Prototyping Wearables

Wearable electronics comes with a bunch of considerations about size and power management. We stock sewable battery holders for coin cells and 9V batteries, and we also have higher-power LiFeP04 batteries available in the robotics workshop. We do not currently stock Lithium Ion batteries, as these aren't allowed on UAL campuses due to fire risk.

Lots of wearable projects involve wireless components (so whoever is wearing it doesn't have to have a USB cable attached to them), so you might also want to look into networking protocols, using either Wifi, Radio or Bluetooth.
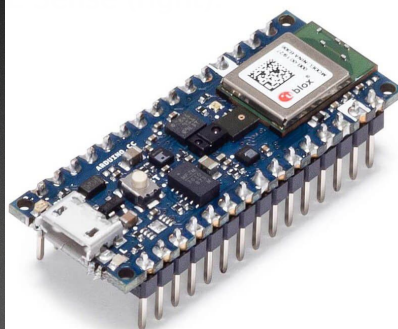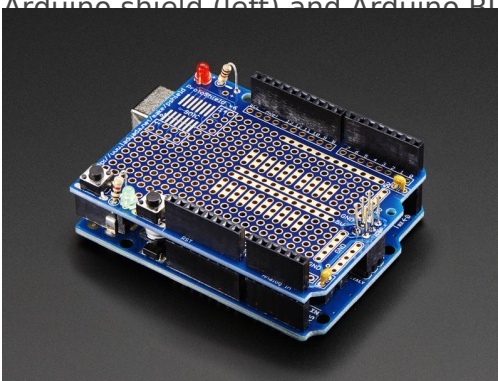
There are many options for integrating circuits into textiles, ranging from making conductive textiles from scratch (e.g. conductive knit) to using silicon-coated wire to stitch flexible threads into garments. For project ideas involving textiles, we have a wiki page for e-textiles and the website How To Get What You Want (by the collective Kobakant) is an amazing resource for different project ideas.

Making your project smaller

This is a pretty classic issue with arduino-based wearables: you have a circuit that works, maybe built with Arduino, and you want to minaturise it. Here are some options, from biggest to smallest:

- **use an Arduino shield** -- this is a special prototyping board that allows you build directly on top of the Arduino. This can be nice if you just want to avoid connection spaghetti
- **use a smaller board** we have many smaller boards available for use, including the Arduino Nano BLE Sense and the ESP32. These have the added advantage of working wirelessly, which is useful for wearable projects!

Arduino shield (left) and Arduino BL

mounting and housing power and boards

There are many options for housing wearable circuits, and often the most effective include wearable bands and pouches. It's important to make sure that your electronics are housed

securely, and can't short-circuit each other! It's also a good idea to solder things on stripboard, rather than relying on header wires.

We have elastics, nylon buck   b   g.

Making your project wireless

In order to communicate between the wearer and other systems -- e.g. a computer, an arduino -- some form of communication needs to take place. In the CCI, the two main boards we stock for doing this are the **ESP32** board (which works using wifi), and the **Arduino Nano BLE Sense**, which works over Bluetooth. We are also stocking a small amount of Arduino Uno R4 boards, which work over WiFi.
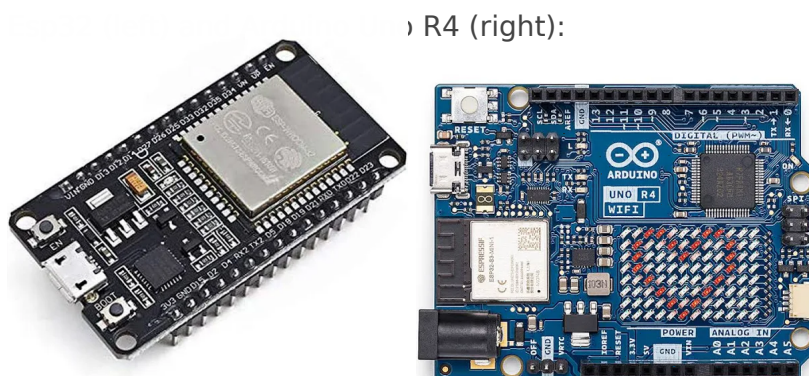
R4 (right):

Remember that even wireless circuits will still need a power supply! Talk to technicians about the best options for powering your circuit.

Making your circuit soft/flexible

Another issue with wearables is that electronics tends to be hard. While it's difficult with the materials we have in the CCI to make totally soft circuits, it's normally possible to make the wires and connections surrounding the circuit softer and flexible. In the CCI we stock the following components that can help with this:

- Silione covered strand-core wire
- Conductive thread and yarn

- Conductive ribbon
- Conductive fabric

A big challenge with integrating electronics into textiles is making good and durable connections.

Kobakant has a bunch of resources for doing this -- normally these involve a fair amount of sewing.
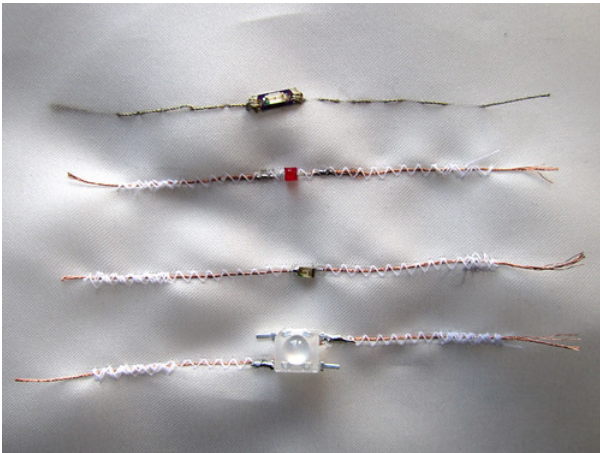
Revision #2
Created 22 January 2025 12:01:21 by agnes cameron
Updated 22 January 2025 13:09:40 by agnes cameron