



OMEGA^{AI}

DNN Features and Performance in the Real World

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Webinar FAQs

DNN Feature & Performance in the Real World

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How to Ask a Question

Click Q & A, type your question, and Send

Where to get the handout

A PDF handout for this presentation may be accessed through your Pending Courses on Audiology Online or by clicking on the link in Chat within the classroom

How to earn CEUs

CEUs are available with a paid Audiology Online Unlimited CEU Access membership

After completing the course, go to your Pending Courses on Audiology Online and pass the multiple-choice exam

Assistance or Tech Support

Call 800-753-2160

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Use the Q&A window



Risks and Benefits

The applicability and accuracy of the course content may vary by the clinical, geographical, and cultural context; you should evaluate the course accordingly.

As healthcare is rapidly evolving, new findings may change the validity of the information presented in this course. Providers should always consult the latest research and guidelines from professional associations.

The interventions discussed in this course may be limited in generalizability, requiring practitioners to consider specific individual and population factors.

The course may not cover all possible risk factors, diagnostic methods, or treatment options, and complex cases may require additional considerations.

Healthcare providers should apply cultural competence and sensitivity to ensure effective and respectful care based on their patients' diverse needs.

Providers should always evaluate the limitations of diagnostic and screening tools, considering their potential for false results as well as any ethical implications.

It is the responsibility of course participants to critically evaluate the evidence from multiple sources to guide professional practice.

Learning Outcomes

1

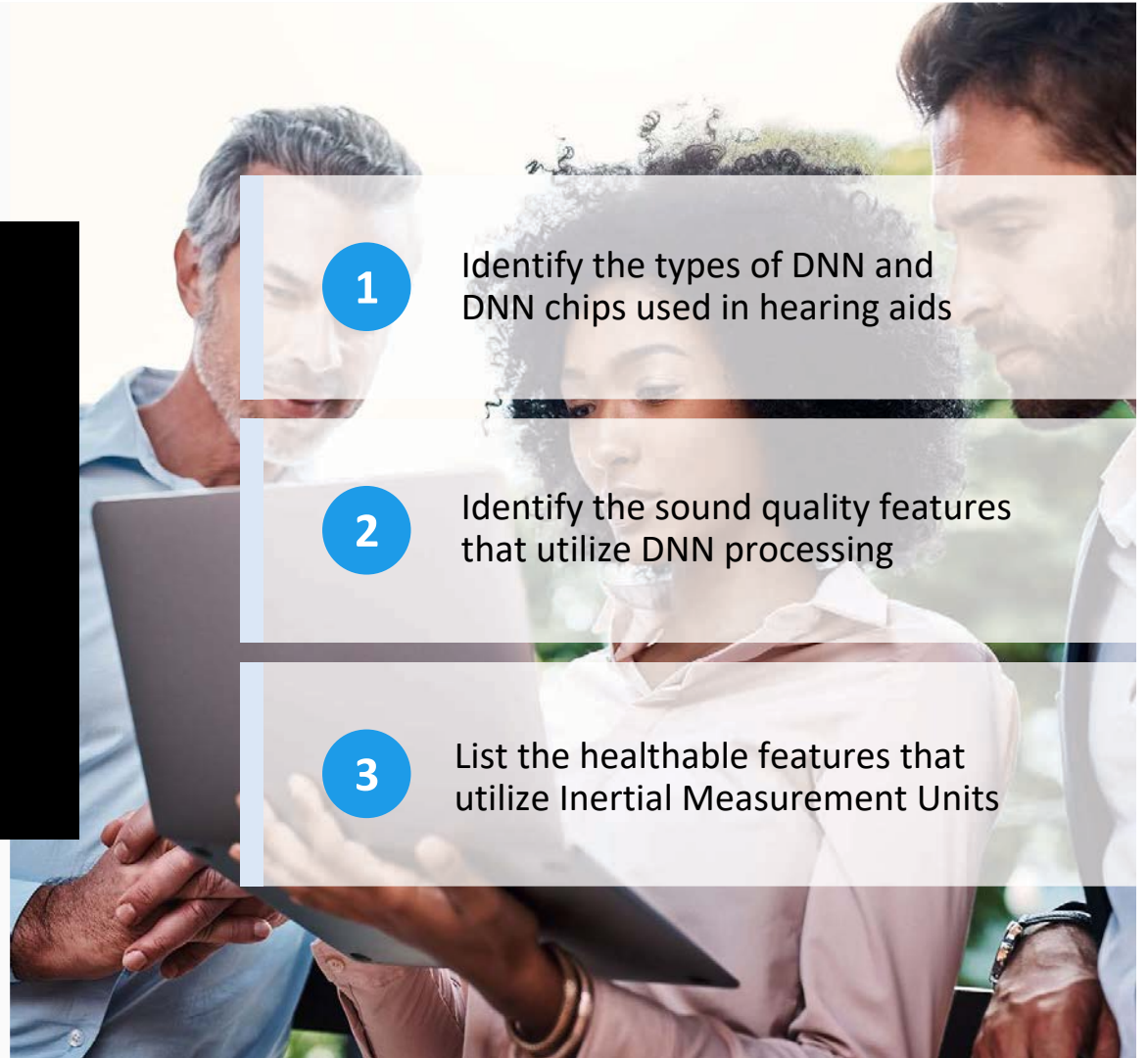
Identify the types of DNN and DNN chips used in hearing aids

2

Identify the sound quality features that utilize DNN processing

3

List the healthable features that utilize Inertial Measurement Units





Reminders

Evidence-Based

All CE courses on continued.com must be evidence-based

In evidence-based continuing education sessions, the presenter provides:

- The best available, current, scientific evidence to support a particular practice or guideline which can include exploratory or pilot study data and the related evidence

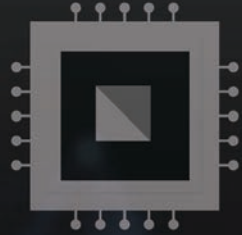
- Information about his/her clinical expertise, expert opinion, and experience in this topic area

- Information related to client/patient/caregiver values.

- An indication of the level of evidence (e.g., systematic review, randomized control trial, cohort study, expert opinion, etc.) for each piece of evidence presented, ensuring clarity on the strength and reliability of the supporting data

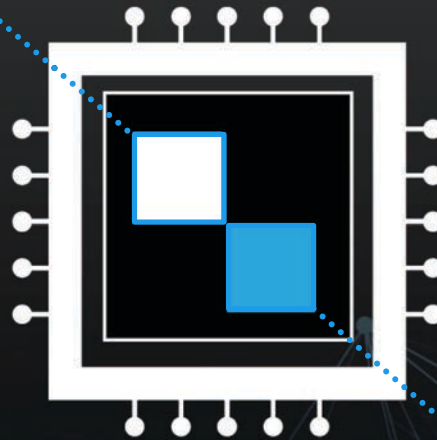


Always creating new paths



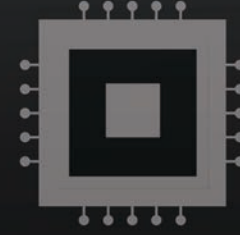
Embedded DNN

G3

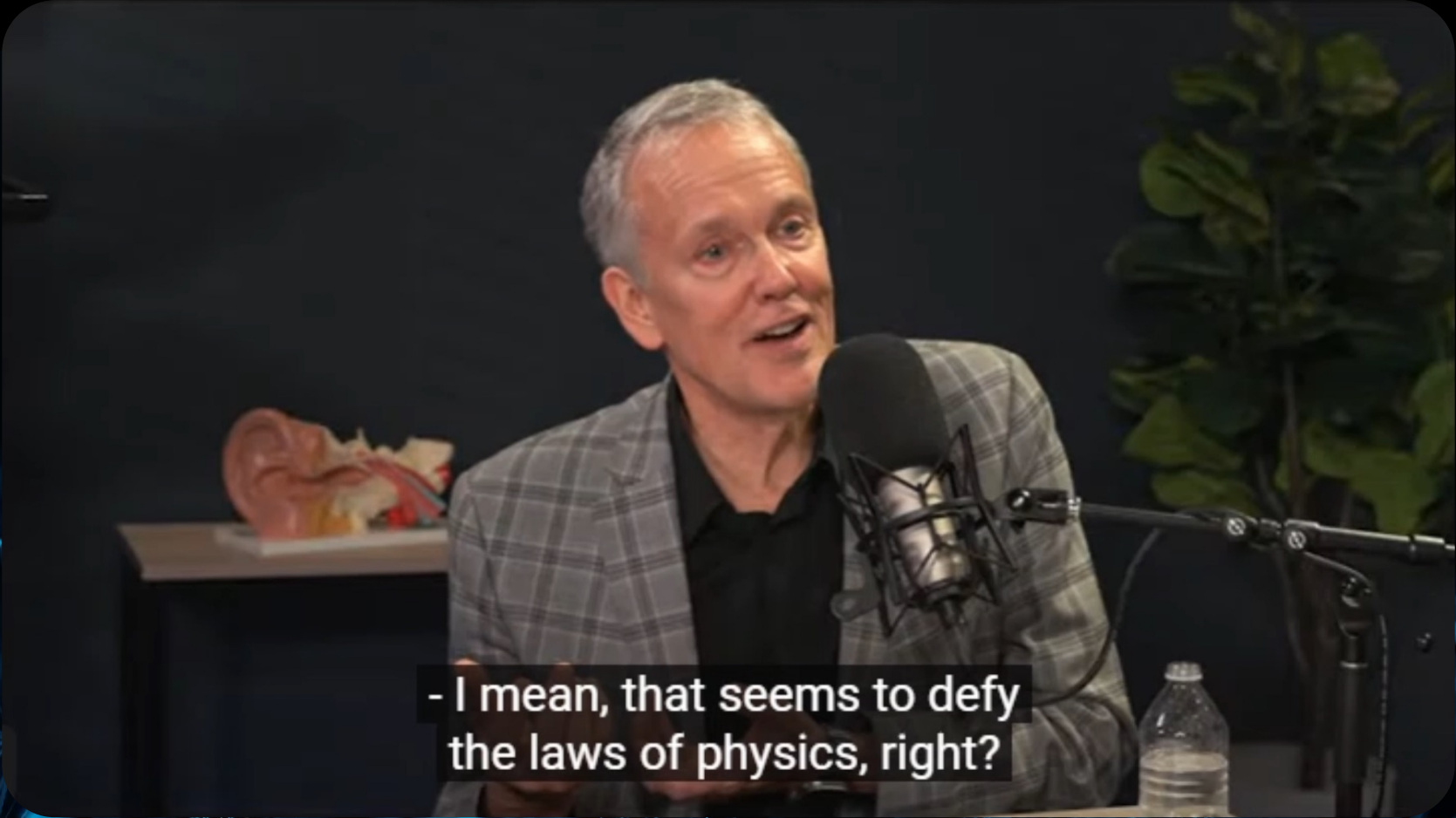


Integrated Neural Processing Unit (NPU)
dedicated to DNN processing, runs in
parallel with our G2 Neuro Processor

NPU



Dedicated AI chip

A middle-aged man with grey hair, wearing a grey plaid blazer over a black shirt, is speaking into a professional microphone. He is in a studio-like setting with a dark background. To his left, a small shelf holds a model of a human ear. To his right, a green plant is visible. A water bottle sits on the table in front of him. The entire scene is framed by a dark blue border with a glowing network pattern.

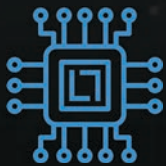
- I mean, that seems to defy
the laws of physics, right?

Understanding speech in difficult listening environments remains a challenge for hearing aid users

Percent of hearing aid owners
satisfied with ability to hear in
each listening situation

Picou EM. Hearing Aid Benefit and Satisfaction Results from the MarkeTrak 2022
Survey: Importance of Features and Hearing Care Professionals. Semin Hear. 2022
Dec 1;43(4):301-316.

1:1 conversation	83%
Workplace	82%
Small group conversation	78%
Outdoors	77%
Shopping	77%
Car	76%
Large group conversation	72%
Conversation in noise	72%
Large lecture hall	72%
Classroom	70%



Artificial Intelligence

Engineering of machines that mimic cognitive functions



Machine Learning

Ability to perform tasks without explicit instructions and reliance on patterns



Deep Learning

Machine learning based on artificial neural networks

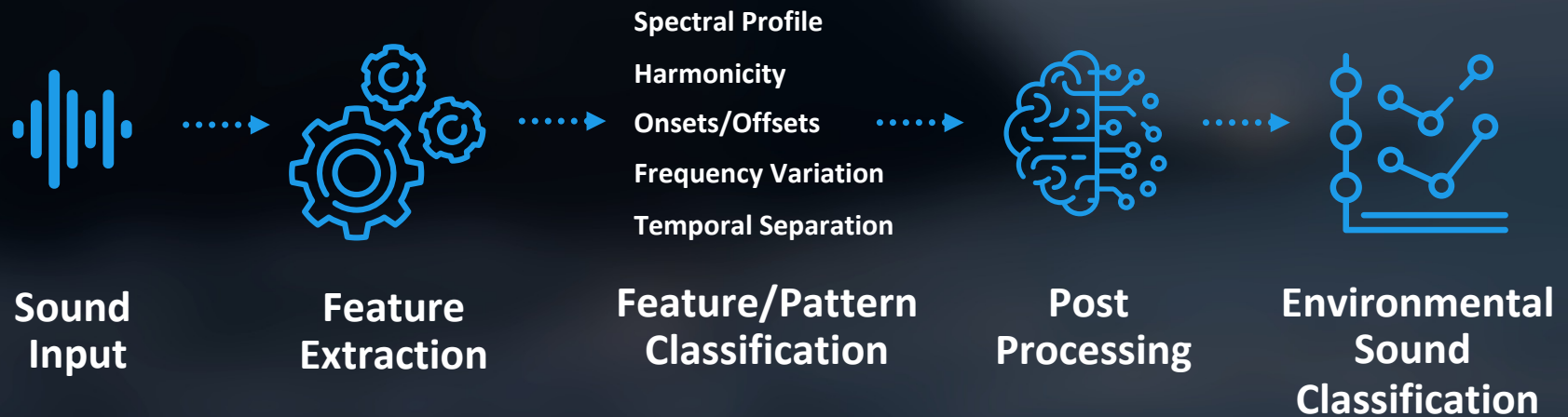


Generative AI

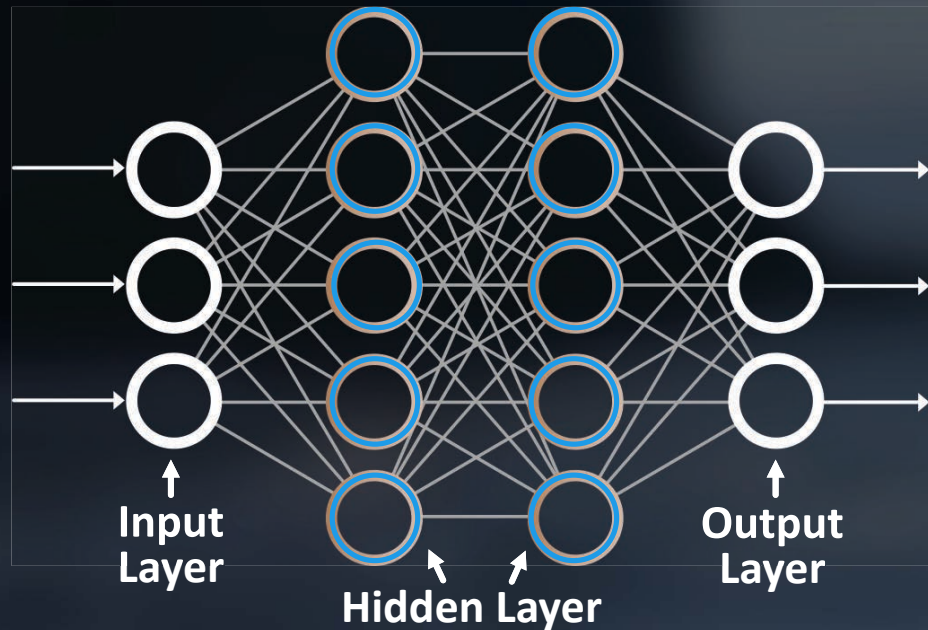
Subset of deep learning that generates new content based on patterns from large datasets

Machine Learning

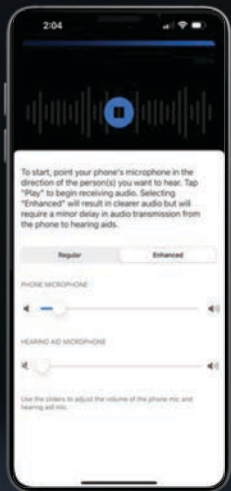
Acoustic Environmental Classification System



Deep Neural Networks (DNNs), a subset of machine learning, open the possibility of creating sophisticated algorithms with greater accuracy by creating a mesh of nodes and layers that can decode information after it has been extensively trained



AI-Driven Sound Quality Advancements



Voice AI



Edge Mode+



**DNN Enhanced
Speech in Noise**



**World's First DNN-Driven
Directionality System**

24 TECHNOLOGY

Voice AI

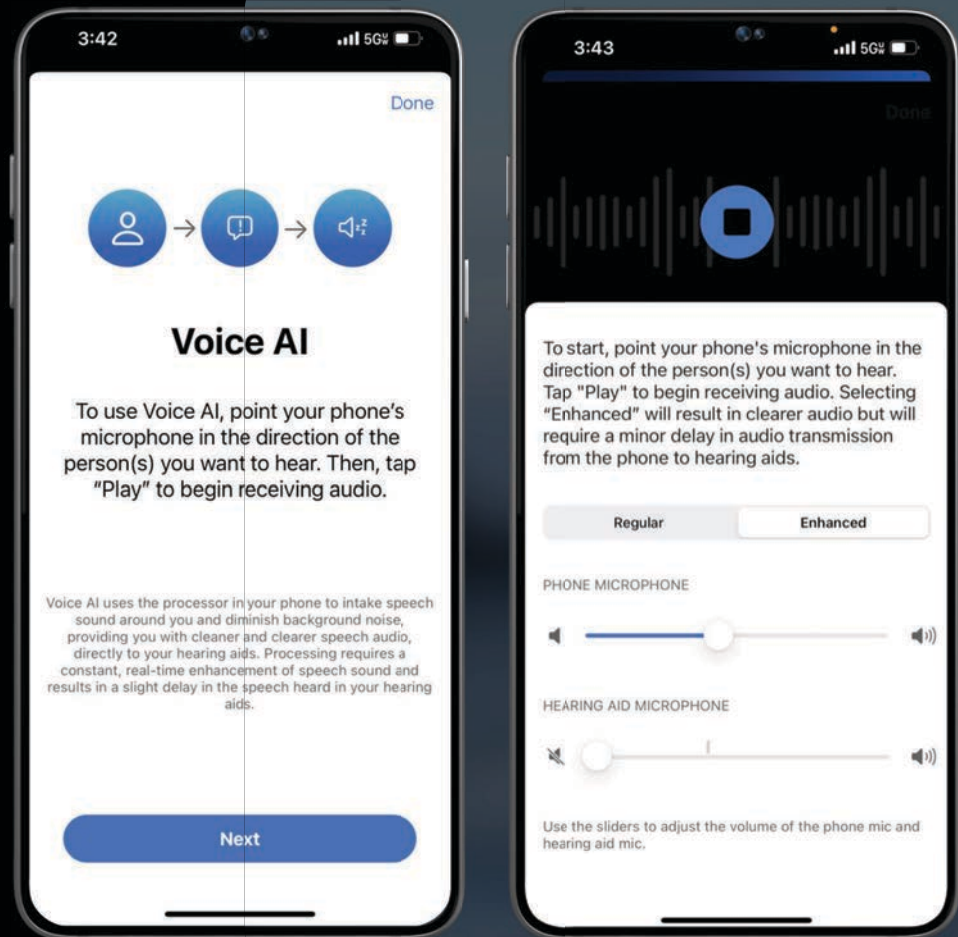
Regular

Similar to Live Listen function but without the low pass filter imposed by iOS

Enhanced

Adds Voice AI algorithm

Adjust input of the phone microphone and hearing aid microphones independently as desired



Edge Mode+

On-demand real-time analysis of environments for additional help with comfort and clarity

Unique adaptations for every environment



Edge Mode+

Automatic Edge Mode+

24 Technology

Automatically rescans as environment changes

Edge Mode+

20 & 16 Technology

Settings are fixed once engaged

Turn ON and OFF to accommodate changes to listening environments





Activate Edge Mode+

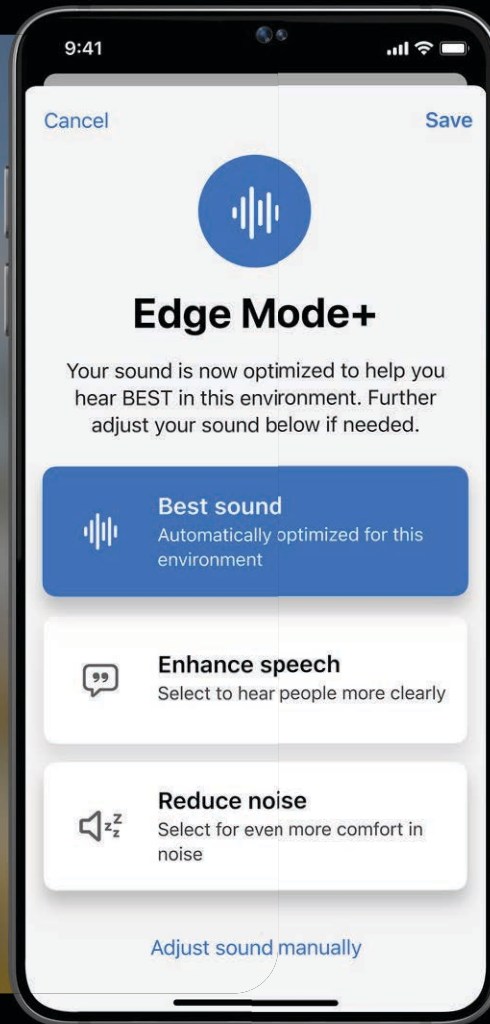
EXCLUSIVE 24 TECHNOLOGY

Automatic Edge Mode+

Continues to scan, adapt and optimize as the acoustic environment changes, ensuring the most appropriate settings are always applied in a dynamic world



Automatically rescans as environment changes



24 & 20 TECHNOLOGY

Edge Mode+

Best sound

Automatically optimized settings for this environment

Enhance speech

Tap to gain more clarity and hear others more clearly

Reduce noise

Tap to get even more comfort by further reducing background noise

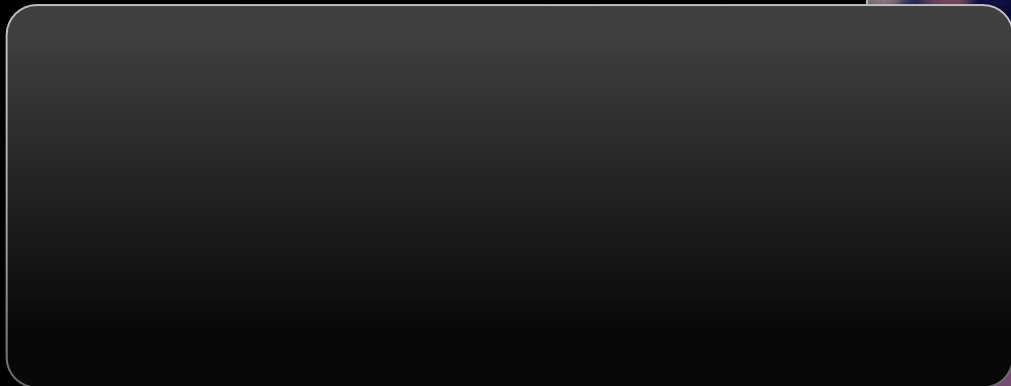


Patient Benefits

On-demand adjustments
made for the listener

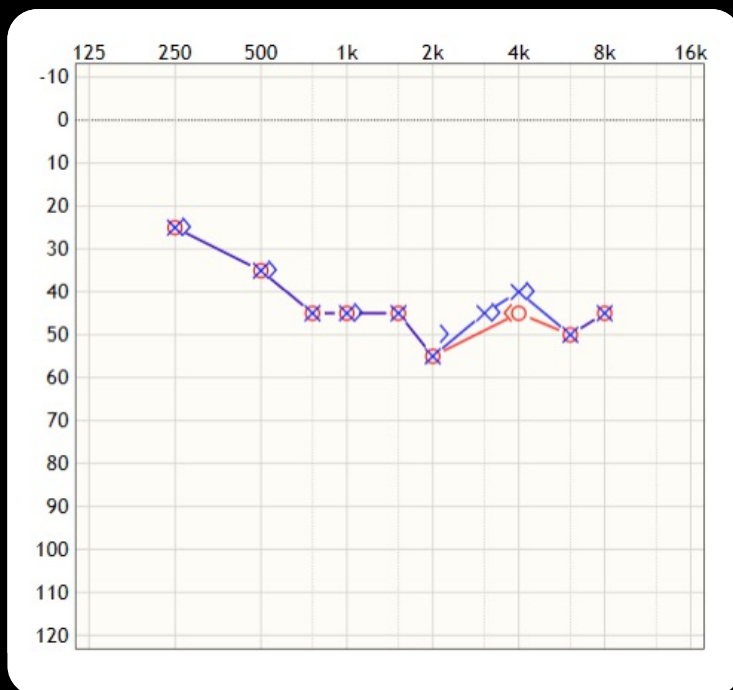
More adjustments than can
be achieved through
My Starkey or Pro Fit

Reduces the need for
hearing aid programs





2021 Alan's Audiogram



WRS
Left ear: 84%
Right Ear 88%



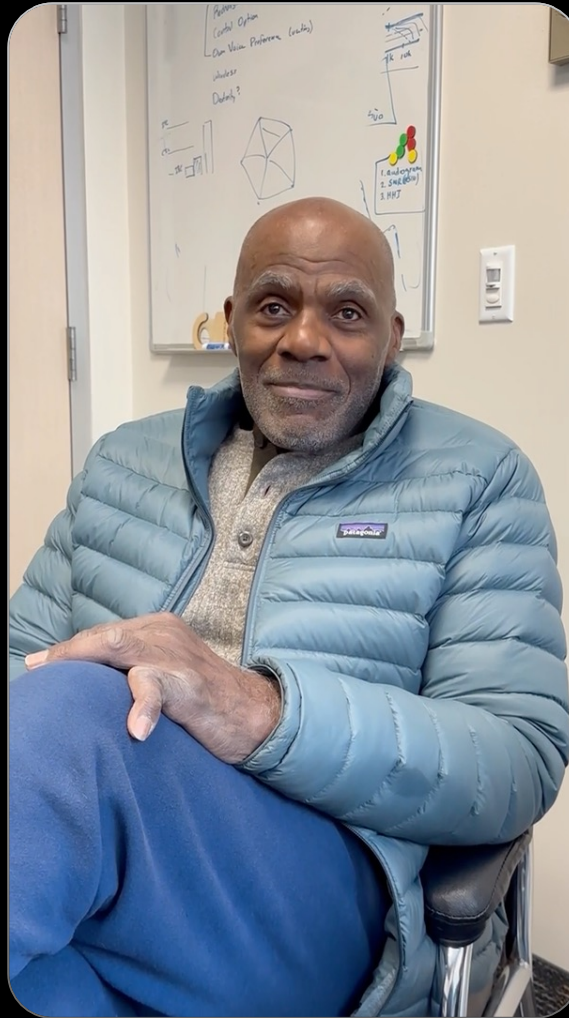
Alan's Best Option



**Bilateral custom
ITC R devices**



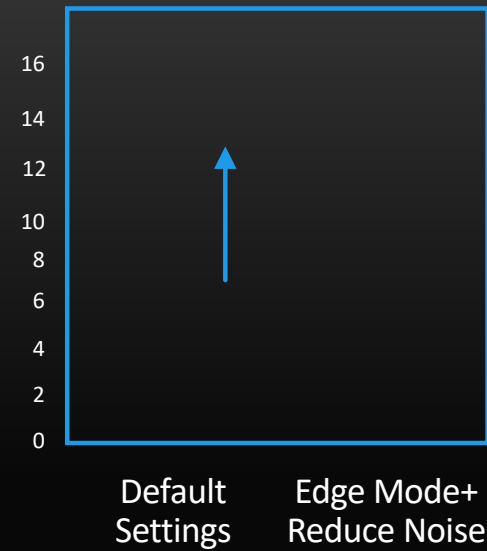


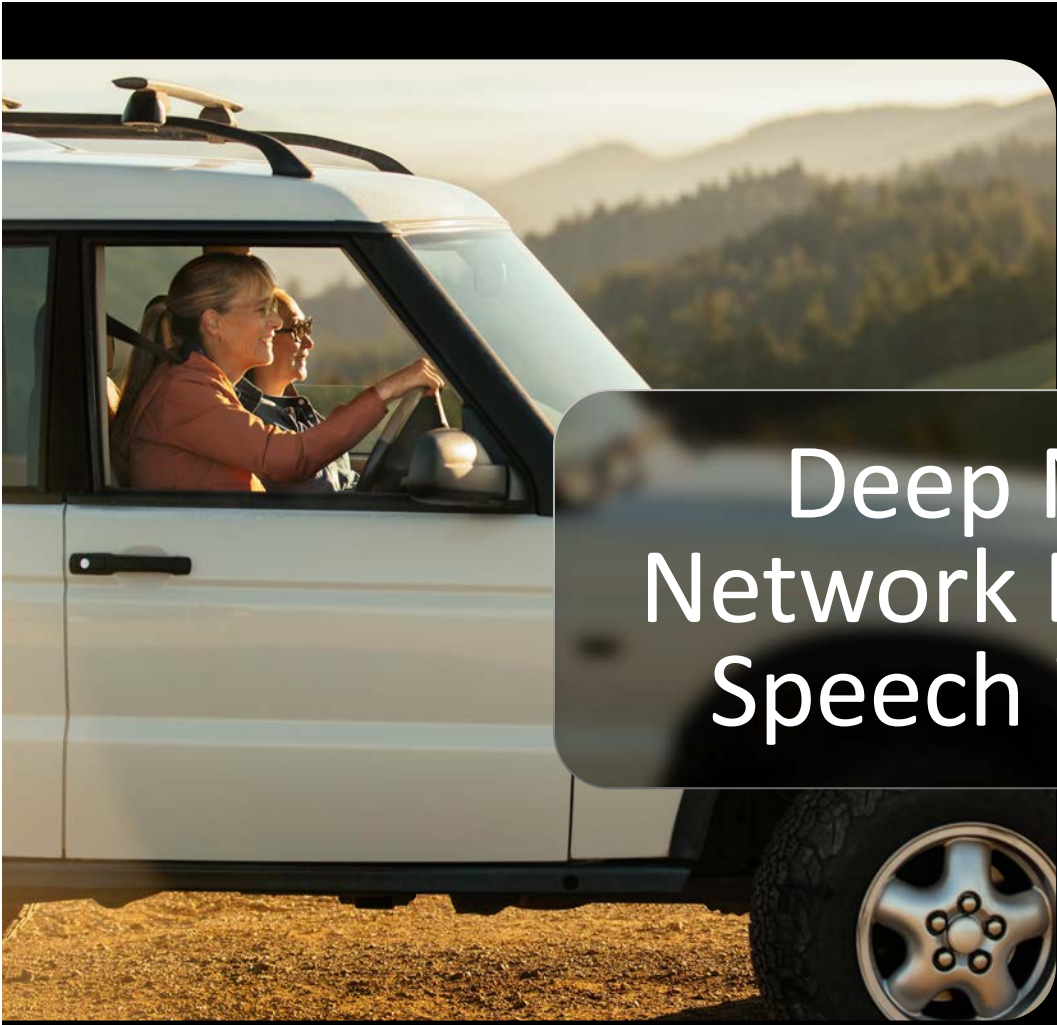




Edge Mode+

**Edge Mode+ provides better
signal-to-noise ratio by up to 13dB**

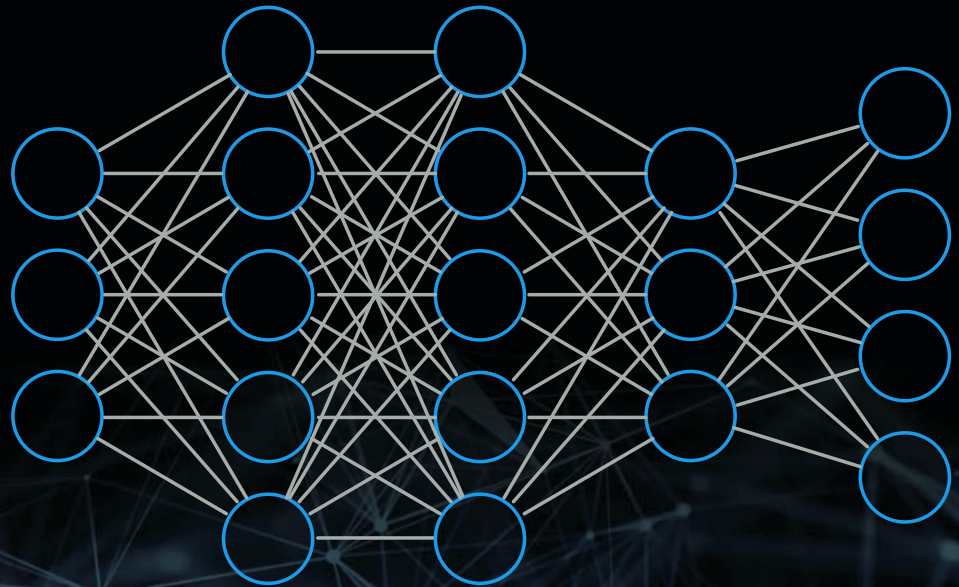




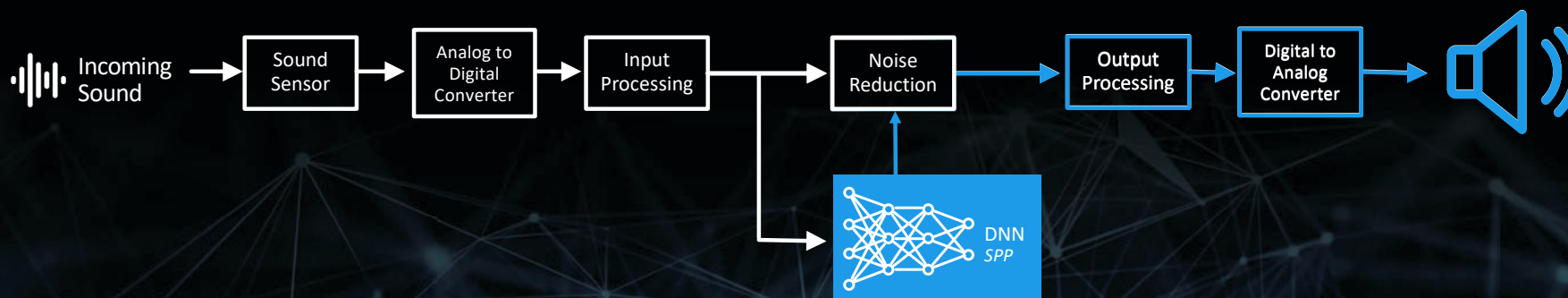
Deep Neural Network Enhanced Speech in Noise

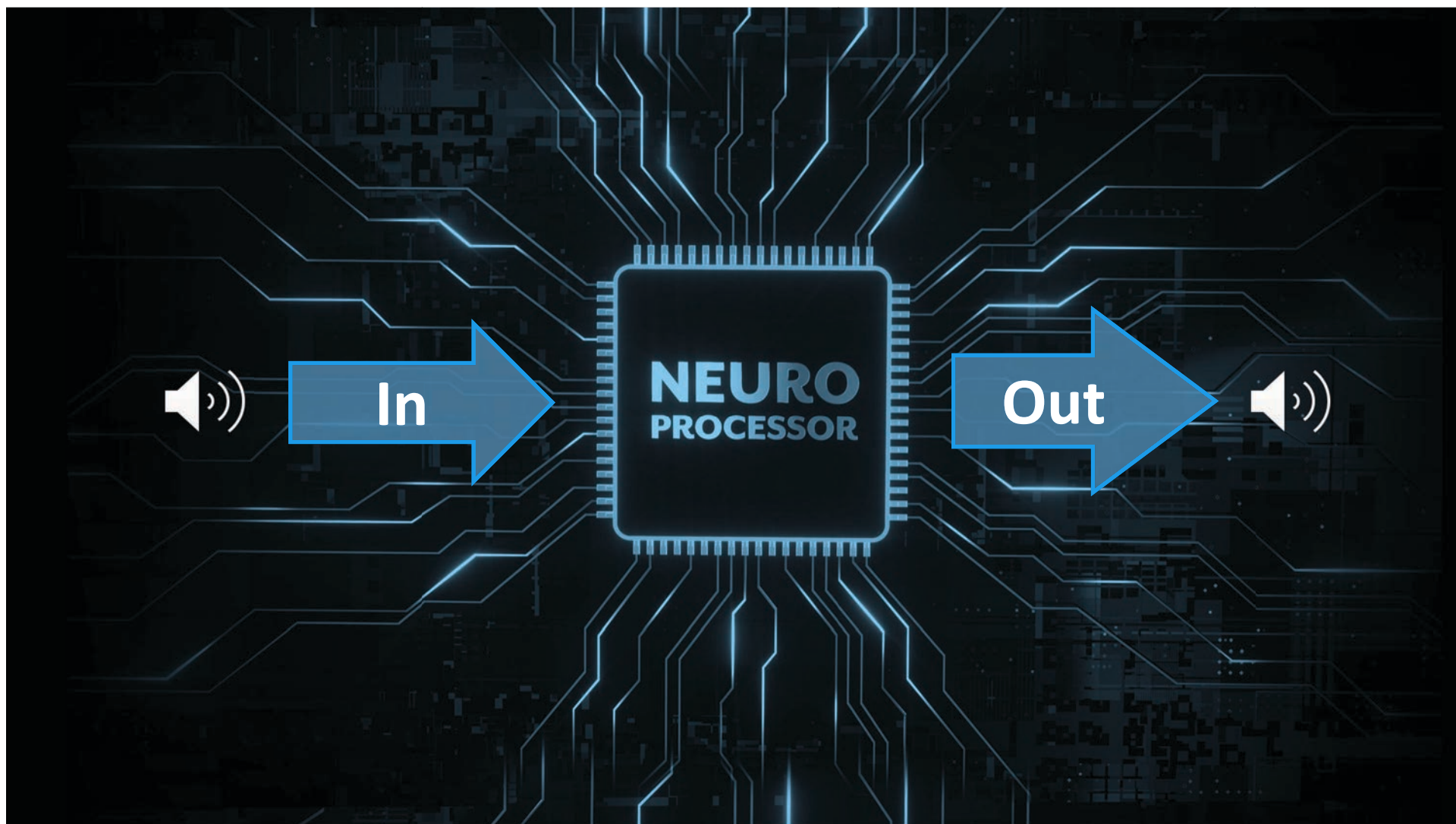
Starkey's Deep Neural Network

DNN processing runs parallel with the sound management system for more efficient processing — both in speed and battery life

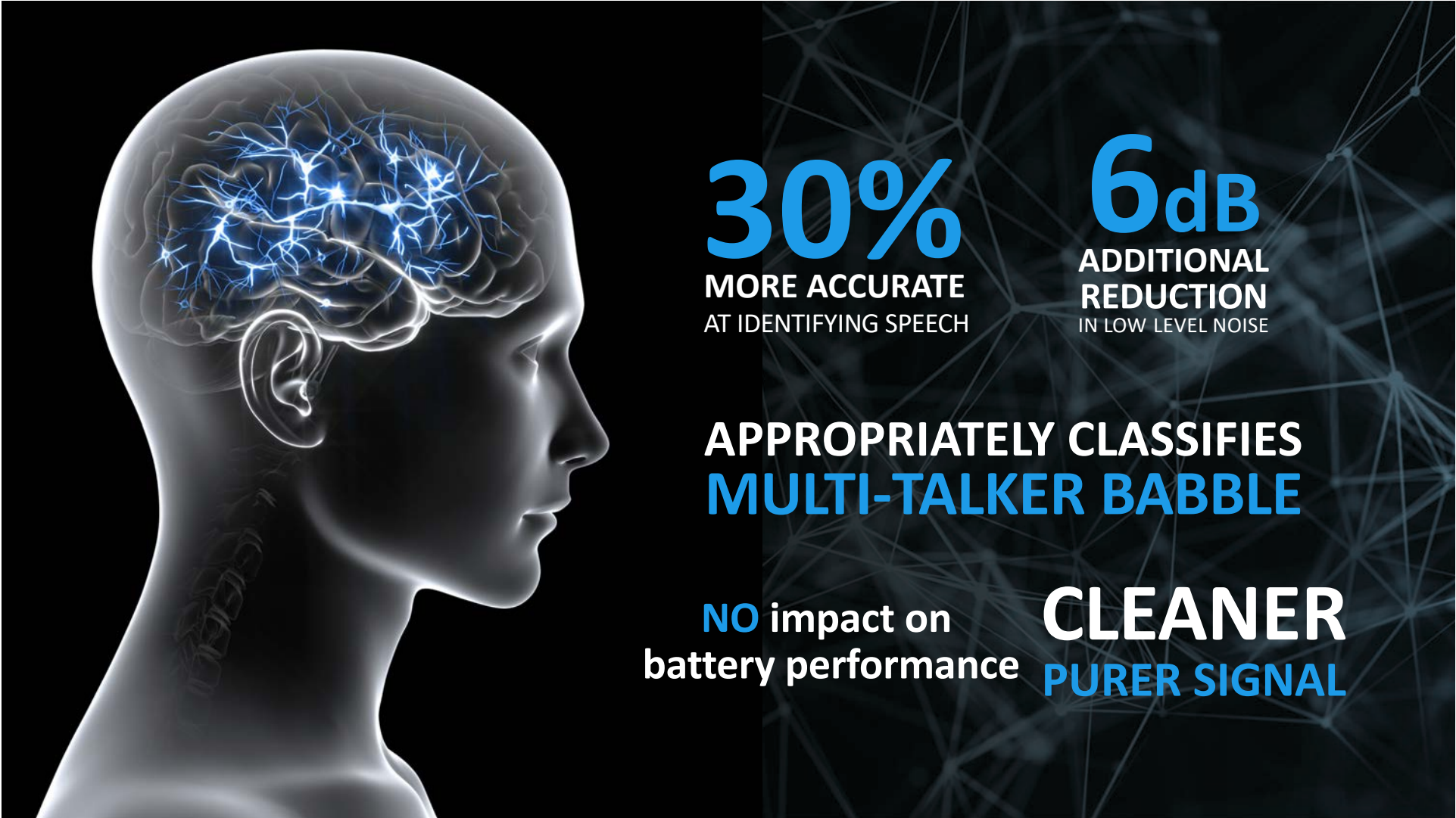


Conventional AI Noise Reduction









30%

MORE ACCURATE
AT IDENTIFYING SPEECH

6dB

**ADDITIONAL
REDUCTION**
IN LOW LEVEL NOISE

APPROPRIATELY CLASSIFIES
MULTI-TALKER BABBLE

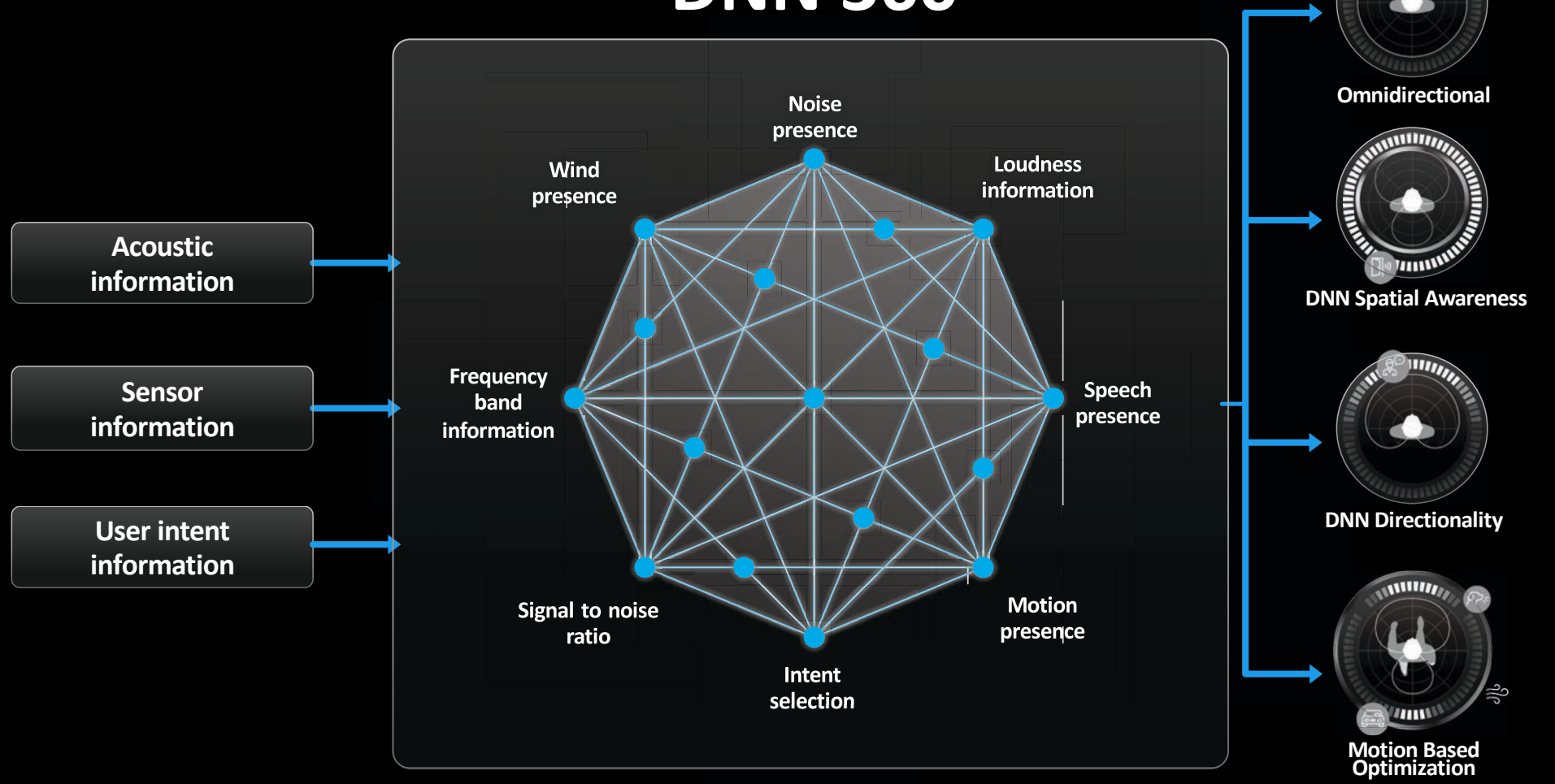
NO impact on
battery performance

CLEANER
PURER SIGNAL

DNN 360



DNN 360



DNN 360



Omnidirectional



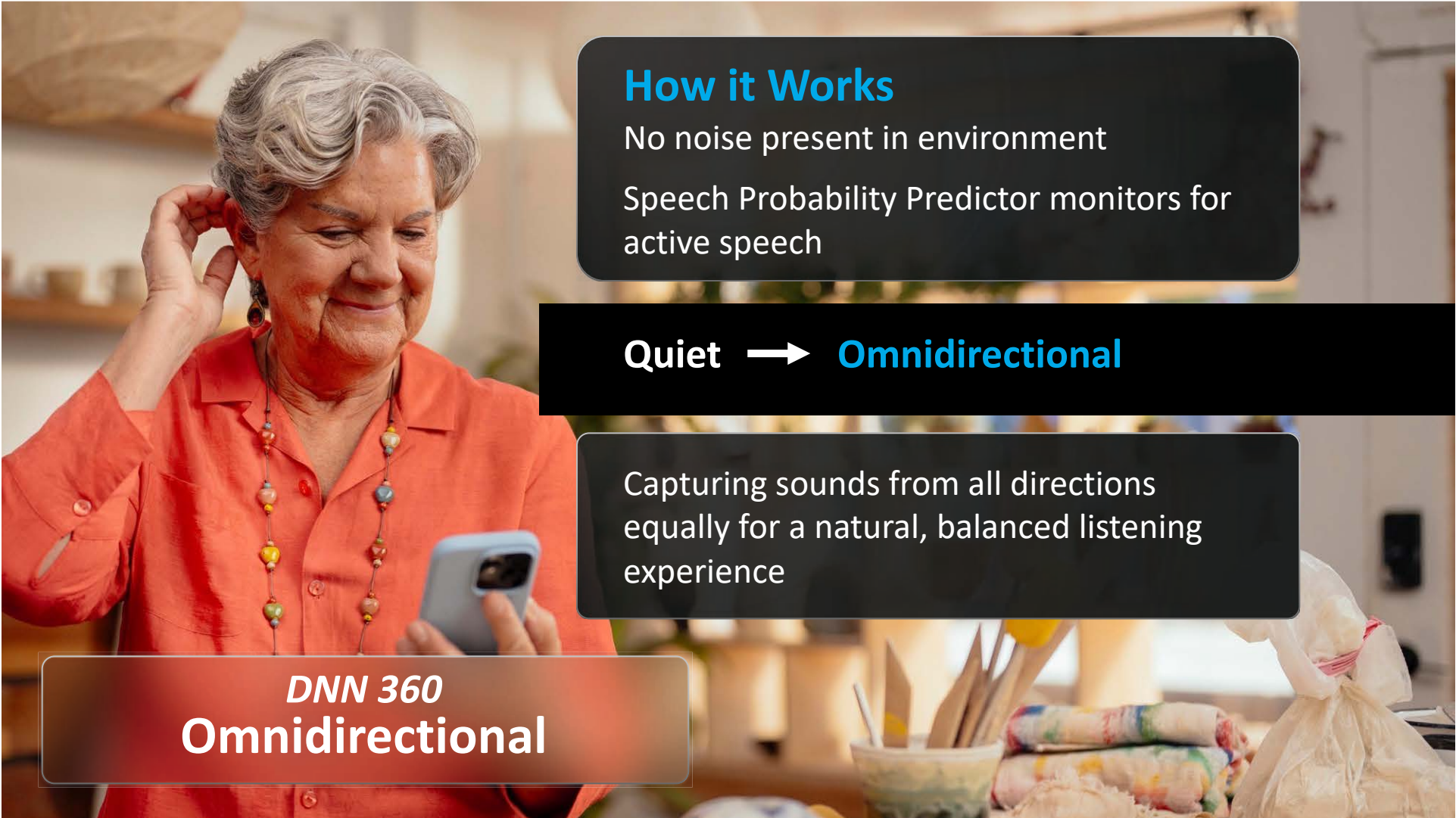
DNN Spatial Awareness



DNN Directionality



Motion Based Optimization



How it Works

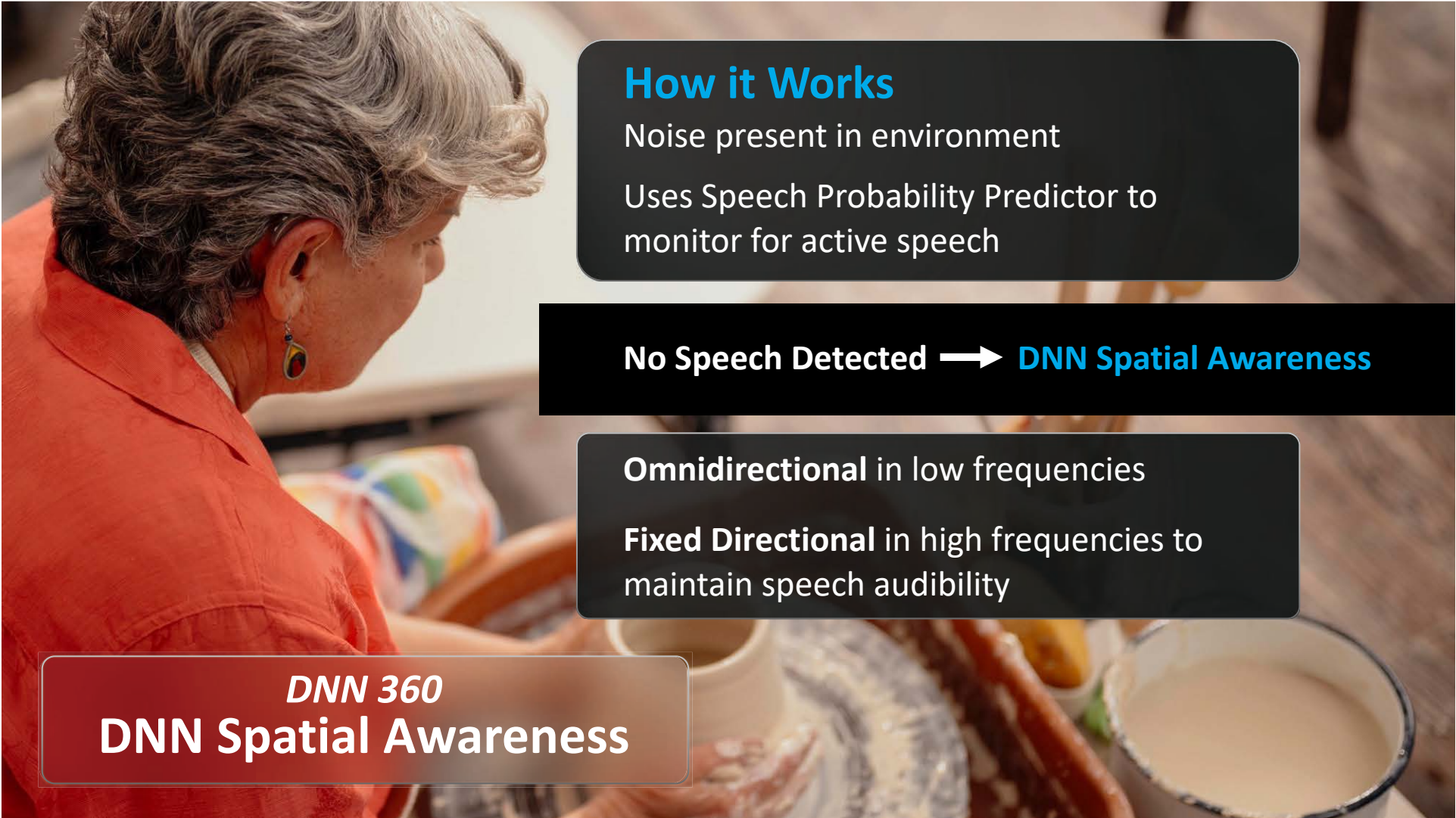
No noise present in environment

Speech Probability Predictor monitors for active speech

Quiet → Omnidirectional

Capturing sounds from all directions equally for a natural, balanced listening experience

DNN 360
Omnidirectional



How it Works

Noise present in environment

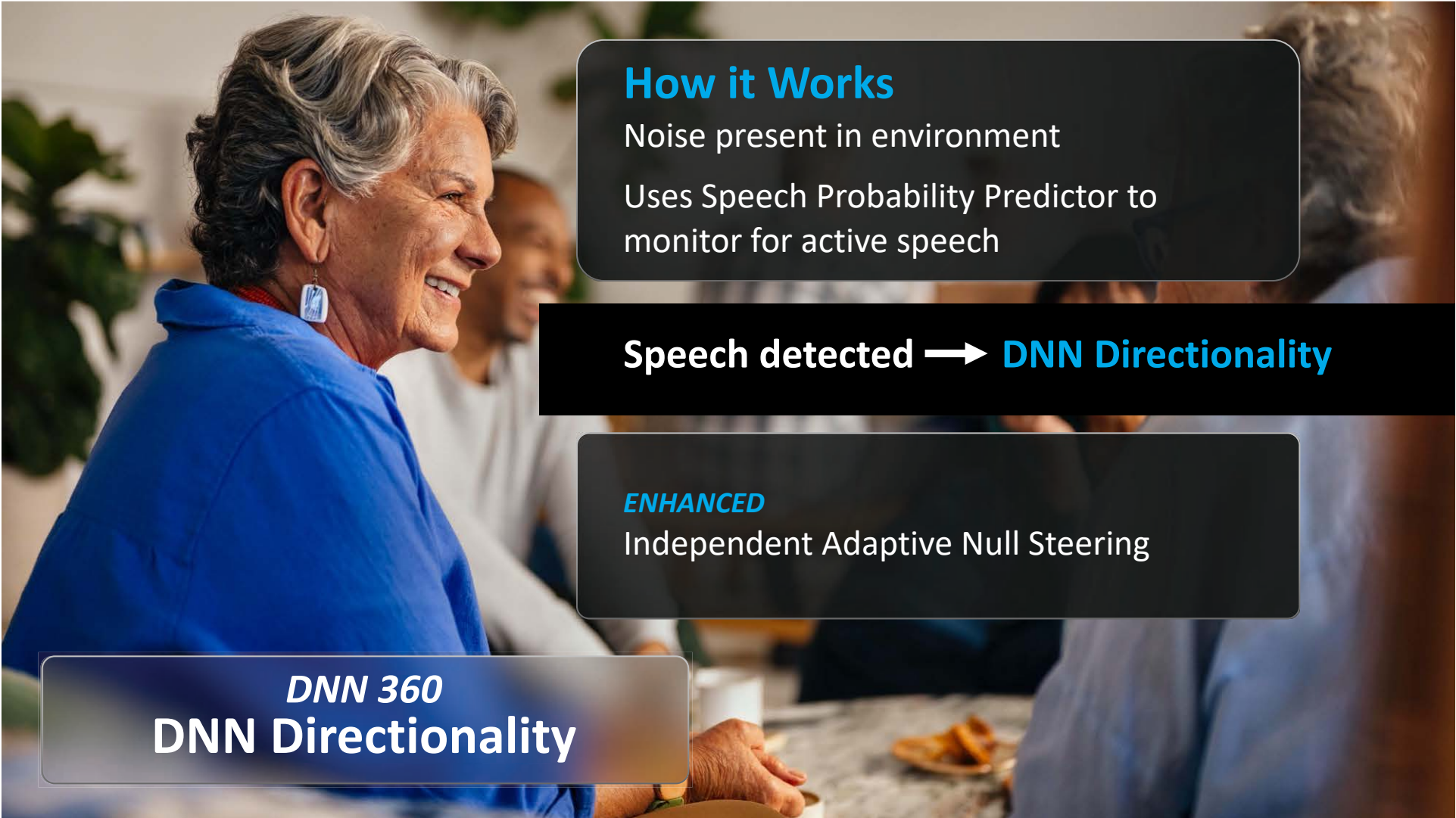
Uses Speech Probability Predictor to monitor for active speech

No Speech Detected → **DNN Spatial Awareness**

Omnidirectional in low frequencies

Fixed Directional in high frequencies to maintain speech audibility

DNN 360
DNN Spatial Awareness



How it Works

Noise present in environment

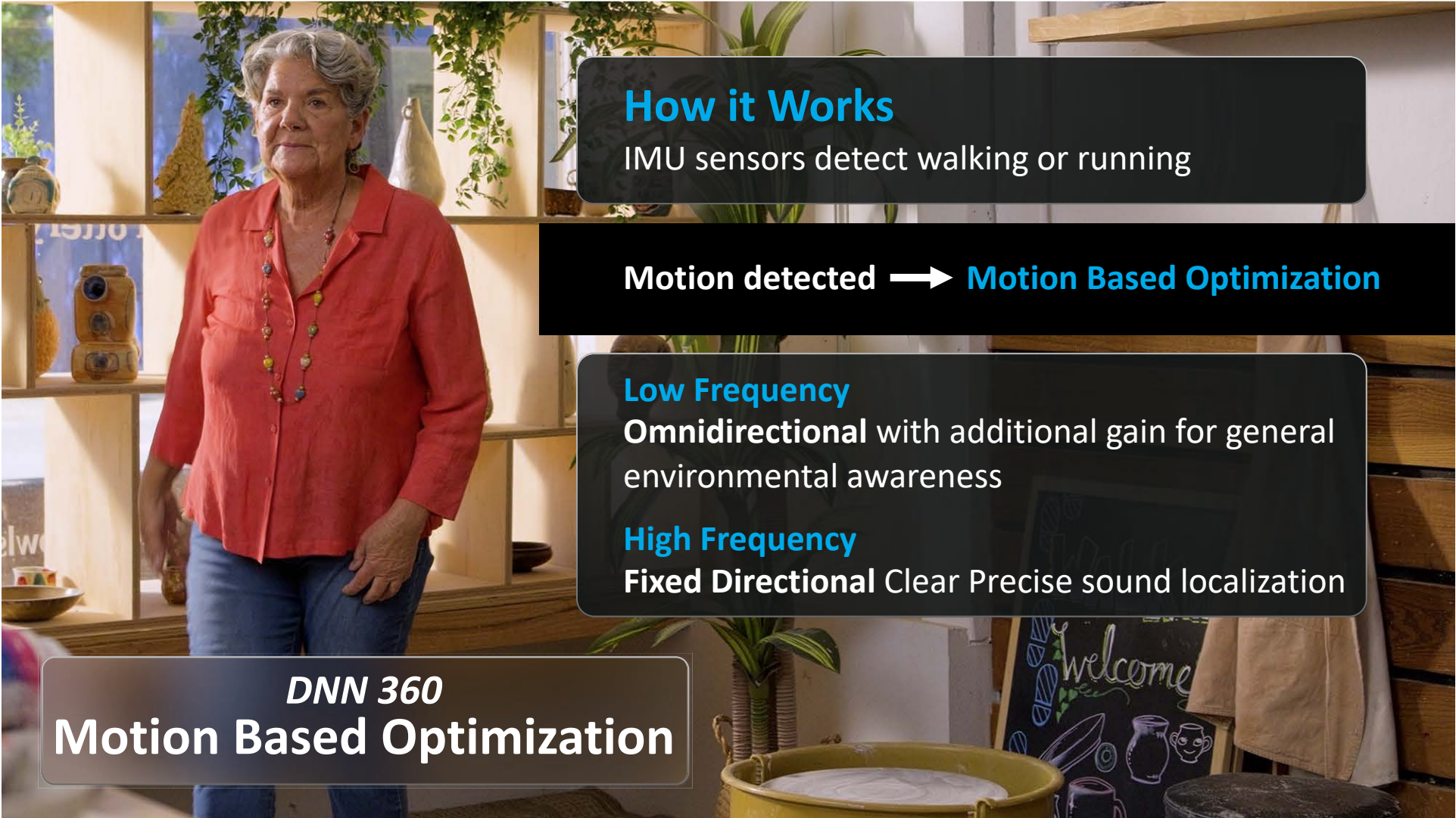
Uses Speech Probability Predictor to monitor for active speech

Speech detected → **DNN Directionality**

ENHANCED

Independent Adaptive Null Steering

DNN 360
DNN Directionality



How it Works

IMU sensors detect walking or running

Motion detected → Motion Based Optimization

Low Frequency

Omnidirectional with additional gain for general environmental awareness

High Frequency

Fixed Directional Clear Precise sound localization

DNN 360
Motion Based Optimization

DNN 360

Exceptional sound, every direction





DNN 360

28%

improved

SPEECH
INTELLIGIBILITY

Up to
8dB SNR

FOR BETTER
SPATIAL
AWARENESS

Maintains *spatial awareness* in
non-speech environments

Maintains our *industry-leading*
battery life

INDUSTRY LEADING

Battery Performance



CIC 312 up to
8 days



Custom R up to
42 hours



RIC RT up to
51 hours

CROS up to
29 hours



mRIC up to
41 hours



RIC 312 up to
6 days

CROS up to
4 days

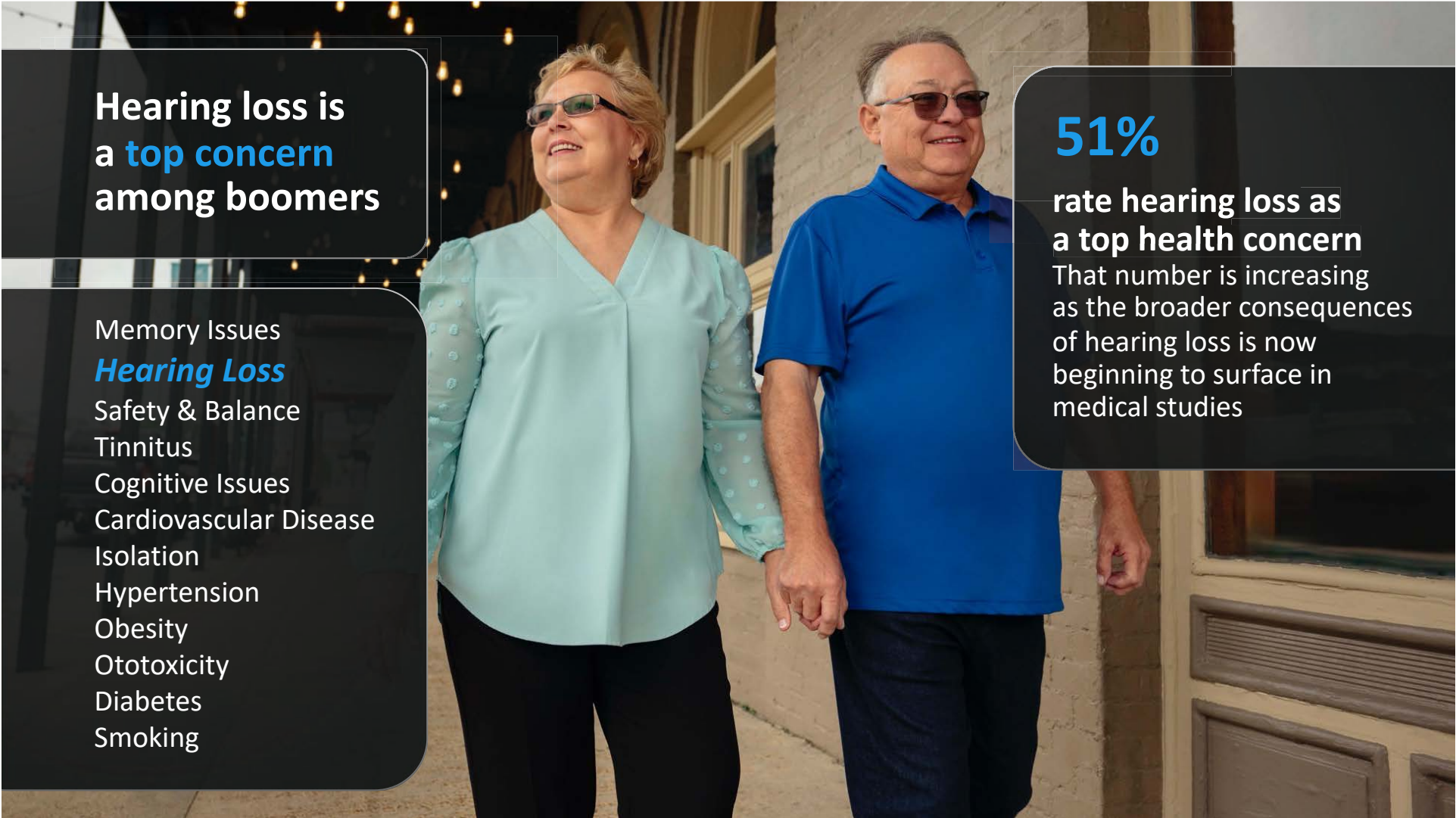
Battery life based on M (50 gain) receiver

INDUSTRY LEADING

Benefits *beyond* better hearing

Accurately track health
and engagement, and
achieve well-being goals





Hearing loss is
a **top concern**
among boomers

Memory Issues
Hearing Loss
Safety & Balance
Tinnitus
Cognitive Issues
Cardiovascular Disease
Isolation
Hypertension
Obesity
Ototoxicity
Diabetes
Smoking

51%

rate hearing loss as
a **top health concern**

That number is increasing
as the broader consequences
of hearing loss is now
beginning to surface in
medical studies

ACHIEVE Study

Aging and Cognitive Health Evaluation in Elders

A landmark randomized controlled trial to determine how hearing intervention affects brain health in older adults

MAIN FOCUS



Cognitive
Decline



Brain
structure



Mental
health &
well-being

OTHER AREAS



Physical
function



Healthcare
use

High adherence and satisfaction with hearing intervention sustained over 3 years

Positive effects* in communication impairment, loneliness, & social network size and diversity

Hearing intervention reduced 3-year global cognitive decline by 48% in the ARIC cohort[†]

*self perceived

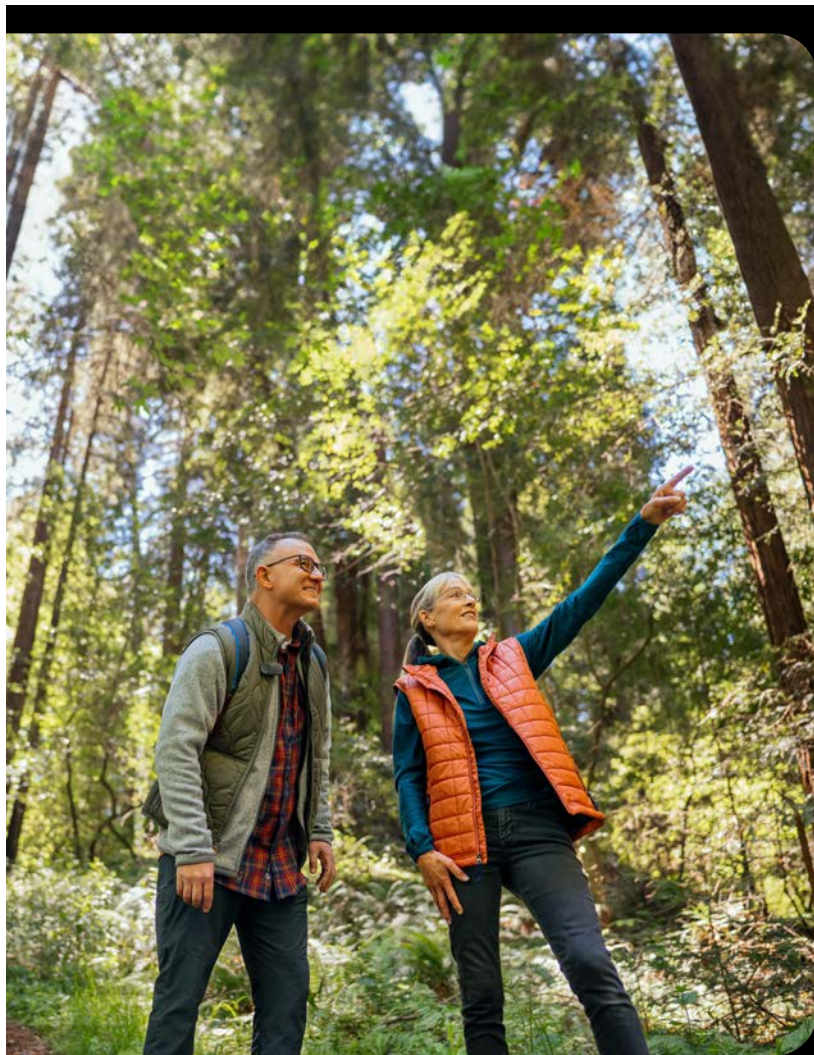
[†]Atherosclerosis Risk in Communities (ARIC) study is to investigate the causes of atherosclerosis and to measure how cardiovascular risk factors, medical care, and outcomes.



Gyroscope
Detects rotation

Accelerometer
Detects velocity changes

IMU
Inertial Measurement Units



Personal Health and Well-Being

Helps patients accurately count steps, track engagement, and achieve well-being goals

Most activity tracking classifications in the industry



Walking



Aerobics



Running



Biking



Falls and Balance



Personal Health and Well-Being

Taking advantage of all
the ear has to offer



**First and only
fall detection system**

Fall Alert



Peace of mind



Easy to use



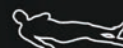
**INCREASED
INCIDENCE OF FALLS**
for every 10 dB of
measured hearing loss

Lin, F. R., & Ferrucci, L. (2012). Hearing Loss and Falls Among Older Adults in the United States. *Archives of Internal Medicine*, 172(4), 369. <https://doi.org/10.1001/archinternmed.2011.728>



30+ MINUTES
of moderate intensity physical activity per
day at age 65 was associated with a **35-40%**
reduced occurrence of falls when older

Paganini Hill A, et al. Lower likelihood of falling at age 90+ is associated with daily exercise a quarter of a century earlier: The 90+ Study. *Age and Ageing*, 2017;46(6), 951-957. <https://doi.org/10.1093/ageing/afx039>



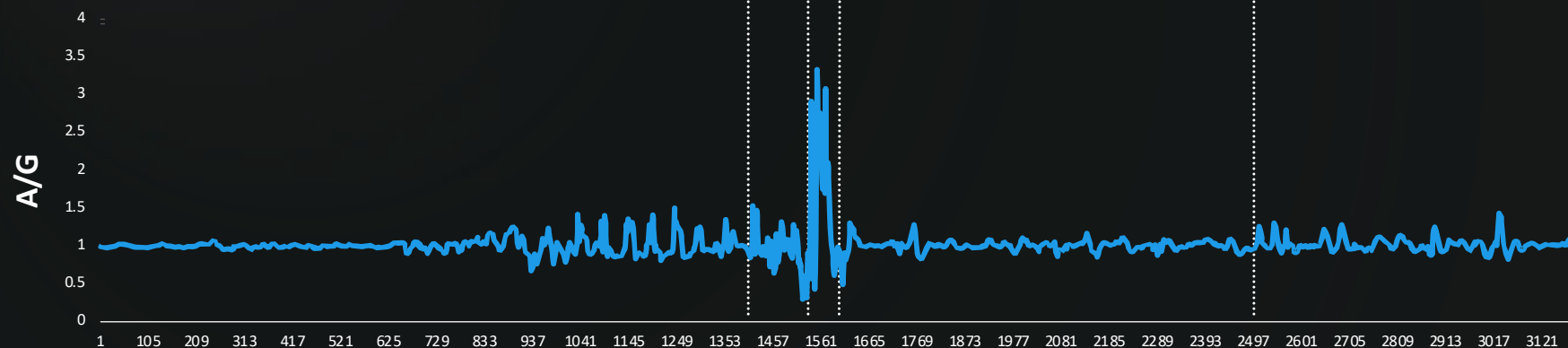
FALLING

IMPACT

PRE-FALL

RESTING

RECOVERY



Samples (104/second)

— Total Acceleration



WALKING



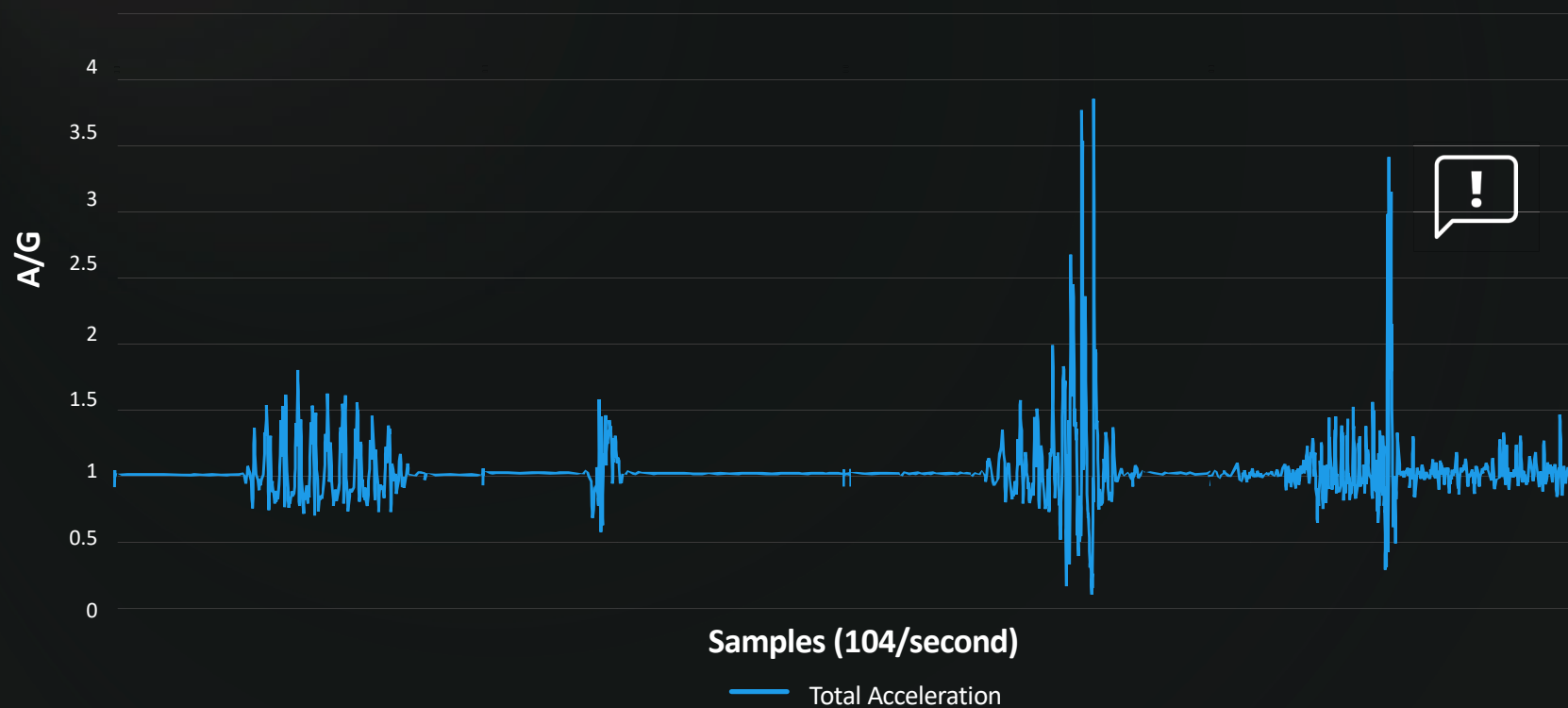
SITTING DOWN

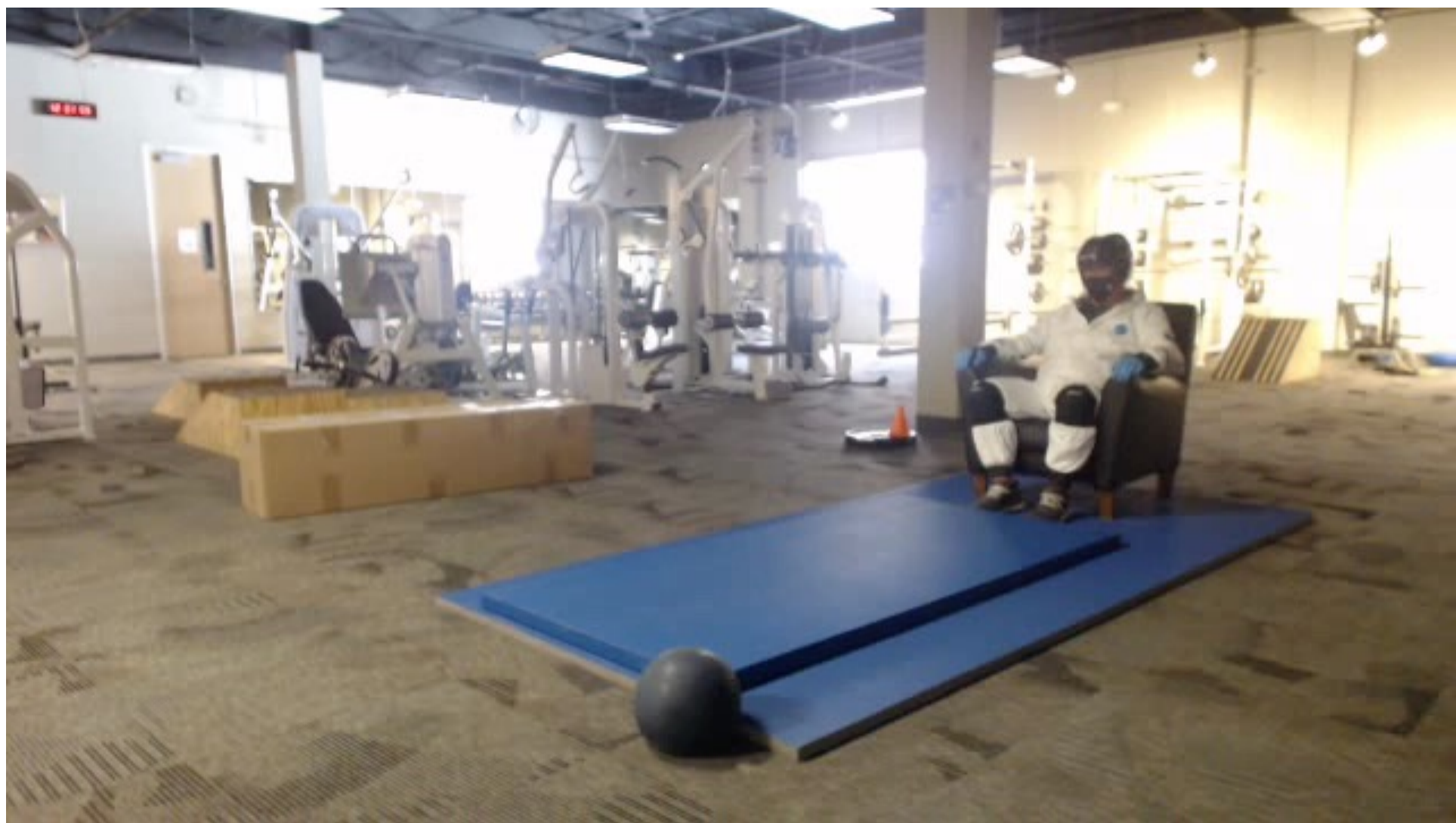


STUMBLE



FALL

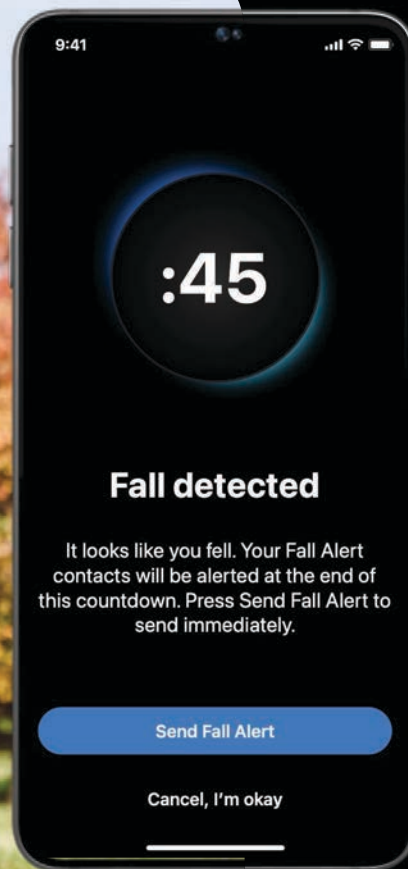








Slip backward on moving platform



Fall Alert



Detect falls and automatically alert family and friends



World's first and only hearing aid with fall detection and alerts

How it works

1



Fall is detected
or manual alert
is initiated

2



“Alert sent”
Alert is sent to
contact(s) or is
cancelled

3

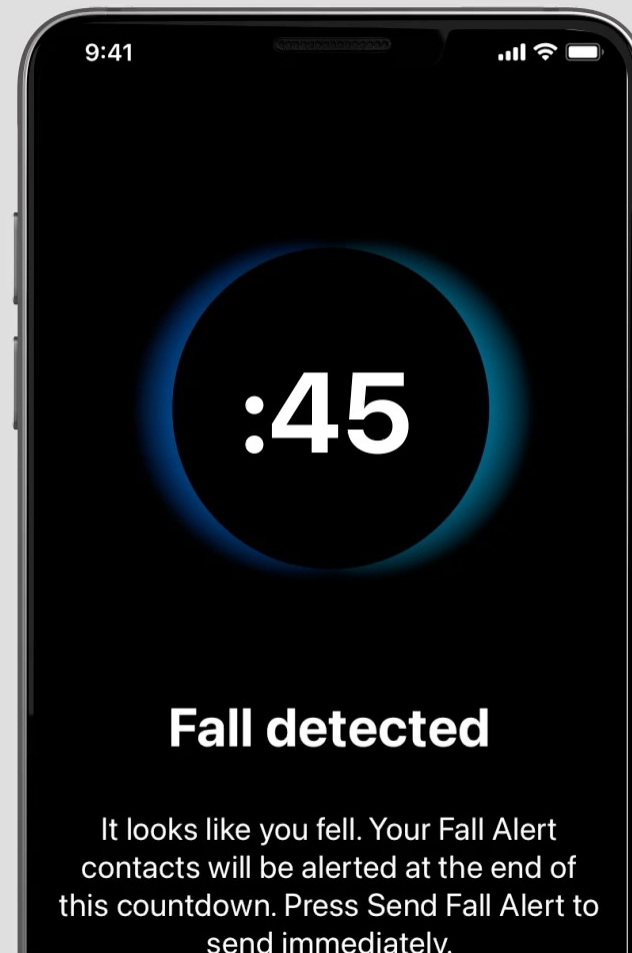


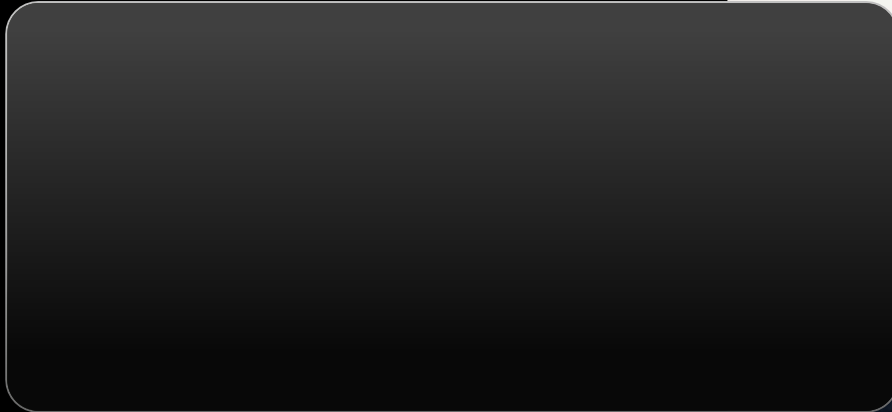
Contact(s) are
notified via text

4



“Alert received”
Patient receives
notification alert
was received
by contact(s)







86-year-old woman
Wearing Edge AI 24 RIC RT
Fall Detection and
Alerts enabled

A man with a white beard, wearing a yellow hoodie and tan pants, is standing on a path covered in fallen yellow leaves. He is performing a balance exercise by lifting his right leg and holding it with his right hand, while his left arm is extended outwards for balance. The background shows trees with yellow leaves, suggesting an autumn setting.

Balance Assessment

Exercises based on the
CDC's STEADI Program

Quickly assess elements
of balance

Performed as needed

EXCLUSIVE TO OMEGA AI

Balance Builder

Exercises similar to
those from the Otago
Exercise Program

Exercises help strengthen
elements of balance

Perform exercises regularly

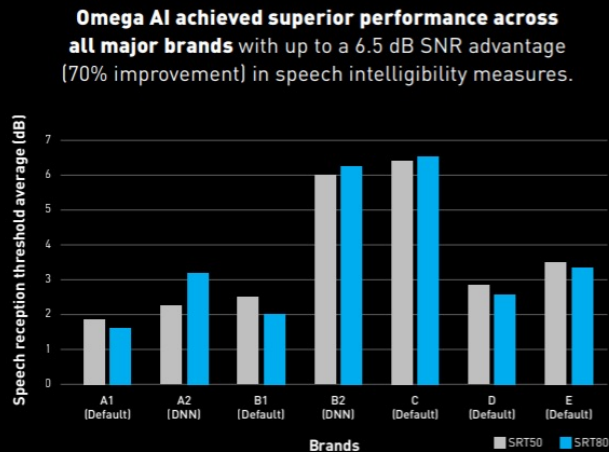
OMEGA^{AI}

THE WORLD'S FIRST DNN-POWERED DIRECTIONALITY FEATURE

Starkey introduces **DNN 360**, an all-new approach to intelligent directionality.

BETTER THAN THE REST IN NOISY CONDITIONS

Larissa, T. & Marquardt, D. [2025]



8^{dB} UP TO **IMPROVEMENT**
SNR FOR BETTER SPATIAL AWARENESS

Marquardt, D. et al. [2025]

28%

**BETTER SPEECH
INTELLIGIBILITY**

COMPARED TO PREVIOUS TECHNOLOGY

Marquardt, D. et al. [2025]

93%

World's first **generative AI**
assistant with 93% accuracy

Mehraei, G. et al. [2025]

**WORLD'S FIRST
BALANCE BUILDER &
RESPIRATORY RATE**

WELLNESS FEATURES

OMEGA^{AI}

Technology so intelligent,
it's superhuman

