Extracting speech embedded in high noise is a problem with rich applications such as hearing aids, hands-free operation of computers, mobile phones, PDA:s etc.. Other traditional applications are audio-video conferencing and voice input for automobiles. In current time there is also significant interest in speech extraction and separation in security, forensic and surveillance applications. For all those applications there is advantages in using more than a single sensor. When considering the sensor array it is most commonly microphones. Typical numbers of sensors are 2-4 in simple applications such as mobile phones, automobiles or computers and for other applications the number of sensors grows mainly as the speaker distance from the array and the reverberation increase. The nature of the problem change significantly for the different applications even if it is the same basic problem to be solved. The problems are far from solved under practical circumstances and significant work is still contributed to these applications mainly for three main reasons:

1. The speech source or speech sources are not available as a reference.
2. The acoustic environment is reverberant and also changing due to movement of speaker and interferer’s.
3. The microphones needs calibration and matching and they are sensitive to temperature variations.

This implies that we know which speaker to extract but that is not straight forward in all applications. To limit the presentation this talk will mainly consider the voice input for PDA:s and mobile phones. Different array processing technologies to improve the speech signal in those applications will be discussed and how the processing can be performed such that good results are obtained even under realistic operational conditions.

About the Speaker:

Prof Sven Nordholm PhD, MIEEE, School of Electrical Engineering and Computing, Curtin University of Technology


He was one of the founders of the Department of Signal Processing, Blekinge Institute of Technology, Sweden in 1990. At BTH he held positions as Lecturer, Senior Lecturer, Associate Professor and Professor. Since 1999 he has been a professor at Curtin University of Technology in Perth, Western Australia. From 1999-2002 he was director of ATRI. He was research director Wireless program ATcsc 1999-2006. Currently he is professor in Department of Electrical and Computer Engineering, Curtin University of Technology. He is also Chief Technology Officer and co-founder of a start-up company Sensear. He is a Senior Member of IEEE.

His main research interests have been Speech Enhancement, Adaptive and Optimum Microphone Arrays, Acoustic Echo Cancellation, Sub-band Adaptive Filtering and Filter Bank Design.