Hearing SALT

Smart Assistive Listening Transceiver

by Alexander Goldin, PhD
Alango Ltd., CEO
Founded: 2002

Offices:
- Headquarters: Haifa (Israel)
- R&D: Haifa (Israel), St. Petersburg (Russia)
- Representative: China, Korea, Singapore, Taiwan, Japan

Main business:
- DSP software technologies for voice, audio and hearing enhancement

Main business model:
- Technology licensing, NRE (porting, customization, support)

Competitive advantage:
- Richest portfolio of sound enhancement technologies for a variety of applications
- Convenient tuning and auxiliary tools
- Excellent customer support

Market share:
- Over 30 million products (units)
- Automotive, mobile, mobile accessories, conferencing, hearing enhancement
The new era of wearables

Wearables are considered the next BIG thing

Wearables market forecast

Which is the most needed wearable electronics device?

What do we (Alango) do?

Hearing enhancement devices - the most needed wearables

Potential market: 14-17% or more than 700M people worldwide report hearing loss

Worldwide hearing impaired

> 500M potential users

~ 10% ?

Worldwide hearing aid users

Number of people with hearing loss of more than 25dB

<table>
<thead>
<tr>
<th>Year</th>
<th>Million</th>
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<tbody>
<tr>
<td>1995</td>
<td>440</td>
</tr>
<tr>
<td>2005</td>
<td>More than 560</td>
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<tr>
<td>2015</td>
<td>More than 700</td>
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<tr>
<td>2025</td>
<td>More than 900</td>
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Million

Year
3 layers of Alango solutions

SALT
Smart Assistive Listening Transceiver

HearPhones™
Hearing enhancement by Bluetooth headsets

PersonaSound™
Custom sound for general devices

Technology
Reference design
Device
Layer 1: PersonaSound™ – we are all different

We hear different...
We use different devices...
We are in different places...

How can we HEAR the same SOUND?
Layer 1: PersonaSound™ – let’s make it personal

- Noise around You
- Your hearing preferences
- Your device properties

General sound enhancement → Noise dependent volume and frequency equalization → User specific sound processing → Device speaker equalization

Layer 1: PersonaSound™ – let's make it personal
Layer 2: HearPhones reference design

Licensable software solution that transforms a Bluetooth headset into a personal sound amplifier

Choose or change your style

- 4 microphone, sport style
- 2 microphone, binaural stylish
- 2 microphone, binaural stylish
- 4 microphone, sport style
- 1-2 microphone, monaural compact
- 2 microphone, monaural

Includes PersonaSound™ technology
Layer 3: SALT - “Army knife” for hearing impaired

PersonaSound™, HearPhones™ and much more...

**PERSONAL SOUND AMPLIFIER**
- Multi-channel sound amplification with advanced noise and feedback cancellation

**BLUETOOTH HEADSET**
- Enables voice communication and music listening with *personal* sound

**REMOTE MICROPHONE**
- Virtually decreases the distance between the user and other people

**T-COIL RECEIVER**
- Directly receives sound of interest in places fitted with induction loop

**SAFETY AND HEALTHCARE**
- Emergency call button
- Intelligent fall detector
- Vibration and sound alerts

**BLUETOOTH INTERCOM**
- Communicates with another SALT user directly

**TV LISTENING SYSTEM**
- Directly transmits TV sound to user’s SALT device
A powerful hardware platform for hearing enhancement and assistive listening applications
Disclosure:

- Adaptive, binaural beamforming
- Advanced feedback canceller
- Stationary, transient and wind noise suppression
- Multi-channel compression tunable for specific environments

120MHz of SALT DSP power running advanced, field proven, fully customizable voice enhancement and hearing enhancement technologies
SALT: Hearing preferences test

Using your mobile device screen...

**Red Slider** – Discomfort level
(sound becomes unpleasant above this level)

**Green Slider** – Comfort level
(sound is most pleasant and clear around this level)

**Blue Slider** – Hearing threshold
(sound becomes audible above this level)
**SALT: Personalization at the end of your fingertip**

"Best hearing point" – *Just find it!*

User can intuitively modify the default hearing enhancement by touching different parts of the screen.

Default hearing enhancement is done automatically based on the hearing preferences test.
Personalized voice call and music sound according to:
• User hearing (based on user’s hearing preferences test)
• User preferences (based on real time sound customization)

Noise dependent volume & equalization control
Sound is additionally amplified according to ambient noise level and spectrum

EasyListen™
Slows down the incoming, far end speech for better understanding

Advanced noise cancellation
• Beamforming (Binaural case)
• Static and transient noise reduction
• Wind noise reduction

Speakerphone for hands-free calls
SALT can be switched into transmitter (auxiliary) mode and used as a remote microphone.

Sound before transmission is enhanced by 4 microphone adaptive beamforming and noise suppression technologies.

Auxiliary SALT (remote microphone) to SALT HearPhones, neckloop or earphones.
SALT: TV listening system

Personalized TV stereo sound directly to your ears

Auxiliary SALT (transmitter)

Direct, wireless, low latency Bluetooth link

to SALT HearPhones, neckloop or earphones

SALT can be switched into transmitter (auxiliary) mode and connected to TV audio output
SALT: Two-way wireless intercom

Direct, wireless communication wherever necessary

Up to 30 meters, person-to-person, direct voice communication with personalized sound, acoustic and wind noise reduction
When you need help occasionally and it is at hand...

Built-in telecoil, amplifier and sound personalization

Can be used with SALT HearPhones™ or any high quality earphones
✓ Intelligent fall detector:
  • Automatic fall detection
  • User response inquiry with vibration and loudspeaker
  • Automatic call to preprogrammed numbers(s)

✓ Emergency call button for help request

✓ Wireless leash for you smartphone
  With vibration and loudspeaker alert

✓ Talking organizer with vibration alarm

✓ More... You name it
SALT: Great for normal hearing users

✓ Advanced Bluetooth stereo headset:
  • Superior music experience with MuRefiner™ audio enhancement
  • Automatic, noise dependent volume and frequency equalizer
  • Outstanding voice clarity due to 4 microphone beamforming
  • Speakerphone functionality for hands-free, “ear-free” calls
  • EasyListen™ technology slowing down speech in foreign language
  • Vibration incoming call alerts

✓ Direct, wireless intercom (limited by ~20m):
  • Outdoor activities
  • In-flight communication between two users
  • In-door communication in noisy places or between rooms

✓ Wireless leash for you smartphone

✓ Emergency call button for increased safety

✓ More with additional smartphone applications
  The sky is the limit
SALT: Development status and roadmap

We are here (April 2016)

- Concept & functionality definitions
  - SW design
  - ID 3D rendering
- HW schematic
- HW prototype
- SW prototype
- Hardware corrections
- HW final
- SW prototype
- ID dummy mockup
- ID functional mockup
- ID final

June: Crowdfunding starts

Q1 2017

SALT manufacturing
SALT: The Tao of hearing

Thank you!

Life

Hearing

Communication

Happiness

Understanding

Q&A