

# VOICE

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## In cooperation with BMW AG

### Project description:

The Project was about how to design the future of automotive sound.

Since there are many important issues, like pedestrian protection and noise pollution involved, the subject is too big to leave it to the marketing departments and sound engineers who might create the engine sounds of the future with the aim of generating unique selling propositions.

To prevent the historical chance to quiet our cities, which comes by the transition to electric mobility, I developed VOICE as an adaptive solution. Why replace the sound of the combustion engine by a slightly harmonized futuristic sound? By using an adaptive System, which only spreads sounds, not noise, when needed, our city centers could finally find peace. By using different and less frequencies, emitting the sound directionally and adaptively regulating it we could resolve the inequitable relation between drivers and pedestrians.

The project contains of three parts:

In the first part, to raise awareness for the subject, I created a simulation of the noise of a combustion engine - deconstructed into pure tones and layered again - and two sculptures to visualize the difference between noise and sound, which was also part of our exhibition at Salone del Mobile 2015.

The second part was an extensive research to understand how the human sense of hearing works, how noise impacts our psychological and also physical well-being. How does the human brain react to different frequencies and different types of noises? How does it adapt to noise and how can it's ability to adapt or to mask sounds be implemented in an adaptive system?

The third part was the development of different scenarios of use to demonstrate the advantages of the concept. For example, if five cars wait in front of a traffic light, why would it be necessary to have five cars make the same loud noise, when they accelerate, which accumulates to a noise level which can permanently damage your ear? Or another scenario, when driving at night through sparsely populated areas, cars do not have to notify the neighborhood the way they do in down-town at rush-hour. Furthermore, higher frequencies could be used to warn pedestrians but do not transmit through windows as well as low frequencies do, thus the quality of sleep of many people could be improved.

Still, pedestrian protection is important. As well as it is to be mindful of the visually impaired. Creating directional sounds, which, instead of increasing the noise level only by acceleration, are controlled to alert pedestrians and cyclists out of sight, for example behind a turn in the road or at a turbulent traffic situation, could solve the dilemma of having to pollute our environment with artificial sounds so much, that the pedestrian protection is even increased.

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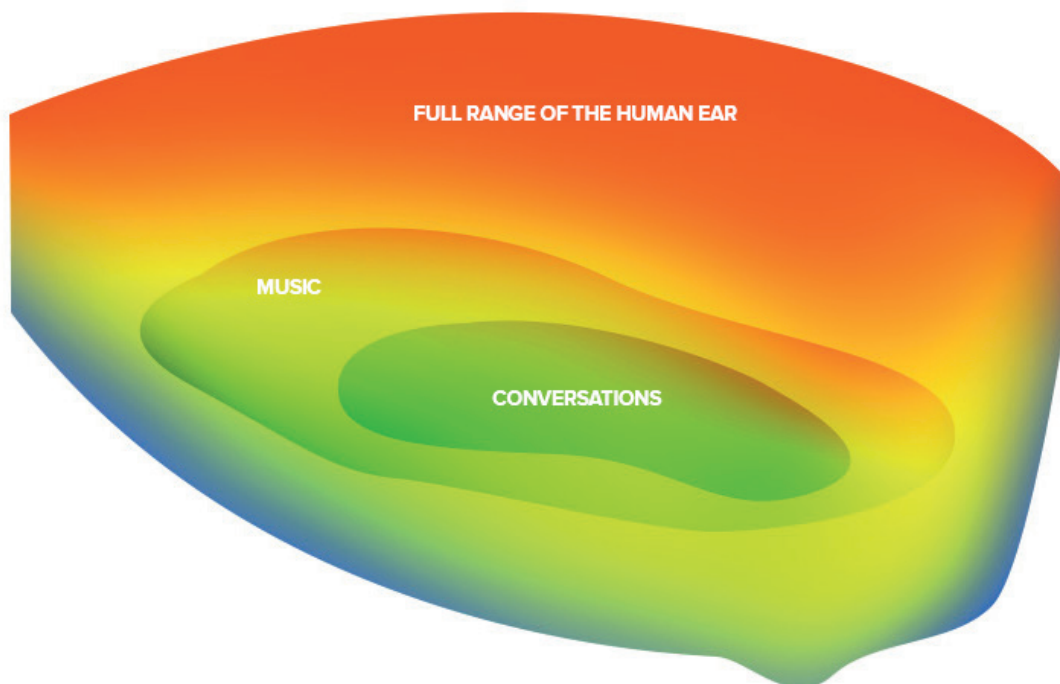
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Research:

The project was prepared by an extensive scientific research on the nature of noise and sound, the anatomy of the human ear, the psychoacoustic effects of the sense of hearing.

How do we react to different frequencies of noise? What is the difference between noise, sound and even music and how does the human brain react? What kinds of sounds trigger calmness, stress, alertness and awareness. How can these effects be used to create a different sound-scape in our cities.



Higher frequencies travel with less energy and are absorbed by walls and windows, low frequencies are less stressful for us. While it is very easy to locate the source of a high frequency sound, the emitter of a low frequency is almost impossible to spot. The list of examples how nuanced our hearing sense and our ability to interpret and perceive sounds would go on for some pages. The noise a normal combustion engine causes fills up almost the whole human hearing range and goes even beyond. The first artificial sounds which were created by the automotive industry are only slightly harmonized and still occupy a wide range of frequencies.

To not miss the chance to free our cities from the noise of combustion engines a adaptive system has to be developed.

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