

Hearing protection technology has been the successful focus of a team within the Western Australian Telecommunications Research Institute (WATRI), a collaboration between Curtin and The University of Western Australia for research in wireless systems, signal processing and electronic systems.

Six years ago, Professors Sven Nordholm and Kevin Fynn, from Curtin's School of Electrical Engineering and Computing, began focusing WATRI's expertise on developing a technology to assist workers in industries where noise-induced hearing loss can be a risk.

'A major problem for workers in noisy environments was they had no choice but to use conventional earmuffs or earplugs that inhibit face-to-face communication,' Nordholm said.

'We developed new "speech-enhancement" algorithms that filtered extraneous noise from entering an array of microphones but admitted useful soundwaves such as human voices.'

Proof-of-concept for the new technology was completed in 2004, and its success led to the company Sensear Pty Ltd being formed. The team has now produced a range of hearing-protection devices that enhance voice communications where acoustic signal-to-noise ratios are problematic.

'The Sensear technology allows binaural processing, which means that directions of external sounds are maintained – an important capability in environments where alarms or sirens occur,' Nordholm said.

'Wearers can also communicate more clearly while using electronic devices such as mobile phones and two-way radios.'

The headsets are now used in a range of environments where noise-induced hearing loss could be an issue, such as in the military, and across commercial and hospitality industries. Notably, Sensear is providing its world-leading technology to companies such as Alcoa, BHP Billiton and Qantas.

The success has now led to the Australian Research Council awarding Sensear and Curtin a three-year grant to further develop the technology into products that are suitable for people who must also use hearing aids.

The new project aims to solve the issue of acoustic feedback, or 'howling', which limits the amplification that can be achieved for selective frequencies; for the hearing-impaired, this can prevent their use of electronic hearing protection devices.

'First we want to advance the body of knowledge about speech intelligibility,' said Nordholm, who is chief scientist at Sensear.

'Specifically, we need to better understand how the human auditory system performs complex binaural signal analysis and synthesis under adverse listening conditions.'

The Sensear team will then apply the knowledge to develop algorithms that exploit both the human auditory model and sonic cues.

'This project has the potential to innovate speech and hearing products – and to lead to the next generation of audio communication devices in general,' Nordholm said.

sensear.com

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SENSEAR IS DEVELOPING NEW AUDIO TECHNOLOGY FOR NEXT-GENERATION SPEECH AND HEARING DEVICES, SUCH AS HEARING AIDS, HEARING PROTECTION HEADSETS AND AUDIO COMMUNICATION DEVICES.

