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EXAMPLE PROJECTS

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CONNECTIONS

POWER

SENSORS

TRACES

CIRCUITS AND CODE

WIRELESS

CONDUCTIVE

MATERIALS

NON-CONDUCTIVE

MATERIALS

TOOLS

TECHNIQUES

THINKING OUT LOUD

SENSORS

- 3D PRINTED SENSORS
- ADJUSTABLE SLIDER
- ANALOG PIN STROKE SENSOR
- ANTI-STATIC FOAM PRESSURE MATRIX
- BALLOON SENSOR
- BEADED SWAY SENSOR
- BONDED BEND SENSOR
- BUTTON BUTTONS
- BUTTON SWITCH
- CAPACITIVE FABRIC SLIDER/WHEELS
- CIRCULAR KNIT INFLATION SENSOR
- CIRCULAR KNIT STRETCH SENSORS
- CONDUCTIVE POMPOM
- CONSTRUCTED STRETCH SENSORS
- CROCHET BUTTON
- CROCHET CONDUCTIVE BEAD
- CROCHET FINGER SENSOR
- CROCHET PRESSURE SENSOR
- CROCHET TILT POTENTIOMETER
- CROCHET/KNIT PRESSURE SENSORS
- CROCHET/KNIT SQUEEZE SENSORS
- DANISH KROWN SLIDE-SWITCH
- DATAGLOVE FLEX SENSOR RIG
- RESISTIVE SENSORS

## WELCOME TO THE KOBAKANT DIY WEARABLE TECHNOLOGY DOCUMENTATION

*This website aims to be a comprehensible, accessible and maintainable reference resource, as well as a basis for further exploration and contribution.*

## MOST RECENT POSTS

Sensors

### BEADED SWAY SENSOR



swing, sway, wave, trail, quiver, quake, judder, jiggle, jig, joggle, jog, jerk, waggle, wiggle, wriggle, wobble, shake, shiver, shudder, squirm, slant, lean, tip, slope, incline, dip, angle, twitch, totter, teeter, tremble, rock, roll, flutter, flap, vibrate, oscillate, convulse ...work in progress... This beaded sway sensor was designed to capture the swinging, swaying, jerking, tilting movements [...]

Tools

### E-TEXTILE SENSOR TESTER



Build a simple circuit with an LED, a coin-cell battery pouch and interrupt the full circuit connection by inserting two crocodile clips. When the clips connect, the circuit is complete and the LED light will shine. When you mount a textile sensor between the clips, the LED brightness will depend on the resistance of the [ ]

# HOW TO GET WHAT YOU WANT

## EXAMPLE PROJECTS

## WORKSHOPS

## ACTUATORS

## CIRCUITS

## COMMUNICATION

## CONNECTIONS

## POWER

## SENSORS

## TRACES

## CONDUCTIVE

## MATERIALS

## NON-CONDUCTIVE

## MATERIALS

## TOOLS

## TECHNIQUES

## CODE

## CONDUCTIVE MATERIALS

ANTI-STATIC FOAM  
CONDUCTIVE FABRIC SUBSTITUTE  
CONDUCTIVE FABRICS  
CONDUCTIVE GEL  
CONDUCTIVE PAINTS AND INKS  
CONDUCTIVE PEN  
CONDUCTIVE PLAY-DOH  
CONDUCTIVE TAPES  
CONDUCTIVE THREADS  
CONDUCTIVE VELCRO  
CONDUCTIVE WOOL  
CONDUCTIVE YARNS  
CUSTOM PLUGS  
FINE STEEL WOOL  
GRAPHITE POWDER  
HEADERS  
METAL BEADS  
METAL FASTENERS  
METAL POPPERS  
MULTI-CONDUCTOR FABRICS  
PERFBOARD  
RESISTIVE AND PIEZORESISTIVE FABRICS  
RESISTIVE PAPER  
RESISTIVE RUBBERS  
STRETCH CONDUCTIVE FABRIC COMPARISON  
THIN FLEXIBLE WIRE  
VELOSTAT

## Conductive Materials

# CONDUCTIVE THREADS

also see: [conductive yarn](#)

conductive threads are usually manufactured for anti-static, electromagnetic shielding, intelligent textiles, wearable technology, data transfer and heating purposes. Most threads are metalized with an alloy of various metals, which can include silver, copper, tin and nickel. The core is normally cotton or polyester.

Conductive threads are uninsulated and sewing them tightly to metal usually makes for a good connection, though this connection tends to loosen over time where movement occurs. One way of avoiding this is to include a squishy material, such as stretch conductive fabric underneath the stitches, or a non-conductive material, so long as it does not obstruct the electrical connection.



see also: [Syuzi Pakhchyan's summary of conductive threads on Fashioning Technology](#)  
>> <http://www.fashioningtech.com/page/conductive-thread>

## About

Craft: PROJECTS

Syuzi Pakhchyan

# FASHIONING TECHNOLOGY

A DIY  
INTRO TO  
SMART  
CRAFTING

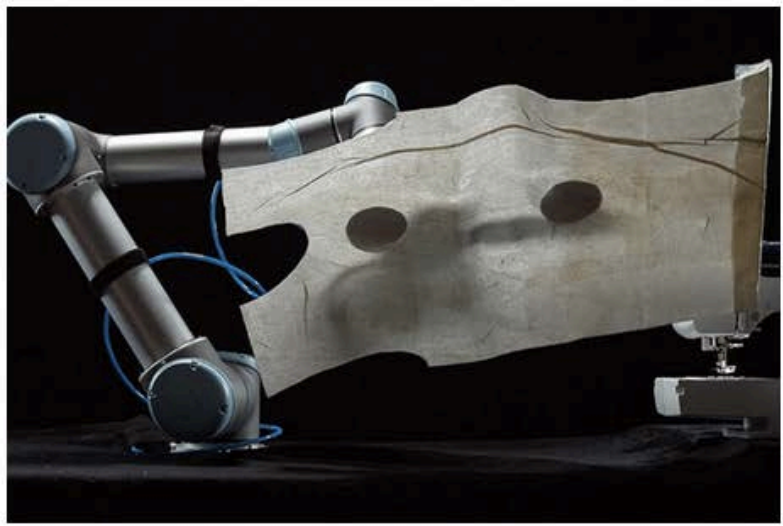
ROCK STAR  
HEADPHONES



- >> Learn Electronics
- >> Make Wearables
- >> Accent Your World
- >> Create Interactive Toys



Craft:  
craftzine.com



MATERIALS & MANUFACTURING

## Sewn by Bots: Is Automation the Key to Achieving Sustainable Fashion?

by Syuzi Pakhchyan | February 23, 2017

Automation has been the holy grail of sustainable fashion. But unlike the manufacturing of mobile phones for example, the sewing of clothing has been tricky to automate because fabric is... [READ MORE](#)



FASHION

## Kinetic Couture: Introducing the Butterfly Dress

by Syuzi Pakhchyan | January 25, 2017

Thanks to Intel's persistent vision of partnering engineers with fashion designers, we are seeing an emergence of ideas that weave technology into garments primarily as vehicles for self-expression. The latest... [READ MORE](#)



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Fabrik Leonischer Waren  
Grimmstraße 75  
91154 Roth - Eckersmühlen

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Email: [info@karl-grimm.com](mailto:info@karl-grimm.com)  
Internet: [www.karl-grimm.com](http://www.karl-grimm.com)

# PRICE LIST

## High-Flex

High-Flex No.:	3981	3981	3981	3981	3981	
Twisting	7 x 1	7 x 2	7 x 3	7 x 4	7 x 5	
Made of	E-Cu	E-Cu	E-Cu	E-Cu	E-Cu	
-----						
Length	about 4.300	2.100	1.400	1.050	850	meters/kilo
Diameter	about 0,42	0,62	0,75	0,80	0,9	mm
Resistance	about 2,3	1,2	0,75	0,55	0,45	Ohm/m
Breaking Strength	about 2,8	5,6	8,3	11,0	14,0	kilo
Copper Cross Section	about 0,013	0,027	0,041	0,054	0,068	mm <sup>2</sup>
Copper tinned	€ 82,--	97,--	86,--	82,--	76,--	per kilo
Copper silver plated	€ 96,--	111,--	100,--	96,--	90,--	per kilo
14/000						

All prices are quoted with the addition of the copper-DEL-note + 5 % working costs following the day of the incoming order.

The price for the silver plated tinsel is basing on a price of EUR 250,00 for 1 kg Silver. In case of higher or lower price an addition or deduction based on the difference will be added.

<b>Karl Grimm Postfach 3162 91146 Roth Germany</b>	Quantity	Price per kilo EUROS	Total EUROS	XE.com exchange rate 1.306 on Feb. 3, 2012	TOTAL CDN
HIGH FLEX SILVER THREAD Copper Silver Plated					
7x1	1 kilo	96	96.00 €		
7x2	1 kilo	111	111.00 €		
7x3	1 kilo	100	100.00 €		
7x4	1 kilo	94	94.00 €		
7x5	1 kilo	90	90.00 €		
<b>Thread Subtotal</b>			<b>491.00 €</b>		
Surcharge for metals increase	30%		147.00 €		
<b>Subtotal</b>			<b>638.00 €</b>		
German Taxes	19%		121.28 €		
			759.28 €	x 1.306	\$991.62
				plus GST PST	xxx
				plus shipping	xxx

[THE THREAD](#)[USING IT](#)[BUYING IT](#)[IDEAS](#)[DESTINATIONS](#)

### Electrical Characteristics

The thread has a resistance of approximately 0.72 ohm / cm, or 22 ohm / foot. This is quite sufficient for, say, powering LEDs over quite large distances. Resistance does not vary significantly from one length of thread to the next as some are reported to do, so you should be able to use this thread without concern for "dead" sections .

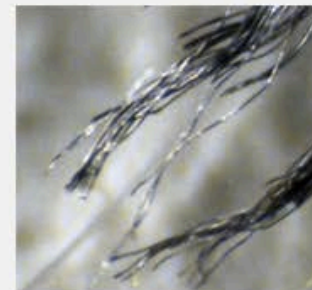
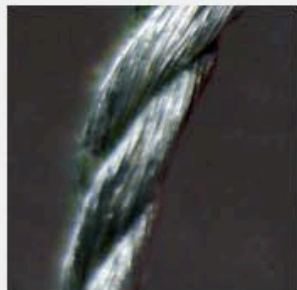
### Physical Characteristics

The thread has a breaking strain of around 9.3 pounds (4.2 kilos). It comprises roughly 96 individual filaments, each coated with a micron-thick layer of natural silver. In construction, 16 of these filaments are wound together to form an initial twist; two of these twists are then twisted together, and finally three of these twists are combined to form the finished thread.

In thread terms, it's around 18 denier. In terms understandable to me, it's a little heavier than a regular sewing thread, but not as heavy as an upholstery thread. It can be sewn on most domestic sewing machines using either a regular needle or the next size up.

This thread does not fray. As far as I can tell, there are no loose ends of filaments except where they have been cut. The filaments are very smooth, so there are no fine tendrils as you will find with a cotton thread. This used to result in a lack of cohesion in the thread, resulting in "bunching" at the needle when machine sewing; this is no longer the case.

Here's what the thread looks like up close:



Questions or comments? New ideas you'd like to share? Email me here at [ubik@shaw.ca](mailto:ubik@shaw.ca)





THE THREAD

USING IT

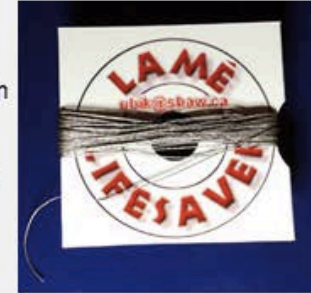
BUYING IT

IDEAS

DESTINATIONS

**Format: 10-Yard Card**

Many people with iPhones and similar devices are finding that they can't be used in regular gloves, and are looking to buy thread to make a fingertip conductive. For this, you don't need 200 yards of thread, so to save you money on thread and on postage, I'm offering ten yards of thread (still enough for a lot of fingers) mailed by regular letter mail for \$10 US anywhere in the world. Postage *is* included. If that's what you need, simply pay \$10 US to sales@conductive-thread.ca via this link:

**Buy Now****Format: 200-Yard Spool**

If you require full spools of thread, you can calculate the cost including shipping using the calculator below. Once you know that you can pay for your thread in any of these ways:

- PayPal - make a payment in the appropriate amount to sales@conductive-thread.ca
- Interac - in Canada, if you have online banking at a major Canadian bank, you can pay directly by email to ubik@shaw.ca. You can read all about it [here](#).
- Personal cheque - I can accept personal cheques in either Canadian or US dollars. Please make cheques payable to Robert Smith and mail them to:

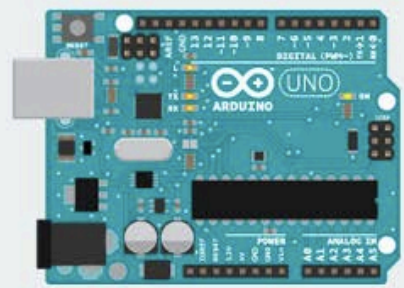
Robert Smith  
2039 Cedar Hill X Road  
Victoria BC V8P 2R5  
CANADA

**Calculator**

This calculator is good for quantities up to ten spools of thread. If you want more than ten spools, I'll need to calculate the price to ship the required quantity to your mailing address. Once I know, I'll email you back. You send payment in whatever form of payment works best for you, and on receipt I'll mail the thread to you.



# WHAT IS ARDUINO?



BUY AN ARDUINO

LEARN ARDUINO

DONATE



THE ARDUINO MKR FAMILY JUST GOT EVEN BIGGER!



BLOG

DRAGON BALL Z HEAD-MOUNTED SCOUTER COMPUTER REPLICA



> ARDUINO  
> WEB EDITOR  
> CODE ONLINE!

MKR WAN 1300  
A POWERFUL BOARD  
WITH LORA  
CONNECTIVITY!  
SHOP NOW



BLOG

Constructing an hourglass



### Petoi Nybble

Project showcase by Rongzhong Li (李...)

11,436 VIEWS 24 COMMENTS 192 RESPECTS



### Automated Chess Board

Project showcase by maguerero

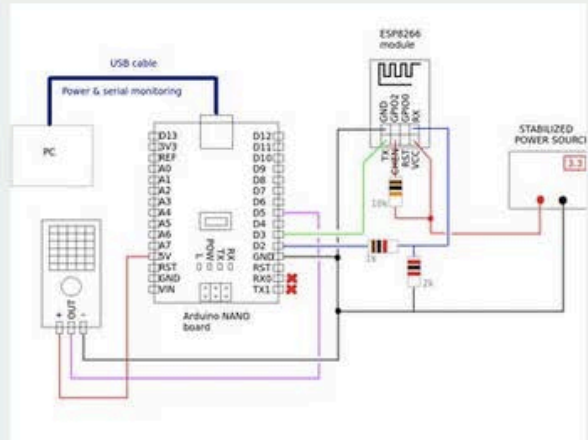
3,986 VIEWS 6 COMMENTS 55 RESPECTS



### SerialDebug: Improving Debug to Arduino

Project tutorial by JoaoLopesF

1,278 VIEWS 6 COMMENTS 16 RESPECTS



Publish Your Arduino Data to



Build Your Own Benkyu's "Self



Arduino DS485 DIN Rail Mount



SHOP

BLOG

LEARN

FORUMS


VIDEOS





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(SEE ALL)


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- RASPBERRY PI (405)
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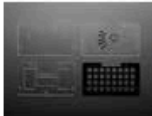
**NEW PRODUCTS**  
(SEE ALL 65)

- 

Speaker - 40mm Diameter - 4 Ohm 3 Watt  
\$4.95
- 


Adafruit NeoTrellis M4 with Enclosure and Buttons Kit Pack  
\$59.95
- 


Silicone Elastomer 4x4 Button Keypad - 2 Pack  
\$9.50
- 


Adafruit NeoTrellis M4 Mainboard - featuring SAMD51  
\$39.95
- 


NeoTrellis M4 Acrylic Enclosure Kit  
\$12.50


**FEATURED PRODUCTS**  
(SEE ALL 33)

- 

Adafruit NeoTrellis M4 with Enclosure and Buttons Kit Pack  
\$59.95
- 

Mini Ad Blocking Pi-Hole Kit with Pi Zero WH - No Soldering!  
\$39.95
- 

Adafruit NeoTrellis RGB Driver PCB for 4x4 Keypad  
\$12.50
- 

Adafruit HalloWing M0 Express  
\$34.95
- 

Adafruit Feather M4 Express - Featuring ATSAMD51  
\$22.95



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- SUPPORT



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PRODUCT MENU

find products, tutorials, etc...

SPARK X EDUCATION A/C FORUM

HOME / PRODUCT CATEGORIES / BRANDS / LILYPAD (47 PRODUCTS)

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  - Newest
  - Oldest

- REFINE BY:**
- SparkFun Original
  - On sale
  - In stock

- CUSTOMER REVIEWS:**
- ★★★★★
  - ★★★★
  - ★★★
  - ★★
  - ★

PRICE: \$0 - \$10

*LilyPad*

**LILYPAD RESOURCE CENTER**

In celebration of its release 10 years ago, we've **reduced prices** on the whole line.

# LilyPad



**LilyPad Sewable Electronics Kit**

KIT-13927

**\$99.95**



**LilyPad Coin Cell Battery Holder - Switched - 20mm**

DEV-13883

**\$19.95**



**E-textile Basics Lab Pack**

LAB-13165

**\$199.95**



**LilyPad Arduino USB - ATmega32U4 Board**

DEV-12049

**\$25.95**



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Home > Robots to Build & Experiment > Robot Parts > Microcontrollers

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  - Lighting
  - Mechanics >
  - Microcontrollers ▾**
    - Arduino

# Microcontrollers

Microcontrollers are robot brains. Microcontrollers allow the designer to interface **sensors** and **specialized control electronics** together (along with anything else required for the project) and contain the overall logic of the robot.

## Arduino Uno R3 USB Microcontroller

Perfect controller for roboticists, artists, designers and hobbyists

[View product details](#)



PRODUCTS

MANUFACTURERS

RESOURCES

LIVE CHAT

0 Item(s)

Hello Barbara Layne MY DIGI-KEY

# World's Largest Selection of Electronic Components Available for Immediate Shipment!

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FREE SHIPPING On Orders Over \$100 CAD! >

## Products [View All](#)

### Semiconductors

- Development Boards, Kits, Programmers
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- Integrated Circuits (ICs)
- Isolators
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- Sensors, Transducers

### Passives

- Capacitors
- Crystals, Oscillators
- Filters
- Inductors, Coils, Chokes
- Potentiometers, Variable Resistors
- Resistors
- Thermal Management

### Electromechanical

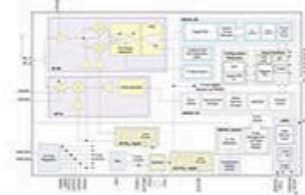
- Audio
- Fans
- Industrial Automation and Controls



#### REFERENCE DESIGNS

### EVAL-CN0350-PMDZ: Piezoelectric Sensor Signal Conditioning

The circuit in this design is a 12-bit, 1 MSPS data acquisition system utilizing only two active devices. The system processes charge input signals from piezoelectric sensors using a single 3.3 V supply.



#### ARTICLE

### Rapidly Implement a Real Time Location System Accurate to 10 cm

Radiolocation systems have become a ubiquitous feature in nearly every type of mobile device and associated application.



#### BLOG

### New Product Discovery: Fluke Electronics Test Meter T6-600

Clamp ammeters measure current flow without the hassle of breaking apart a circuit to insert test leads for current readings.



SUSTAINABILITY

ENTREPRENEURSHIP

PRODUCTION

R&D

EVENTS & WORKSHOPS



B

F

D

A

Research Fellows TEK-TILES 2017 TEK-TILES 2018

R&D





## Smart textiles makes robots move

Robots that sense touches, controlled with simple hand movements, and with soft muscles. A five-year collaboration project between the University of Borås and the University of Skövde is on the tracks of the future.



## Textiles that behave abnormally is Ana's field of research

Textile in relation to the body, the room and the building. Design to create more sustainable ways of living by linking architecture, textiles and interactive surfaces. That is what the EU-project ArcInTexETN is about.



## Integrated digital platform for a new clothing business model

Researchers are now developing an innovative business model to make it profitable to manufacture small series of certain garments in Europe. The business model is based on a digital platform that integrates all actors involved in the process.

### Postal address

Högskolan i Borås  
S-501 90 Borås  
Sverige

### Visiting addresses

Allégatan 1, Borås  
Skaraborgsvägen 3

### Contact

+46-33-435 40 00

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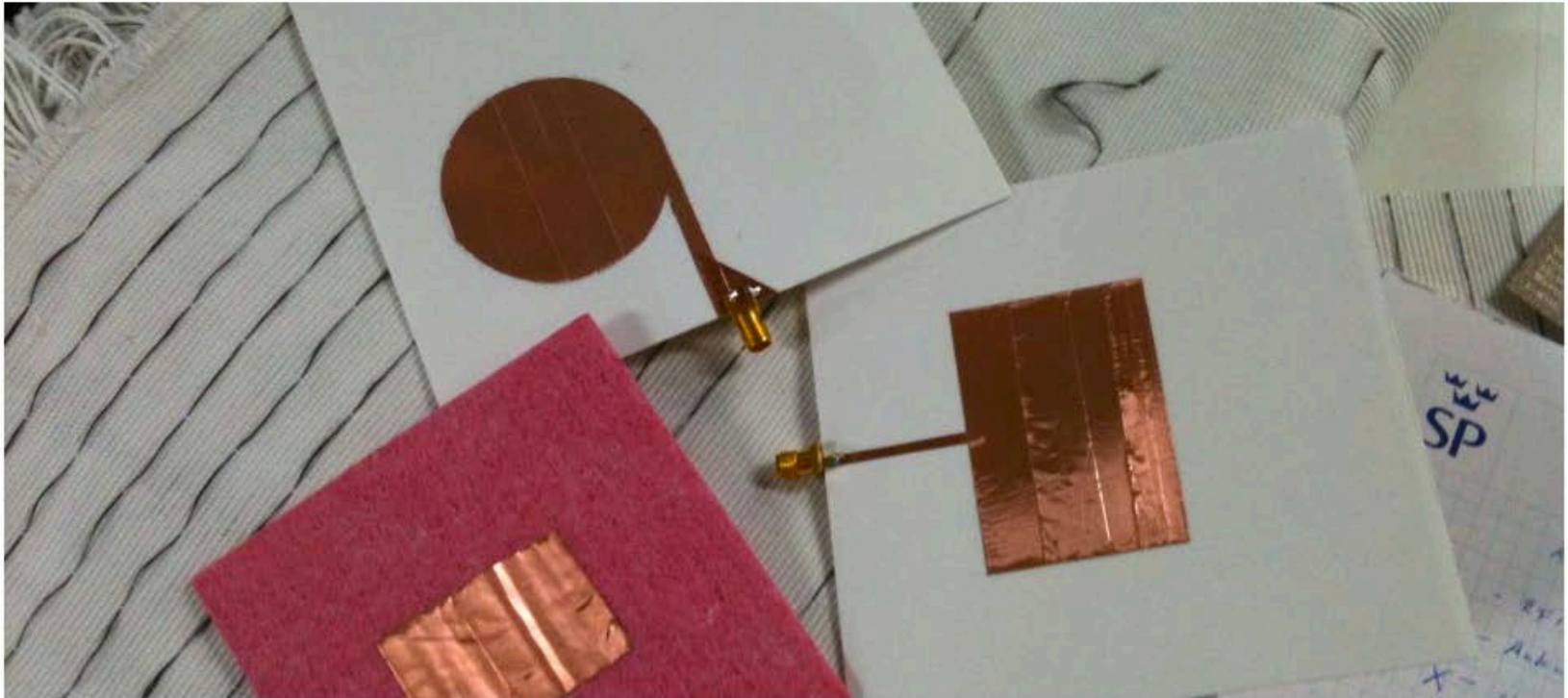
[Instagram](#)

[RSS](#)

<http://www.stdl.se/>

posts

Smart Textiles Design Lab Blog at The Swedish School of Textiles

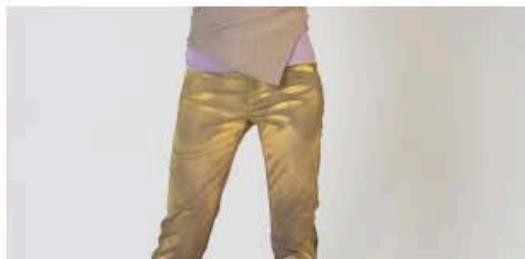


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I come from...



Let Your Body Prints Your Dress



Thermochromic workshop at Aalto University





The Mirror Handbag  
**BUY NOW**

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# LEAH BUECHLEY

publications talks



Leah Buechley is a designer, engineer, and educator. Her work explores integrations of electronics, computing, art, craft, and design. She has done foundational work in paper and fabric-based electronics. Her inventions include the LilyPad Arduino, a construction kit for sew-able electronics. She currently runs a design firm, Rural / Digital, that explores playful integrations of technology and design. Previously, she was an associate professor at the MIT Media Lab, where she founded and directed the High-Low Tech group. Her work has been featured in publications including The New York Times, Boston Globe, Popular Science, and Wired. Leah received a PhD in computer science from the University of Colorado at Boulder and a BA in physics from Skidmore College. At both institutions she also studied dance, theater, fine art, and design.

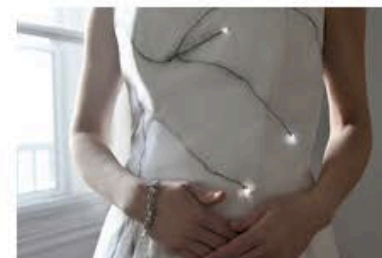
Leah was the recipient of the 2017 Edith Ackerman award for Interaction Design and Children.

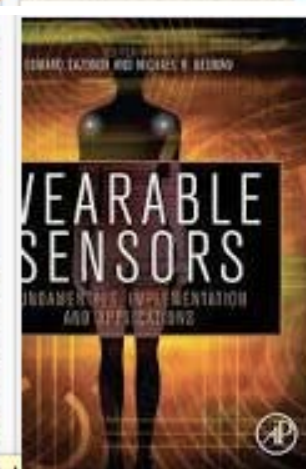
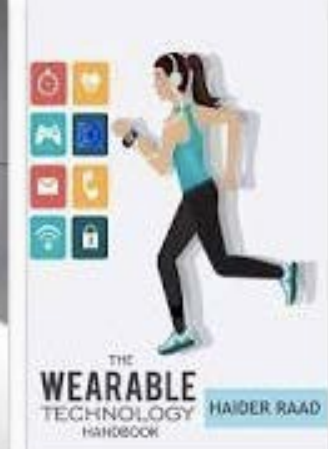
instagram  
twitter  
Rural / Digital  
High-Low Tech

# 3electromode

Projects + Exhibitions  
Press + Conferences  
About

valerie@  
3electromode.com  
+1 514 823 8587





# Getting Started in Electronics

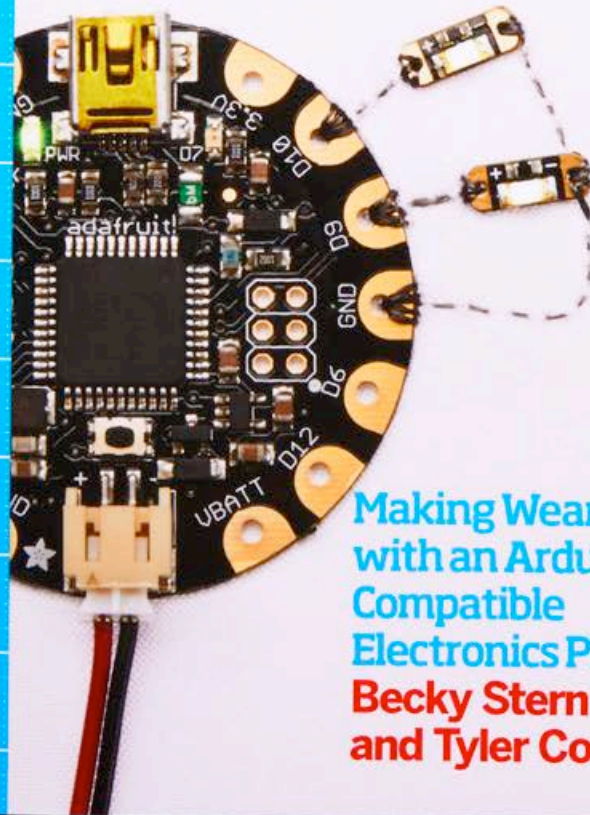
A complete electronics  
course in 128 pages!



Forrest M. Mims III

**Make:**

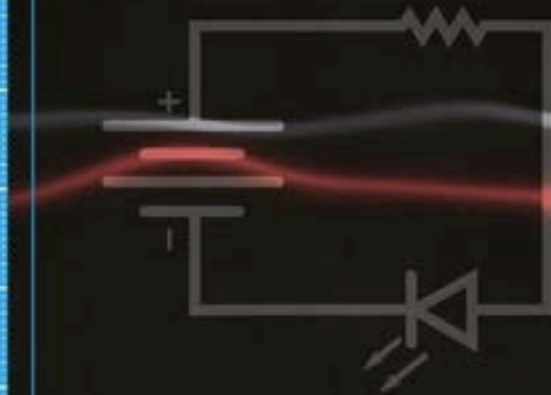
# Getting Started with Adafruit FLORA



Making Wearables  
with an Arduino-  
Compatible  
Electronics Platform  
**Becky Stern**  
and **Tyler Cooper**



**Make:**



# Wearable Electronics

Design, prototype, and wear your  
own interactive garments

**Kate Hartman**

Copyrighted Material



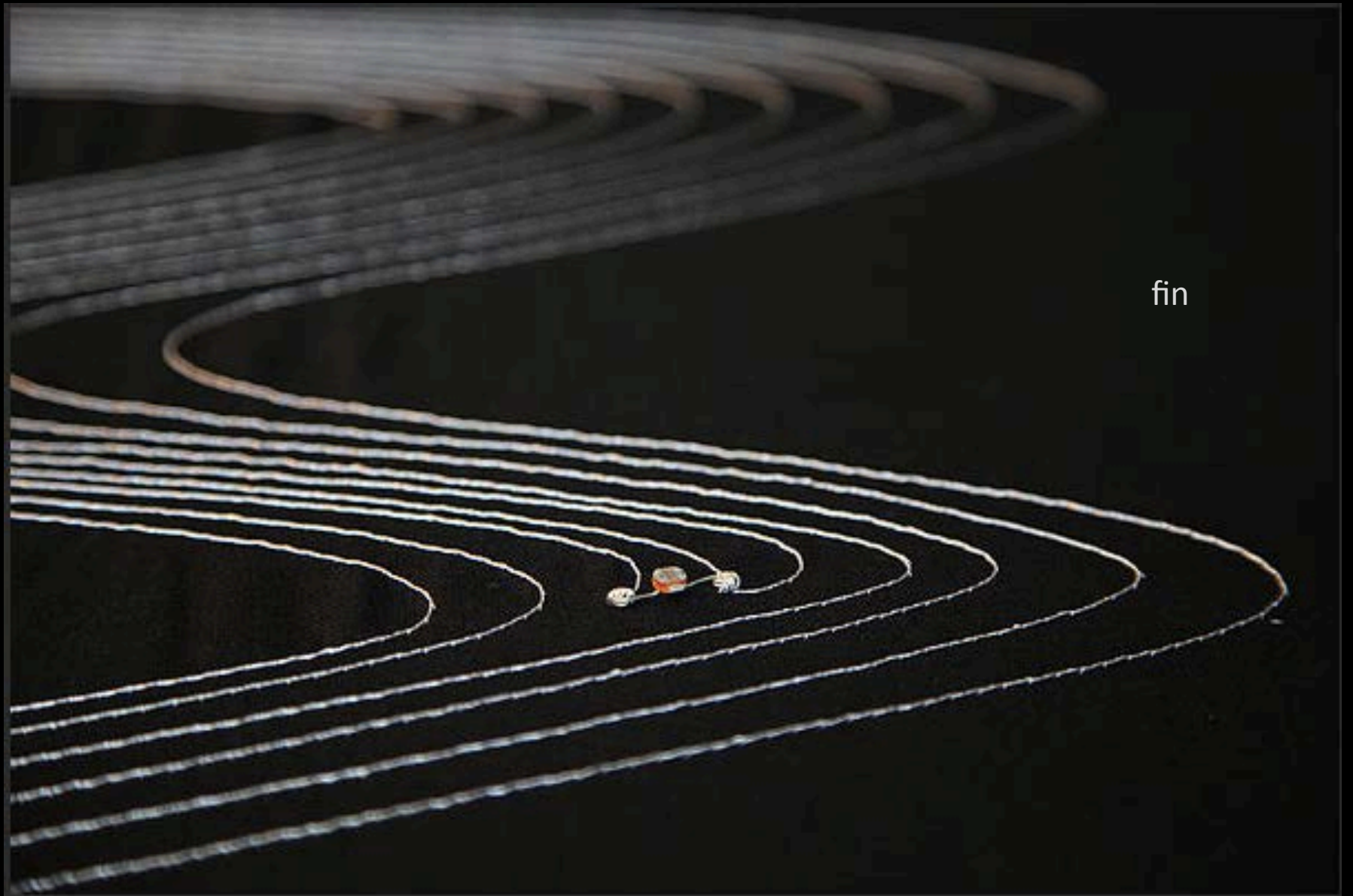
# SMART TEXTILES FOR DESIGNERS

INVENTING THE FUTURE OF FABRICS

designing  
with  
smart  
textiles

*Sarah Kettley*

BLOOMSBURY



fin