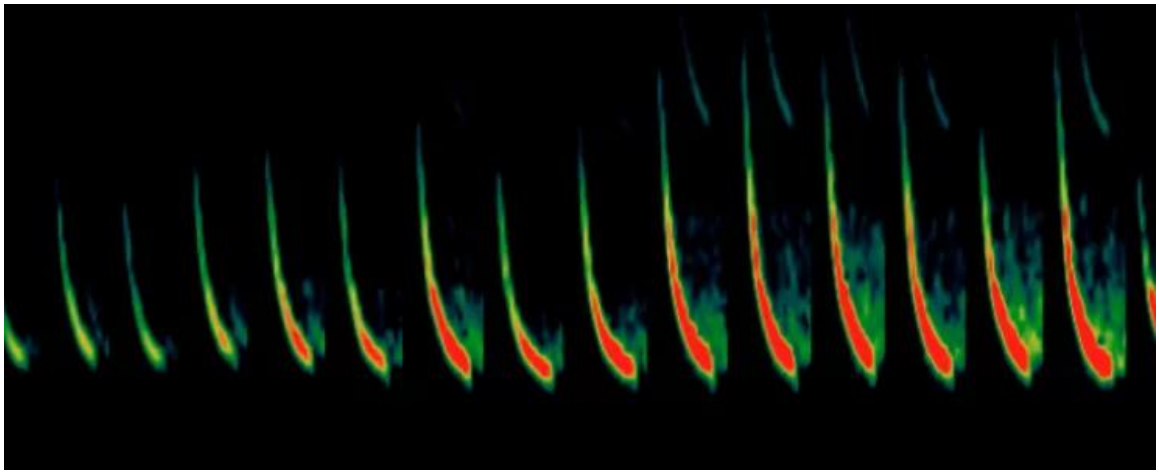
Browser-Based Spectrogram Task Description

- Here is a video of the portal

Goal

Recreate the Spectrogram view of Kaleidoscope Lite as a browser-based app (instead of their desktop based app)



Priority 1: High-resolution Spectrogram

- Improve spectrogram resolution (match Kaleidoscope Lite)
- Evaluate rendering options:
- - Try LightningCharts
- - Research alternatives if it doesn't support high resolution well
- Enable FFT with small hop sizes (e.g. 64 or 128)
- - Might need to switch to AudioWorklet
- - Example code outline provided
- Experiment settings:
- - FFT size = 256
- - LC buffer size = 32
- - Make LC buffer size and hop size configurable (16, 32, 64, 128)

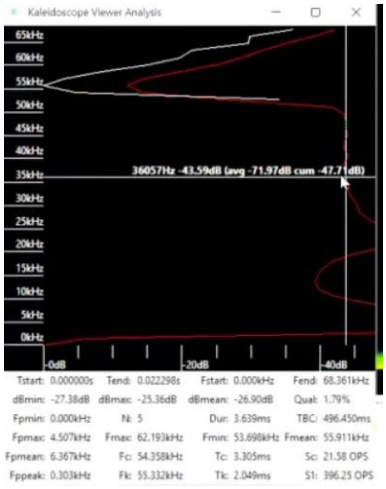
Code Snippet Example

```
class FFTProcessor extends AudioWorkletProcessor {
  constructor() {
    super();
    this.buffer = new Float32Array(fftSize); // e.g. 2048
    this.writeIndex = 0;
    this.hopSize = 64; // your desired overlap
  }

  process(inputs, outputs, parameters) {
    const input = inputs[0][0]; // mono channel
    for (let i = 0; i < input.length; i++) {
      this.buffer[this.writeIndex++] = input[i];

      if (this.writeIndex >= this.hopSize) {
        const frame = this.buffer.slice(this.writeIndex -
fftSize, this.writeIndex);
        const magnitude = computeFFT(frame);
        this.port.postMessage({ magnitude });
        this.writeIndex -= this.hopSize;
      }
    }
    return true;
  }
}
registerProcessor('fft-processor', FFTProcessor);
```

Next Tasks (After Spectrogram is High-Quality)

- EFM max overlay
  - 

- Move FFT processing to backend
- User settings:
- - Save gain/dynamic range between sessions
- - Frequency range: 20–120 kHz
- - LC FFT size
- - Keyboard bindings
- Chart constraints:
- - Prevent panning/moving outside LightningCharts window
- Playback support
- New columns in the table:
- - 'Social feeding echo'
- - 'Needs review' (boolean from backend)
- Performance:
- - Reduce LC buffer size to 128
- - Retain frequency position when switching files

Notes

- Improve time vs resolution tradeoff
- File sizes:
- - Raw audio: ~5MB
- - FFT matrix: ~50MB
- Clear unused files from memory
- Use cache to save RAM and storage
- Consider moving audio decoding to backend (especially for Safari)