

Augmented Hearing

We combine modern audio engineering with personalized hearing technology

Real-time audio processing that balances, enhances, and personalizes sound to bring comfort and correct for hearing loss.

The hearing technology industry is antiquated and leaves millions underserved.

- **Extremely expensive** — often costing thousands of dollars
- **Technically outdated** compared to modern digital audio processing
- **Difficult** for many users to operate and maintain
- **Dependent on short-life batteries** and fragile hardware
- Poor at handling feedback, loudness, and real-world sound dynamics

Modern audio technology has advanced rapidly — hearing technology has not.

Traditional Hearing Aids

- Expensive
- Outdated DSP
- Dangerous feedback and no volume limiting
- Rudimentary EQ
- Difficult to use
- Battery dependent
- Hardware-dependent

Modern Audio Processing

- Affordable
- Cutting-edge frequency processing
- Multiband dynamic range compression
- Volume limiting
- Feedback cancellation
- Intelligent noise reduction
- High-resolution EQ

My 101 year old grandfather is in a pretty good shape for his age, but he's experiencing hearing loss. The hearing aids he was prescribed would cost \$8000 in Canada today, and they don't serve his needs.

He can't operate them himself, the feedback screeches unbearable noise into his ears, and the only way to turn them off and on is to take out the batteries.. And the batteries don't last long.

So we gave him an old field recorder microphone with wired earbuds, a piece of professional audio equipment which costs under €100. We turned on dynamic range compression and volume limiting. His hearing improved immediately, and most of the time the setup can be turned on with a flick of a switch. Even these basic DSP effects improved upon the medical state of the art.

We realised how badly the hearing technology space needs reform, and that modern audio knowledge has long outpaced it. With Brett's cutting-edge audio expertise, and our shared programming knowledge and a commitment to accessibility and open-source values, we are in a unique position to do this. That was the origin of this project.

- Eva

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The Roadmap



Current Goal:

A TINY SOUND ENGINEER LIVING INSIDE YOUR COMPUTER

**balancing volume levels and correcting for your hearing profile system-wide,
starting with 1 billion Windows devices worldwide**

- System-wide audio processing
- Cutting-edge DSP chain
- Audiogram interface for hearing profile personalization

This roadmap allows us to deliver great sound to more and more people at every stage, while adapting our cutting-edge audio processing to new devices and platforms. This allows us to release products on platforms where we have fewer blockers, while developing solutions for others.

The next stage is to create lightweight middleware that acts like a tiny sound engineer inside your PC, improving sound and correcting for hearing loss in all your remote work and entertainment media experience.

Software-first approach

- No limits due to processing power of small devices
- Faster innovation cycles
- Continuous improvement through updates

Modern audio expertise

- Professional DSP techniques used in music production
- Cutting-edge frequency processing, multiband dynamic range compression, intelligent noise and feedback reduction system-wide
- Technology already proven in high-end audio

Personalized hearing optimization

- Sound customized to each user's hearing profile
- Audiogram-based EQ adaptation
- Accessible and easy to use

Massive distribution potential

- Runs on existing computers and devices
- Scales through software instead of hardware manufacturing

How it is VS how it can be

Typical computer audio experience

- Volume constantly changing between apps
- Speech often unclear in meetings and videos
- Music, dialogue, and effects poorly balanced
- No personalization for hearing ability
- Users constantly adjusting volume and settings

Frustrating and inconsistent listening experience

With a tiny sound engineer inside your computer

- Automatic leveling between apps and media
- Clearer speech in calls, videos, and podcasts
- Balanced sound through dynamic compression, no more movies where dialogue is too quiet and explosions too loud
- EQ customized to your hearing profile
- Audio automatically optimized in real time

Clear, consistent, personalized sound everywhere

Basic DSP tools used in professional audio – dynamic range compression, level control, and limiting – can dramatically improve hearing clarity.

Before



[M-1](#)



[F-1](#)

After



[M-2](#)



[F-2](#)

The hearing industry is ripe for disruption by software-first and open hardware audio technology.

Hearing technology is a massive market stuck in an outdated model.

Over 1.5 billion people worldwide experience some degree of hearing loss.

Yet the industry remains dominated by a small number of legacy manufacturers selling expensive hardware through a medical distribution model.

- Hearing aids often cost \$3,000–\$16,000 per pair
- Devices rely on hardware-centric designs
- Technology cycles are slow and proprietary
- Access requires clinical appointments and fitting
- Millions who could benefit from hearing assistance never get it
- Meanwhile, modern software and digital signal processing can deliver far better sound at a fraction of the cost.
- Hearing technology is ready to move to accessible, open-source hardware and intelligent software.

Business Model

Potential monetization paths:

- Premium desktop software subscription or one-time pro license
- Licensing with hardware manufacturers who want to compete with AirPods Pro
- Licensing DSP technology to platforms
- Accessibility and hearing enhancement market

Huge market:

- The hearing aid industry is worth and estimated USD 9.8 billion, but millions more people are in need of hearing technology due to its prohibitive pricing and poor quality solutions.
- There are over a billion Windows PCs worldwide, and a PC solution would improve the experience of remote work, entertainment media and online interactions.
- Why hasn't anyone solved this problem yet?

TEAM



Brett Alexander Preston is a cutting-edge audio software engineer, and his expertise of audio techniques is the foundation of this project. He's made multiple audio tools that bring comfort, accessibility and privacy to our relationship with sound, and these tools have received grants from the NLnet Foundation and Wau Holland Stiftung.

He is also a music producer, sound designer, composer, and has been an audio director in VR gaming. This means he's an expert on positional audio and volume compression, in multiple settings and platforms, and has many more skills relevant to this project.

<https://brettpreston.github.io>

<https://zaga.music>

https://github.com/brettpreston/Rustic_Audio



Dr Eva Infeld is a mathematician, coder, and researcher. She has delivered successful grants in the realm of open source software with multiple funders, including the NLnet Foundation and Wau Holland Stiftung, leading remote teams to success while delivering bleeding edge technology.

After a PhD in mathematics, and fellowships at some of the world's leading universities, she went from academia to working on privacy software, and has been a part of the Free and Open Source Software community for over a decade, pushing the development of cryptographic tools and finding exploits in widely used protocols.

<https://evainfeld.github.io/>

What we are raising and why

Current goal: polished, easy to use system-wide PC middleware

Developed efficiently by experienced coders and UX/UI experts in 250-400 hours.

Key hires: Bartosz Owczarek (**Software Engineer**), Marta Marczykowska-Górecka (**UX/UI expert**)

Next stage: hardware hearing aid device

Hardware engineering and design

Prototyping

Testing

Distribution

We have a manufacturing pipeline arranged in Shanghai, with experience in high-end audio devices, and complete with in-house engineers who can adapt a design and specifications. We have also established contact with hardware engineers with interest in analog signal processing and researchers at the Warsaw Hearing Centre.

APPENDIX I: A COMPARISON OF SELECTED HEARING AID/ENHANCEMENT TECHNOLOGY

| | Type | Price | Ease of use | Open source | Audiogram interface | Volume limiter | Noise reduction | Feedback cancellation |
|--|----------------------------------|--|--|-------------|----------------------------|----------------|----------------------|--------------------------|
| JLab HEAR OTC | Budget off-market hearing aid | Under €100, doctors don't prescribe it | Seniors may need assistance | No | No | No | No | No |
| Sony CRE-C20 ¹ | "Budget" medical hearing aid | €900 | Seniors may need assistance | No | Yes (reviews are critical) | Some | Some | Some/bad |
| Horizon Go IX ¹ | High-end medical hearing aid | €3000-€5000 | Seniors may need assistance | No | Doctor's appointment | Yes | Yes | Yes |
| Hearing Clear ² | Commercial app, #1 in Play Store | \$14,99/month +ads | Seniors need assistance | No | No | No | Not very good | No |
| Apple AirPods Pro 2 Hearing Aid | Corporate feature | Included with AirPods Pro 2 (€279) | Pretty good | No | Yes | Yes | Yes | Some |
| Hearing Aid App for Android ² | Commercial app | \$22/week | Seniors need assistance | No | No | No | No | No |
| Augmented Hearing | Danish startup | Unreleased yet | Unreleased | No | No | Yes | Yes (neural network) | Yes |
| Tympan | Open hardware | €700 hardware | Requires coding | Yes | No (requires an upload) | Programmable | Programmable | Programmable (very good) |
| OpenMHA | Academic project | Off-the-shelf hardware | Requires coding and hardware expertise | Yes | No | Yes | Yes | Yes |

OPEN SOURCE EFFORTS

Tympan¹ is the best developed Open Source hearing project. It has impressive features. However, it highlights some ways in which we should do better. The customised Tympan Teensy processing unit is priced at a disappointing €300.00, with earpieces for €400.00. The set up requires programming knowledge.² One needs to upload one's hearing profile, obtained in some other way. We aim to create a solution that works with an easily available off-the-shelf processing unit, earbuds and mic for under €150.00 total.

OpenMHA³ is an impressive academic project which has many DSP effects implemented and a lot of useful code, that can be used with off-the-shelf hardware. There is much room for improvement in accessibility, as it is also aimed at highly technical audience, researchers, and industry professionals.

Crescendo⁴ is focused on musical frequency correction, spectral gain compression and psychoacoustics. Its functionality can be performed by any music production spectral compressor software.

¹ <https://www.hearingtracker.com/hearing-aids/compare>

² Android Apps seem to all have high latency, and all they seem to do reliably is a volume boost.

¹<https://tympan.org> <https://forum.tympan.org/>
²<https://github.com/Tympan/Docs/wiki/Getting-Started-with-Tympan-Rev-E>
³<https://www.openmha.org/>
⁴<https://github.com/dbmclain/Crescendo-Hearing-Correction>