Patien(t/ce) System Signal Flow

Knitted Socks, tethered by a stretch sensor with pressure sensors under the heels

Sensors connect to ESP-32 microcontroller running Arduino, sewn into the garment.

ESP-32 reads the data from the sensors and connects to local wifi network.

Data is transmitted over wifi via Open Sound Control (OSC).

Bela microcontroller running Supercollider is converted into Eurorack module using Pepper DIY kit.

Bela receives data and coverts it into control voltage (CV). Sends CV via 8 outputs to other modules in the Eurorack synth to control things like filter cutoffs, delay feedback, and quantizer values.

Music is amplified or recorded

Knitted shrug with built in gloves, with:
- heart rate sensor on finger tip
- muscle contraction sensor on forearm
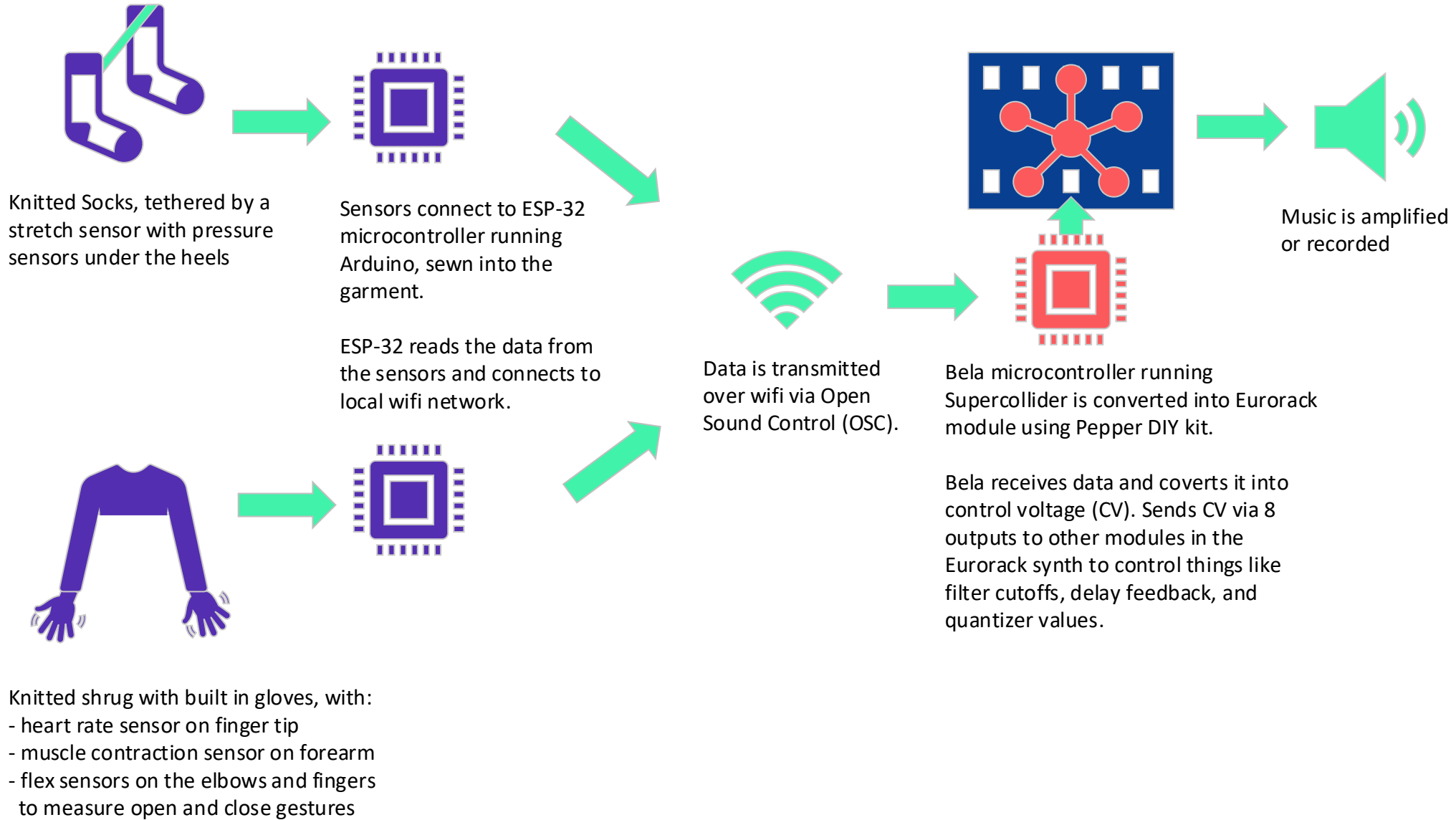- flex sensors on the elbows and fingers
  to measure open and close gestures

Patien(t/ce) Glossary

Arduino: Open-source electronic prototyping platform enabling users to create interactive electronic objects. Refers to both microcontroller hardware and programming language.

Bela: Powerful microcontroller designed for creators using sensors and sound. Natively supports many programming languages, including Supercollider.

Control Voltage (CV): A standard of musical communication encoded in electricity. In an analog synthesizer, CV is the primary mode of changing parameters such as pitch, filter cutoff, envelope shape, and more. Voltage controlled by a variable resistor is sent from a CV source to the component that will be changed.

Eurorack: A modular synthesizer format where specialized modules produced by a vast number of designers can be combined inside a case to build a custom instrument. Eurorack uses the CV standard, allowing all the disparate modules to work together.

Microcontroller: A small computer built on a single integrated circuit. Commonly used for DIY electronics projects.

Module: Within the Eurorack format, a module is a component that typically provides a single function, such as an oscillator, filter, or sequencer. Eurorack owners collect or build a set of modules that perform the jobs of sound generation, sound modulation, and effects to assemble a fully-feature synthesizer.

Open Sound Control (OSC): OSC is a networking protocol for allowing synthesizers and other devices for music generation to communicate, in this case over wifi.

Sensor: An electronic component that can detect a change in environment and respond by converting that change into data. For example, a pressure sensor can detect how much pressure is placed on it and send data in a range from 0 to 100. The data can then be scaled and coverted into CV, or many other things, such as the brightness or color of an LED light.
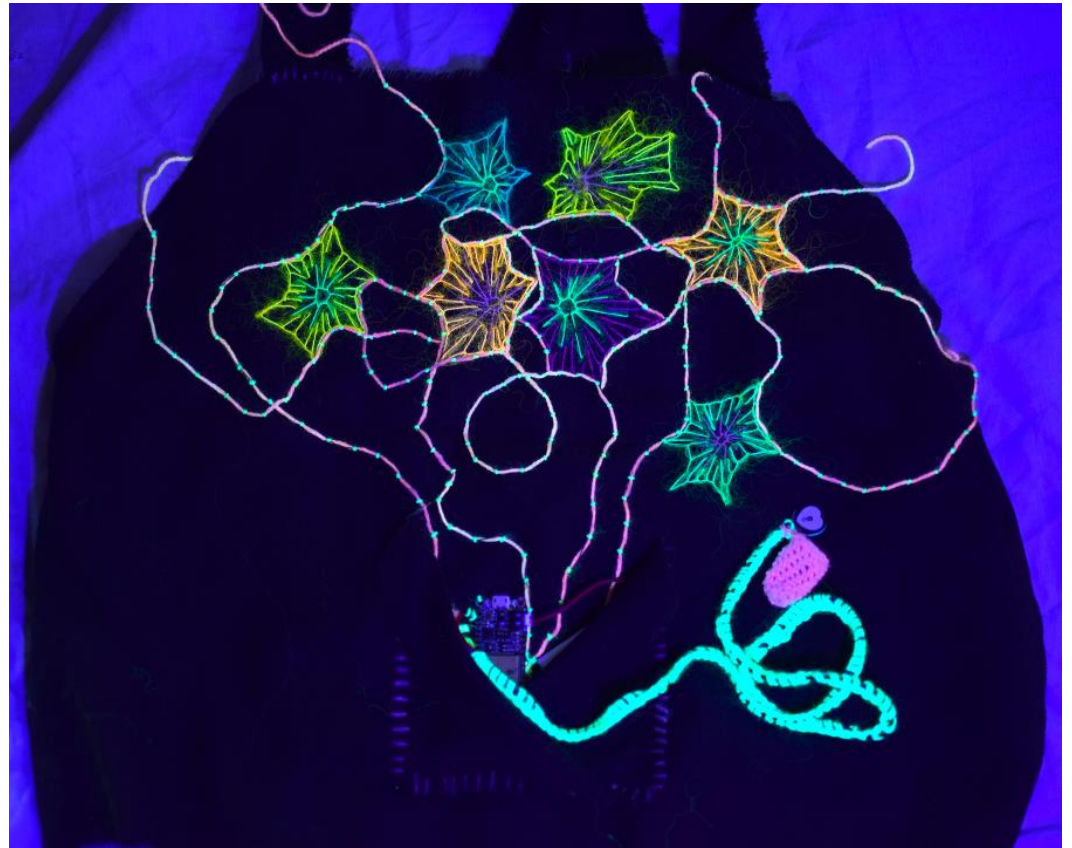
SuperCollider: A platform and programming language for audio synthesis and algorithmic composition, used by musicians, artists and researchers working with sound.

Patien(t/ce): Aphasia Patch and Performance Notes

Text

I am in the world, unable to deny the way of it. I carry the world in me. It is because of the world that I am sick. Aphasia is a symptom of being in the world, of living in lanugage and its limits.

Excerpt from, "Impossible Word: Toward a Poetics of Aphasia" by heidi andrea restrepo rhodes. *Poetry Magazine*, October 17, 2020.

Steps

1. Set the envelope tracker from mic input to the voltage controlled attenuator for the Arbhar output so the sound from the Arbhar is only audible while speaking into the microphone.
2. On the Arbhar granulator module, set the grain length to the approximate duration of one syllable of text, with medium-low density.
3. With the dry/wet set to fully dry, begin speaking the text into the microphone.
4. After one repetition, begin turning slowly turning the dry/wet mix to gradually mix in the granulated version of the text, which will begin to replace the words being spoken with the recorded version stored in the Arbhar buffer and broken into small pieces.

When the dry/wet mix becomes fully wet, the performer will appear to be speaking, but the sound produced will be a jumble of syllables.

Basic Patch Sketch

An image of my current Eurorack setup with a patch sketched using the website ModularGrid.net.

DIY Controller Possibilities

Flex Sensor: Slowly closing the hand into a fist controls the dry/wet mix parameter.

Heart Sensor: Controls the clock, which sets the rate for grain triggering.

Stretch Sensor: Controls the grain length, sometimes allowing more recognizable words to emerge.

Pressure Sensor: Controls the volt/octave of the grains, allowing them to be played back at higher or lower pitches than originally recorded. This creates the effect of many people speaking.

Patien(t/ce) Bib Controller Prototype

Regular Light

Blacklight

This controller is the first playable piece I made. The touch sensors are embroidered using conductive thread, and embellished with embroidery in the design of neurons using hand dyed thread.

The heart rate sensor is attached to a finger using crocheted finger cap.

I learned good lessons from this prototype that I will use to improve my next controllers. First, conductive thread wears quickly with use, and after a couple of performances the circuit broke. I need to use sturdier materials.

Second, touch sensors provide data that is of limited use to me. I need to use sensors that provide data in a range rather than binary in order to make the most interesting music with it.