AUTOMATED SOUND AMPLIFIER

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EN-1190 ENGINEERING DESIGN PROJECT

UNIVERSITY OF MORATUWA

PROBLEM

Effective communication is crucial when addressing an audience, ensuring that every individual can clearly hear and understand the speaker. However, practical challenges arise due to variations in speaking styles, voice levels, and acoustics.

In situations where multiple people speak, the ideal approach is to adjust the audio system for each speaker individually. However, this typically requires a skilled audio technician, which may not always be practical or cost-effective. While hiring such a professional might be justified for large-scale events, common scenarios like lectures, meetings, or small gatherings often rely on a single, fixed audio setting. This can lead to uneven audibility—some speakers may be too loud, while others may be difficult to hear—resulting in communication gaps and reduced audience engagement.

Solution

To address the issue of fluctuating audio levels that impact communication clarity, we propose the development of an **external volume adjustment device**. This system intelligently monitors and adjusts the audio output from an existing amplifier without needing to replace or heavily modify the current setup.

key components:

1. **Signal Monitoring Unit –** continuously samples the output signal from the main amplifier.
2. **Threshold Analysis Module –** determines whether the current audio level is within an acceptable range.
3. **Dynamic Gain Adjustment Unit –** adjust the audio to maintain optimal clarity
4. **Configuration and Calibration Setup –** customizes the system for different environments
5. **Compact and Modular Hardware Design –** ensures the solution is easy to integrate with existing audio setups.

Stakeholder Review

We conducted a survey among audio engineers, sound controllers, students, and institutions managing large audiences. The feedback confirmed that fluctuating audio levels are a common issue, emphasizing the need for a dynamic adjustment solution.

To gather further insights, we invite you to complete our brief feedback form

Uniqueness and limitations

Our solution stands out by offering an external, standalone device that dynamically adjusts audio levels without modifying the existing amplifier system. Unlike many current products with fixed thresholds, our design supports customizable calibration for different environments. However, limitations include the need for initial test runs to determine optimal thresholds, the assumption of relatively stable environmental conditions, and dependency on the quality and characteristics of the existing audio system — such as the responsiveness of the amplifier and the dynamic range of the speakers — which may affect overall performance.

Overall flaw of the system.