

Cooperative Research Centre for Cochlear Implant & Hearing Aid Innovation

CRC HEAR



CENTRE MISSION

The unifying mission of the Cooperative Research Centre for Cochlear Implant and Hearing Aid Innovation (CRC HEAR) is to improve communication for the millions of hearing-impaired adults and children in Australia and the rest of the world through Hearing, Education and Research.

OBJECTIVES

The Centre couples the individual strengths of the Parties into multidisciplinary research leading to:

- innovations enabling new hearing technology products;
- innovative clinical procedures that enhance benefits to users of hearing devices;
- innovative approaches expanding professional training;
- innovative technology transfer activities to ensure that Centre research and education outcomes result in improved communication benefits for hearing impaired adults and children.

In Australia alone, over 2 million adults and children suffer from hearing disabilities. With rising noise levels in everyday life, and the aging of the population, the number of people with hearing loss will continue to rise. Australian Bureau of Statistics survey data show that hearing loss will affect 1 in every 10 Australians, leading to increased social isolation and medical problems, as well as decreased quality of life.

CRC research and innovations are enabling new products that will help to restore near-normal hearing of speech, music and other sounds to hearing-impaired adults, and allow hearing-impaired infants to develop natural speech and language.

CRC HEAR ~ fostering Hearing, Education & Research

CRC HEAR is an unincorporated joint venture, dedicated to developing new hearing prosthetics and procedures to improve communication for hearing-impaired adults and children. CRC HEAR has built on the successful relationship between Cochlear Limited and The University of Melbourne, which contributed to the development and market success of the Nucleus family of multiple-channel cochlear implants. CRC HEAR links these two organisations together with The Bionic Ear Institute and the National Acoustics Laboratories into a major collaborative research entity, capable of conducting interdisciplinary research across a wide range of cochlear implant and hearing aid technologies. CRC HEAR also incorporates 14 Support Parties, each providing specialist technological know-how or clinical expertise. CRC HEAR collaborates with international research centres in the fields of cochlear implants and hearing aids and works with the Parties to develop new markets for Australian hearing prosthetics.

CORE PARTIES

- Australian Hearing (National Acoustics Laboratories)
- The Bionic Ear Institute
- Cochlear Limited
- The University of Melbourne (Department of Otolaryngology & Department of Learning and Educational Development)

SUPPORT PARTIES

Research teams in CRC HEAR benefit from combined expertise and infrastructure support of 14 Support Parties spread geographically across a number of Australian states.

New South Wales-based Parties:

- The Royal Prince Alfred Hospital Adult Cochlear Implant Program, (The Central Sydney Area Health Service)
- St Gabriel's School for Hearing-Impaired Children
- The Shepherd Centre for Deaf Children and Their Parents (NSW)
- Children's Hospital Westmead (The Sydney Cochlear Implant Centre (NSW))
- The University of Sydney, Department of Surgery
- The University of Wollongong, Intelligent Polymers Research Institute

Victoria-based Parties:

- The Audiological Society of Australia Inc
- The Royal Victorian Eye and Ear Hospital, Cochlear Implant Clinic
- St Mary's School for Children with Impaired Hearing Inc.
- Siemens Hearing Instruments
- Taralye (The Advisory Council for Children with Impaired Hearing (Victoria))

Queensland-based Parties:

- Griffith University (and the MicroTechnology CRC)
- The Hear and Say Centre for Deaf Children and Their Parents
- Queensland Hearing

OTHER COLLABORATIVE PARTIES (AUSTRALIAN & INTERNATIONAL)

- Kilmarnock Cochlear Implant Clinic
- Manchester Cochlear Implant Clinic
- Massachusetts Institute of Technology
- Medizinische Hochschule Hannover
- New York University Medical Centre
- University of Freiberg HNKO Klinik
- University of Iowa
- University of Hong Kong
- Washington University School of Medicine

CRC HEAR's links with these Australian and international research and clinical groups allows for more rapid accumulation of results and focused collaborations. It also adds to the international applicability of research outcomes, which have been independently verified in a number of research centres.

An exciting new project with the University of Hong Kong will address speech processing for speakers of tonal languages.

Hearing Education & Research

COCHLEAR IMPLANT INNOVATIONS

Cochlear implants provide improved understanding of speech for adults and children with profound hearing loss. Approximately 2,000 adults and children in Australia, or 10% of the potential users, have chosen to have a cochlear implant.

CRC HEAR collaborated with industry partner Cochlear Limited to assist the development of the ESPrit ear-level speech processor for users of the Nucleus 24 and 22 cochlear implant systems, including the new ESPrit 3G, a state-of-the-art ear level speech processor, addressing the cosmetic and lifestyle concerns of many adult and teenage users, without sacrificing performance or function.

CRC research also helped Cochlear Limited in the development of the Contour electrode array, winner of the Australian Design Award 2000 and a U.S. Silver Medical Design Excellence Award 2001. CRC research is exploring new avenues for development of cochlear implants with expanded capacity for information transmission and improved control of auditory nerve stimulation.



HEARING AID INNOVATIONS

The largest proportion of hearing-impaired adults and children however, are those with mild to moderate hearing loss. Of these, only 25-30% currently use hearing aids.

CRC HEAR collaborated with Australian Hearing to develop NAL-NL1, a major advance in fitting of non-linear hearing aids, now being used by major international hearing aid companies and audiology equipment suppliers. CRC research is developing new, quieter, and more reproducible microphones that will enable hearing aids to improve speech understanding in noisy environments. In addition, CRC research is addressing the problems of a reduced ability to localise the source of sounds and the unpleasant occlusion effect resulting from a device blocking the ear canal. Two major projects are aimed at devising methods by which hearing aids should automatically adjust their amplification characteristics in different background noises. The involvement of Bernafon in CRC research provides important capacity for prototyping and supply of advanced hearing devices.

CRC research was fundamental to development of the SoundShield, an acoustic shock protector for headset users.

CLINICAL INNOVATIONS

CRC research is developing new clinical procedures that allow customisation of speech processor & hearing aid programming, more efficient fitting procedures including use of electrophysiology, more accurate prediction of potential benefits for individuals, and more predictable outcomes, ensuring that cochlear implants and advanced hearing aids are becoming the management option of choice for an increased proportion of hearing-impaired adults and children.

DI-EL First Words is an example of CRC clinical tools - DI-EL provides qualitative information about early language progress in young hearing-impaired children not available from other assessment tools. It uses a diary technique and parent report methods to assess and monitor a child's language acquisition.

CRC HEAR - COMMERCIALISATION

SPEAR3 Speech Research System comprises an advanced DSP together with programming software and a sound processor suitable for unilateral or bilateral cochlear implant and/or hearing aid research.

Adaptive Dynamic Range Optimisation (ADRO)TM is advanced digital signal processing software, which produces improved speech perception and quality of sound for cochlear implant users (through Cochlear Limited) and hearing aid users (through CRC spin-off - Dynamic Hearing).

SoundShield the world's best acoustic shock protection device for users of telephone headsets, now manufactured by Polaris Communications.

NAL-NL1 is a software program for prescription fitting of hearing aids that maximises speech intelligibility for hearing aid users.

Audiology and Clinical Education Products. Word/Sentence Perception Test Audio CDs, CASALA (Computer Aided Speech and Language Analysis), DI-EL First Words (early language development guide).

Postgraduate and Professional Educational Services

CRC HEAR offers opportunities for post graduate research in our fields, and intensive four and five-day training courses covering all aspects of cochlear implant surgery, patient selection and rehabilitation, designed for audiologists, surgeons and clinicians.

Contract Research:

DSP Engineering in Communications

CRC HEAR offers experience in the development of speech processing strategies for use in hearing aids, cochlear implants and telecommunications equipment. Such strategies are designed to maximise speech intelligibility and hearing comfort, in a variety of hearing situations. CRC HEAR can develop algorithms to meet the needs of the strategy, or create programming to implement an existing algorithm. Our programmers have expertise with a variety of software packages including Borland C++ and Matlab.

Microfocus Imaging X-ray & Fluoroscopy

CRC HEAR has a specialised facility for microfocus imaging X-ray and fluoroscopy. We can produce quality digital high magnification images of small equipment components and zoological and anatomical specimens. The images offer precise records of internal anatomical details and component position.

Clinical trials

CRC HEAR offers expertise in clinical assessment of therapeutic hearing devices such as hearing aids and audiological equipment. Our audiological and scientific staff are trained in clinical trial design and statistical analysis. CRC HEAR can design and carry out a clinical trial and analyse the resultant data or provide expert advice as required.



HearWorks Pty Limited is the commercial arm of the Cooperative Research Centre for Cochlear Implant and Hearing Aid Innovation (CRC HEAR).

HearWorks offers a range of products and services developed by CRC HEAR for clinicians and researchers, and for sale or license to commercial partners.

The intellectual property rights for technologies and products developed by CRC HEAR are held by HearWorks which manages the licensing or sale of intellectual property directly or through Parties or spin-off companies.

HearWorks also manages contract research conducted by CRC HEAR research staff.

HearWorks holds interests in CRC spin-off companies Dynamic Hearing Pty Ltd and Microphones Pty Ltd.

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