Development of Hearing Technology with Safe Listening Features

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Presentation Overview

• Understanding risk and prevalence of Noise Induced Hearing Loss (NIHL)
• Description of App to address NIHL
• Continuing efforts to support WHO-ITU initiatives for safe listening
NIHL is Global Health Concern across Wide Demographic

**CIVILIAN**

- 40 M in US at risk
- 50% do not have noisy jobs
- 20% US teens at risk

**US Center for Disease Control (CDC)**

**YOUNG ADULTS**

- 1.1 B at risk globally due to unsafe use of personal audio devices

**World Health Organization (WHO)**

**MILITARY**

- Disqualification for battle readiness
- Of concern both on and off duty

**US Dept. of Defense (DoD)**

NIHL is Painless, Progressive, Permanent... but Preventable

*US DoD Hearing Center of Excellence*
Proposed App Development Flow

Realtime cumulative sound exposure vs. US and UN safe listening standards

User Voice integration

Promote safe listening habits (guided by WHO-ITU Toolkit)
Realtime Safe Listening Exposure Assessment

Daily sound exposures (SPL in dBA) - Occupation, Lifestyle, Recreation

Realtime Computation vs. Safe Listening Standards

Audio
WHO-ITU (H.860)

Occupational
CDC, NIOSH, OSHA

Military
ARL, APHC, HCE

Personal Sound Exposure

vs.

Global Safe Listening Standards

NIOSH: National Institute for Occupational Safety and Health, OSHA: Occupational Safety and Health Administration, ARL: Army Research Labs, APHC: Army Public Health Center, HCE: Hearing Center of Excellence
User Voice Integration

**User Voice:** Civilian, Military, Young Adult, Adult - With and Without Hearing Impairment

**Questions:**
- Listening experience, issues, awareness

**Responses:**
- Problems, Preferences

**Interest in**
- Improving listening habits
- Preferences
- Occupation needs
- Lifestyle needs

**Features:**
- Simple, Effective
Features to Promote Safe Listening Habits

- Audio
- Real-time
- Cumulative
- Ambient
- Track
- Compute
- Inform
- Choice
- Share
- Alert

- Exposure vs. Safe Dose
  - Risk
- Iterative
- Lifestyle based
- Family, Caregiver, Work, Doctor

- Visual, Haptic

- Safe Listening App
- Privacy, Cybersecurity

- Standalone
  or
- Companion to Personal Sound Amplification System, Hearing Aid
Interfaces - Non Hearing Impaired User

- Audition Tech Safe Listening App
  - Start your safe listening experience now
  - Login
  - Sign In
- Profile
- Essentials
- Decibels
- History

Cumulative Sound Exposure

- Exposure (%)
- Time (hour)

Daily
Weekly
Interfaces - Non Hearing Impaired User

1. **HIGH ambient sound exposure**
   - Can you take steps away from source?
   - Can you wear hearing protection?
   - Can you postpone high risk activity? (see sound library)

2. **HIGH audio sound exposure**
   - Can you lower the volume?
   - Can you change music genre?
   - Can you limit headphone use today?
Key Safety Considerations

Guided by WHO recommended principles of digital development and US (FDA, HHS) rules

PRIVACY
- No personal identifiers accessed, stored or shared
- Only collects amplitudes of sound in decibels and stores in secure cloud for personal exposure reports
- Sharing of personal reports decided by user

CYBERSECURITY
- Conforming to NIST (National Institute for Standard and Technology)
- Prevent unauthorized use, trusted content, data confidentiality, vigilance
Efforts to Support ITU Standard Development

Non Hearing Impaired Users
- Accuracy Testing
- Usability and Optimization
- FDA and UN engagement
- Continual learning, improvement

Hearing Impaired Users
- ‘Council’ formation
- Understand needs, what matters most
- User defined features

Public Communications
- Military Health System Research Symposium
- Provisional patent - Utility patent (ongoing)
- Military Medicine, WHO Bulletin (planned publications)
Summary

‘Almost entire world population lives within reach of mobile network’


Proposed App with simple, user-centric features could:

Promote safe listening habits

Help in reducing NIHL risk

*(App is not meant to diagnose or treat hearing impairment)*
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Thank you