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By Yan Zhuang

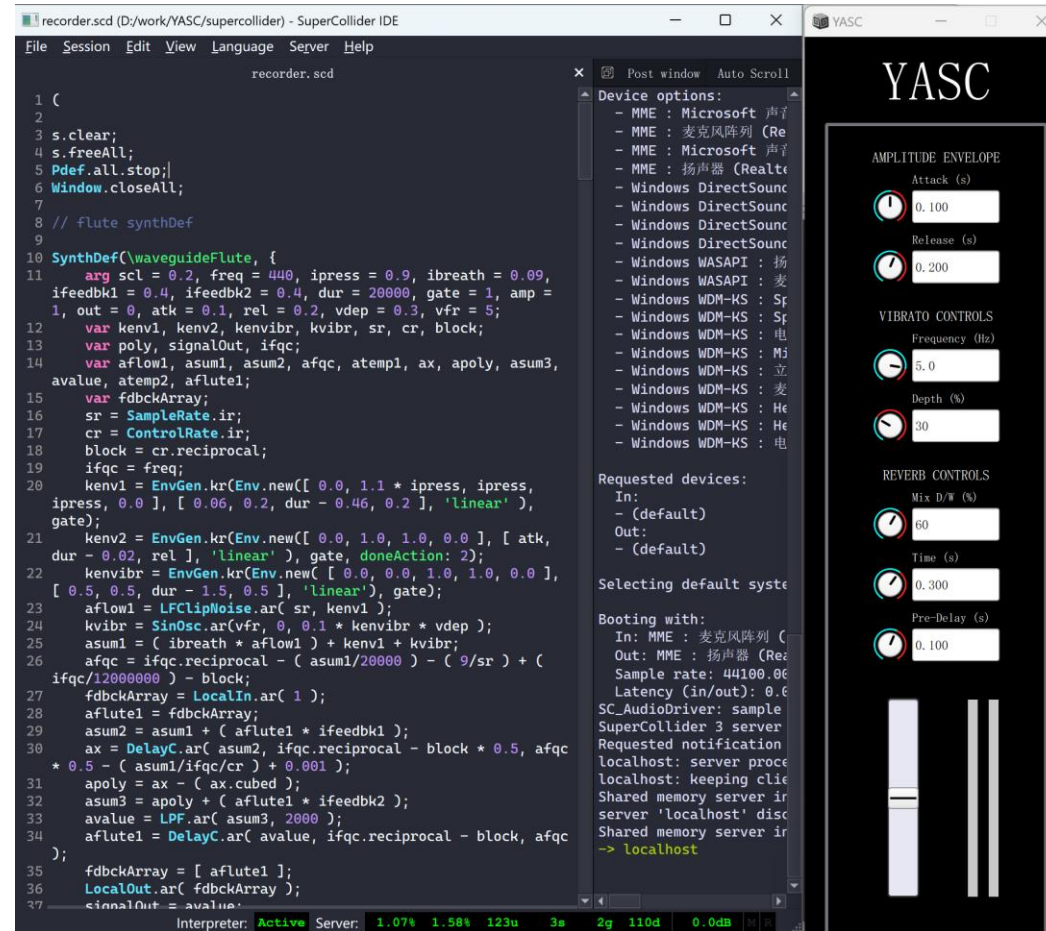
# Introduction

- The goal of the project is to develop an interactive recorder performance tool, incorporating Joy-Con controllers via a web interface for gesture-based inputs and SuperCollider for sound synthesis.



# SuperCollider

- It's an engine for sound synthesis and algorithmic music composition.
- It's a real-time sound-based OOP language.
- <https://supercollider.github.io>





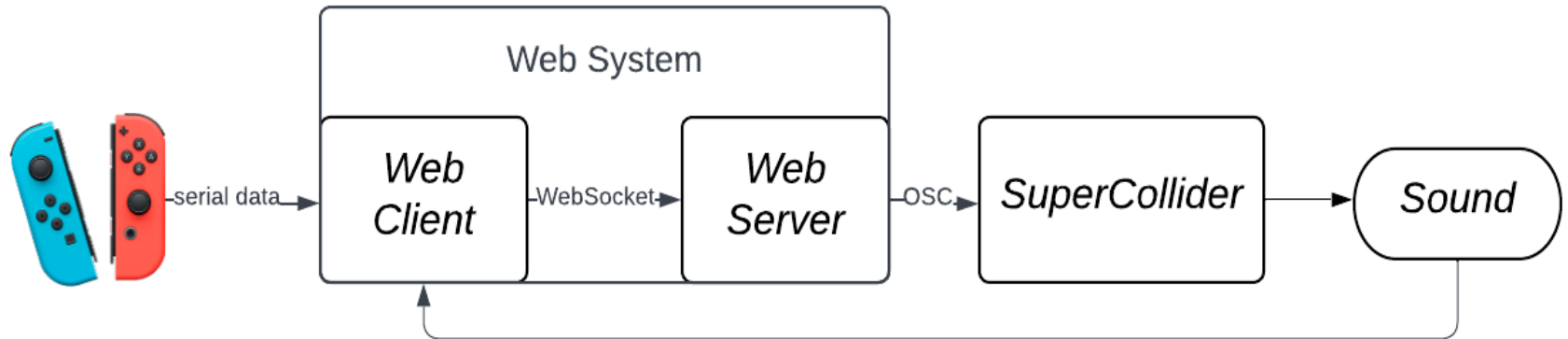
# Joy-Con controller

- Primary controllers for the Nintendo Switch gaming console.
- We could use that to play music.



# Structure overview

- User interaction accomplished with Joy-Con controllers.
- Web system acts as main interface.
- SuperCollider serves as sound synthesis engine, generating/editing sounds according to the web system commands sent via OSC protocol.
- Sound captured by the web system to provide visual feedback.



# Web system – Map your controller

- Through this page, Joy-Con controller can be mapped to different functions.
- The left controller is responsible for adjusting parameters in SuperCollider.
- The right controller is dedicated to play notes.

The screenshot shows a web interface titled "Custom Hotkeys" for mapping Joy-Con controllers. It features two columns of controls for the "Left Controller" and "Right Controller", with a central image of the controllers. The "Left Controller" mappings are: Up (↑amplitude), Down (↓amplitude), Left (↑Mix D/W of reverb), Right (↓Mix D/W time of reverb), L (↑amplitude), ZL (↑amplitude), and Vertical Move (amplitude). The "Right Controller" mappings are: A (A3), B (F#3), X (D4), Y (B3), R (E4), ZR (F4), Home (G4), Plus (B4), SR (C5), SL (D5), Stick Top (C#4), Stick Down (F#4), Stick Left (A4), Stick Right (C4), and 3D Move (freestyle). A "Submit" button is at the bottom.

Left Controller		Right Controller	
Up	↑amplitude	A	A3
Down	↓amplitude	B	F#3
Left	↑Mix D/W of reverb	X	D4
Right	↓Mix D/W time of reverb	Y	B3
L	↑amplitude	R	E4
ZL	↑amplitude	ZR	F4
Vertical Move	amplitude	Home	G4
		Plus	B4
		SR	C5
		SL	D5
		Stick Top	C#4
		Stick Down	F#4
		Stick Left	A4
		Stick Right	C4
		3D Move	freestyle

Submit

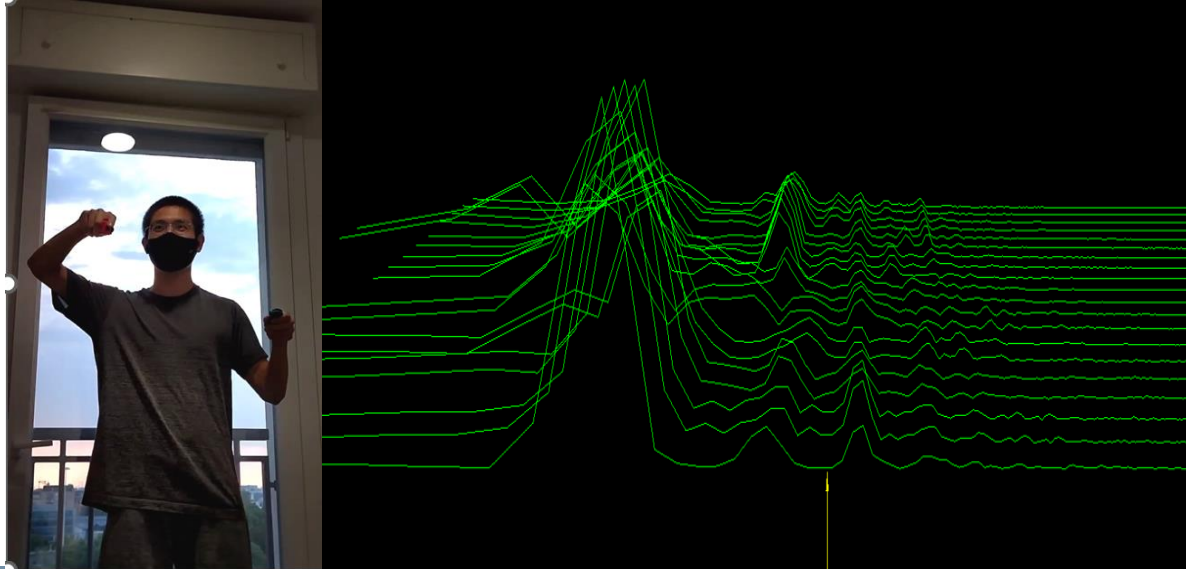
# Web system – Train your memory

- The dino game page is an interactive training tool designed to help users familiarize with their custom hotkeys.
- If you want to jump, press the corresponding hotkey.



# Web system – Play recorder

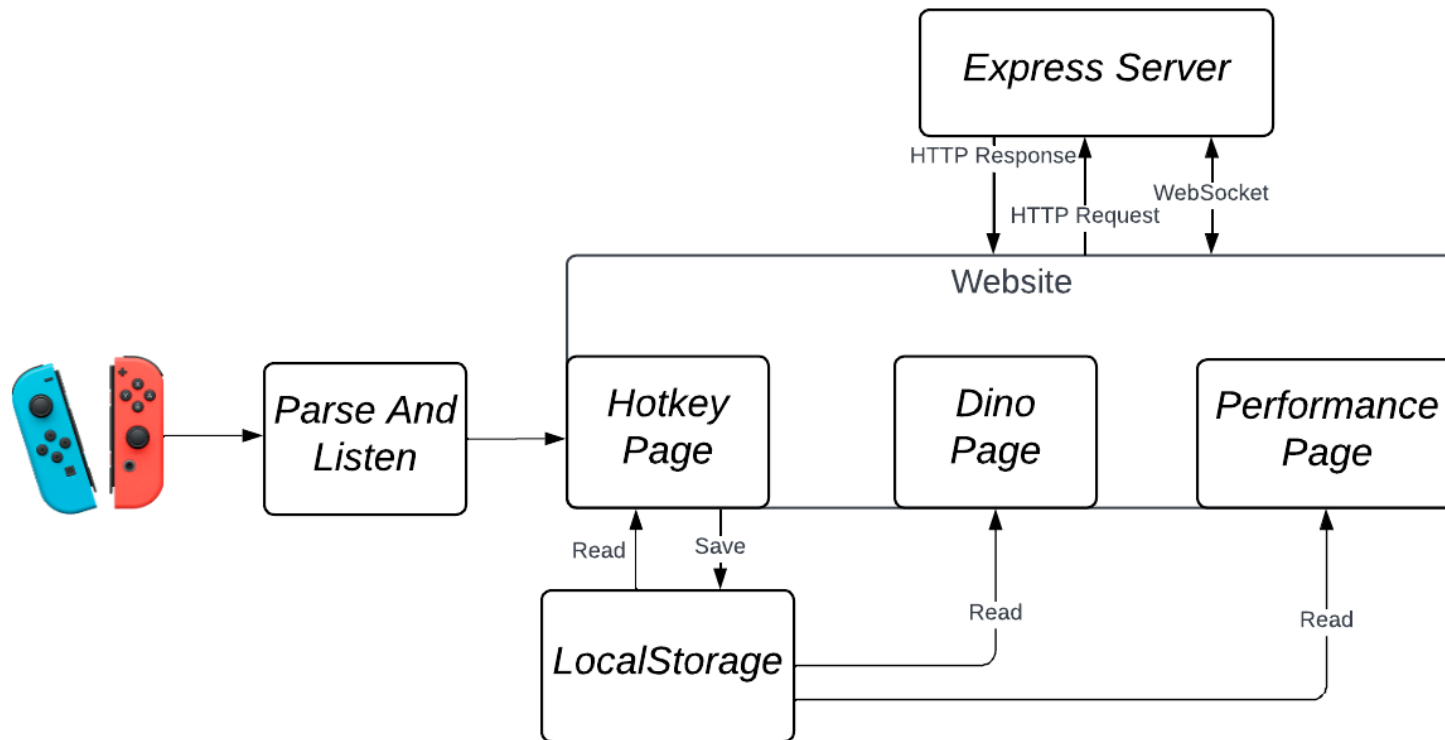
- The performance page provides an immersive audio-visual experience by showing the output sound spectrum.





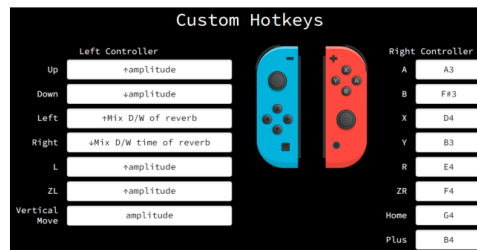
# Web system – Implementation

There are three main components which run the web system:



# Web system – libraries

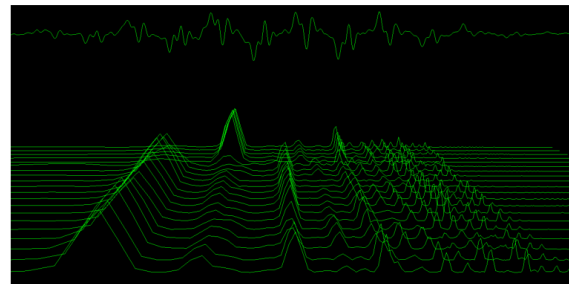
1. Vue3 for web interface.
2. joy-con-webhid for parsing joy-con controllers' input.
3. meyda for the sound analysis, three.js for rendering spectrum.



(a) Hotkey page detail



(b) Dino game detail

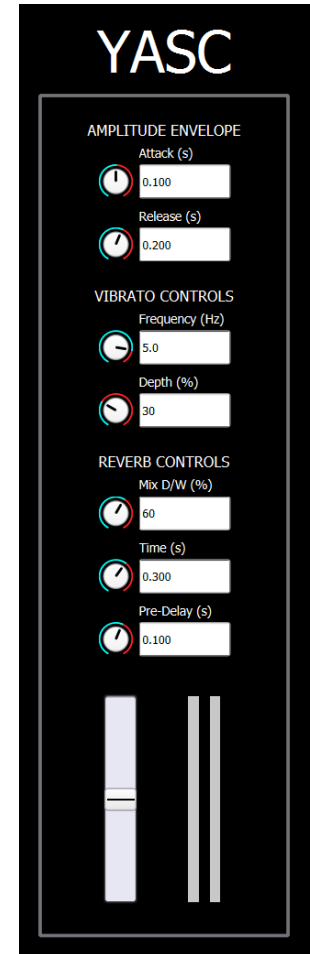


(c) Performance page detail

# Sound synthesis – GUI

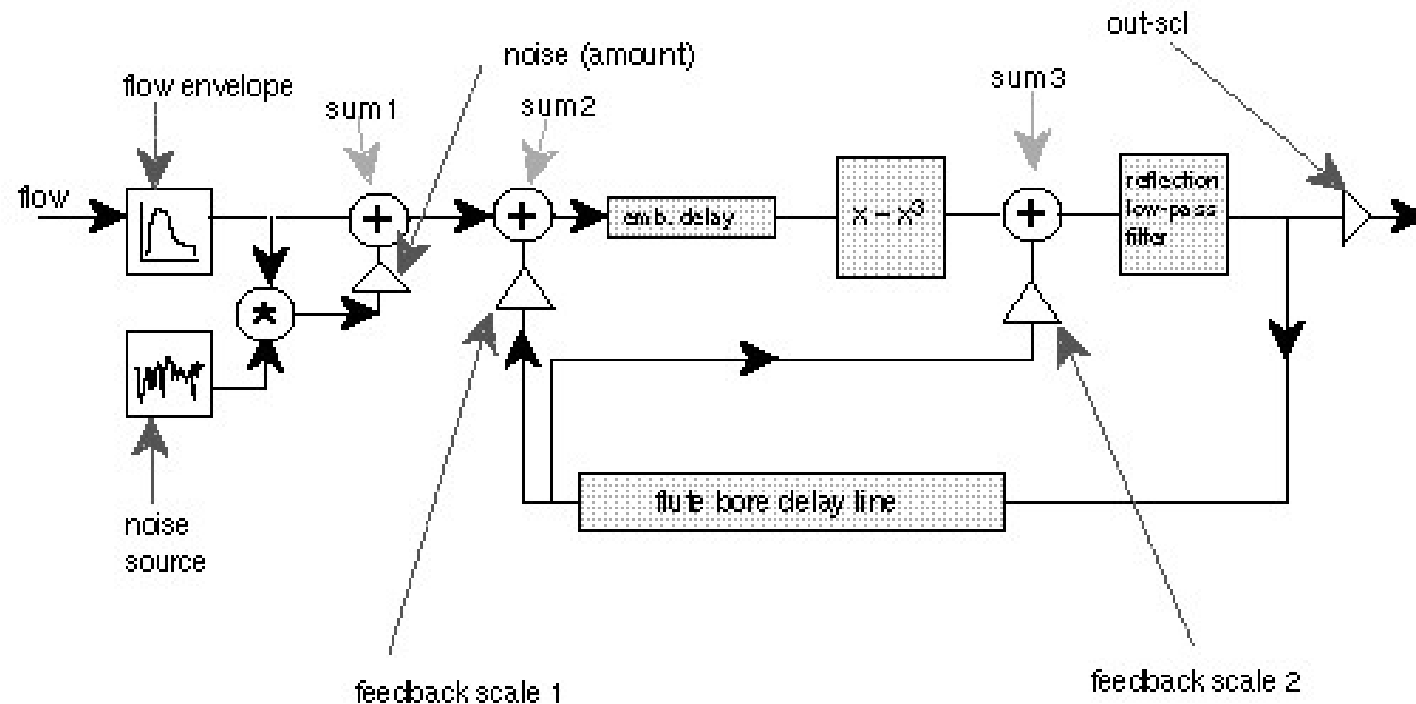
The recorder sound produced in SuperCollider. Users can see the changes made with controllers of some parameters:

- Amplitude envelope attack and release time.
- Vibrato frequency and depth.
- Reverb D/W mix, time and pre-delay.



# Sound synthesis – Implementation

## Perry Cook's recorder model



# Future work

- Implement features that allow users to record, save, and replay their performances.
- The waveguide model doesn't behave well at high frequencies. In the short future, multi-modal or multi-dimensional models could be adopted to solve the issue.
- Offer more sophisticated sound parameters for users to control in SuperCollider.

A decorative horizontal band at the top of the slide, consisting of a series of thin, vertical white lines of varying heights, creating a textured, barcode-like effect.

# Thanks