



Immersive Sonic Sweet Spot

Living the Experience with Sound

*Each note a brushstroke, vibrations paint air as harmonic frequencies resonate within
the Heart & the Soul*

A sonic symphony unfolds, as is created - A masterpiece.

*At the sweet spot, the symphony - transcends the ordinary - inviting us to an immersive world where
sound turns to art in its purest, most enchanting state.*

What is new in Sound?

A comprehensive immersive spatial sound system.

Video sets the stage; audio breathes life into it. Sound introduces new dimensions to the visual content, elements that are not visible but can only be fully appreciated through the immersive audio experience.

The sonic sweet spot offers a strategic vantage position to get immersed within those dimensions.

Enhancements in audio technology continually push the boundaries of fidelity. With immersive audio, you—the consumer—are placed at the core of the narrative, enjoying a comprehensive surround sound experience tailored for your ears.

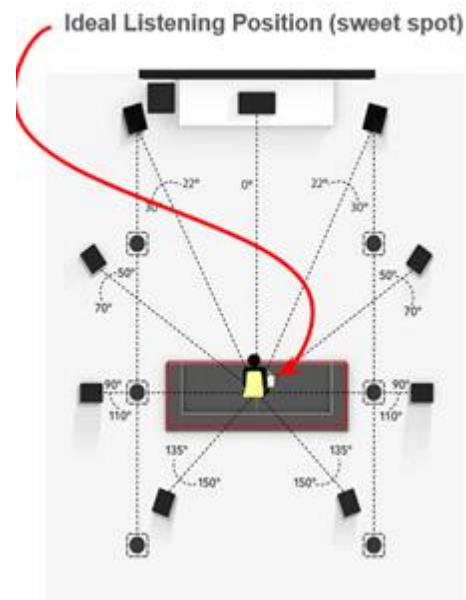


Fig:1 - Ideal Static Sweet Spot

The conventional audio setup is limited in capacity for variations in the sweet spot. There is a restricted optimal listening experience to specific locations within a given room.

This limitation often results in uneven audio distribution and may not cater to diverse spatial configurations. Therefore, listeners outside these prescribed zones may miss the full spectrum of audio richness, emphasizing the need for innovative solutions that transcend the constraints of traditional setups.



By employing steered sweet spot technology, audio systems aim to extend the benefits of the sweet spot to a broader range of locations within a given space.

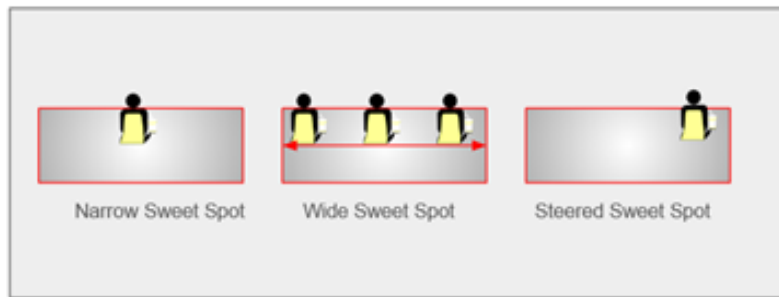


Fig:2 - Static Positioning

Now with the advent of Machine Learning (ML) we are presented with a unique opportunity to overcome this limitation by dynamically adjusting audio parameters based on real-time data, thus creating a broader and wider sweet spot. Leading to a flexible listening environment.

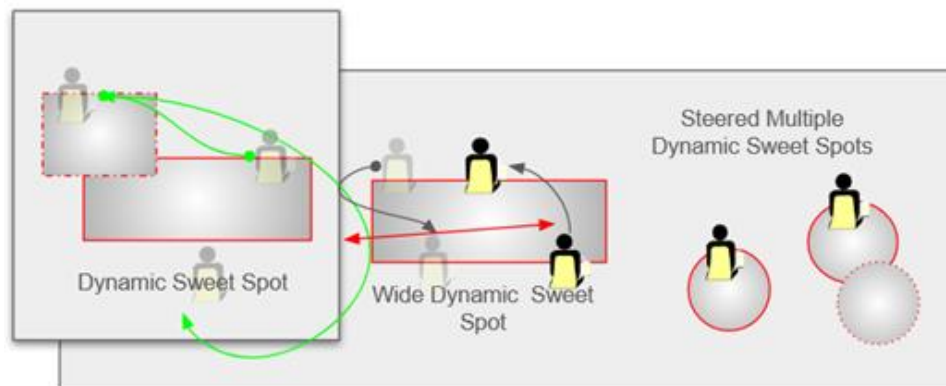


Fig:3 - Dynamic Positioning

Achieving an optimal listening environment despite advancements in audio technology remains an elusive goal. Bridging that gap with ML based real time audio enhancement and tuning brings us closer to that goal. The integration of machine learning in audio enhancement promises to revolutionize how we perceive and interact with sound, offering a glimpse into a future where audio systems seamlessly adjust to our preferences, the acoustic characteristics of the space, and the nuances of the content being played.

Under consideration to leverage the emergence of Generative AI for future platforms, which would integrate positional sensors and other feedback mechanisms.

This integration aims to not only enhance the overall audio experience but also enable intelligent, adaptive responses to user preferences, spatial configurations, and real-time changes in the listening environment. The tango of artificial intelligence with machine learning presents a promising frontier in the pursuit of sonic excellence.



Don't only watch; but get immersed in the Passion Theater

The Passion Theatre audio room at Jasmin has been calibrated for reflections, reverberations, resonance, and optimal positioning in consideration to room dimensions, acoustics, listening position, speaker position and toe-in, speaker height, bass management, frequency analysis and other parameters.

Passion Theater's Advanced Dolby Atmos Speaker Layout

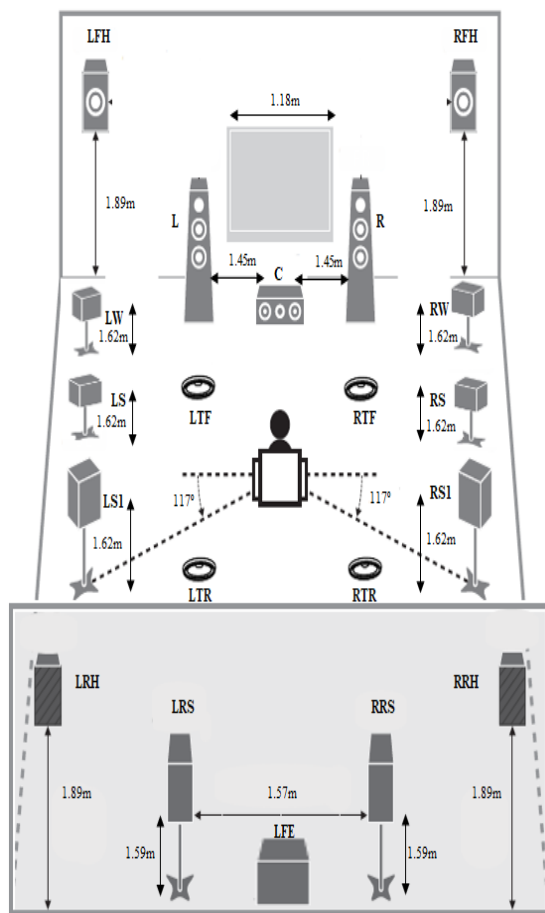
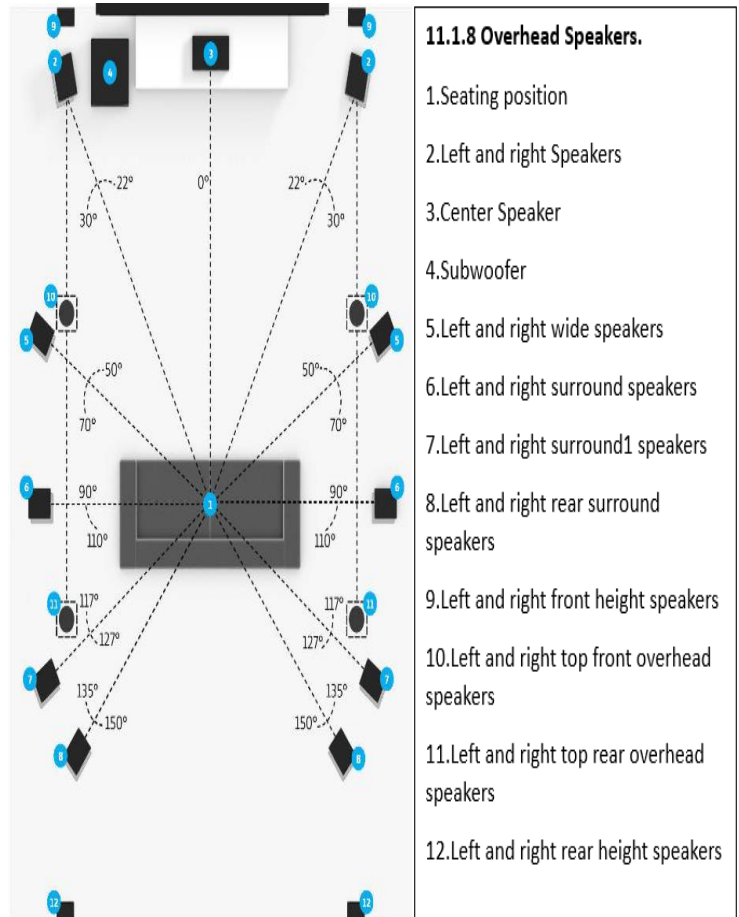


Fig:4 Passion Theatre: Speaker & listener positions



11.1.8 Overhead Speakers.

1. Seating position
2. Left and right Speakers
3. Center Speaker
4. Subwoofer
5. Left and right wide speakers
6. Left and right surround speakers
7. Left and right surround1 speakers
8. Left and right rear surround speakers
9. Left and right front height speakers
10. Left and right top front overhead speakers
11. Left and right top rear overhead speakers
12. Left and right rear height speakers

Fig:5 **Referenced Dolby Atmos 11.1.8 Speaker Setup



Passion Theatre at Jasmin Infotech



Image 1: Front view



Image 2: Back View

Passion Theater: Don't Watch but immerse.

The Ultimate Viewing Experience State-of-the-Art audio implementations.
 Latest AV Standard Certifications. Finely Tuned Home Theater demonstration & testing Room at
 Jasmin-Infotech, Chennai, India.

Room Dimensions: 6.04m x 5.55m x 2.8m	Soundproof Wall Panel Advanced acoustic soundproof material. Walls & Ceiling acoustically layered for optimal reflections, reverberation and damping effects.
Optimal sweet spot positioning parameters: <ul style="list-style-type: none"> ● Room dimensions ● Acoustics ● Listening position ● Speaker position ● Toe-in ● Speaker height 	Passion Theater Room Calibration parameters: <ul style="list-style-type: none"> ● Reflections ● Reverberations ● Resonance ● Bass management ● Frequency analysis ● Other parameters.
Number of speakers: 20	Speaker Layout: L, R, C, LFE, LW, RW, LS, RS, LS1, RS1, LRS, RRS, LFH, RFH, LRH, RRH, LTF, RTF, LTR and RTR
Key partners: Best-in-class Immersive Surround Audio Partners	
Audio Testing: Denon, Pioneer, Onkyo, Yamaha, Bose, Samsung, LG, Philips, B&O, Linn, AV Receiver equipment.	Professional Consumer (Prosumer) grade Amplifiers with Decoder Algorithms implemented & certified on high precision Analog Devices DSPs with Jasmin Infotech's Firmware



Realtime Solutions for Audio Tweaking

In Jasmin's Passion theatre, a 11.1.8 surround sound setup with the precise calibration in place, the system furthermore will have real-time audio tuning embedded with audio sensors positioned at multiple spots and positive feedback loop to enhance the audio quality and the speakers will have a core processor controlling the decibel range of the audio output from the speakers.

The core processor, after a comprehensive analysis of real-time audio sensor data, engages in intricate audio tuning and enhancement algorithms. These algorithms are tailored to rectify imperfections, optimize frequency response, and mitigate acoustic anomalies within space. The refined audio output is then meticulously channeled to the strategically positioned speakers throughout the room, ensuring a harmonious and immersive auditory experience for the audience in Jasmin's Passion theatre.

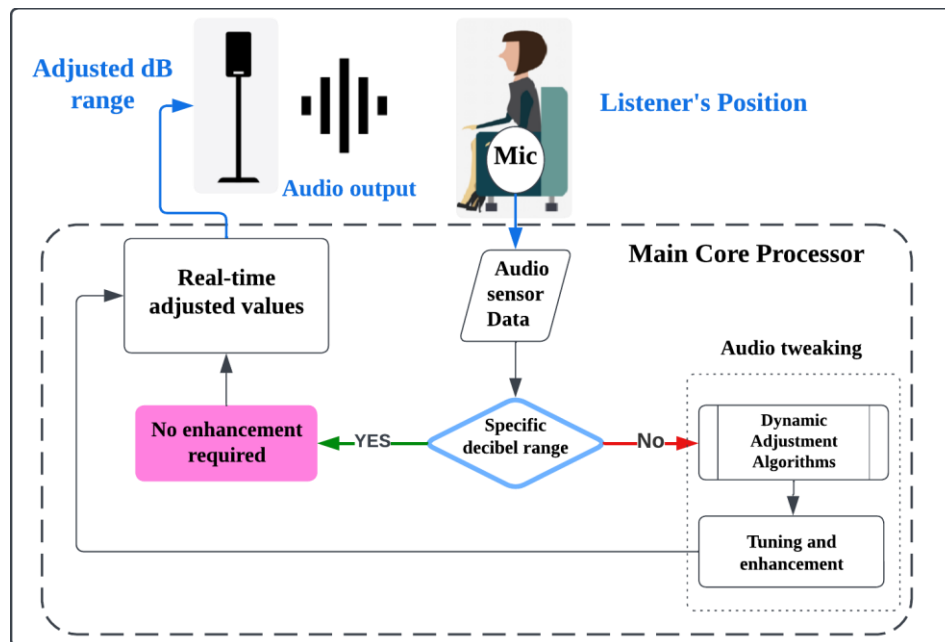


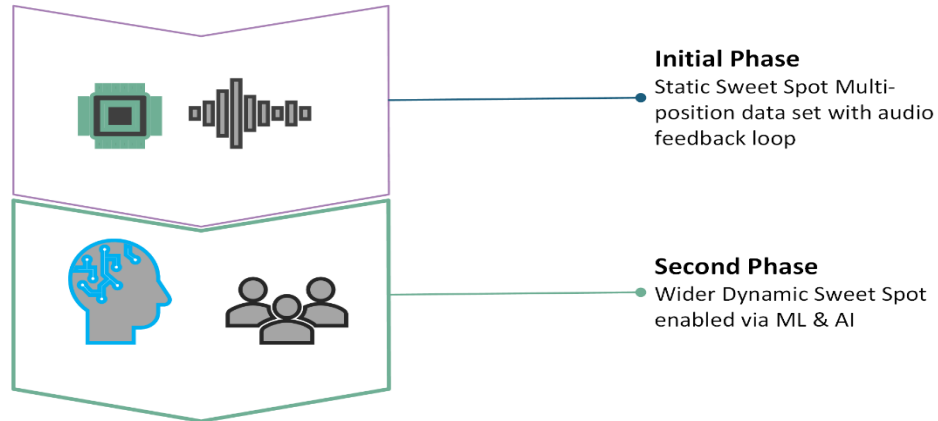
Fig:6 - Feedback system process flow diagram

Taking this approach further with the Time-of-Flight system in the future integration, will produce an exceptional audio fidelity room with a sweet spot of precise, optimized, and accurate sound for all the listeners seated in the room irrespective of their seating position.

Future Scope

The multi data set from the static sweet spot from multiple positioning will be utilized in feeding the ML database to enhance the range of the sweet spot within the theatre.

We will be venturing more into dynamic data processing, processor capability, ToF (Time of Flight) integration and AI implementation to dynamically generate a sweet spot anywhere across the room.



After experimentation and observation, the feasibility of integrating the adaptive ANC framework can be also considered for the noise cancellation or reduction in the room and provide a seamless high-quality sound experience as never experienced before. This complete system offers the potential to redefine the listening experience, providing a personalized and optimized auditory excellence in any defined space.

DISCLAIMER

The immersive audio is taking the world into its hold with the current 360° spatial surround sound system set up at home, audio rooms, theatres, and virtual reality.

Jasmin Engineering Support Team aims to deliver a complete immersive surround sound experience at your desired space to enhance your senses while watching any content at your place at your seat for an astounding audio experience.

The upcoming article will demonstrate the ML and AI integrated dynamic sweet spot across an audio room, stay tuned for the innovative approach to expand the horizons of immersive audio experience.

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