



Spatial Active Noise Cancellation for Rotating Mechanisms

Advanced System to Enjoy a
Peaceful and Quiet Environment

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1. Intetics R&D Team Has Created an Innovative Noise Cancellation System That Effectively Reduces Noise Generated by Rotating Mechanisms



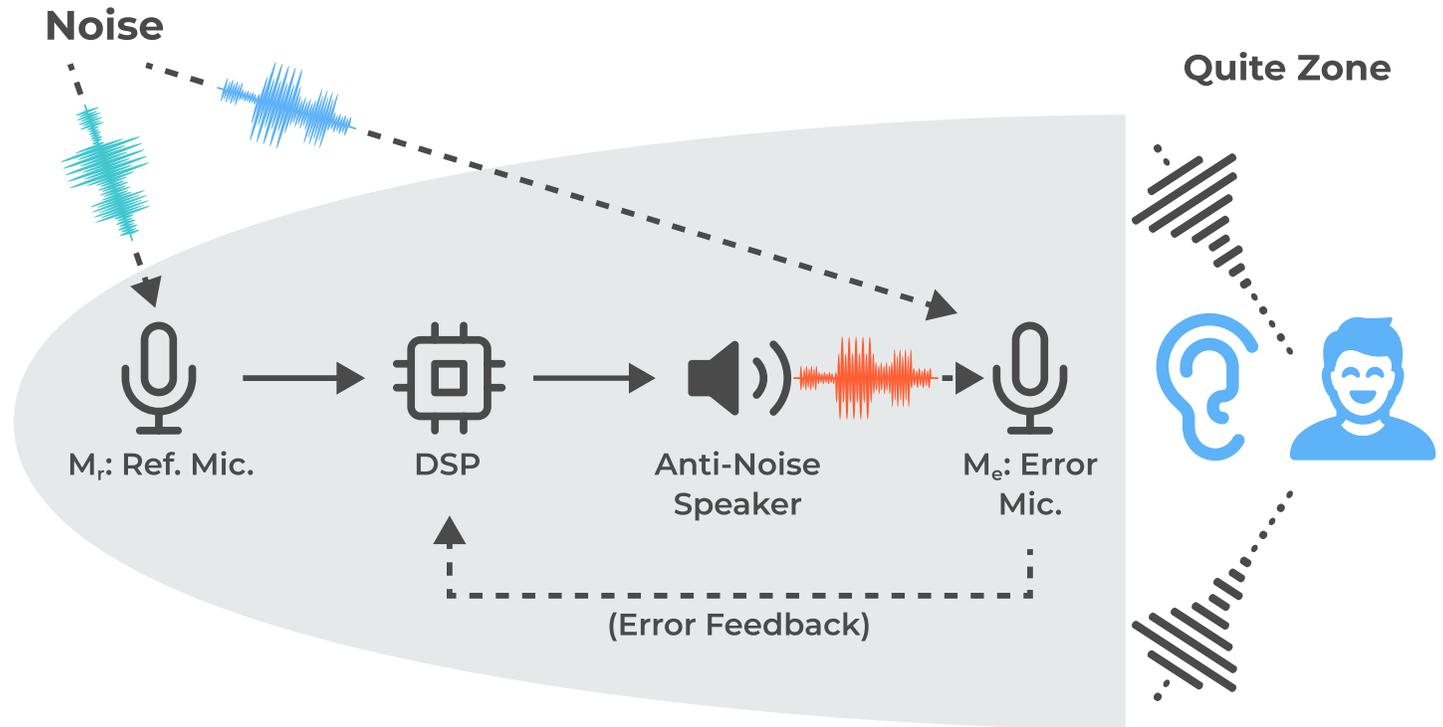
The system is well-suited for dealing with rotating mechanisms since they generate a type of noise known as harmonic noise, which is perceived as a hum and can be effectively attenuated through active noise reduction solutions.

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Driven by curiosity and users demand, combining math, hardware, and software we received a fascinating **physical phenomenon**: **noise and anti-noise sound waves interacting reduce each other resulting in the reduction of environmental noise**



This discovery became the foundation for our innovative noise reduction solution.



Unlike regular noise-cancelling headphones that operate only in the proximity of the user's ears, our system is specifically designed to operate in larger areas such as rooms. With this advanced system, you can enjoy a peaceful and quiet environment without the disturbance of unwanted noise.

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2. The Objective



To develop hardware and software that could be used in situations where passive noise reduction approaches were not feasible or effective. This is particularly useful in situations where shielding may interfere with air exchange.



To develop an innovative solution that actively reduces noise by capturing it, inverting its phase, adjusting the delay to match with real noise, and emitting this anti-noise.

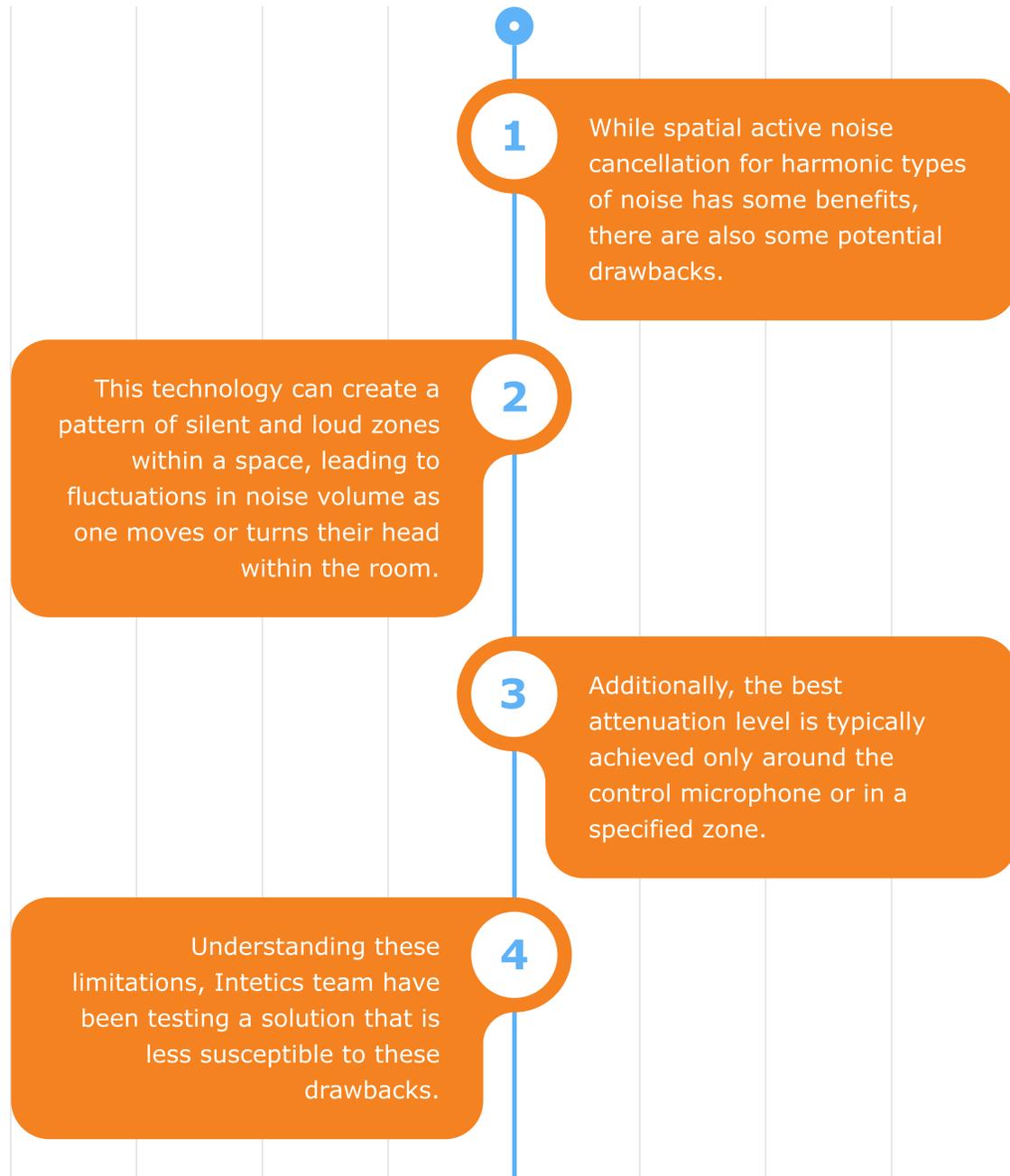


To bring potential health benefits, such as reducing the negative impact of noise on people's health, including hearing loss, sleep disruption, and stress.

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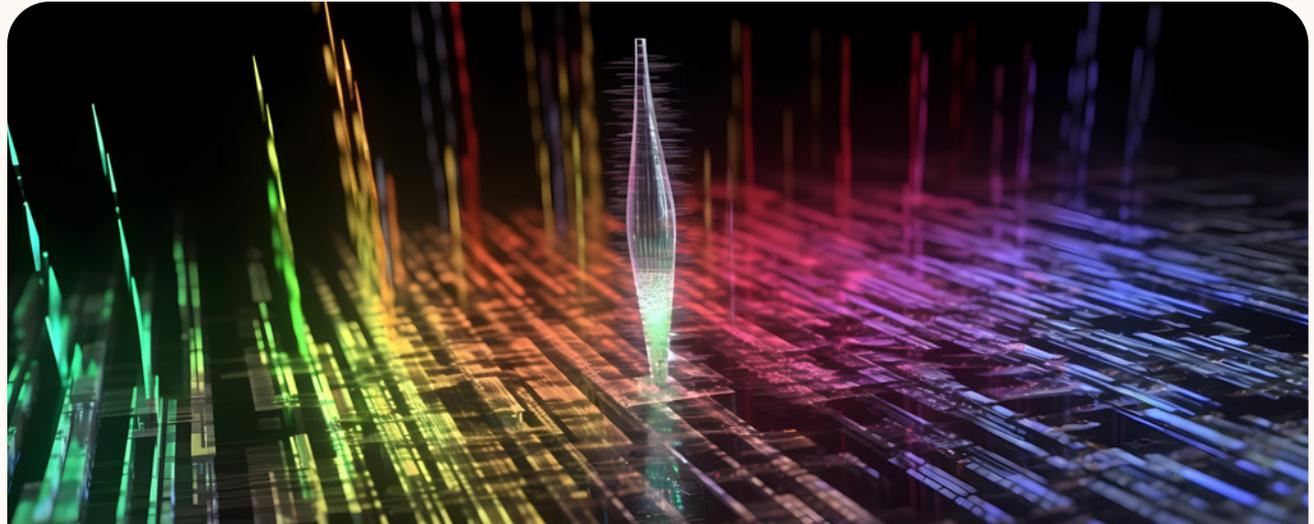
3. Challenge That We Solve



4. The Science behind Effective Noise Reduction and Results

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During anti-noise generation, instead of minimizing instantaneous squared acoustic pressure, we followed the more advanced method, proposed by scientists in the last decade: minimizing acoustic energy density.

This method gives spatial active noise reduction, while traditional ANC creates only a small quiet zone in the small vicinity of the microphone.

While this modern approach requires more computational power and a custom 3D acoustic probe, it produces noticeable and effective results.

Quick Facts

- ✓ 20 dB noise reduction for the main harmonic of the target noise (around 200 Hz)
- ✓ Tetrahedron and orthogonal 3D custom acoustic density probes with electret microphones suit other applications and noise sources
- ✓ Scalable for any # of channels Filtered-x Normalized LMS that minimizes acoustic energy density captured by our probe
- ✓ Feedback ANC structure

Technologies

C DSP/BIOS / GNU octave / TI C6713 / DSK_AUDIO4 / UltiMaker Cura

5. Solution

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★ 01

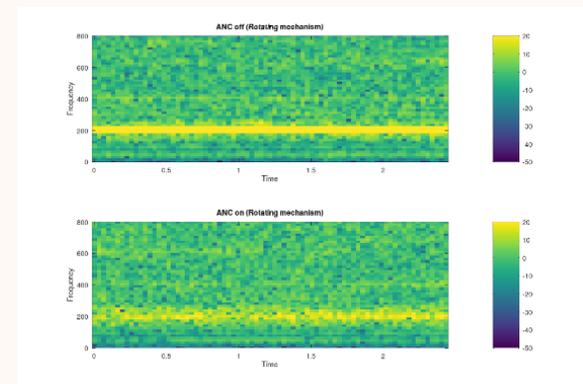
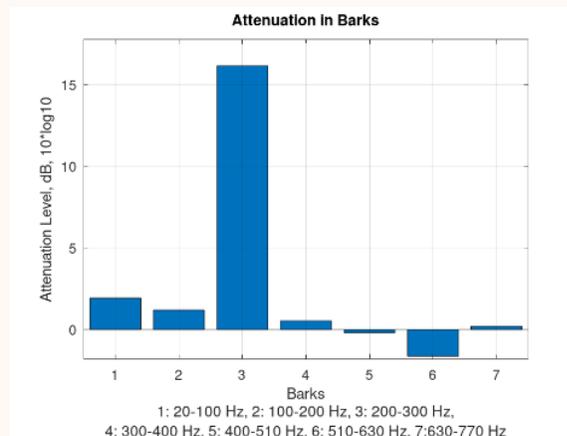
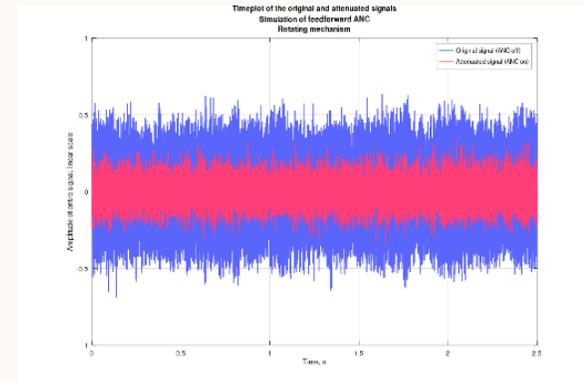
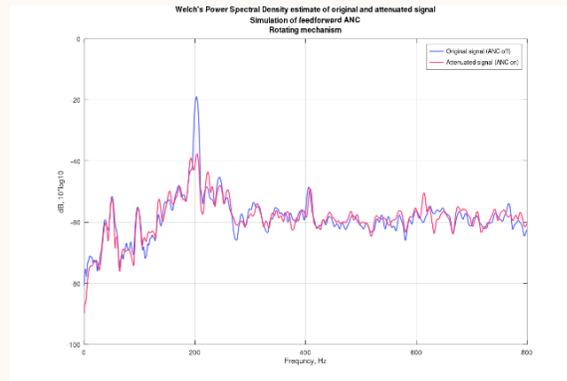
Developing solutions that are thoroughly tested and proven effective.

★ 02

The noise cancelling algorithm is easily customizable for various usage scenarios and any desired number of input and output channels.

★ 03

The solution operates without interfering with airflow and functions effectively in cases where passive methods are not applicable.



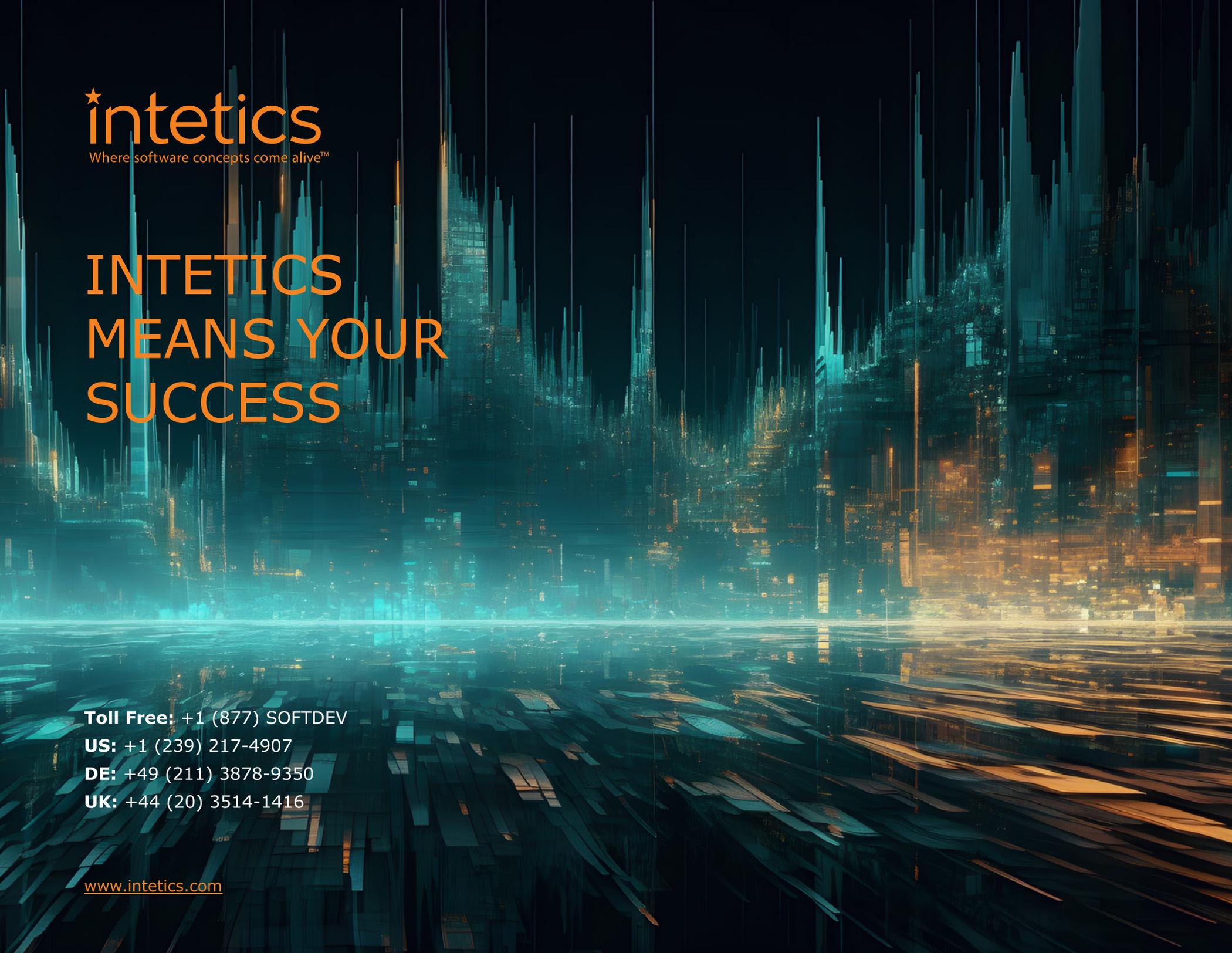
Intetics noise reduction system has been physically tested on multiple objects with rotating mechanisms and has provided a significant reduction in the main harmonic around 200 Hz. Our testing has shown a reduction of up to 20 dB, providing noticeable and effective noise reduction.

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Toll Free: +1 (877) SOFTDEV

US: +1 (239) 217-4907

DE: +49 (211) 3878-9350

UK: +44 (20) 3514-1416

www.intetics.com