

Decibel Threshold Event Displayer

BTI3031 Project 1 | Final Presentation

January 8, 2025

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Initial Situation



Project Goals

- Analyze Audio File



Project Goals

- Analyze Audio File
- Summarize findings in a PDF

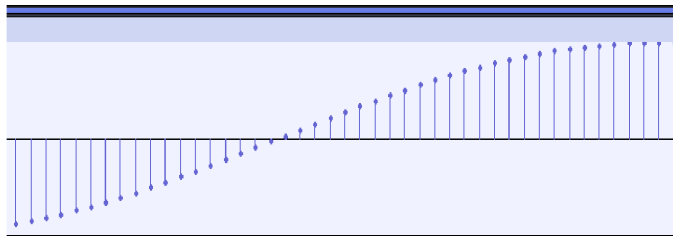
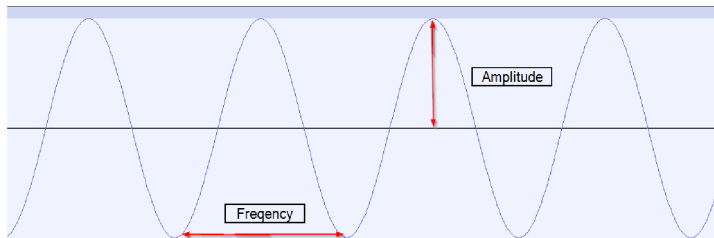


Project Goals

- Analyze Audio File
- Summarize findings in a PDF
- Easy to use



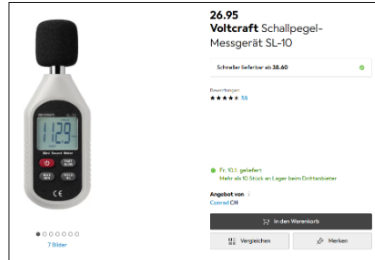
Audio Files



Measuring the Sound Level



DecibelX for iOS



Sound level measuring device from Galaxus

Requirements

- Take .wav file, threshold and additional reference values as input

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- User should not need any Technical know-How

Requirements

- Take .wav file, threshold and additional reference values as input
- Analyze and Summarize
 - Metadata
 - Plot
- User should not need any Technical know-How
- Platform independent

Technology evaluation

| Technology | Total score |
|----------------|-------------|
| Kotlin minimal | 74 |
| Kotlin bundled | 56 |
| Web SwiftLaTeX | 82 |

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Architecture and Processes

Testing

License and Privacy

Deployment / Distribution

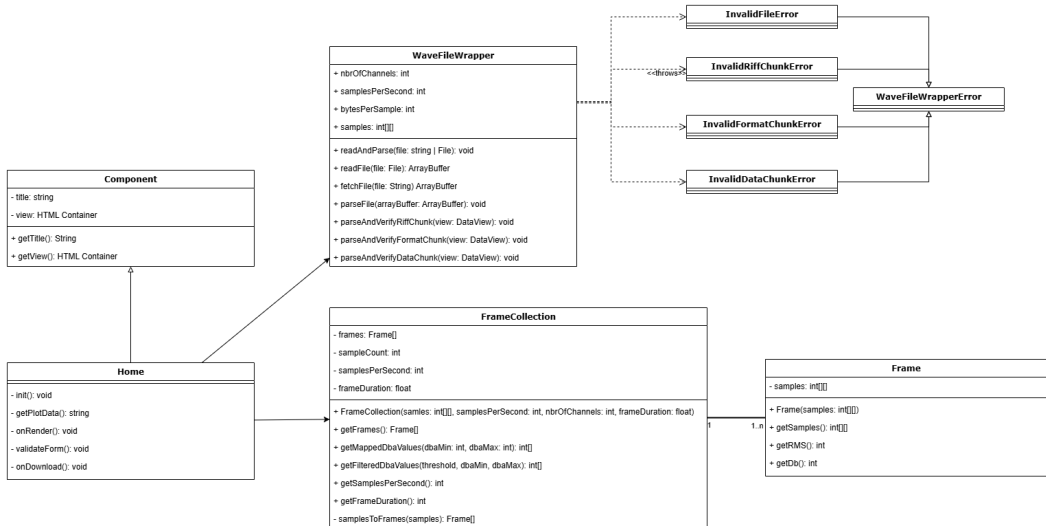
▶ Scrum

▶ Demo

▶ Conclusion & Future Work

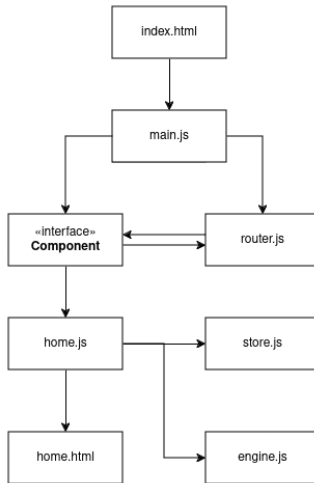


Architecture - Class Diagram



Architecture - SPA Techstack

- Vanilla JS SPA Framework (Web Programming Module)
- Bootstrap CSS Framework
- SwiftLaTeX in Browser WASM LaTeX rendering Library

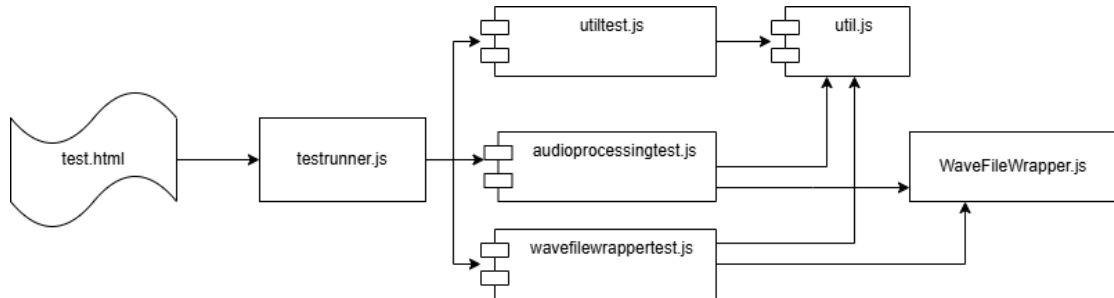


Processes

1. Read *.wav File
2. Group samples into frames (duration of 300ms)
3. Calculate root-mean-square (RMS) per frame
4. Convert RMS dB values per frame
5. Map the relative dB to absolute dB(A)
6. Filter the resulting list of dB(A)
7. Render PDF with dB(A) and user data

```
function rms(values) {  
  const squared = values.map(  
    sample => Math.pow(sample, 2)  
  );  
  const sum = squared.reduce((a, b) => a + b);  
  const mean = sum / values.length;  
  return Math.sqrt(mean);  
}  
  
function rmsToDb(rms) {  
  return 20 * Math.log10(rms);  
}  
  
function dbToDbA(db, dbMin, dbMax, dbaMin, dbaMax) {  
  return (db - dbMin) * (dbaMax - dbaMin) /  
    (dbMax - dbMin) + dbaMin;  
}
```

Testing - Overview



Testing - In action

decibel-threshold-event-displayer.github.io/js/test/test.html

Wave File Tests

Dark Mode

▼ Wave File Creator

Choose File No file chosen

Create WaveFileWrapper

▼ Test Runner

Run Tests

Test Results: Util

| Test Name | Status | Error |
|---------------------------------------------------|---------|-------|
| testAssertEqualsFail | Success | |
| testAssertEqualsSuccess | Success | |
| testAssertNotEqualsFail | Success | |
| testAssertNotEqualsSuccess | Success | |
| testAssertNotThrowsFailure | Success | |
| testAssertThrowsWithError | Success | |
| testAssertThrowsWithNoError | Success | |
| testAssertThrowsWithWrongError | Success | |
| Summary: Total Tests: 8, Successful: 8, Failed: 0 | | |

Test Results: Audio Processing

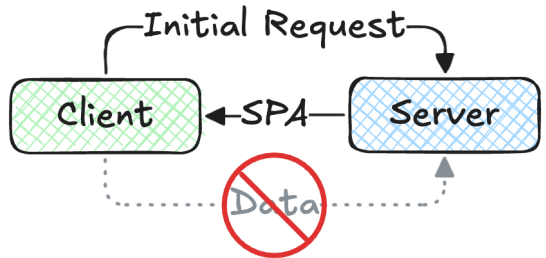
| Test Name | Status | Error |
|---------------------------------------------------|---------|-------|
| testGetDbValues | Success | |
| testGetDbValues | Success | |
| testGetFilteredDbValues | Success | |
| testGetRMSValues | Success | |
| testVerifyMeanValues | Success | |
| testVerifySampleValues | Success | |
| testVerifySquareMeanValues | Success | |
| Summary: Total Tests: 7, Successful: 7, Failed: 0 | | |

Test Results: Wave File Wrapper

| Test Name | Status | Error |
|-----------------------------------------------------|---------|-------|
| testIllegalNumberOfBitsPerSample | Success | |
| testInvalidDataIdentifier | Success | |
| testInvalidFmtIdentifier | Success | |
| testInvalidRiffIdentifier | Success | |
| testInvalidWaveFormat | Success | |
| testNoDataChunk | Success | |
| testPassNonFileInConstructor | Success | |
| testPassNullInConstructor | Success | |
| testReadValid32BitFloatFile | Success | |
| testReadValid64BitFloatFile | Success | |
| testReadValidAudioFile | Success | |
| Summary: Total Tests: 11, Successful: 11, Failed: 0 | | |

Privacy concerns

- No data is sent to the server, after the initial request
- From the Plot on the PDF the original Audio File cannot be recreated



**The user does not get into legal trouble,
using the application or the resulting PDF!**

License

Dependency Licenses:

- SwiftLaTeX: AGPL-3.0
- pgfplots: GPL-3.0

Resulting License:

- **GPL-3.0 licence (FLOSS)**

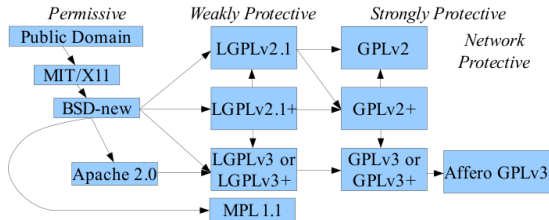


Image Source: <https://dwheeler.com/essays/floss-license-slide.html>

Deployment / Distribution

1. A dev pushes or merges code to the main branch
2. GitLab automatically mirrors the repository to GitHub
3. GitHub deploys automatically to GitHub Pages
4. The Application is available under:
<https://decibel-threshold-event-displayer.github.io/>

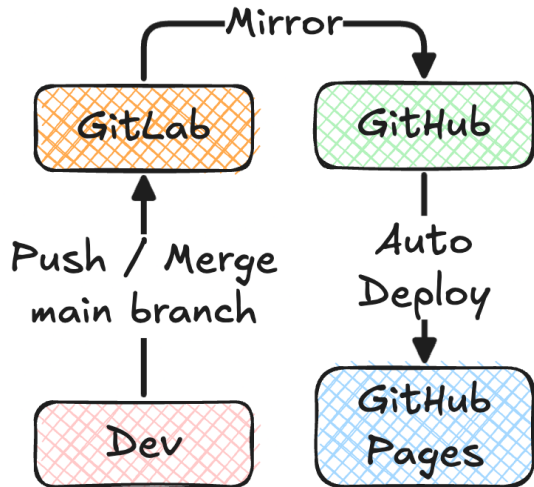


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Scrum

- 2 week iterations
- Daily every week
- Review every other week
- Product goals / sprint goals
- GitLab, MS Teams, LaTeX, excalidraw, draw.io

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Demo

- Watch the demo on YouTube
- Or better yet: Try it yourself on Github Pages!

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Conclusion

- Product goals achieved
- Scrum generally applied
- Minor issues with GitLab
- Great teamwork and team chemistry
- Interesting and well-defined project
- Lots of insights about audio, WAV files, and WebAssembly

Future Work

- Localization (DE, FR, IT)
- Custom thresholds
- Custom form fields
- Support more audio formats
- Dark mode / visual improvements



Questions / Discussion

