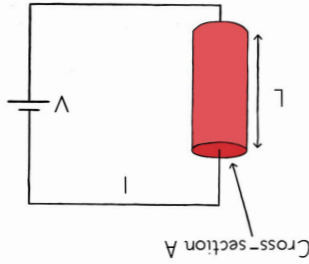
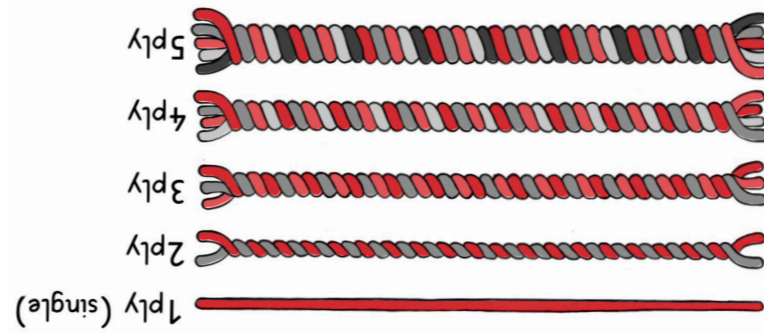
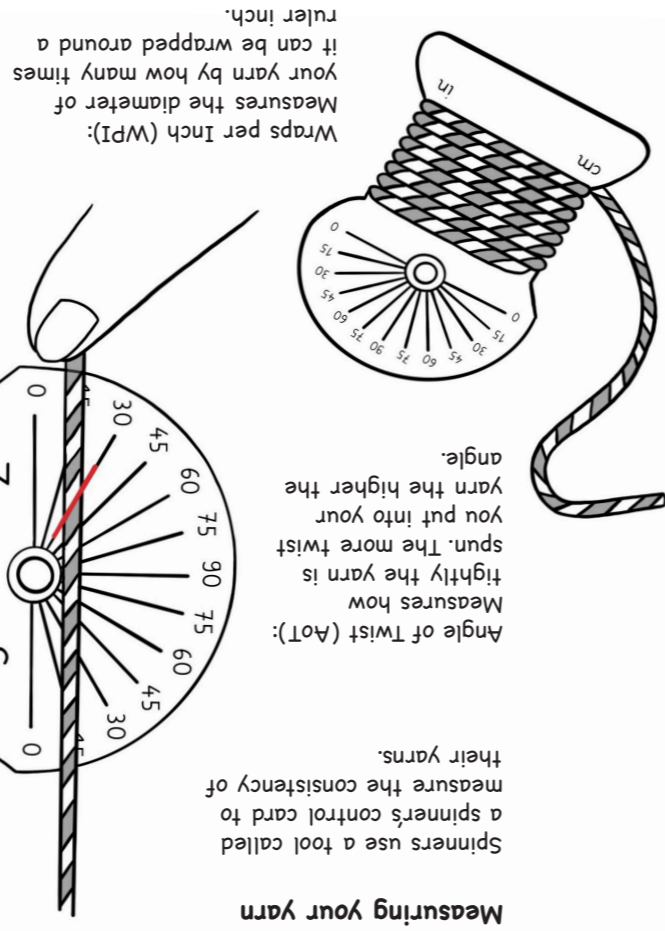


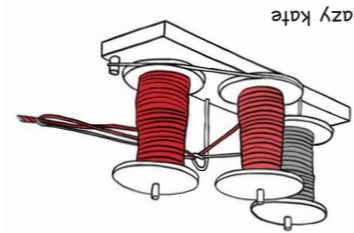
Volume resistivity is used to measure how strongly a material resists the flow of electrical current. It is expressed in Ohms/cm.



$p = R \times A/L$
 p = Volume Resistivity (Ohms/cm)
 R = Resistance (Ohms)
 A = Cross-sectional area of the material (cm²)
 L = Distance between probe electrodes (cm)
 Measuring volume resistivity (Ohms/cm)

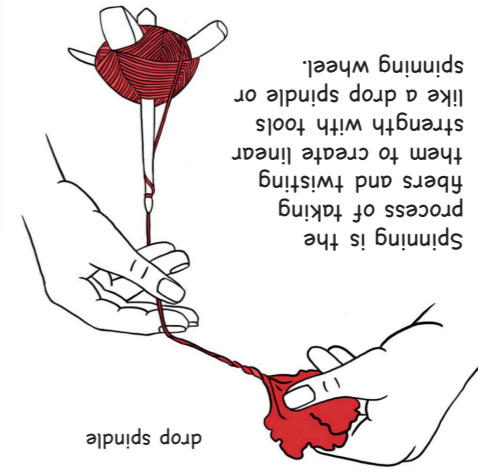


*Open this zine for a poster inside showing the full process of creating e-textile yarn.



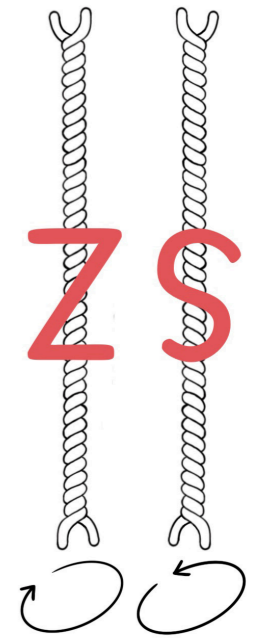
To create a structurally stable yarn, most yarn singles need to be plied together. For example, spinning two S twist yarns with a Z twist will create a "balanced" yarn.

Plying



drop spindle

Spinning is the process of taking fibers and twisting them to create linear strength with tools like a drop spindle or spinning wheel.



Adding twist

Learn more in our DIS'24 paper



Lee Jones, Ahmed Awad, Marion Koelle, and Sara Nabil.




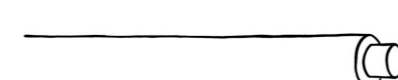


Hand Spinning E-textile Yarns: Understanding the Craft Practices of Hand Spinners and Workshop Explorations with E-textile Fibers and Materials.

In Designing Interactive Systems Conference (DIS '24), July 1-5, 2024, IT University of Copenhagen, Denmark.
<https://doi.org/10.1145/3643834.3660717>



E-textile yarn fabrication in HCI

E-textile researchers have used a wide variety of fabrication methods to create interactive yarns.

-  Spinning and plying
-  Braiding
-  Knitting
-  Coating
-  Core spun
-  Filament

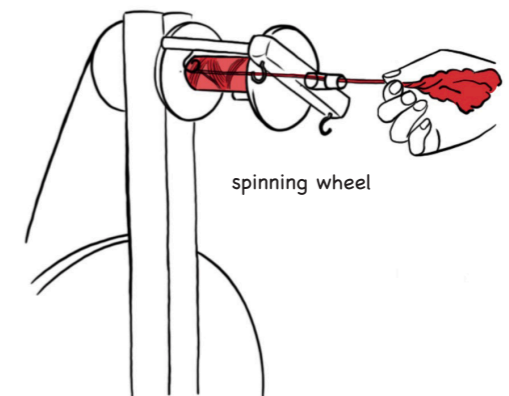
Here we expand upon hand spinning and plying due to its accessibility to makers. Though finely craft tools can be expensive, spinning tools start at a low cost.

Hand spinning e-textiles

Hand spinning is the process of developing yarns by hand by "spinning" fibers into yarn.

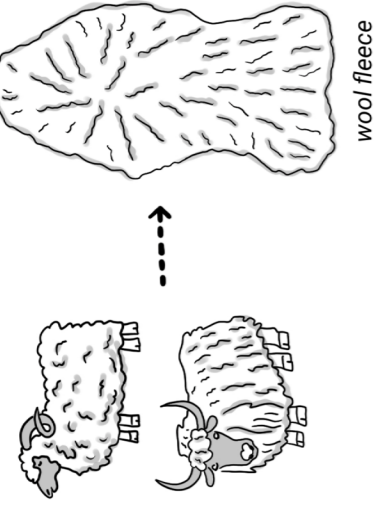
From an HCI and personal fabrication perspective, spinning enables individuals to customize their own yarns at home. Instead of buying commercial e-textile yarns, spinners have the ability to blend yarns.

They could, for example, add texture, different materials, colour, or different levels of conductivity. In doing so, spinning provides the potential to have e-textile yarns that blend into projects and are customized to a maker's creative vision.



spinning wheel

LOCALLY SOURCED FIBERS



wool fleece

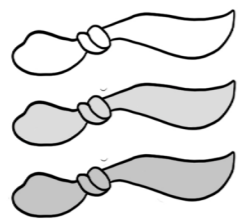


SCOURING (WASHING)



SORTING

"OFF-THE-SHELF"



staple fibers



blended "conductive wool"



conductive filaments

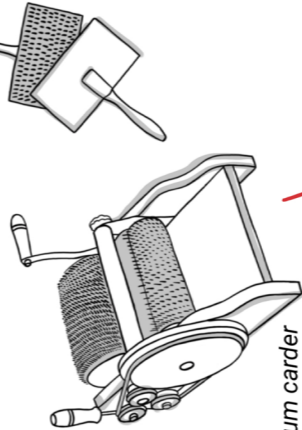


conductive yarn

A BRIEF GUIDE TO Hand Spinning Conductive Yarn

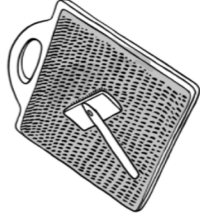
Lee Jones, Ahmed Awad, Marion Koelle and Sara Nabil at DIS 2024

CARDING

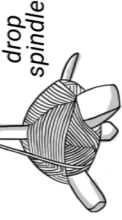


drum carder

BLENDING

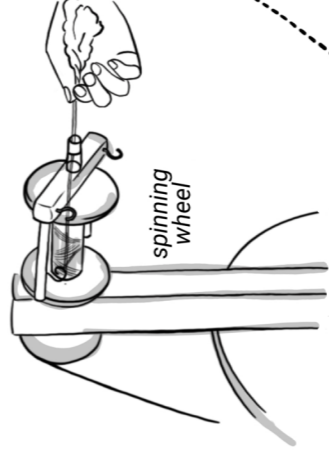


blending board



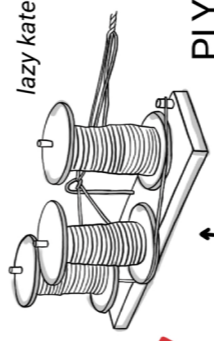
drop spindle

SPINNING



spinning wheel

PLYING

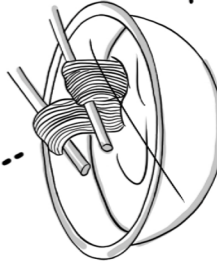


lazy kate



PAINTING

DYEING



SINGLES



non-conductive



conductive, spun from filaments



conductive, spun from blended fibers and filaments

PLIED YARN



non-conductive yarn



conductive yarn



conductive and non-conductive singles plied together