

Hearing Hearables & Hearing Health



A L A N G O

Technologies and solutions



MOBILETM
WORLD CONGRESS SHANGHAI
世界移动大会·上海

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Global Device Summit

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\$ 750 billion



I want to ask you a 750-billion-dollar question:
Which wearable is the most needed device?



Smart watch? Smart glasses? Smart clothes? Fitness tracker?

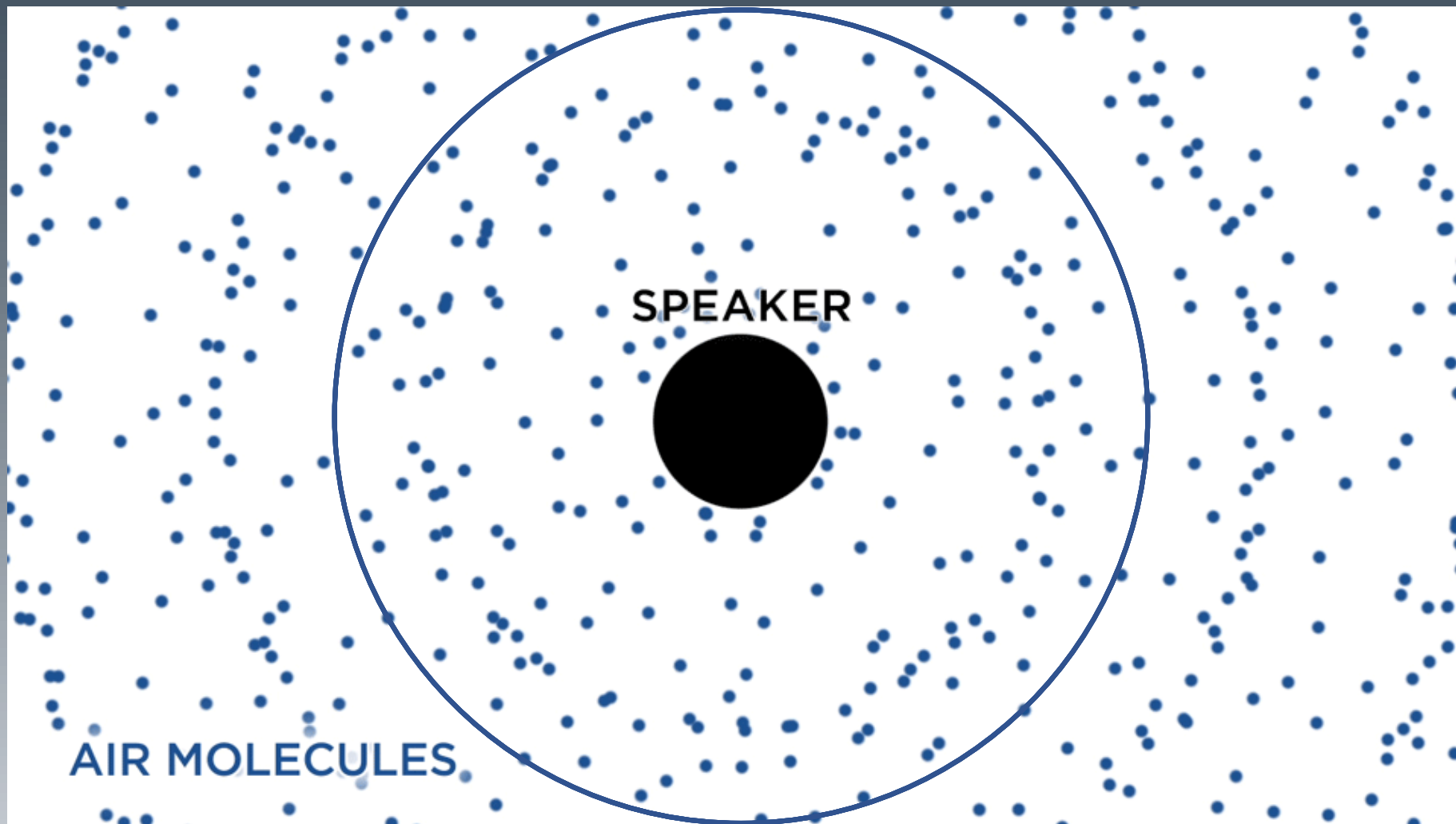
NO.

NONE OF THE THOSE.

HEARING AMPLIFIER!

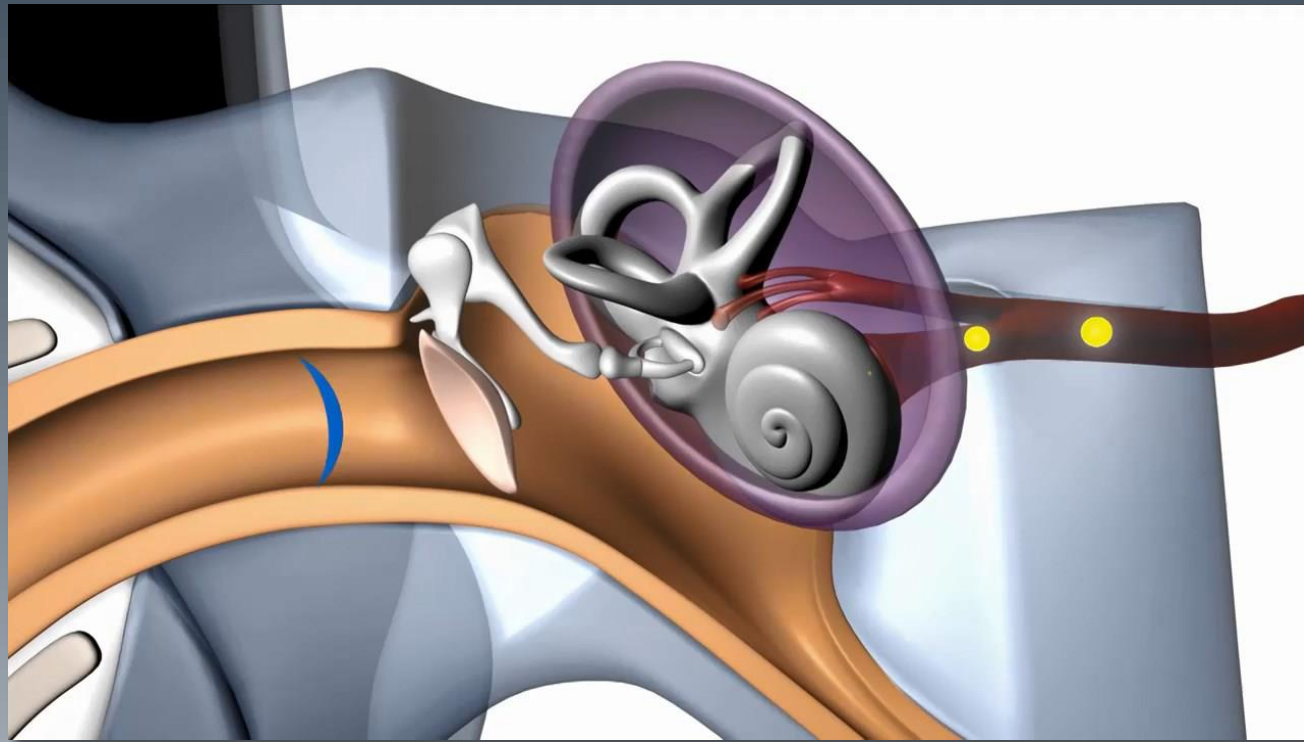


The most needed wearable is a hearing amplifier.
And now, I am going to prove that.



But, first, I would like to talk about sound and our marvelous sense of hearing. What is sound?

Sound is just a synchronized oscillation of air particles that propagates from the sound source as sound waves.



When sound waves reach our eardrum, they cause its corresponding movement. This is picked up by 3 tiny bones inside the middle ear. The bones provide a mechanical coupling between the eardrum and a fluid-filled, spiral-shaped organ called the cochlea. The cochlea's inner walls are populated with receptors that generate impulses in the nerve fibers in response to the motion of fluid in the cochlea. The impulses travel towards the brain where they are interpreted as voices, music, noise, and other sounds.

Hearing is a very sophisticated mechanism and our ear is an outstanding sensor. Unfortunately, this sensor is prone to degradation, resulting in hearing loss.

**BORN
WITH IT**

5%



There are many different reasons for hearing loss.
Only 5% of people are born with hearing loss.

**INFECTION
OR INJURY**

17%



17% of people experience hearing loss as a result of infection or injury.

AGING

28%



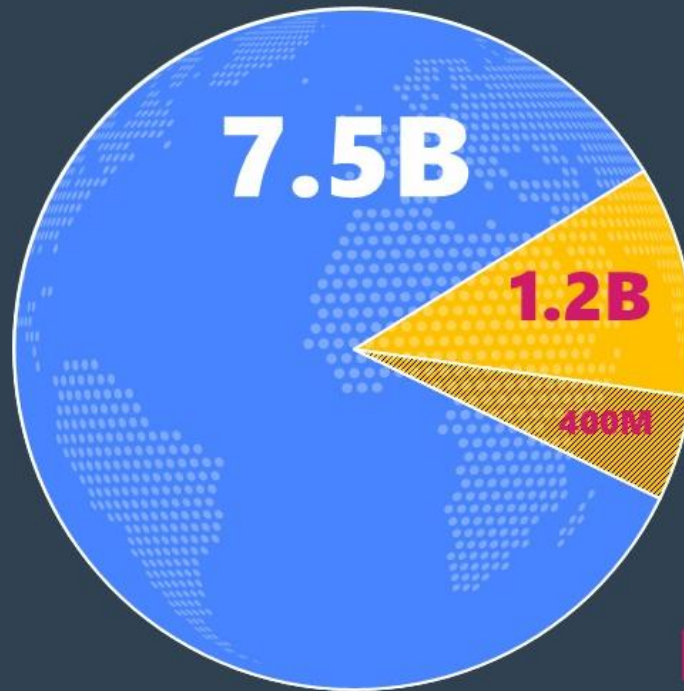
The natural aging process leads to hearing loss in 28% of people.

LOUD NOISE

34%



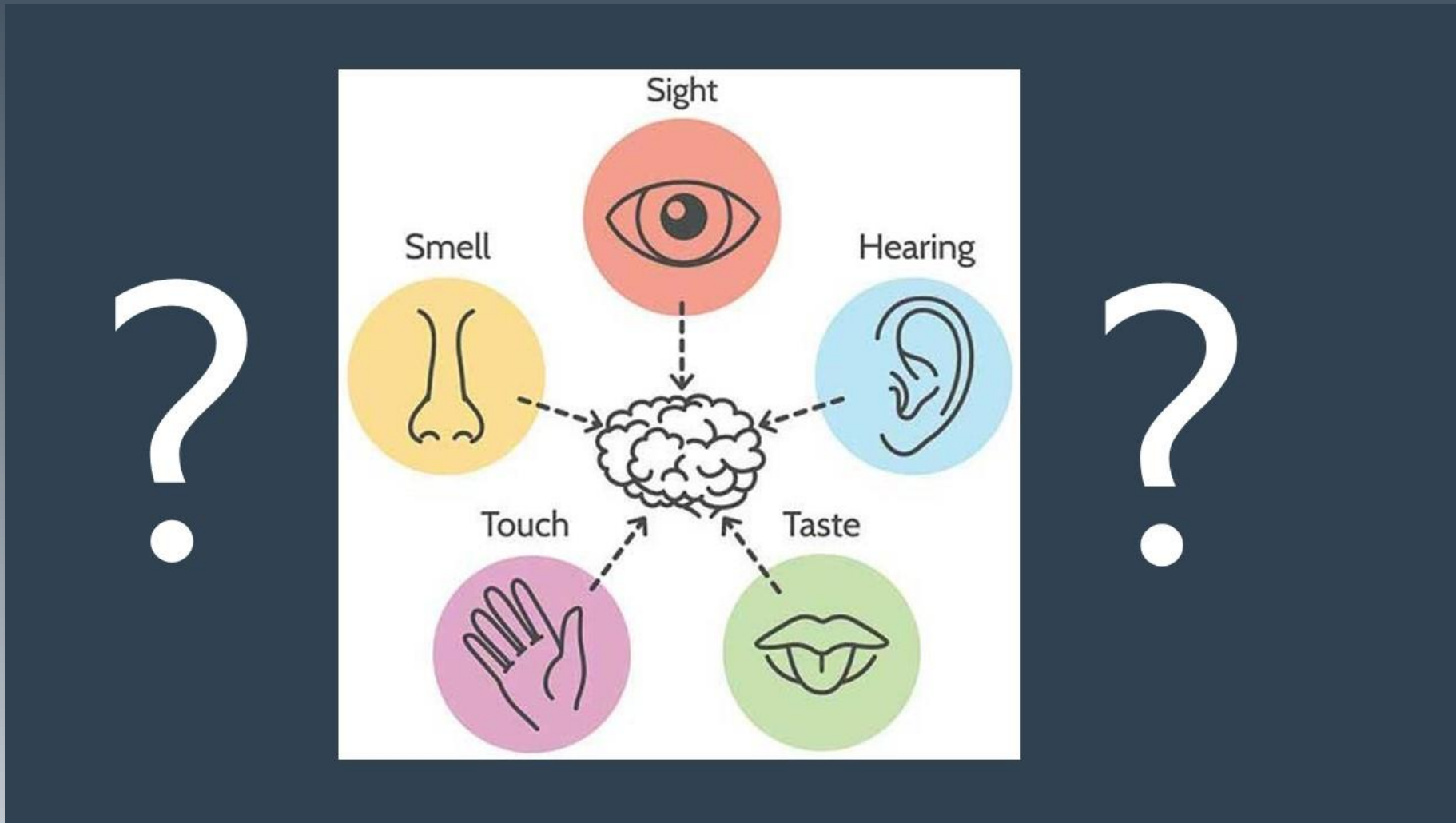
The main culprit that damages hearing in 34% of people is exposure to loud noises and other very loud sounds - such as gun shots.



Hearing loss

Disabling hearing loss

Overall, about 1.2 billion people on earth have some level (>25dB) of hearing loss. Over 400 million have disabling hearing loss (>45dB in a good ear) and, unfortunately, these numbers are growing fast.



When asked what the most sophisticated human sense is, most people will answer vision. I initially wanted to put some physical numbers comparing human vision and hearing capabilities, but I realized that no numbers could express it better than the words of Helen Keller.



*"Blindness cuts us off
from things, but deafness
cuts us off from people"*

Helen Keller

Helen Keller was born as a normal child, but lost both her vision and hearing when she was 19 months old. Despite this, in 1904 she received an academic degree, the first deafblind person to do so. Later, she wrote an inspiring book called "The Story of My Life" where she described her experience of being deafblind. She said that "Blindness cuts us off from things, but deafness cuts us off from people".



To help you experience hearing loss, we prepared a video clip.
Imagine yourself at a classical music concert with different levels of hearing loss.
Use headphones while watching the video for better immersion into the problem.
Press any key or click the mouse when ready ...



Hearing loss is a frustrating experience for an individual and it has multiple consequences. Children with hearing loss experience delayed speech development, impaired communication and reduced cognitive skills.



In adults, hearing loss is linked to poorer job performance and, as a result, lower salaries.



In the elderly, hearing loss is associated with dementia, falls, depression, social isolation and loneliness.

MILD HEARING LOSS

\$2,500

These problems impose a heavy financial burden on society.

It is estimated that untreated mild hearing loss costs society \$2,500 per individual each year.

MODERATE HEARING LOSS

\$8,000

Untreated moderate hearing loss costs \$8,000 per person, per year.

SEVERE HEARING LOSS

\$13,000

Untreated severe hearing loss costs \$13,000 per person, per year.

Cost: \$ 750,000,000,000



Unaddressed hearing loss

Overall, the annual cost of unaddressed hearing loss is in the range of \$750 billion globally. And this is the cost of the question I asked in the beginning of my presentation.



There is good news. 95% of hearing impaired people can be helped by hearing amplification. That said, we've just proved that a hearing enhancement device is, by far, the most needed wearable electronic device, both for individual users and society as a whole.



So, what is the first thing that comes to mind for treatment of hearing loss?
It is, of course, hearing aids.

Hearing aids have a long history, evolving from hearing trumpets ...



Under-wearables

... through the development of the first wearable electronic devices. Nowadays we would probably call these devices "under-wearables".

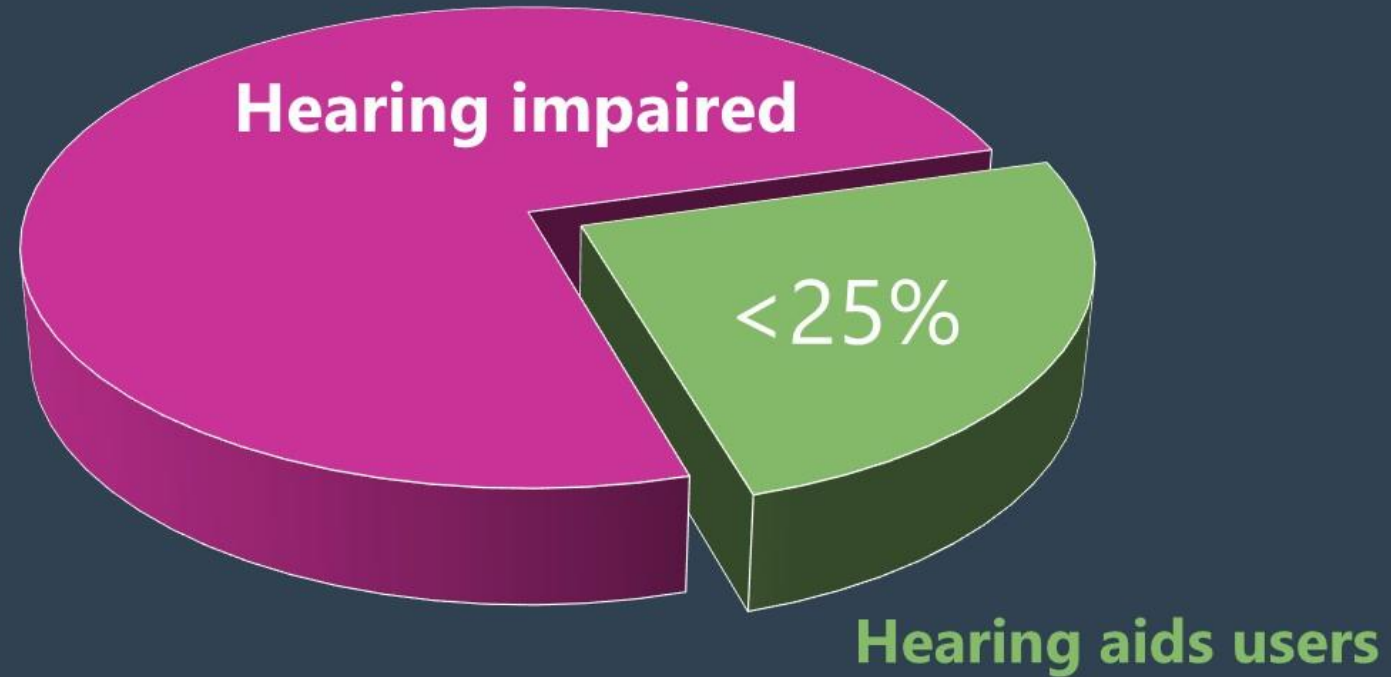


Hearing Aids

As of today, hearing aids have evolved into small, sophisticated, digital devices of various styles.

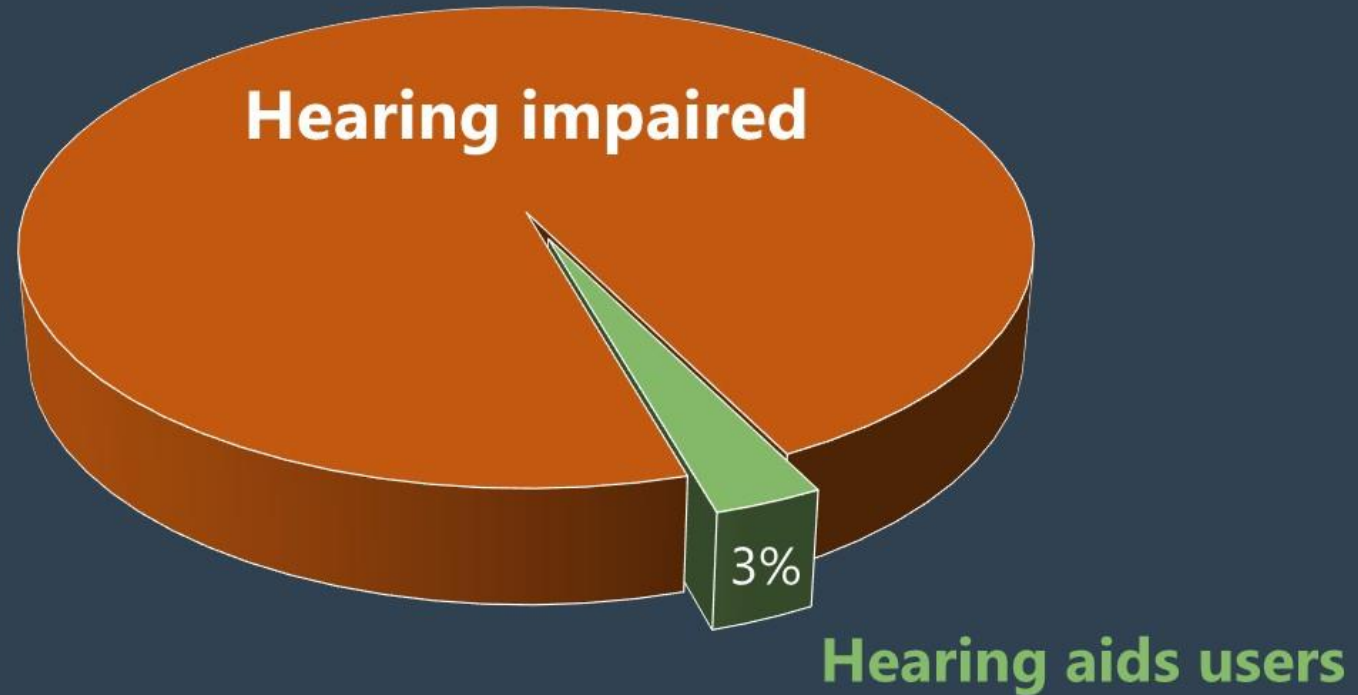
You may think: mission accomplished, we have the solution!
But no, unfortunately we don't!

Developed countries



Hearing aids are used by less than 25% of hearing impaired people in developed countries and ...

Low income countries



... less than 3% in low income countries.

I can see four main reasons for such a failure:

1. Extremely high cost



A pair of hearing aids costs between \$2000-\$8000. It is not surprising that, unless this expense is covered by insurance, most people hesitate before buying hearing aids.

2. Social stigma



Justified or not, people feel that wearing hearing aids makes them look older or handicapped. This feeling does not, actually, depend on age. We all want to be young.

3. Limited functionality



We're used to multi-functional electronic devices that can do much more than their main functionality. Smartphones are a classic example. However, basic, reasonably-priced hearing aids are limited to voice amplification only.

4. Poor Performance



Satisfaction is not guaranteed.

20% of people who buy hearing aids, return them.

17% of those who don't return are not satisfied so,

7% of them keep their very expensive devices in a drawer.

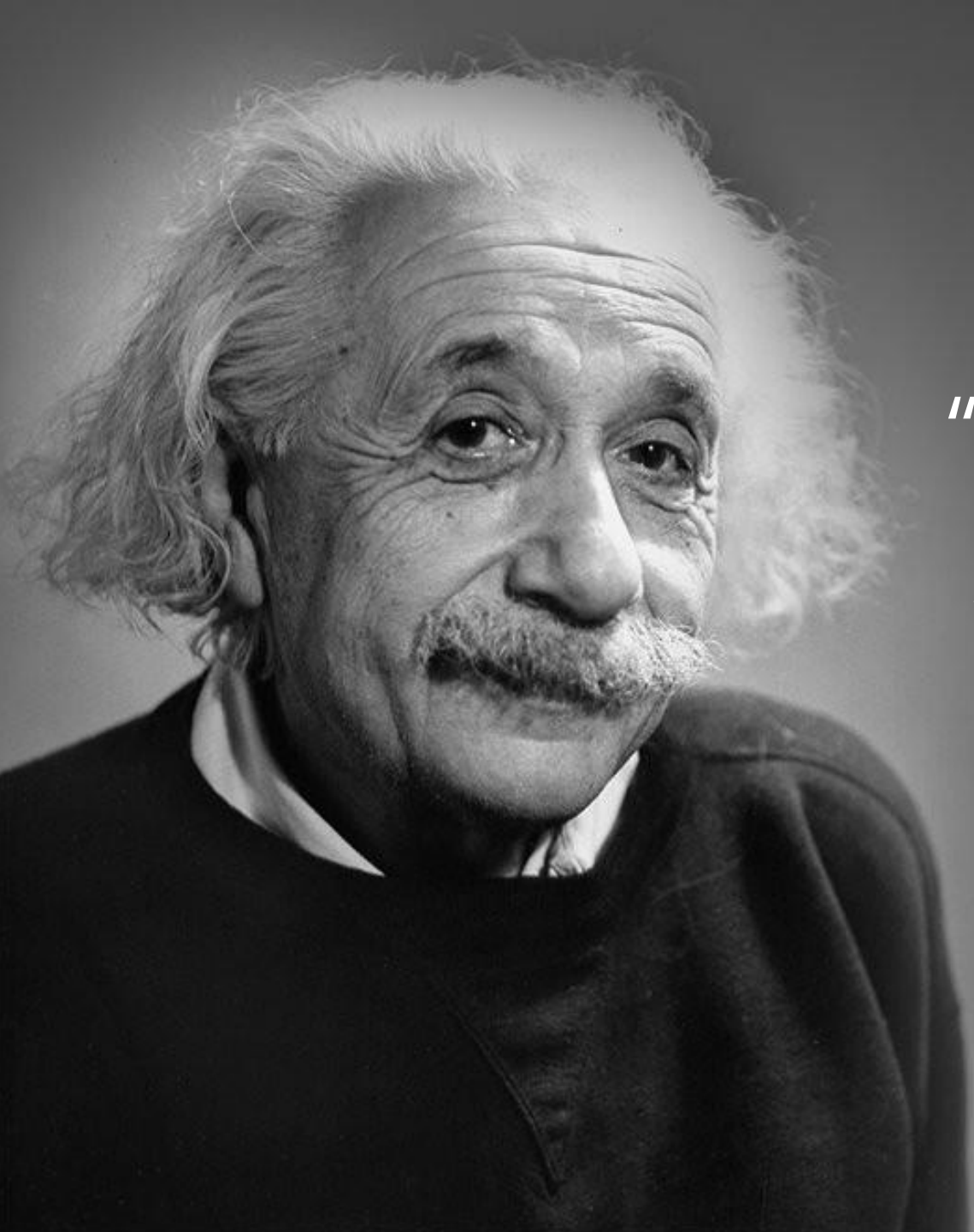
OUR APPROACH

I have about 25 years of experience in the communications industry developing and licensing digital sound processing technologies similar to those used in modern hearing aids: acoustic beamforming, acoustic feedback cancellation, noise reduction, automatic gain control, frequency equalization and dynamic range compression.

About four years ago I became aware of the situation with hearing health, and I decided to do something about it. Fortunately, I was not alone, I had my company, Alango Technologies, with years of relevant experience. All we needed to do was to modify our technologies developed for voice communication to work for hearing impaired people, and to find the right form factor for integration. We could, of course, create another hearing aid, but we wanted a solution that had the potential to change hearing health worldwide.

We needed a disruptive solution.

So, we followed the advice of this wise man, who once said:



*"No problem can be solved
by the same kind of
thinking that created it"*

The development trend for hearing aids throughout history has been to make them smaller and less noticeable. We wanted our devices to be stylish, even fashionable.

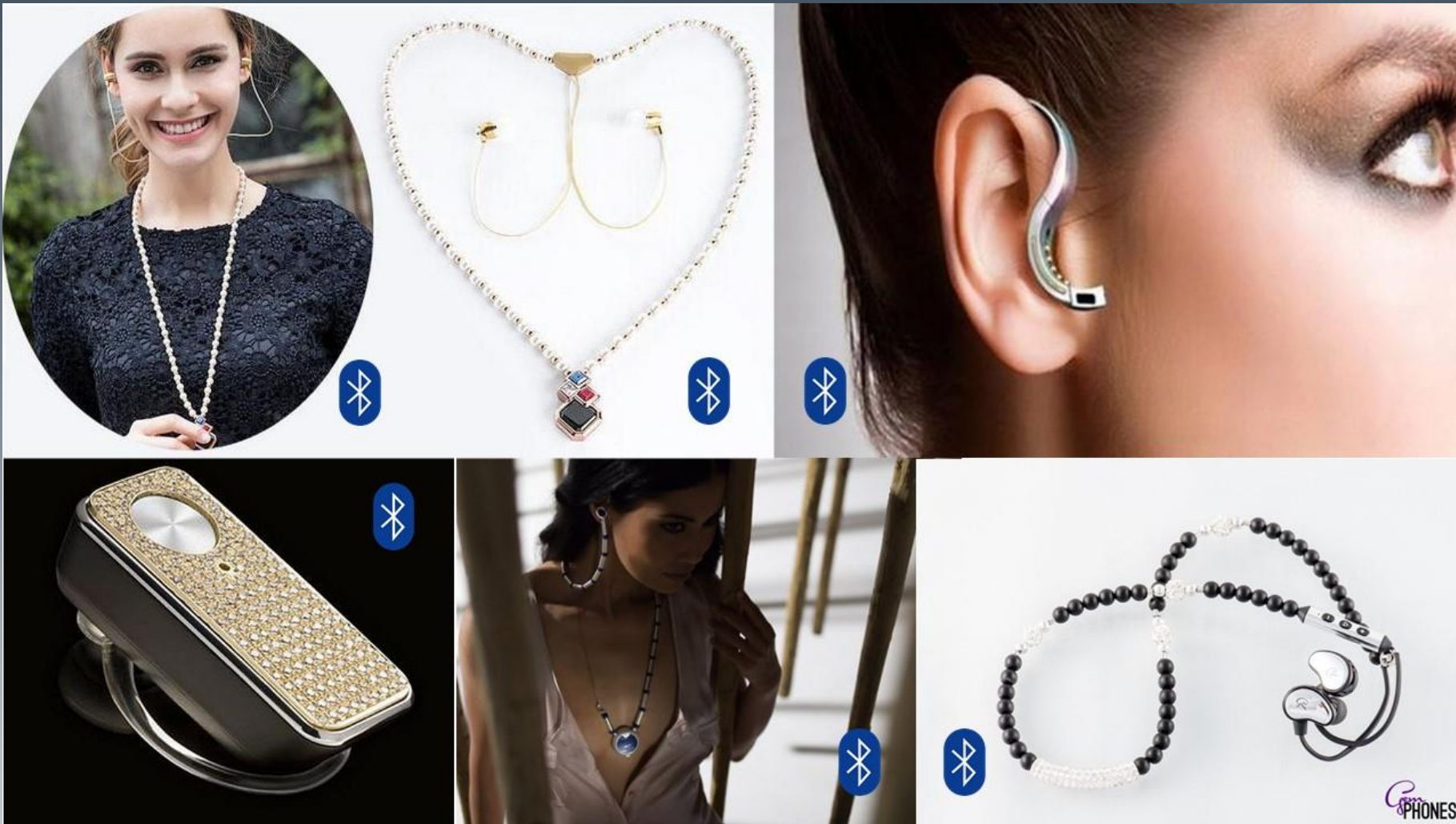
Instead of expensive medical devices, we wanted to create affordable consumer electronics devices.

In addition, we wanted our devices to be high performance and multifunctional.

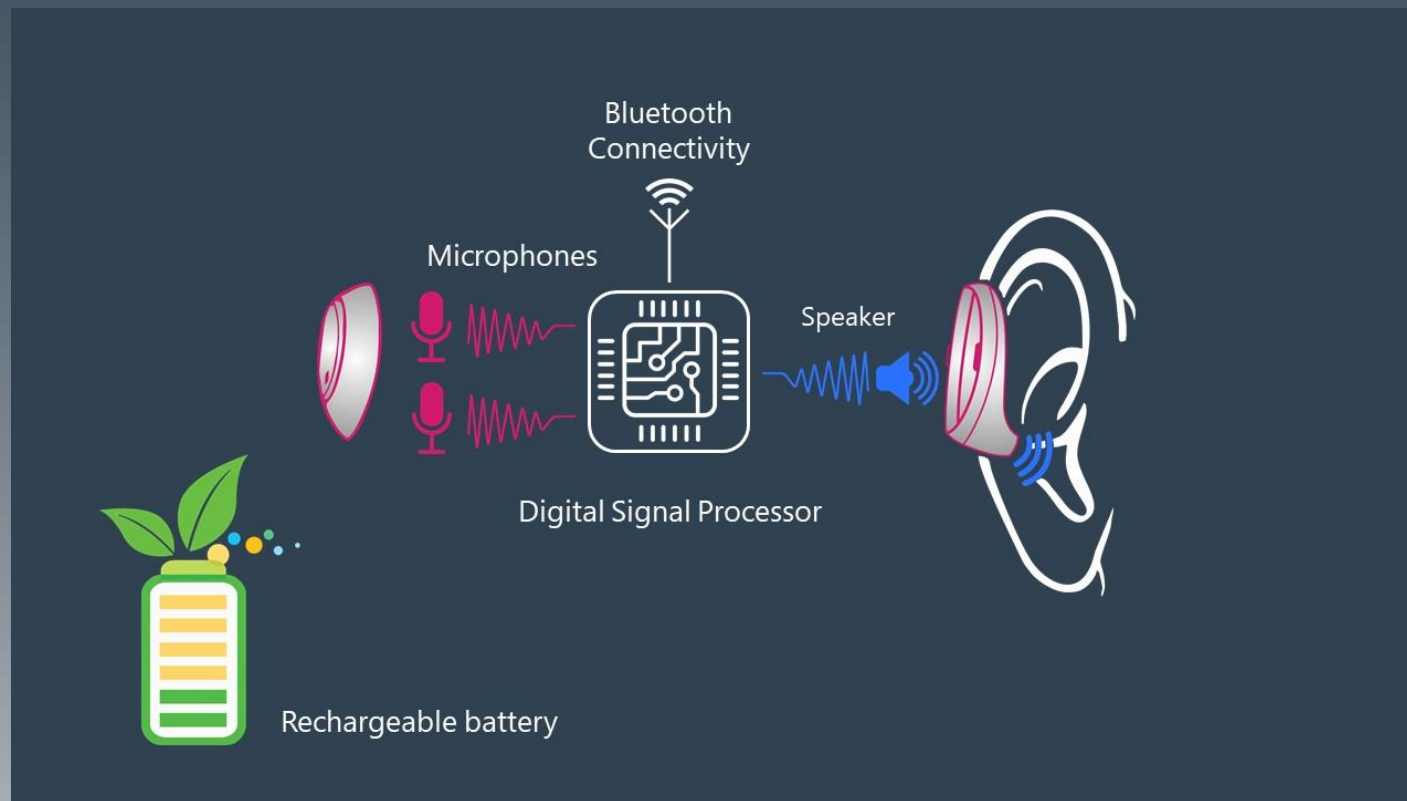
It is quite natural that we've chosen a Bluetooth headset as the starting point for our development.



Just look at the results for “Bluetooth headset” image search on Google: Everything you can imagine: different shapes, sizes and wearing styles. You can choose your favorite...

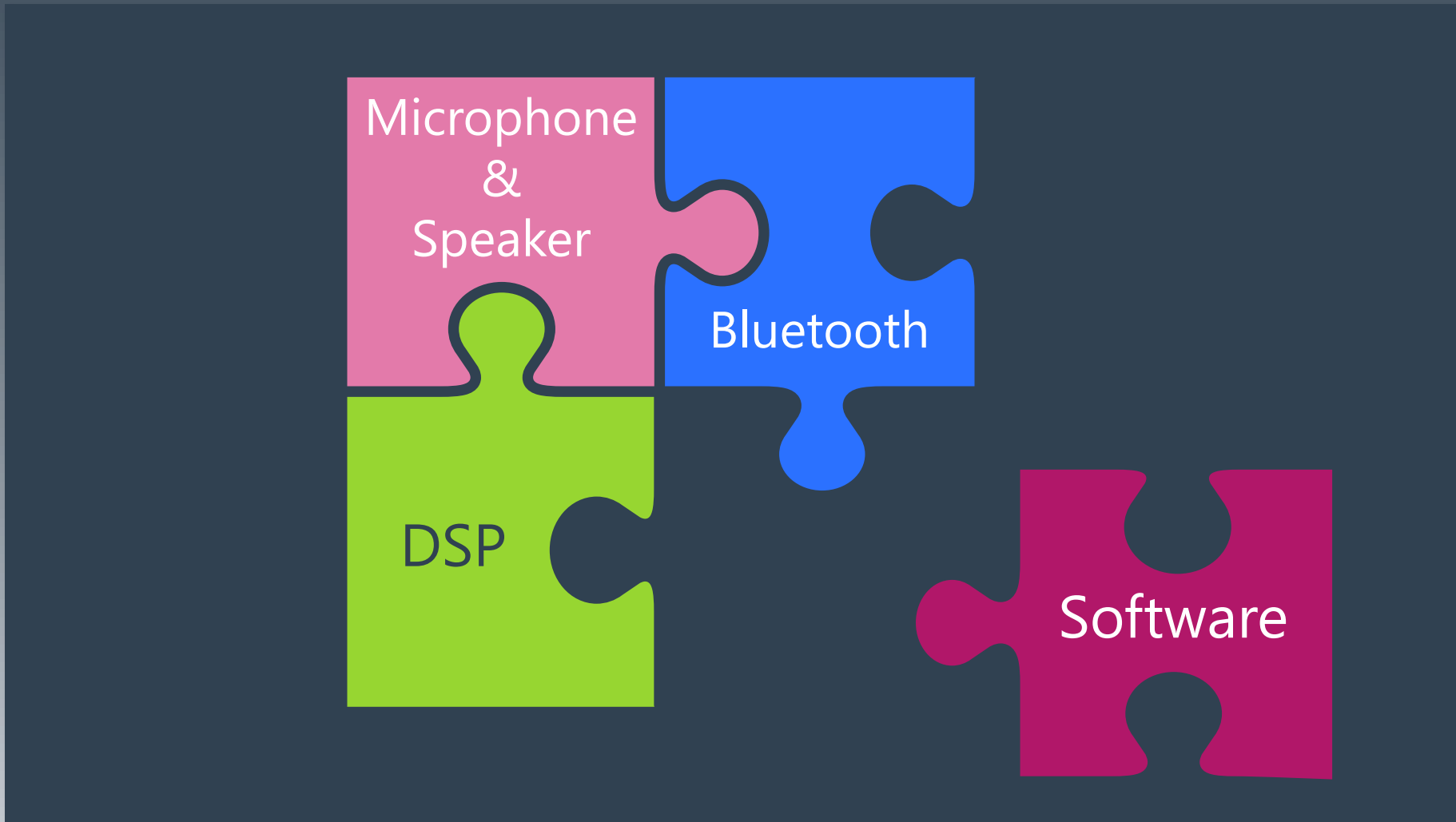


...and, if you like luxury, you have that choice too.

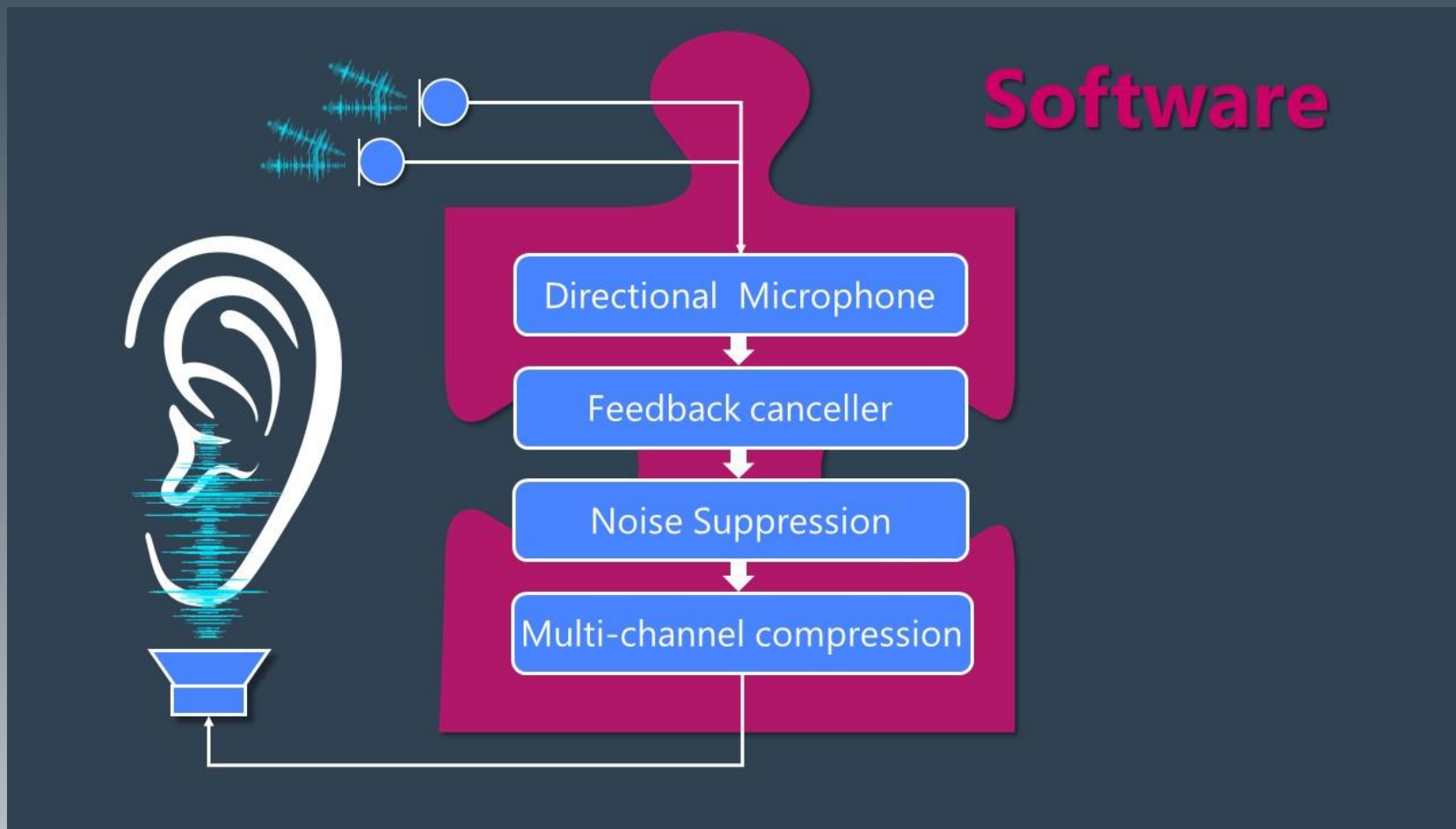


Let's look under the hood of a Bluetooth headset and see what we need to do to transform it into a powerful hearing enhancement device. Let's open it up.

- **A microphone.** In many headsets we can find a dual microphone that is used in high end hearing aids only.
- **A high-quality speaker** that is much better than that of hearing aids due to the lack of size limitations.
- **A Digital Signal Processor** that is 4-5 times more powerful than that of most hearing aids.
- **Bluetooth connectivity** present only in the latest, greatest and most expensive hearing aids.
- And, finally, an environmental friendly **rechargeable battery**.



There is only one important piece missing to transform ANY Bluetooth headset into a powerful hearing enhancement device. That piece is software. Just do it and you have exciting news for more than 1 billion hearing impaired people worldwide. So, we did it!



We created a licensable software reference design that allows the addition of hearing enhancement functionality to virtually any Bluetooth headset.

But how can we be sure that our software solution and the integrated signal processing technologies are really good, that they help hearing impaired people equally or better than hearing aids?

www.WearAndHear.com

Wear & Hear
Hearing On Demand

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Hear Better Wherever You Are

- 1 Converse more easily, even in noisy places.
- 2 Watch TV together without arguing over the volume.
- 3 Communicate effortlessly over the phone.

This is BeHear® NOW, a personalizable Bluetooth® headset with built-in hearing enhancement.

[Learn More →](#)

To validate that we decided to go one step further. We decided to create our own brand of concept products that we call **Wear & Hear**.

Our first product, **BeHear® NOW**, has just been released.

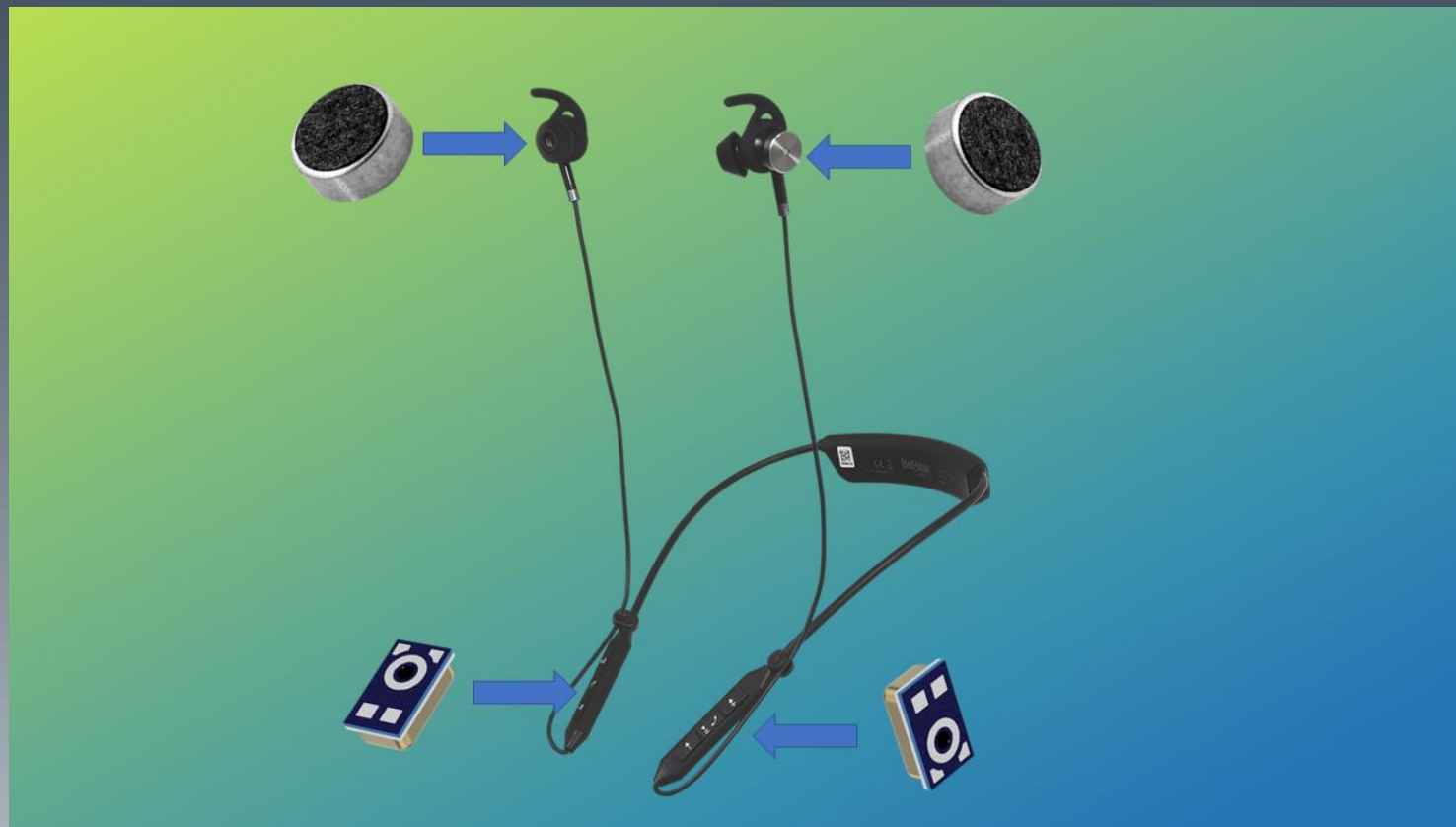
BeHear

Now



BeHear NOW is a stylish, comfortable, light-weight Bluetooth stereo headset with excellent sound quality that can be used to listen to music or make phone calls.

In addition, like hearing aids, it can be used to enhance the wearer's ambient hearing.



BeHear features four microphones:

- two ultra-low noise microphones in the earpieces, and
- two MEMS microphones in the control boxes.

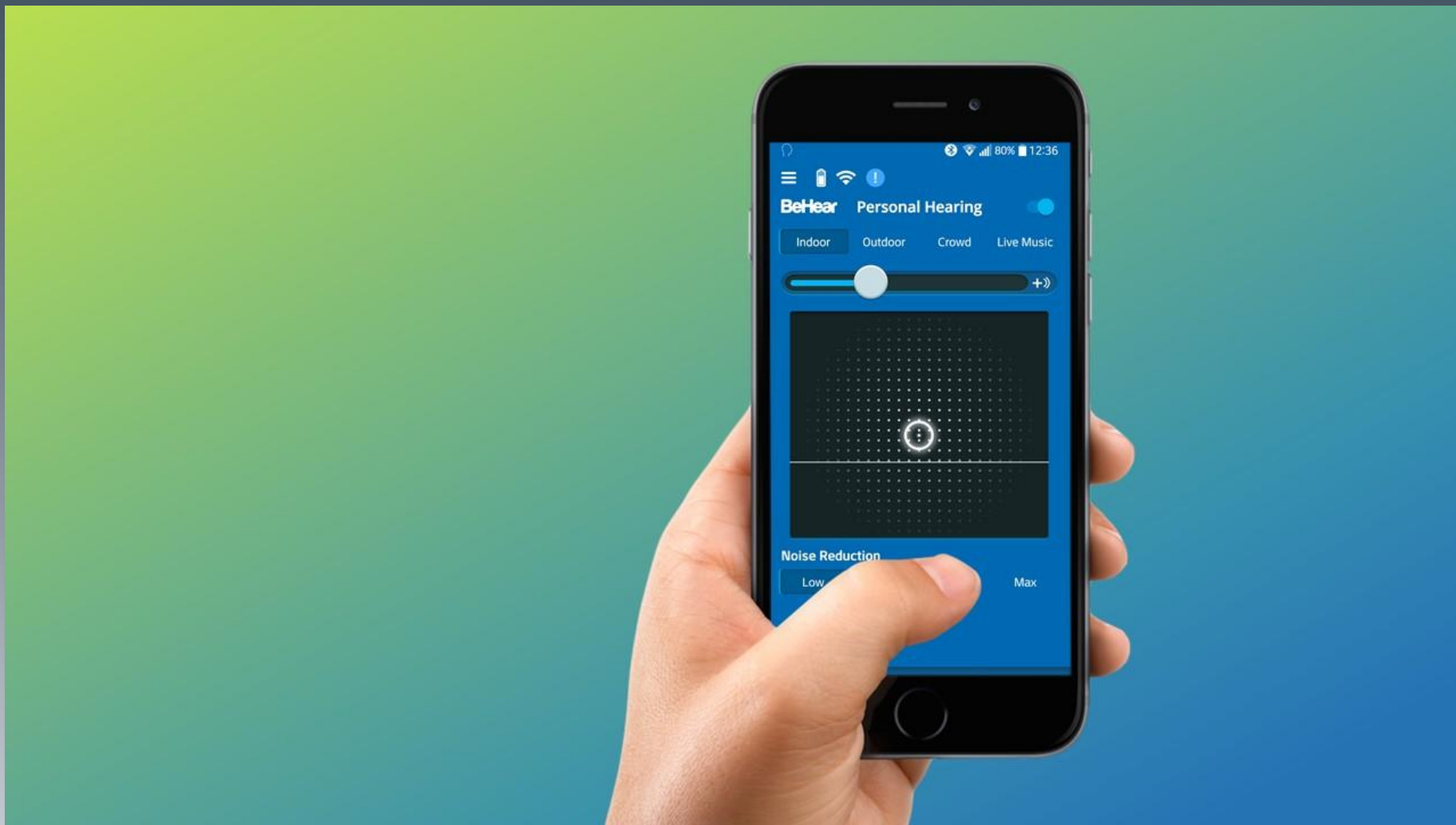
Using four microphones enables unprecedented sound quality for both ambient hearing and voice communication. It also allows complete acoustic feedback elimination.



BeHear also features two hi-fi speakers delivering the full-range of sound.

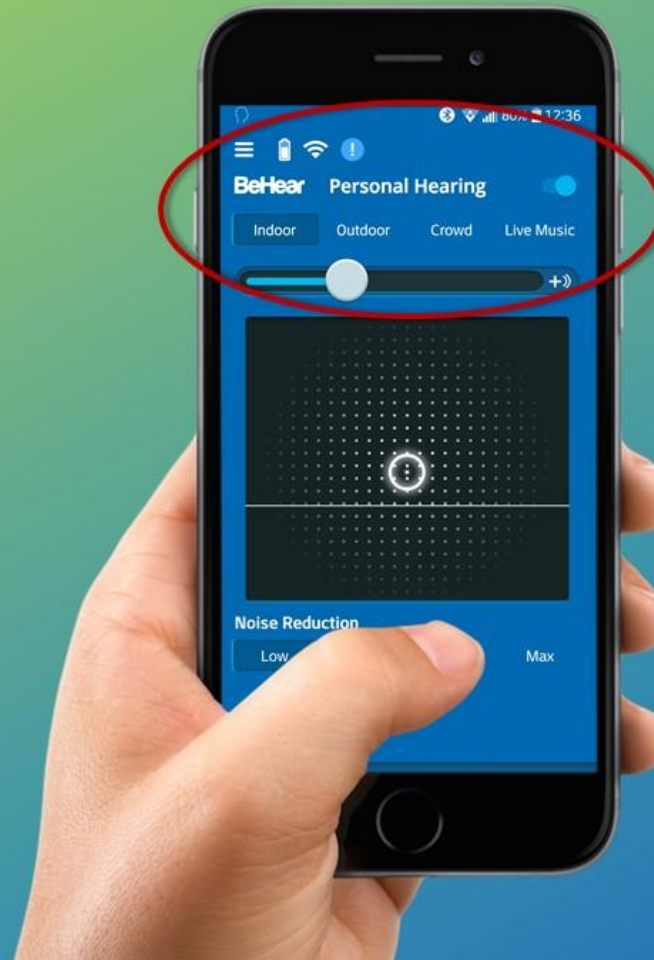
BeHear hearing enhancement, voice communication and music enhancement algorithms run on a powerful, 120MHz digital signal processor.

A large rechargeable battery enables continuous BeHear operation during an entire day.



BeHear can be used as a standalone hearing amplifier, but its most valuable features are found in its smartphone application.

Ambient Hearing Profile

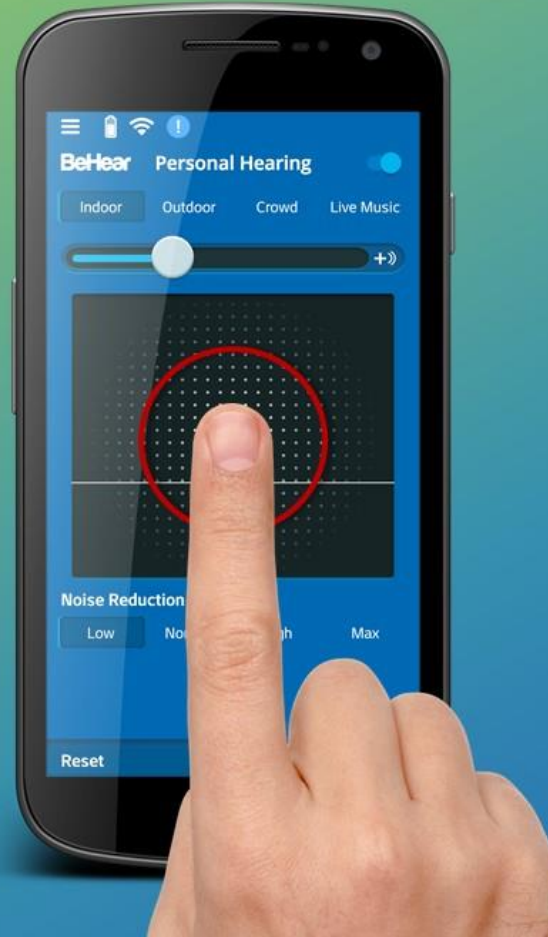


With the application the user can enable ambient hearing and choose the most suitable hearing profile, such as indoor, outdoor, crowd and even live music. Live music mode provides an extended frequency range and high fidelity sound.



Noise reduction settings can be adjusted from low to maximum, depending on the environment.

Best Sound Point

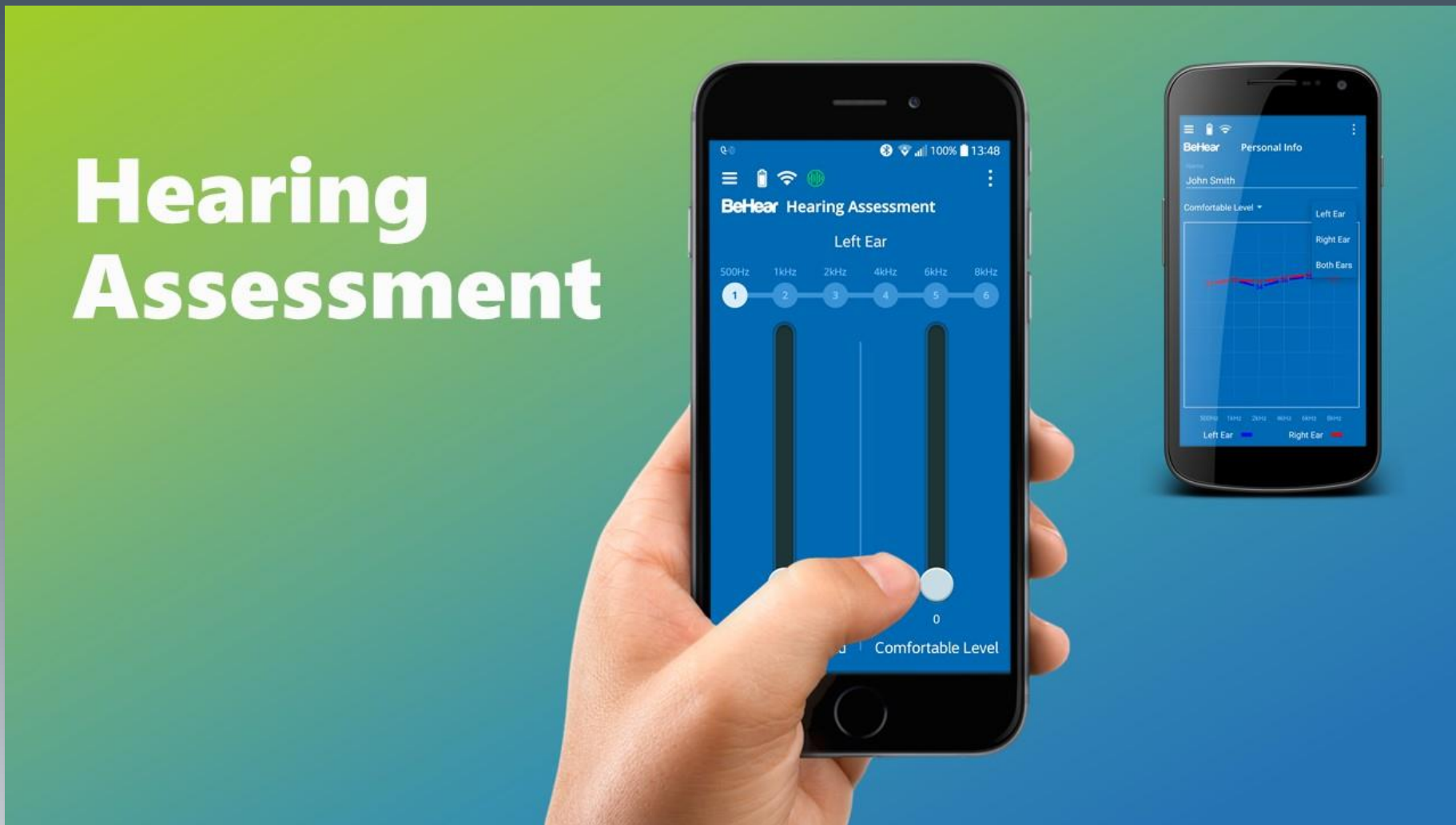


Hearing aids require professional fitting. Even if all the other problems are solved, there are, simply, not enough audiologists on earth to fit hearing aids for everyone, especially in rural, distant areas.

With BeHear, this is not an issue! Using a finger it is possible to modify the **sound heard in real time** by moving the white dot on the screen to find what we call the Best Sound Point.

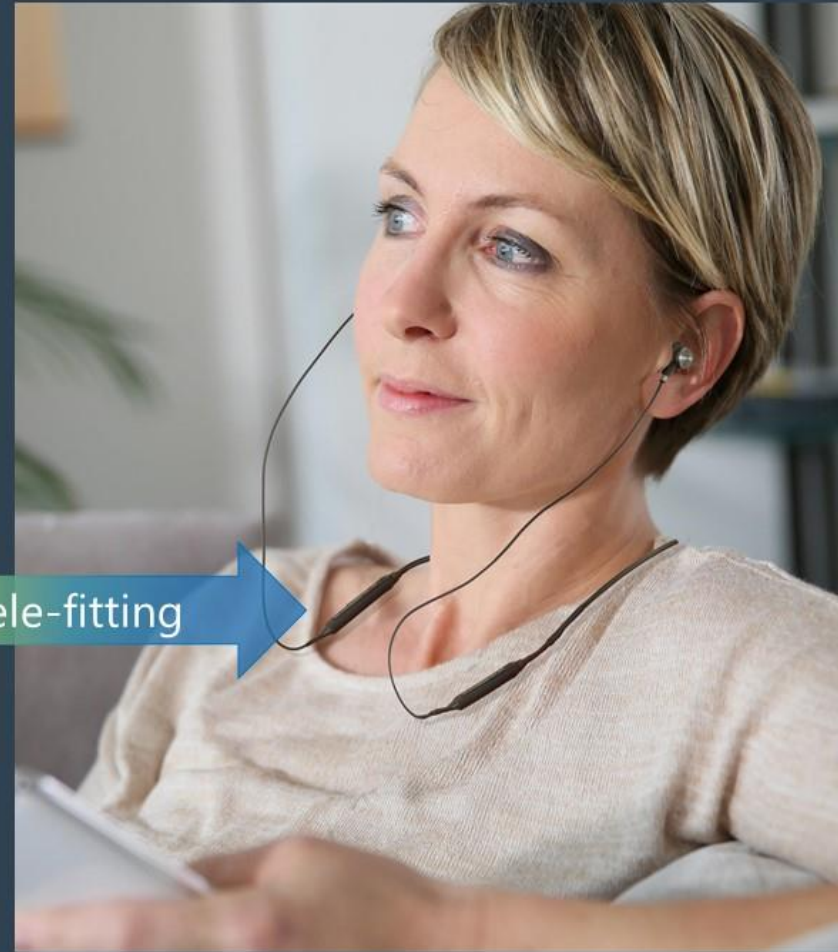
The Best Sound Point for the specific user!

Hearing Assessment



To go one step further, perform a simple hearing assessment test and get immediate results. When completed, all BeHear sounds will be modified to fit personal hearing preferences.

BeHear[®] NOW TeleAudiology SOON !



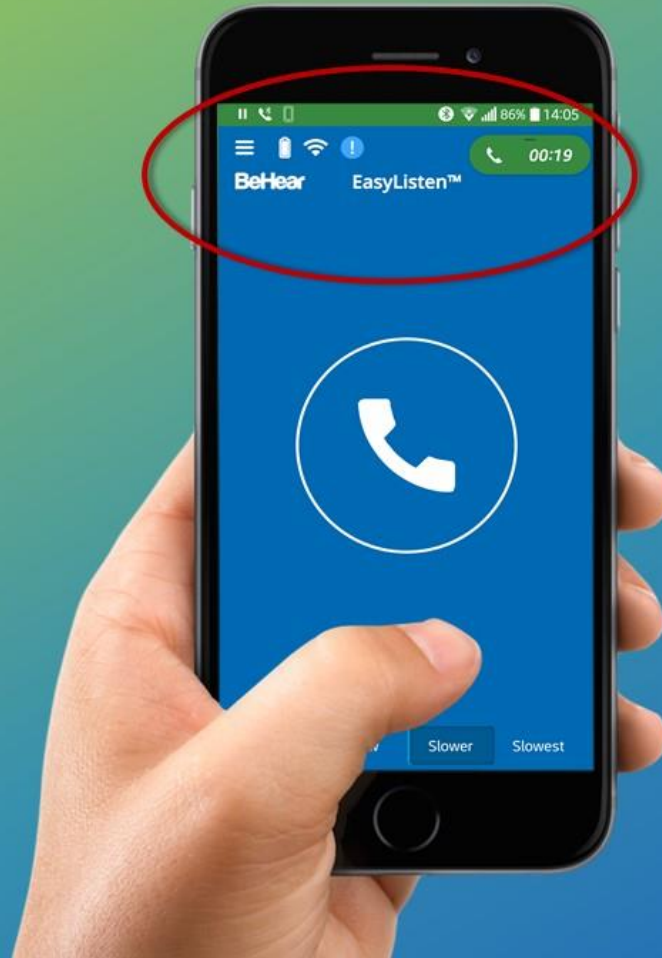
Tele-fitting

And, if for any reason a professional tuning is desired, it can be done without leaving home. Via a mobile phone, BeHear device can be controlled remotely by a professional, enabling a healthcare feature of the future known as tele-audiology.



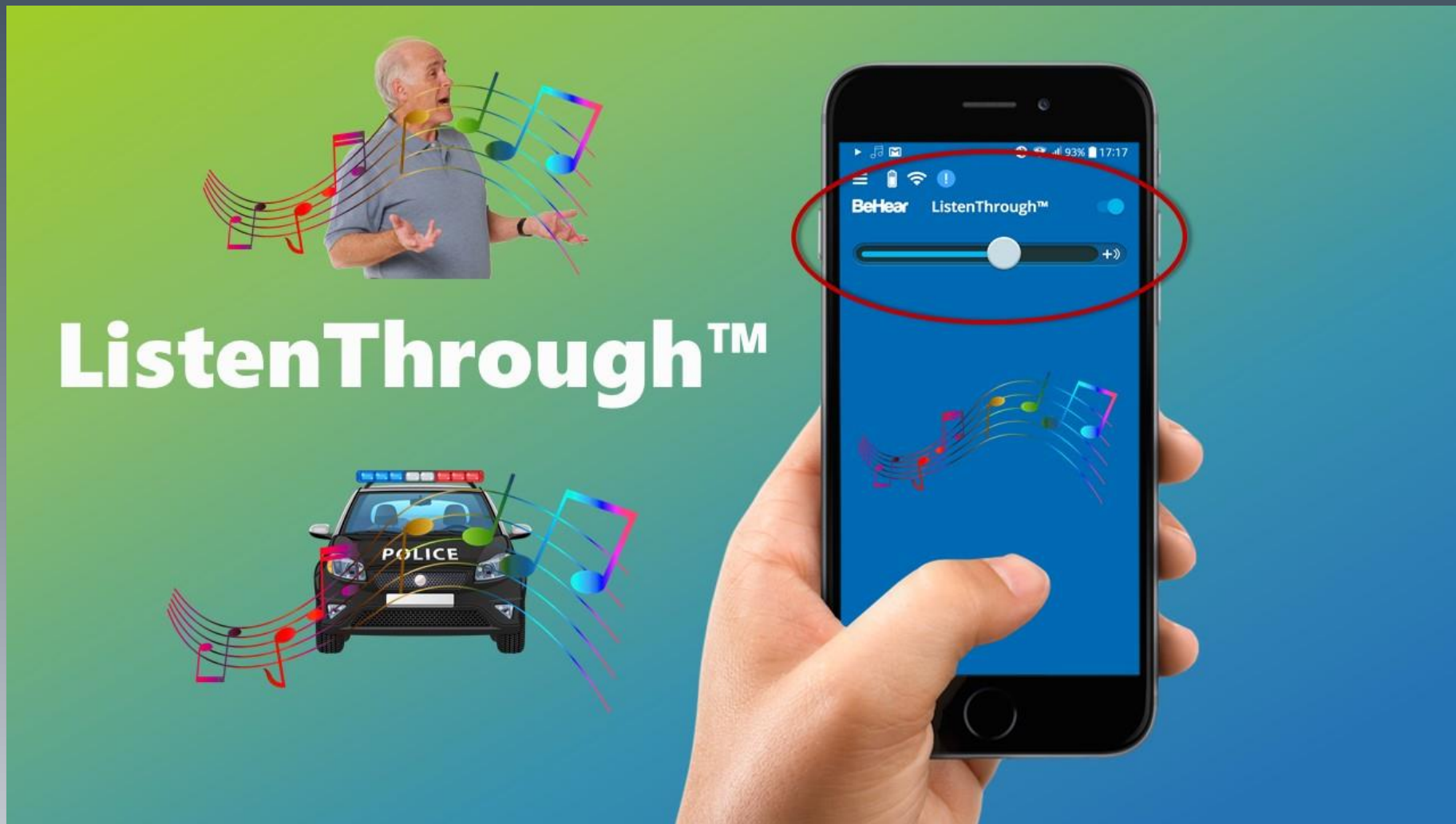
Advanced features in BeHear are useful for people with normal hearing as well. Many people experience difficulties understanding fast speech during a phone call. It happens, for example, when we need to copy down a phone number, or when hearing a foreign accent or language. With BeHear, there is a solution...

EasyListen™



During a phone call, EasyListen technology can be activated.

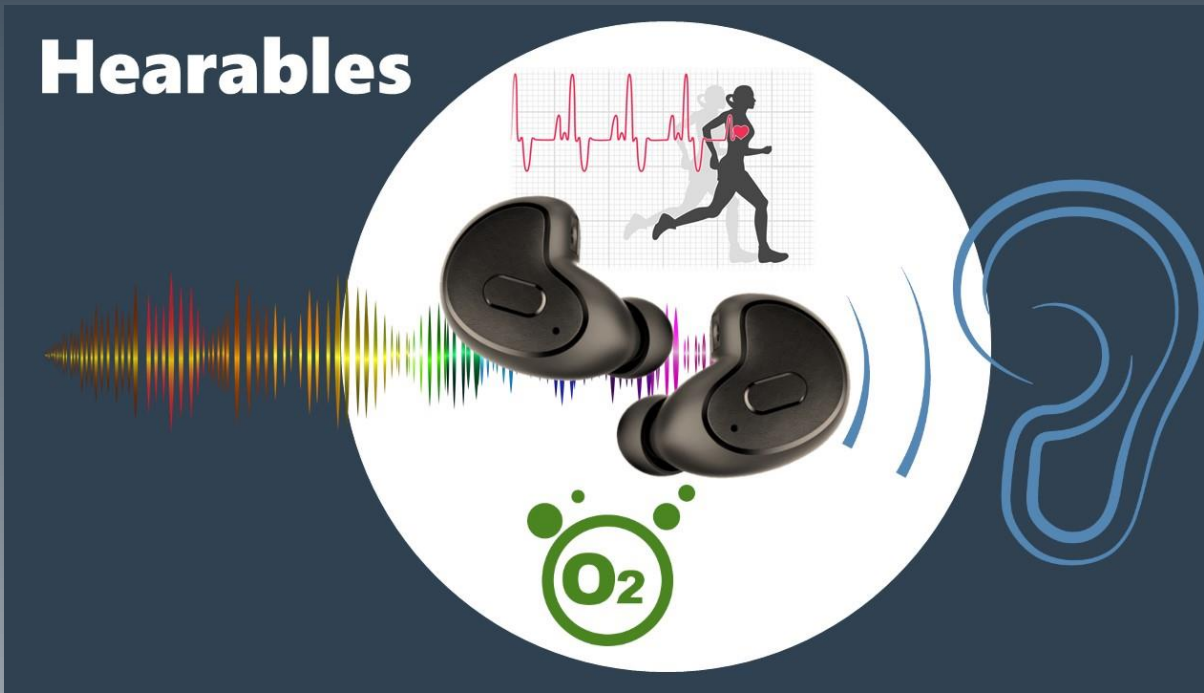
The incoming speech will be slowed down in real time, improving my comprehension as well as the ability to retain information.



All people become virtually deaf to ambient sound while listening to loud music. This is inconvenient and, sometimes, can even be dangerous.

For this, BeHear supports ListenThrough technology.

And suddenly, voices of people nearby, the sound of an approaching car, and other important or alarming sounds become audible, while ambient noises remain blocked.



BeHear belongs to an emerging class of devices that we call Hearables.

Hearables are smart wearable audio devices that do more than enable voice communication or music playback.

There are multiple health-related applications for Hearables. In the case of BeHear, it is hearing amplification. In other cases, it can be monitoring heart rate, blood pressure, oxygen level, and our physical activity.

I believe that we are living in an exciting time when the consumer electronics industry may provide affordable yet efficient solutions to many worldwide health and disability problems. Affecting more than 1.2 billion people, hearing loss is one of these major problems. It has recently been called the "silent epidemic". Hearables with hearing amplification may be a vaccine for it, but we are at the very beginning of the journey. The market still needs education so that people with hearing loss will know that there is an alternative to hearing aids.

And no single company can cover the diversity of the tasks and devices required by this huge number of potential users! Fortunately, we are not alone. The demand for Hearables with hearing amplification was realized by several companies.

BeHear
Now



NUHEARA



BOSE



BOSE with their Hearphones and several startups including NuHeara with their IQbuds are just two examples. We are competing, but, together we are also paving a new way in hearing healthcare. And a new way is always bumpy. I don't know how they see us, but I don't see them as competitors. I see them as fellow travelers on the same path.



*"Alone we can do so little;
Together we can do so much"*

Helen Keller

I would like to finish with another famous quote from Helen Keller.



Thank you

We are looking for partners.

Let's make this world sound good to all of us.

Thank you!

www.alango.com

www.WearAndHear.com