectable (visible) motion detector.

Can you detect the direction or size of the object (your hand) moving across the sensor?



davison112 says:
WEll, for the carpet security thing, Have it set up in a grid pattern, so like, the foot would be Grid space (1,1;1,2)

Feb 7, 2010. 2:54 PM [REPLY](#)



Arbitror says:
No, I pretty sure it's just a switch.(or resistor?)

Jan 14, 2010. 4:27 PM [REPLY](#)



Carlos Marmo says:
Extremely creative!

Jan 14, 2010. 10:09 AM [REPLY](#)

Extremely well done!
Its design would you suggest implementing numerous ideas!
Congratulations!



nbiehl says:
I'm surprised no one has mentioned the musical applications for this sensor. You could use it to send a signal to a midi device. Or you could use it as a trigger for circuit bent instruments.

Jan 14, 2010. 7:53 AM [REPLY](#)



Koosie says:
Wow, so simple but brilliant! Keep up the great work.

Jan 12, 2010. 12:40 PM [REPLY](#)



silverbyte says:
you know what... I was impressed with your fabric sensor a while back (posted on hackaday) and I'm continuously impressed with this too.

Jan 12, 2010. 9:50 AM [REPLY](#)

It's so SIMPLE, and it's the thinking outside the box which is impressive, I LOVE IT!.

you're basically completing the circuit loop with conductive fabric (I just saw the video at this point I have yet to read your instructable at this point) but I'm sure that's exactly what's happening here.

I had to comment on your work, I'm impressed, thank you for the IDEA this is awesome. please continue with your awesome ideas!



Jayefuu says:
Congrats! You got featured on hackaday.com
<http://hackaday.com/2010/01/12/stroke-to-unlock/>

Jan 12, 2010. 9:48 AM [REPLY](#)



Lynne Bruning says:
SWEET!

Jan 12, 2010. 4:39 AM [REPLY](#)

and you have perfect timing.
thank you.

