LikeToHear

Self-Adjustment of Open Source Mobile Hearing Aid Prototype

Peggy Sylopp, Computer Scientist, M. Public Policy, Media Artist

LikeToHear

Self-Adjustment of Open Source Mobile Hearing Aid Prototype

Photo: Peggy Sylopp, CC BY-NC-SA

- Open Source Hearing Aid Prototype
- Developed for the citizen science Project “Hear How you Like To Hear” (2017-2020)
- Fraunhofer IDMT Oldenburg
- https://www.idmt.fraunhofer.de/en/institute/projects-products/projects/liketohear.html

Supported by
Contract number 01BF1708

Liketohear

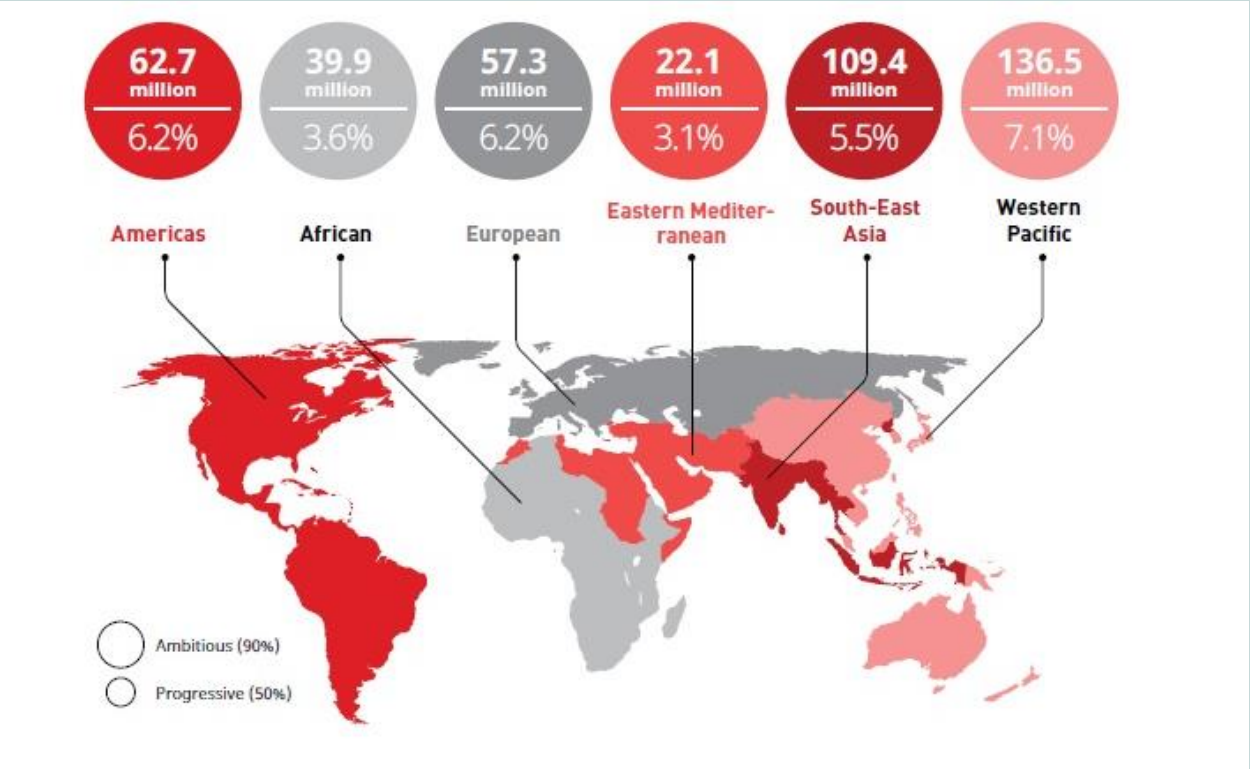
Like_to_hear

Globally 1,5 Billion people live with hearing loss

World Report on
Hearing, WHO, 2021

Prevalence of Hearing Loss

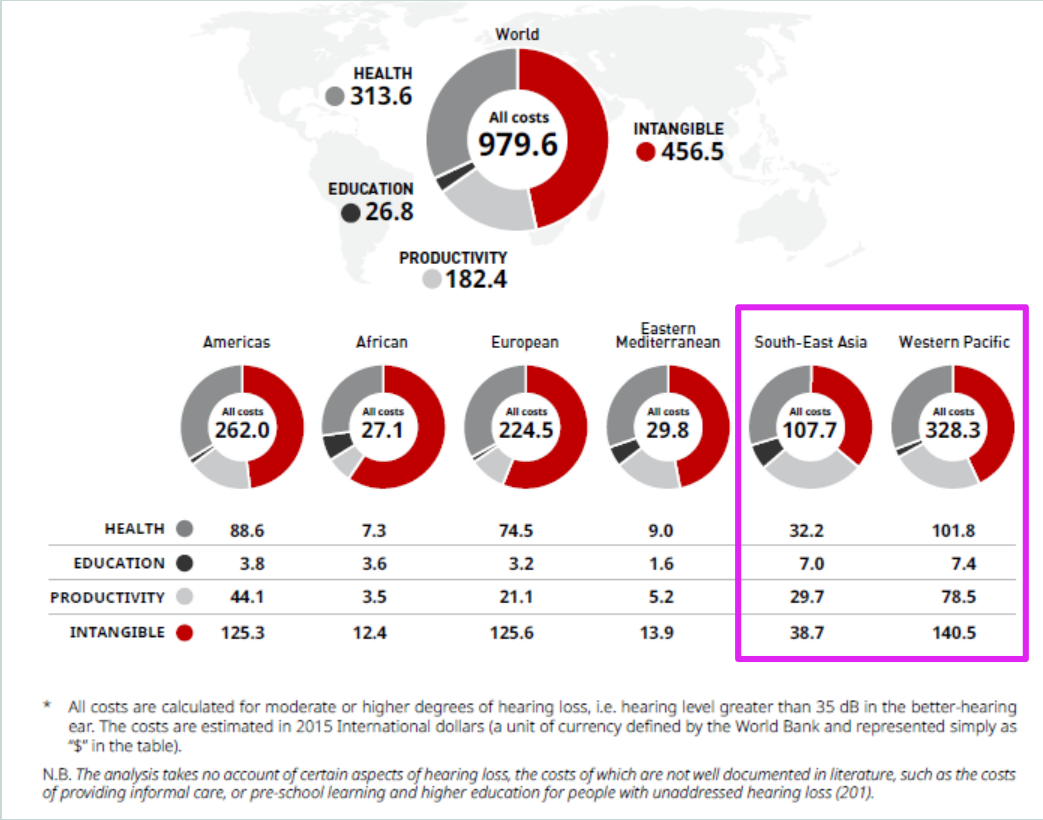
moderate or higher grades hearing loss across WHO regions



World Report on Hearing, WHO, 2021

Worldwide Costs of Hearing Loss

Illustrative combined direct, indirect and intangible costs of hearing loss (in billion dollars)



	Americas	African	European	Eastern Mediterranean	South-East Asia	Western Pacific
HEALTH	88.6	7.3	74.5	9.0	32.2	101.8
EDUCATION	3.8	3.6	3.2	1.6	7.0	7.4
PRODUCTIVITY	44.1	3.5	21.1	5.2	29.7	78.5
INTANGIBLE	125.3	12.4	125.6	13.9	38.7	140.5

* All costs are calculated for moderate or higher degrees of hearing loss, i.e. hearing level greater than 35 dB in the better-hearing ear. The costs are estimated in 2015 International dollars (a unit of currency defined by the World Bank and represented simply as "$" in the table).

N.B. *The analysis takes no account of certain aspects of hearing loss, the costs of which are not well documented in literature, such as the costs of providing informal care, or pre-school learning and higher education for people with unaddressed hearing loss (201).*

World Report on Hearing, WHO, 2021

$ 980 billion anually

Return of Hearing Aids after Test

45% returns of hearing aids after first fit

Dirk Oetting, HörTech, 2020

⇒ assumption:
Adjustments in audio laboratory unsatisfactory

Hear How You Like To Hear (2017-2020)

Citizen Science Project at Fraunhofer IDMT Oldenburg, Germany

- 57 Soundwalks, about 100 hour
- 550 submissions online questionaire
- 2 Hack4ears Hackathons with 200 ppl
- https://www.idmt.fraunhofer.de/en/institute/projects-products/projects/liketohear.html

Photo: Peggy Sylopp, CC BY-NC-SA

Self-Adjustment of Sound in Real Life

User’s Experience with liketohear-box

„There was very good intelligibility and the natrual language was particularly impressive.“

Dr. Udo Spiegel, severe hearing loss

Videomessage

The LikeToHear-Box

Self-Adjustment of Open Source Mobile Hearing Aid Prototype

Photo: Peggy Sylopp, CC BY-NC-SA

- LikeToHear-Framework
  https://github.com/liketohear/
- Open Source Mobile Hearing Aid Prototype
  https://github.com/m-r-s/hearingaid-prototype
  Prof. Dr. Marc René Schädler
  Mailinglist: hearingaid-prototypes@lists.uni-oldenburg.de
- Open Master Hearing Aid (openMHA)
  https://github.com/HoerTech-gGmbH/openMHA/
  HoerTech-gGmbH

The LikeToHear-Box: Hardware

Hardware setup based on Mobile Hearing Aid Prototype by Marc René Schädler

Liketohear-App Usage

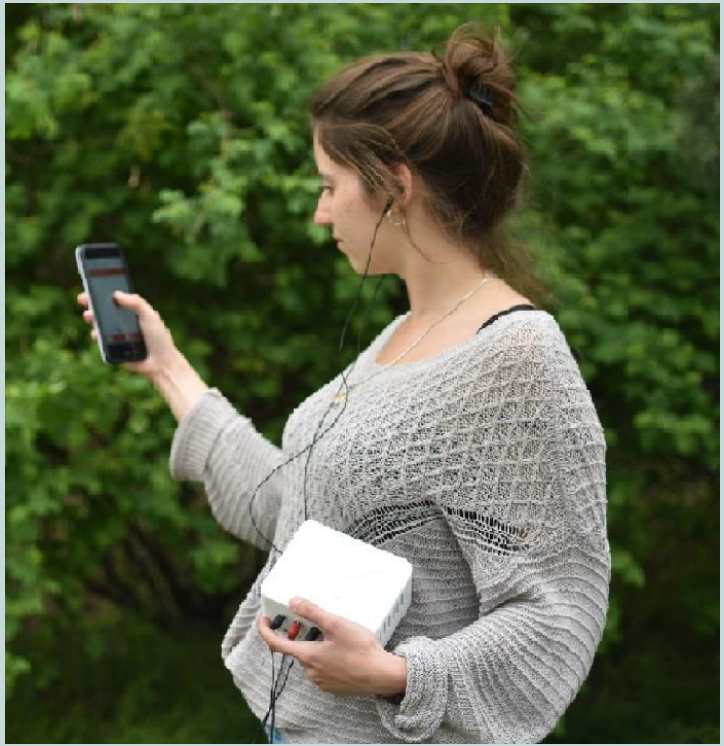
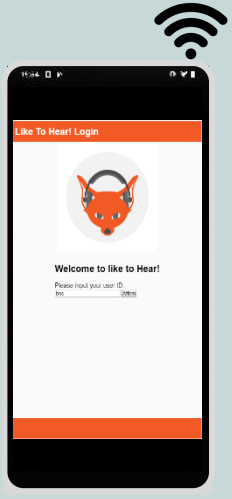


Photo: Peggy Sylopp, CC BY-NC-SA

Liketohear Framework

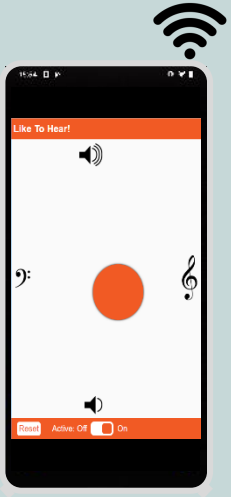


Smartphone (any)

Log in

Raspberry Pi Access Point

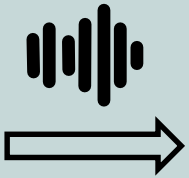
Liketohear Framework



liketohear-
Web App

Sound control

liketohear-Framework
Hearingaid Prototype



Headphones

LikeToHear

- Easy to use web application on the smartphone
- hearing aid configuration user presets
- Intuitive User Interfaces
- Smart Self-Fitting approach

openMHA

- Basic Hearing Aid Features
- Research platform for novel Algorithms
- TCP/IP Interface
- Easy to configure

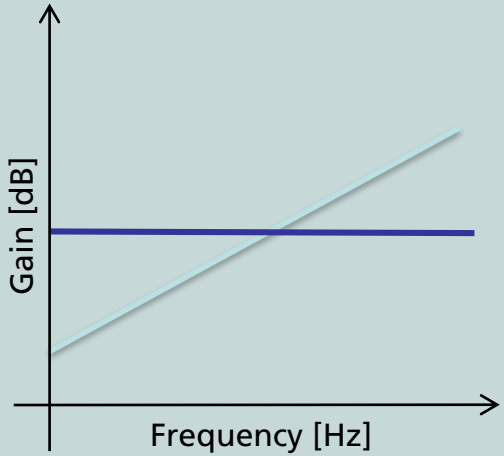
Hearing Aid Prototype

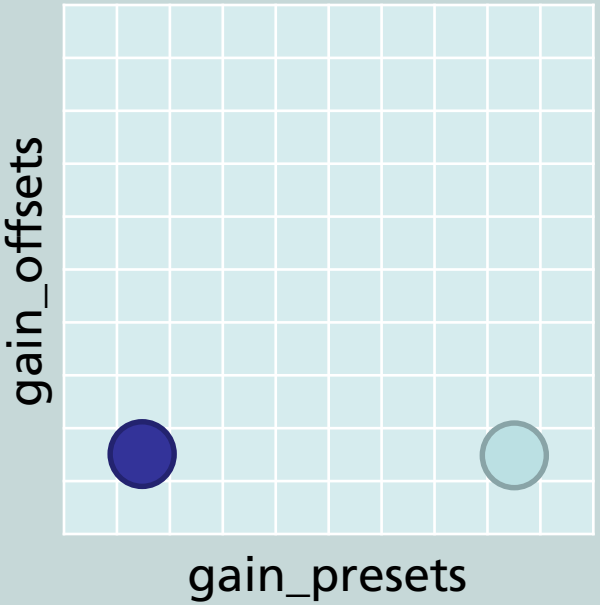
- Hardware calibration
- Raspberry Pi software setup
- openMHA configuration
  - Dynamic Sound Compression
  - Feedback Reduction

JACK Audio Connection Kit

- Connection to ALSA
- Transfer audio between applications

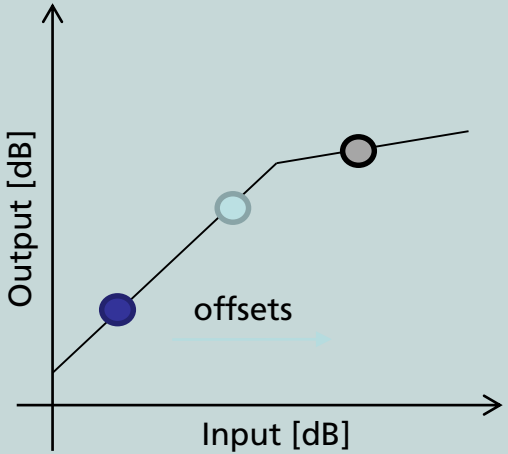
Gain Presets

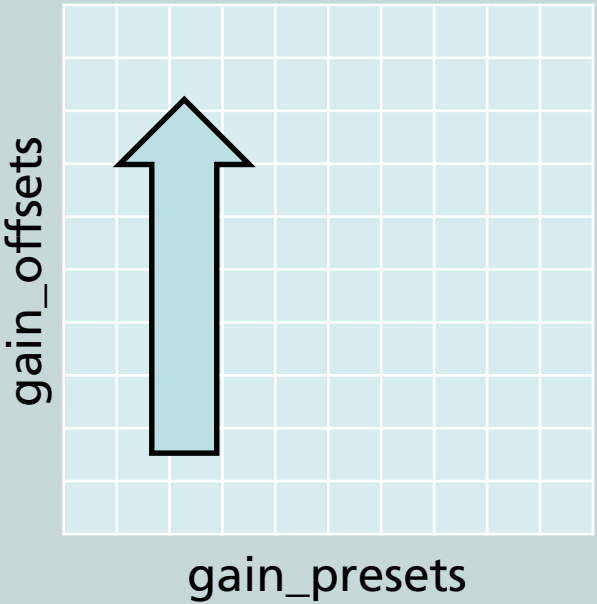




Gain Offsets

Gain Offsets for a Single Band





What‘s Next?

Videomessage

„A smaller *[liketohear-]* prototype would be really helpful“

Jorge Kuriki, moderate hearing loss

Call to Action

Aims: Turn the Prototype into a Product

- Accessible for everyone
- Affordable for everyone
- Highly individualized with personal settings

Requirements: Easy to Use and Robust

- Hardware: Smaller and handsome
- Software: Made for everyday use

Next Step: Small Donation goal

Production of 20 prototypes for demonstration purposes

10,000 $

- Supported by **enactus** [1] (**en**treneurial **act**ion **us**):

  Bank Details:
  Enactus Göttingen e. V.
  DE31 2605 0001 0056 0584 23
  Purpose: Hearing Aid

  (Donations of 500 euros or more include the *optional ordering* of a prototype, which halves the donation amount)

[1] https://www.enactus.de/

Literature

- Acoustic Transparency in Hearables – Technical Evaluation
  F. Denk, H. Schepker, S. Doclo, and B. Kollmeier, J. Audio Eng. Soc., 2020
  https://uol.de/f/6/dept/mediphysik/ag/sigproc/download/papers/SP2020_3.pdf
- Validation of a Self-Fitting Method for Over-the-Counter Hearing Aids
  Dianne J. Van Tasell, Bill Rabinowitz, 2020
  https://journals.sagepub.com/doi/full/10.1177/2331216519900589
- User-interface concepts for sound personalization in headphones
  Jan Rennies, Dirk Oetting, Hannah Baumgartner, and Jens-E. Appell,
  Conference on Headphone Technology 2016

If you want to support, get in contact:

Peggy Sylopp, info@pexlab.space

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