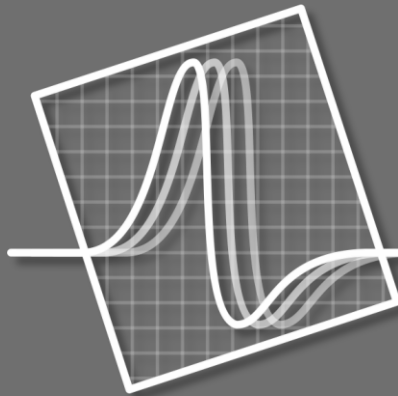




# HearPhones

hearing enhancement solution  
for modern life

*As simple as wearing glasses*



## A L A N G O

Technologies and solutions

*Revision 3.1  
October 2015*

# HearPhones – glasses for hearing impaired



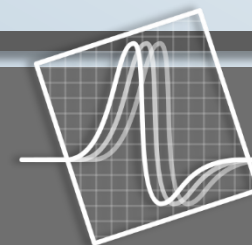
What differs life of people with poor eyesight from people with poor hearing?

First of all, people with poor eyesight do not consider themselves handicapped. Today poor eyesight is a small inconvenience that is simple to correct. Poor hearing is still considered a disability which a person feels both physically and emotionally. Can we try to correct it? Can we try to return hard of hearing people the feeling of self-confidence, the feeling of being healthy, the feeling of being unlimited in their personal, social and business life? Can we reuse the previous human experience with glasses that once were also treated as an attribute of elderly people and now has almost become a fashion item?

To find, fit and buy glasses in modern society is easy. There are plenty of optical stores where your vision is tested, lenses and frames are chosen and glasses are quickly made. Prices according on your wallet, design according to your taste...

The experience of hard of hearing people is completely different. Acquiring hearing aids is a complicated and expensive procedure. Visiting audiologist several times with a lengthy fitting procedure, very high prices and no guarantee of end result – all this “encourages” people to hide their problems from others and, most important, from themselves.

We believe that future belongs to hearing enhancing devices that are as easy to choose, personalize and buy as ordinary glasses. These devices shall provide a solution to millions of hard of hearing people around the world. We want to make it happen and our first step is a reference design for a group of hearing enhancement devices that are modern looking, simple in fitting and personalization and attractive in price. One can call them “sound glasses”, but we call them “HearPhones”.



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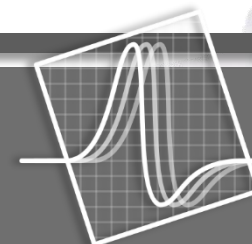
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# What's wrong with hearing aids?

Only 15-20 percent of hearing impaired people in developed countries use hearing aids. We see at least three serious reasons for it:

1. Hearing aid is a medical device
  - Associated with elderly or handicapped people
  - 15 million (approximately half) people in US with hearing loss avoid seeking help
2. High cost due to marketing & distribution
  - Top-of-the-line devices hearing aids are sold by audiologists for \$3000-\$5000 (per device)
  - Manufacturers spend: \$75 on R&D + \$250 on manufacturing + \$250(!) on marketing = **\$575**
3. Technology (satisfaction is not guaranteed)
  - ~20% of people who bought hearing aids return them
  - From those who keep them, ~7% keep them in the drawer,
  - From those who use them, ~17% are dissatisfied
  - Almost all prefer old analog hearing aids over digital ones for listening music

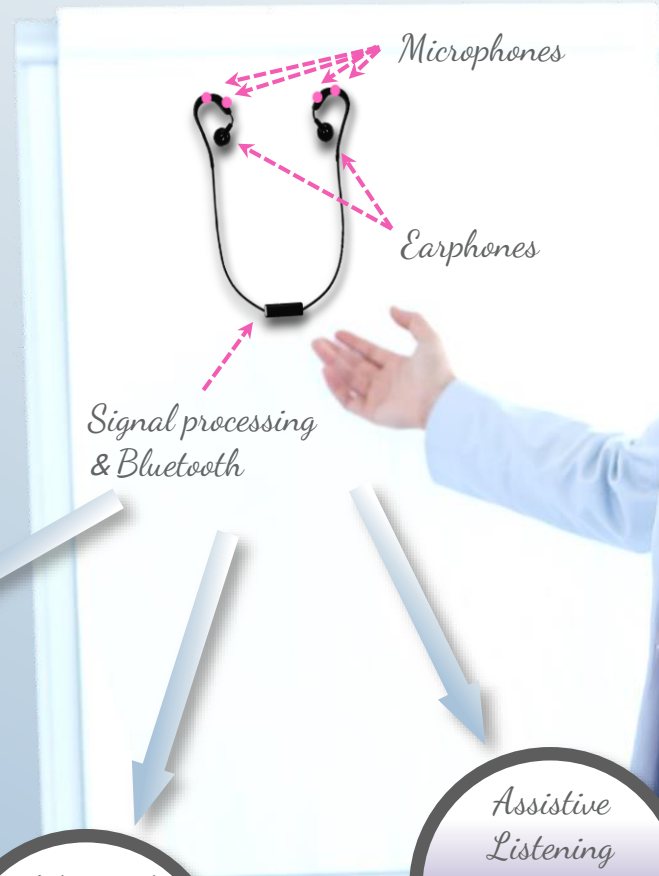
*Do you want to buy a device that is expensive, makes you look handicapped and, most probably, will not satisfy you?*



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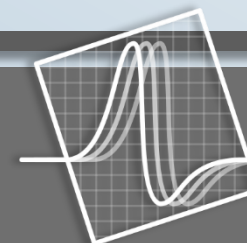
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# HearPhones – smart hearing solution



**HearPhones:** revolutionary consumer electronics device with hearing enhancement and assistive listening capabilities.

HearPhones are really 3 in 1: a unique combination of Personal Hearing Enhancer (PHE), Assistive Listening Device (ALD) and advanced Bluetooth Headset (BH).



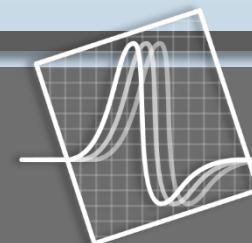
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# HearPhones vs. hearing aids



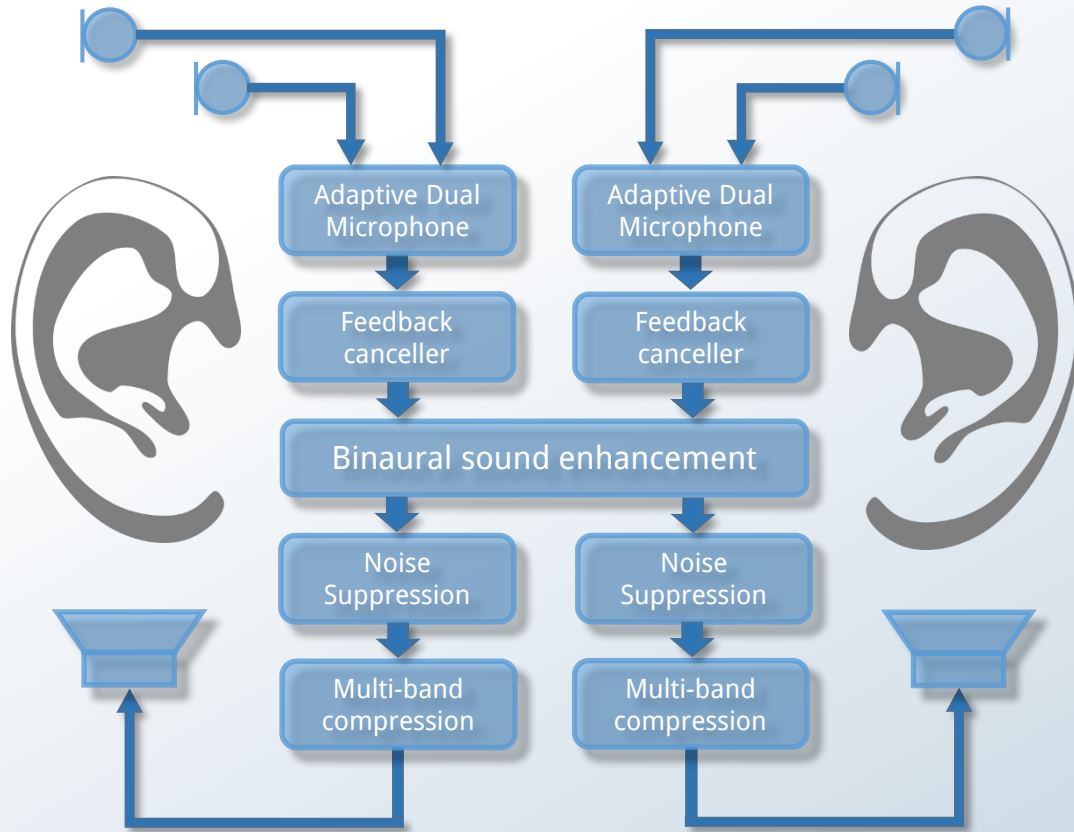
Traditional hearing aid	Score		HearPhones™
Medical Device with handicapped look and limited functionality (hearing enhancement only)	0	1	Consumer Electronics (CE) device looking and functioning as a modern communication and entertainment device with hearing enhancement functionality
High cost (\$2000-\$3000) due to expensive components, large marketing expenses & huge distribution markup	0	1	Low cost (<\$150) due to CE components, distribution via Internet, consumer electronics or other low cost channels
Limited sound quality due to insufficient computational power to run sophisticated DSP technologies	0	1	Uncompromised sound quality due to large computational resources allowing to utilize the best DSP technologies
No assistive listening capabilities without additional devices	0	1	Assistive listening capabilities built into devices: Bluetooth headset, direct connection to remote microphone or TV listening system, intercom between HearPhones users
Personalization requires professional help, cannot be done in real conditions	0	1	Simple and intuitive personalization from a mobile phone applications, can be done in real conditions by the user



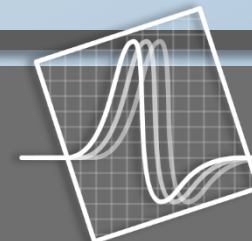
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# HearPhones as Personal Hearing Enhancer



- HearPhones work as a hearing enhancer with the most powerful digital sound enhancement capabilities. HearPhones digital signal processor is 5-10 times faster than processors used in most digital hearing aids.
- HearPhones perform all digital signal processing tasks necessary to enhance human hearing with frequency resolution of 30Hz, far exceeding frequency resolution of modern hearing aids.
- HearPhones perform true binaural signal processing with 4 microphone beamforming and sound enhancement utilizing acoustic properties of human head.
- HearPhones hearing enhancement technology allows full, binaural sound personalization according to user specific hearing and preferences in various usage conditions.



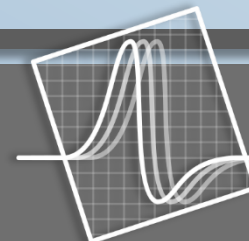
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# HearPhones: hearing personalization



- Choose one of the standard hearing enhancement “presets” with a smartphone application  
or
- Measure your own hearing profile with your own HearPhones and use a recommended preset
- Modify a standard or recommended preset by moving your finger to adjust volume, noise reduction, dynamic range compression and other digital sound enhancement parameters.
- Chose the best settings for the left and right ears separately
- Optionally create your custom presets for various use cases (home, office, meeting, street, etc.)  
and
- Enjoy the best, personalized for you sound
- Don’t worry to lose your personal setting with HearPhones, backup your favorite presets on your mobile device or PC

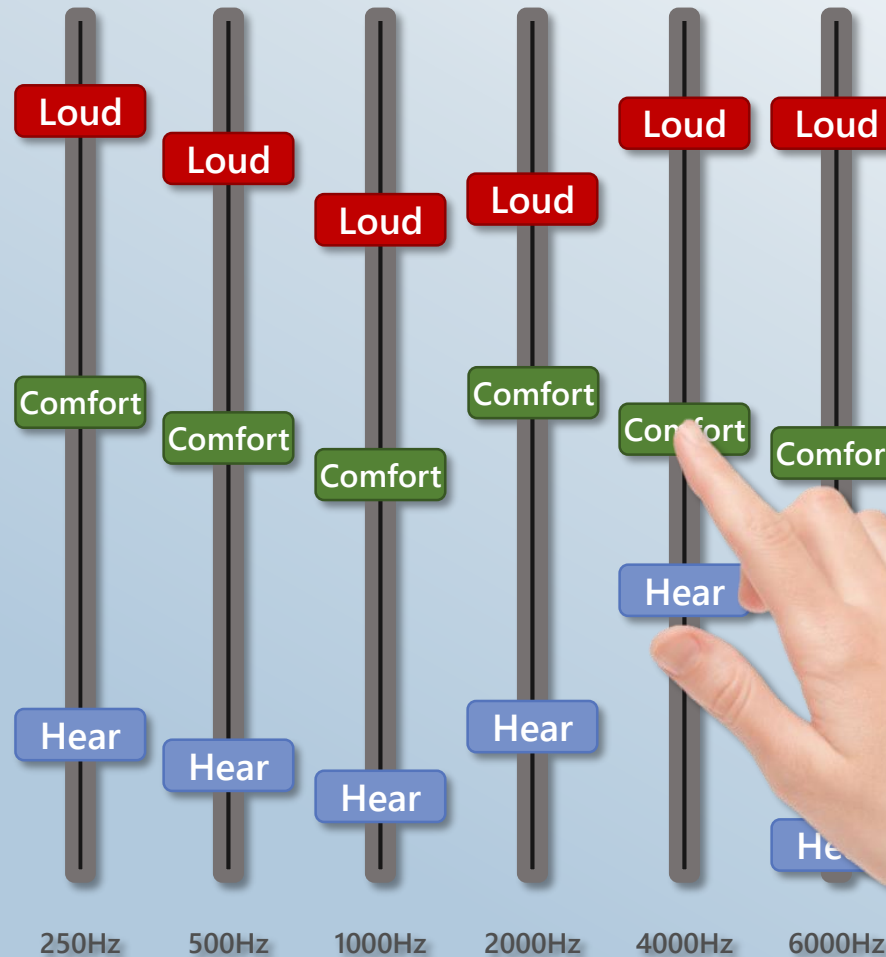


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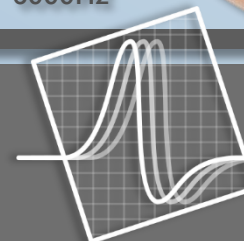
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# HearPhones: defining your hearing profile

- **Red Slider** – Discomfort level  
(till sound becomes unpleasant above it)
- **Green Slider** – Comfort level  
(most pleasant and clear sound around this point)
- **Blue Slider** – Hearing threshold  
(till you become hearing tones)



For each frequency bar, touch and move sliders from bottom to top to define discomfort, comfort and hearing threshold levels.



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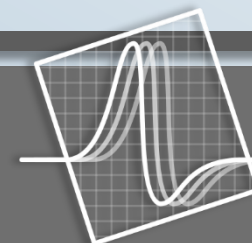
# HearPhones as Assistive Listening Device



HearPhones do not only enhance natural hearing, they allow extending human capabilities in situations where even people with normal hearing often experience difficulties.

HearPhones function as:

1. **Wireless intercom**  
Communicate directly with another HearPhones user within up to 20 meters distance
2. **Remote microphone**  
Receive direct voice of another person without ambient noises and annoying room reverberation
3. **TV listening system**  
Listen for your favorite TV program without disturbing others



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# HearPhones as an advanced Bluetooth voice headset



## 1. Advanced noise cancellation

- Unique binaural 2x2 microphone beamforming (Binaural case)
- Best in class 2 microphone beamforming (Monaural case)

## 2. Personalized far-end voice according to:

- User phone (each phone sounds different)
- User hearing (user hearing parameters will be taken from the hearing enhancer)
- User preferences (user may correct sound enhancement for the best phone call intelligibility)

## 3. Automatic, noise dependent volume & equalization control

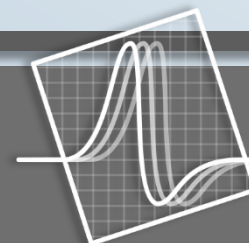
The other person voice is additionally amplified and modified to ensure maximal intelligibility in varying noisy conditions.

## 4. EasyListen™ (requires activation)

After activation, slows down the incoming, far end speech for better understanding of foreign languages or fast talkers.

## 4. HearAgain™ (optional, requires additional hardware)

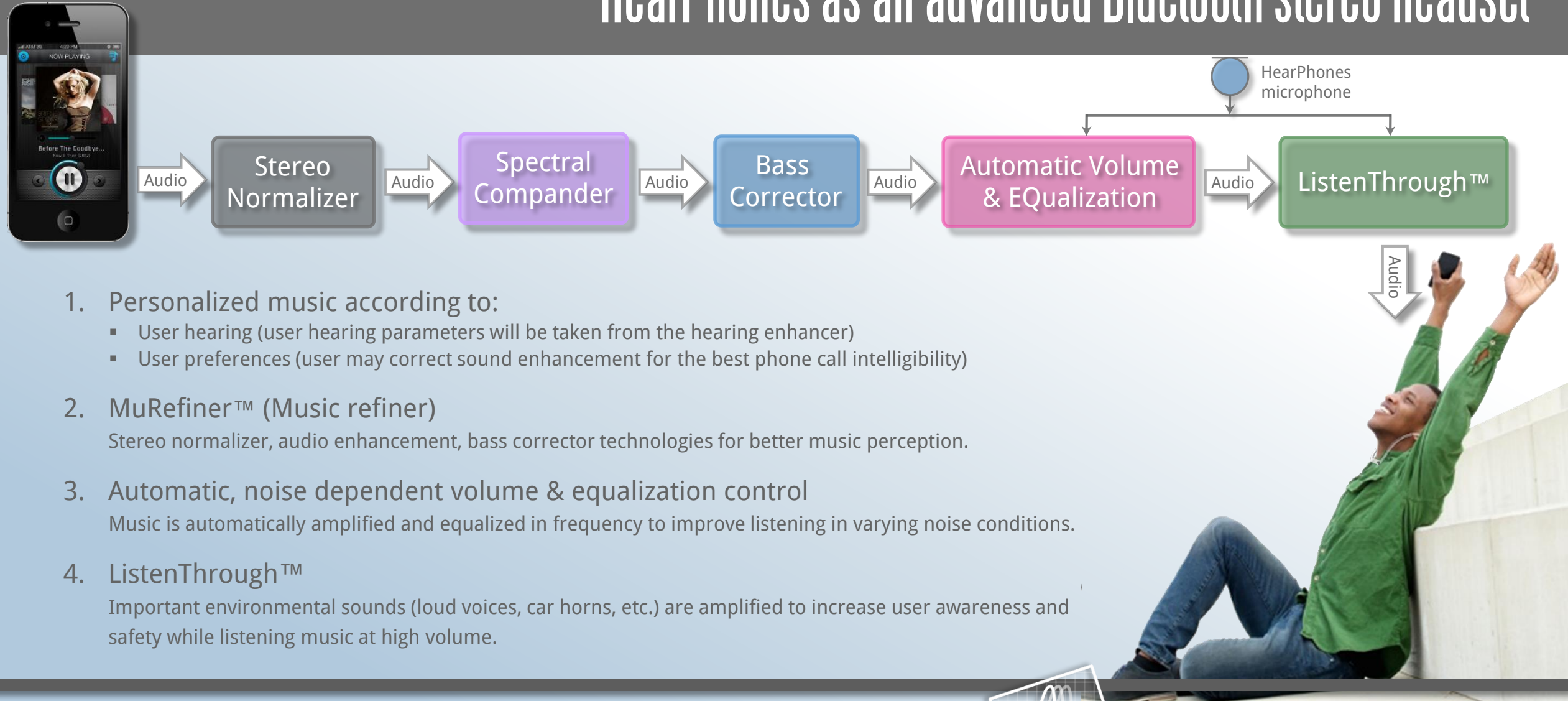
After pressing a button, repeats the last 10 seconds of sound again in case the user missed something important.



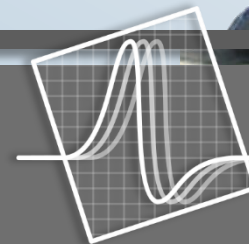
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# HearPhones as an advanced Bluetooth stereo headset



1. Personalized music according to:
  - User hearing (user hearing parameters will be taken from the hearing enhancer)
  - User preferences (user may correct sound enhancement for the best phone call intelligibility)
2. MuRefiner™ (Music refiner)  
Stereo normalizer, audio enhancement, bass corrector technologies for better music perception.
3. Automatic, noise dependent volume & equalization control  
Music is automatically amplified and equalized in frequency to improve listening in varying noise conditions.
4. ListenThrough™  
Important environmental sounds (loud voices, car horns, etc.) are amplified to increase user awareness and safety while listening music at high volume.



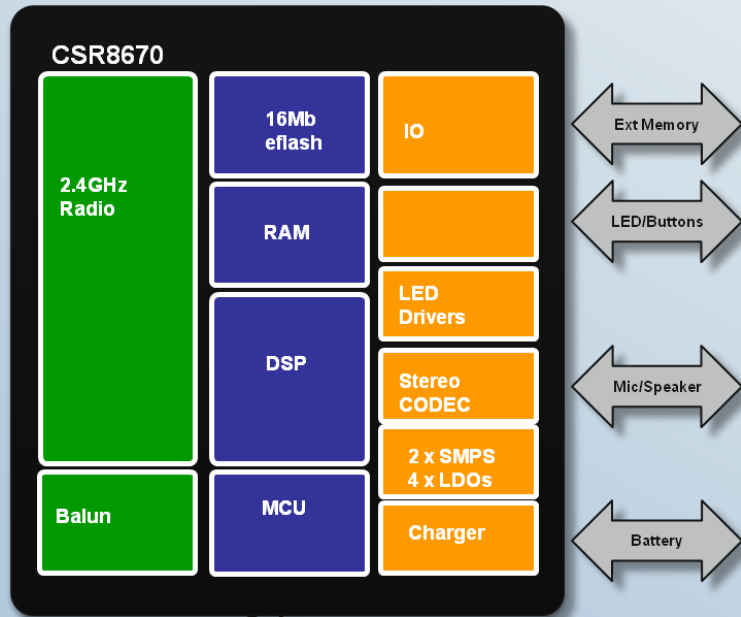
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# HearPhones: What we offer

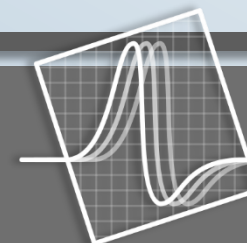
Make your own HearPhones product with our help.

We license software reference design based on CSR 8670 Bluetooth System On Chip.



You will receive:

- Digital signal processing libraries for all modes: hearing enhancement, phone call, assistive listening
- Example source code for CSR 8670 MCU demonstrating all functionality
- Software configuration tools
- Hearing API (HAPI) libraries for Android, iOS and Windows allowing to build custom applications to control HearPhones
- Example applications for Android, iOS and Windows illustrating Hearing API libraries



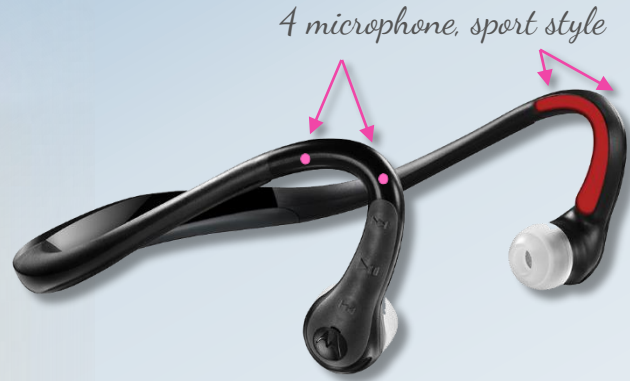
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# HearPhones: How your product may look like



*4 microphone, binaural,  
Alango style*



*4 microphone, sport style*



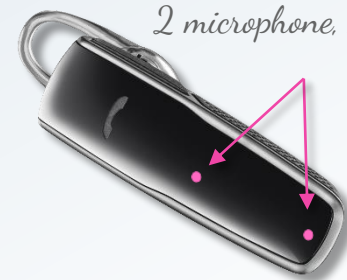
*2 microphone, binaural stylish*



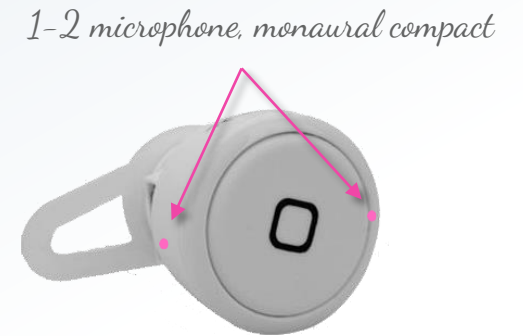
*2 microphone, binaural stylish*



*4 microphone, sport style*

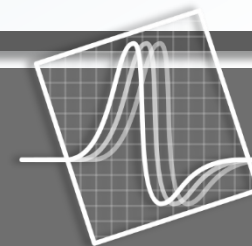


*2 microphone, monaural*



*1-2 microphone, monaural compact*

 The pictures above are for the concept illustration only. Currently non of this products has HearPhones functionality

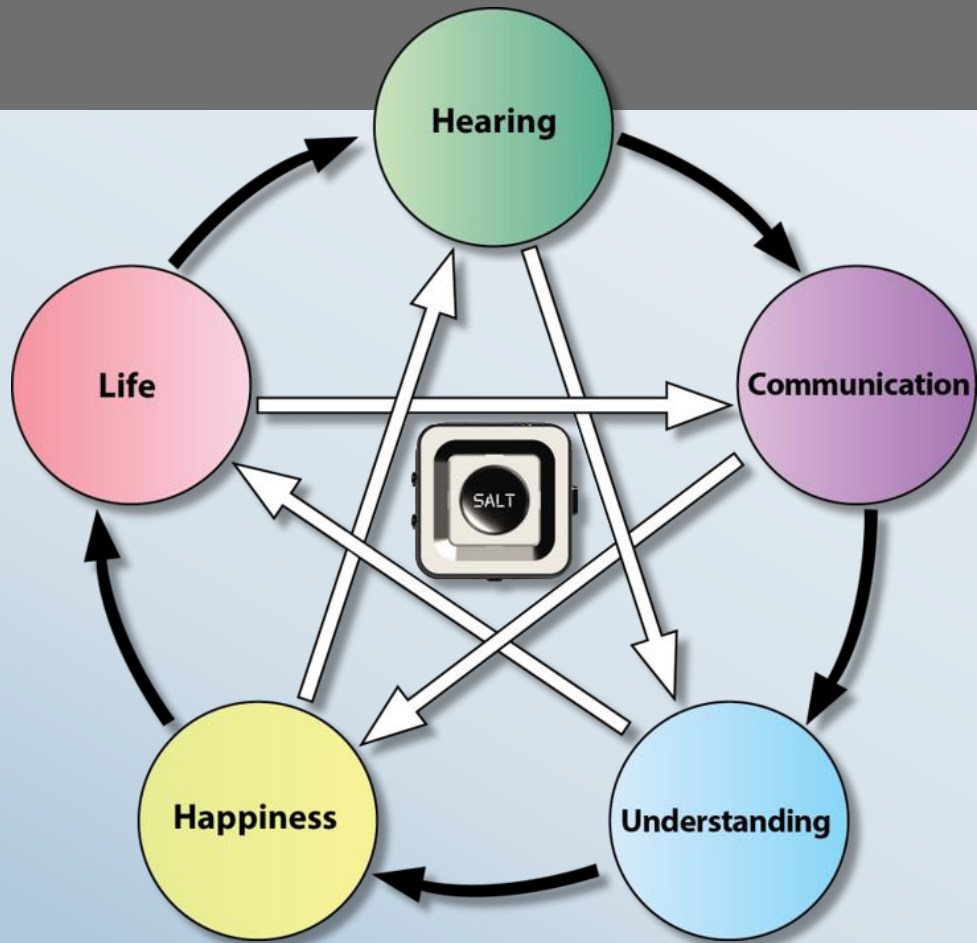


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# The TAO of hearing



*Hearing pentagram – hearing connection to life*

## Generative Cycle

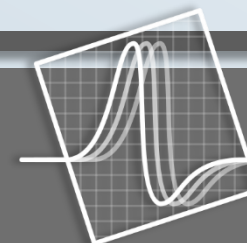
Hearing enables Communication,  
Communication facilitates Understanding,  
Understanding elevates Happiness,  
Happiness nourishes Life,  
Life gives birth to Hearing...

## Controlling Cycle

Hearing heads Understanding  
Understanding moves Life  
Life controls Communication  
Communication shapes Happiness  
Happiness sharpens Hearing

## Destructive Cycle

Without Life there is no Happiness...  
Without Happiness there is no Understanding...  
Without Understanding there is no Communication...  
Without Communication there is no Hearing...  
Without Hearing there is no Life...



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# HearPhones: contact information



Don't hesitate to contact us if you want to be our customer or just have any comments. We are looking forward hearing from you!

Please, send your questions, comments, thoughts, proposals to [info-il@alango.com](mailto:info-il@alango.com) or specifically

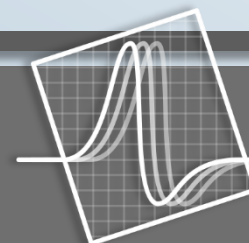
Tatiana Borovikov (Product enquiries): [hearphones@alango.com](mailto:hearphones@alango.com)  
Alex Radzishovsky (Technical enquiries): [tech-il@alango.com](mailto:tech-il@alango.com)  
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