

Seminar



IRA A. FULTON SCHOOL OF ENGINEERING

Challenges in cochlear implant sound perception

Brett Swanson, Phd

Abstract: A cochlear implant restores a sense of hearing to a person with severe to profound deafness. More than 100,000 people have received a Nucleus cochlear implant, manufactured by Cochlear Ltd. Most recipients achieve good speech perception under good listening conditions, but the two big challenges are speech perception in noisy conditions, and pitch perception.

To address speech in noise, the Nucleus Freedom processor incorporates a dual-microphone adaptive beam-former. Multi-band gain-control algorithms compensate for the limited dynamic range of electrical stimulation.

Cochlear implant recipients report disappointment with music, and have difficulties with tonal languages. Attempts to improve pitch perception by changing the sound processing and stimulation strategy have not been successful. This is most likely due to our inability to reproduce the spatio-temporal neural firing pattern evoked by resolved harmonics in normal hearing. The only demonstrated method of improving pitch perception is to make use of residual acoustic hearing, with a contralateral hearing aid, or with the new hybrid device which incorporates low-frequency acoustic stimulation in conjunction with a short electrode array.

Biography: Brett Swanson received a Bachelor of Electrical Engineering from the University of New South Wales (Sydney, Australia) in 1985. He joined Cochlear Ltd in Sydney in 1992. He has worked on integrated circuits for cochlear implants and sound processors, clinical software, and digital signal processing (DSP) firmware. In 2008 he received a PhD from the University of Melbourne for a thesis entitled "Pitch Perception with Cochlear Implants". He is presently engaged in research into cochlear implant sound perception, and is collaborating with the ASU Center for Adaptive Neural Systems on neural-enabled hand prostheses.

Location and Time:

Location: ISTB1 227
Time: 9:30am - 10:30am
Date: July 10, 2009

Contact for further information:

Jeanine Elliott
Phone: 480-965-9489
Fax: 480-727-7624
E-mail: jeanine.elliott@asu.edu

Map: <http://www.asu.edu/tour/main/istb1.html>



"designing adaptive engineered systems to promote adaptation in neural systems"