
IBM CAPSTONE PROJECT

AUDIO SIGNAL PROCESSING ASSISTANT AGENT

Presented By:

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OUTLINE

- Problem Statement
- Technology used
- Wow factor
- End users
- Result
- Conclusion
- Git-hub Link
- Future scope
- IBM Certifications

PROBLEM STATEMENT

Designing and debugging audio circuits—like amplifiers, filters, and op-amp systems—is complex and time-consuming. Users often face issues like distortion, noise, wrong component choices, and a lack of clear design resources or expert help.

Proposed Solution:

AudioFix.AI Audio Signal Processing Assistant is a specialized AI tool that helps users design, troubleshoot, and optimize audio circuits like amplifiers and filters. It offers expert guidance, diagrams, key formulas, and research links—focused only on audio signal processing.

TECHNOLOGY USED

- IBM cloud lite services
- Natural Language Processing (NLP)
- Retrieval Augmented Generation (RAG)
- IBM Llama Foundation model
- IBM Watsonx.ai Studio
- Vector Index (Watsonx.ai)

IBM CLOUD SERVICES USED

- IBM Cloud Watsonx AI Studio
- IBM Cloud Watsonx AI runtime
- IBM Cloud Agent Lab
- IBM Llama foundation model
- IBM Cloud Object Storage
- IBM Cloud IAM (Identify and Access Management)

WOW FACTORS

- Domain Expert AI

Unlike general-purpose bots, AudioFix is laser-focused on audio signal processing and analog circuit design, offering precision help where others can't.

- Instant Circuit Diagnostics

Detects noise, distortion, or design flaws instantly and suggests exact fixes—from component tweaks to layout changes.

- Visual + Analytical Help

Generates clear circuit diagrams, key formulas, and even shares IEEE papers and application notes to back your designs with solid theory.

- Fast Design Companion

Saves hours in design and troubleshooting by providing real-time feedback, design calculations, and filter configurations.

- Reliable Scope Enforcement

Never strays from its core domain—ensuring focused, expert-level help without irrelevant distractions.

END USERS

- Academic Researchers
- Research Institutions and Universities
- Industry R&D Teams
- Educators

RESULTS: SETTING UP

IBM watsonx

Upgrade ?

Santhoshri S's Account

Sydney

SS

Projects / AudioFix / AudioFix.ai

Share feedback β

Autosave on

New agent +

Deploy

Build

AI

Model: llama-3-2-11b-vision-instruct

<

Setup

Name

AudioFix.ai

Description 99/100

Welcome to AudioFix, your AI assistant for audio signal processing. Let's design, debug, and learn.

Icon

Placeholder image

Quick start questions

Agent preview



Sample questions

Why does my preamp have a high noise floor? →

How can I fix distortion in my audio output? →

Why is there a hum in my audio setup? →

Help me troubleshoot my audio circuit signal drop. →

Type something... →

RESULTS: TOOLS USED

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Autosaved 12:19 AM

New agent +

Deploy

Build

AI

Model: llama-3-2-11b-vision-instruct

Tools

Add a tool

Create custom tool

Added tools (4)

Google search

Retrieve information from the internet with the Google search engine.

DuckDuckGo search

Retrieve information from the internet with the DuckDuckGo search engine.

Wikipedia search

Retrieve information from Wikipedia articles.

Webcrawler

Retrieve information from a website.

Agent preview

Sample questions

Why does my preamp have a high noise floor?

How can I fix distortion in my audio output?

Why is there a hum in my audio setup?

Help me troubleshoot my audio circuit signal drop.

Type something...

RESULTS: AGENT PREVIEW

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Upgrade

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🟢 Autosave on

📁

▼

New agent +

Deploy 🚀

🔒

ℹ️

Build >


Agent preview

🤖

AudioFix.ai 01:19 AM

Welcome to AudioFix.ai

Welcome to AudioFix, your AI assistant for audio signal processing. Let's design, debug, and learn.




Sample questions


Why does my preamp have a high noise floor?
→

How can I fix distortion in my audio output?
→


Type something... 🗑️ ➤




RESULTS: AGENT RESPOND

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Deploy   

Build > Agent preview



 You: 01:20 AM



Why does my preamp have a high noise floor?

 AudioFix.ai 01:20 AM

The high noise floor in your preamp could be due to several reasons. Here are some possible causes:


- 1. Insufficient decoupling capacitors:** Decoupling capacitors help to filter out power supply noise and reduce the noise floor. If the decoupling capacitors are not sufficient or are not placed correctly, it can lead to a high noise floor.
- 2. Poor grounding:** Grounding is essential in audio circuits to prevent noise and hum. If the grounding is poor, it can cause a high noise floor.
- 3. Incorrect component values:** Using incorrect component values can affect the performance of the preamp and lead to a high noise floor.
- 4. Noise from the power supply:** The power supply can be a significant source of noise in audio circuits. If the power supply is not clean or is not regulated properly, it can cause a high noise floor.
- 5. Electromagnetic interference (EMI):** EMI can cause noise in audio circuits. If the preamp is not shielded properly or is placed near sources of EMI, it can lead to a high noise floor.



To reduce the noise floor in your preamp, you can try the following:




 







RESULTS


Deployed AI Agent

 IBM watsonx

Upgrade


Santhoshri S's Account  Sydney  

Deployment spaces / AudioFix / AudioFix.ai /      


AudioFix.ai  Deployed Online

API referenceTestPreview

New chat +


 You 01:02 AM

How can I fix distortion in my audio output?

 AudioFix.ai 01:02 AM

To fix distortion in your audio output, you can try the following:

1. **Check your amplifier's gain:** If the gain is too high, it can cause distortion. Try reducing the gain to see if it improves the sound quality.
2. **Use a low-noise op-amp:** Some op-amps are designed to produce less noise and distortion than others. Look for an op-amp with a low noise figure and high slew rate.
3. **Add a clipping indicator:** A clipping indicator can help you detect when the signal is clipping, which can cause distortion. You can add a clipping indicator circuit to your amplifier.



CONCLUSION

- AudioFix.ai Assistant simplifies complex audio circuit design and troubleshooting.
- Provides expert help on amplifiers, filters, op-amps, and noise reduction.
- Offers accurate diagrams, formulas, and research references.
- Saves time, reduces errors, and boosts design efficiency.
- Ideal for students, hobbyists, and professionals in audio engineering.

GITHUB LINK

<https://github.com/Santhoshri142/AudioFix.ai---Audio-Signal-Processing-Assistant>

FUTURE SCOPE

- Multilingual Research Support
- Voice-Activated Research Assistant
- Real-Time Audio Analysis Integration
- Personalized Assistant Model
- Community & Learning Portal
- Hardware Integration
- Community & Learning Portal

IBM CERTIFICATIONS

In recognition of the commitment to achieve
professional excellence



Santhoshri S

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence



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IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Santhoshri S

for the completion of

**Lab: Retrieval Augmented Generation with
LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 26 Jul 2025 (GMT)

Learning hours: 20 mins

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THANK YOU