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AIRWAVE

Gesture-Based Granular Synthesis

Abstract

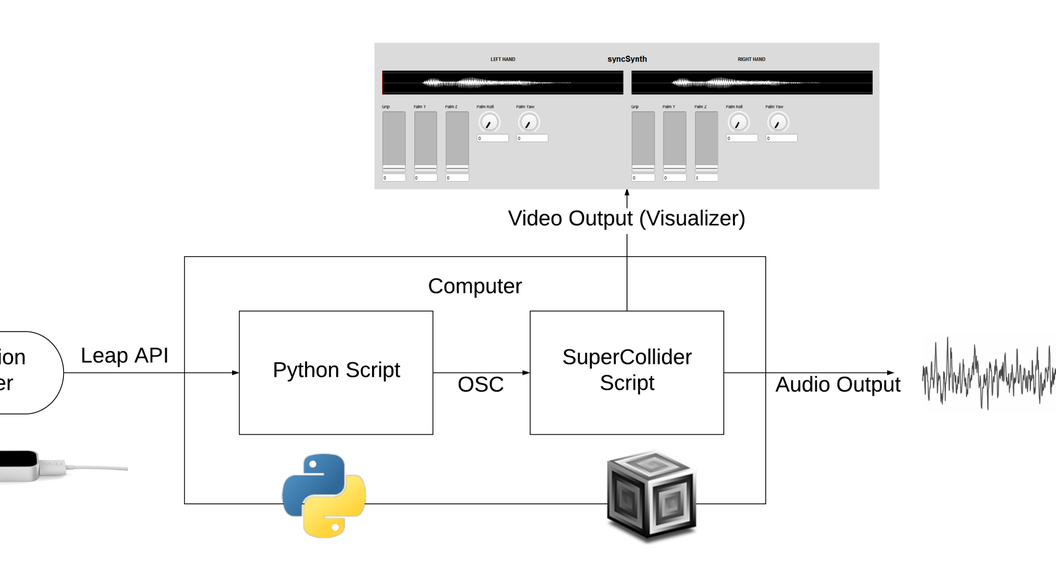
AIRWAVE allows musicians and hobbyists to explore the wide parameter space of **granular synthesis** – a powerful synthesis and signal processing technique for manipulating sound – through simple hand gestures.

Gesture-based Controls

Our custom Python script fetches information from a Leap Motion Controller which tracks real-time 3D hand position data such as:

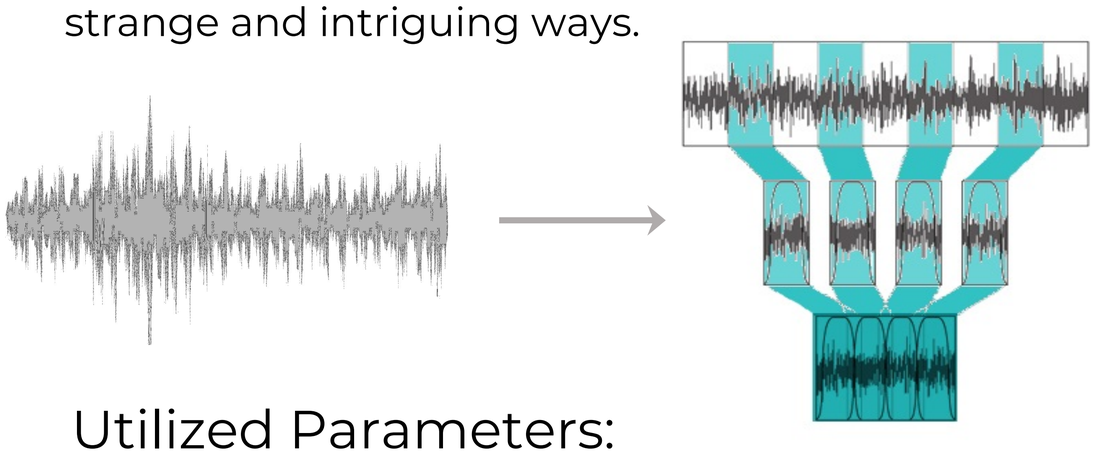
- x, y, and z coordinates
- pitch, yaw and roll of the palm
- grip strength (open/closed fist)
- velocity of the palm

This data is then sent via OSC to SuperCollider which maps the information directly to granular synthesis parameters over a pre-selected audio file.



Granular Synthesis

Granular synthesis is a digital signal processing technique in which audio is sliced into small, enveloped “grains”. By manipulating these grains, the original audio can be transformed in strange and intriguing ways.



Utilized Parameters:

- Grain Index – where in the sound a grain is made
- Grain Rate – how quickly grains are fired
- Grain Size – the duration of each grain
- Wave Ratio – the playback rate of the grain

Future Work

- Package AIRWAVE for easy plug & play use
- Interface with algorithmically generated visuals
- Expand to facilitate collaborative performances

Modular Design

AIRWAVE consists of a Python script that parses the Leap Motion data for two hands and sends it to a SuperCollider script – which then maps the data to synthesis parameters, performs granular synthesis, and creates a simple visualizer for the performer.

Parameter Mapping:

- Palm X-coordinate → Grain Index
- Palm Y-coordinate → Grain Rate
- Palm Z-coordinate → Volume
- Palm Roll → Wave Ratio
- Palm Yaw → Panning
- Grip Strength → Grain Size

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