# Pitch Detection

Oluwamayowa Praise Ojofeitimi G00407342

Bachelor of Engineering (Honours) in Software and
Electronic Engineering
Atlantic Technological University
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What is Pitch Detection?

- My project Pitch Detection is an application centered around signal processing It is an application in which takes in an audio file/real time recorded audio and with use of FFTs which in my case is used to converts signals from a time domain to a frequency domain we can then access the frequency or frequencies given from the audio file or given over a microphone.

- And with this we can perform frequency based application.

Project Architecture
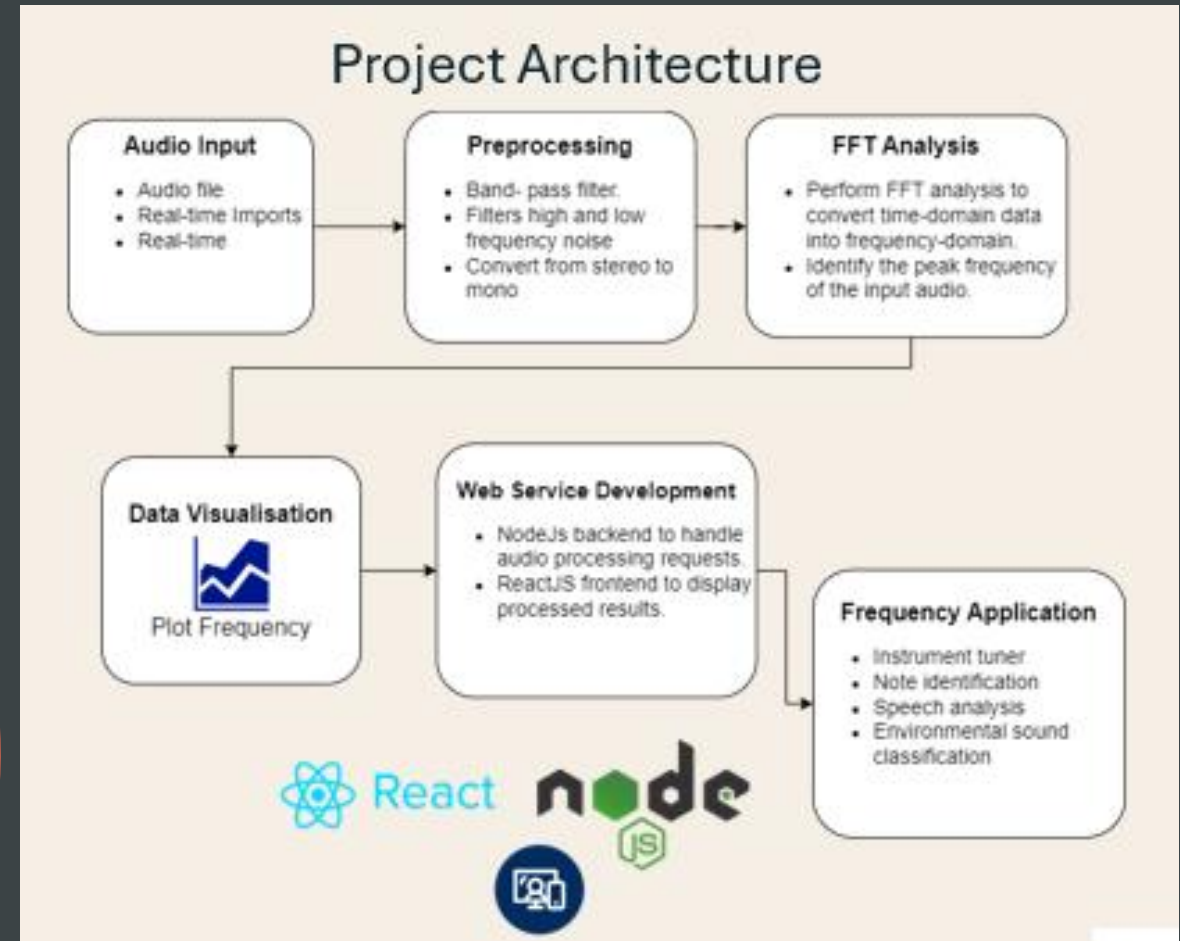
Code Implementation (Backend)

- FastAPI endpoints handle file upload:

  /upload_fft → calculates FFT

  /predict_chord → Major/Minor prediction

  /instrument_key_detector → returns key and instrument

- Machine learning models loaded from .pkl files from PyCharm

- Files processed using soundfile, converted to NumPy arrays

- To modify the outputted audio to receive optimal output ML models use MFCC, Chroma, Tonnetz Extraction features

Code Implementation (Frontend)

In React:

Home.js – welcome message to the Web interface

FileUpload.js – handles the audio input and posts it to the API

DropdownFunctions.js lets the user choose what analysis to run.

The FFT results are fetched from backend using axios a HTTP client

Challenges

- React Media Recorder's live stream didn't consistently generate valid .wav files across browsers.

- When users uploaded non-WAV files e.g. .mp3, the backend failed unless strict format checks were added.

- Machine learning models performed well on training data but needed improvement when predicting instruments

Results & Conclusion

- Detects pitch and chords from real instrument sounds
- Classifies chords as major or minor
- Identifies instrument type
- Detects key and logs data for visual analysis

I tested it on multiple WAV files with strong results, especially for piano and guitar inputs

In conclusion, this project demonstrates how audio signal processing
and machine learning can be integrated into a browser-based applications. It's particularly
useful for musicians and learners.
There is strong potential for future features like music transcription, pitch correction, or even live
performance tracking

THANKS FOR LISTENING
if you have any questions,
please ask them now