NATIONAL AND INTERNATIONAL CONTACTS

Our contacts with other research institutions in Sweden and internationally are well developed. Of major importance in this respect is our scientific journal, the TMH-QPSR, which has four volumes/year. Close to 900 copies are distributed to 56 countries. Abstracts from the contributions in the 2000 issues are included in this report.

We have several guest researchers staying half a year or longer, and we participate in a substantial number of international symposia, conferences, and workshops, as listed in the following sections.

Speech Group

The Speech group is engaged in European co-operation within the COST-program (European Co-operation in the Field of Science and Technical Research) in projects on

- *speech recognition* (COST 249, Continuous speech recognition over the telephone
- *speaker recognition* (COST 250, Speaker recognition in telephony), and
- *speech synthesis* (COST 258 - Naturalness of synthetic speech).

We also participate in two new, related actions that started recently

- COST 275 - Biometrics-Based Recognition of People over the Internet
- COST 278 - Spoken Language Interaction in Telecommunication.

We have also been part of several other European projects, such as projects on

- *speaker recognition* (PICASSO),
- *spoken dialogue* (DISC).

The department is the Swedish managing node for *Elsnet*, the *EU*-sponsored European Network for Language and Speech Research.

Within the current EC-program *TIDE* (Technology Initiative for Disabled and Elderly), we have been engaged in *ENABL* (ENABler for computer-based vocational tasks with Language and Speech).

Another exponent of increased European co-operation in the speech research area is *ISCA* (International Speech Communication Association), where we are represented on the board.

Outside Europe, we have contacts with several groups on a non-formal basis. Exchanges of students, guest researchers, shorter visits, and exchange of reports is the normal mode of operation. Of special interest is the long-lasting close contact with speech researchers at *MIT*, USA, and the increased contacts with *ATR*, Japan.

In the context of *ISAAC* (International Society for Augmentative and Alternative Communication), we have been very active, having had a member on the board of both the international organisation and the Swedish chapter.

We have had an important role in extending interdisciplinary contacts within Sweden, e.g., through almost weekly demonstrations, lectures, and open-house activities for schools and professional organisations.

Swedish dialogue systems (*SDS*) has been studied in co-operation with Linköping, Lund and Gothenburg Universities. This work was carried out within the *"Language Technology Program"* jointly sponsored by *NUTEK* (Swedish National Board for Industrial and Technical Development) and *HSFR* (Swedish Council for Research in the Humanities and Social Sciences). This program has now ended. We are part of a continuation in the form of a national research school.

Contacts with Linköping University have been active, with joint education in speech technology and a project on spoken dialogue modelling.

We have also close technical and scientific contacts with

- Telia Promotor (Infovox) AB, which markets speech technology products based on our research and development
- The research department of Telia, the Swedish Telecom (Telia Research AB)
- Special Instrument AB, which markets the tactile aid "Minivib4" and some of our aids for speech training;
- Rehabmodul AB
- Svenska ENTER Rehabilitering AB
- Fonema AB
- Statens Institut för Handikappfrågor i Skolan (SIH, the National Swedish Agency for Special Education), which market aids for motorically handicapped.

Within CTT we have during 2000 had formal co-operation with thirteen companies:

- Ericsson Radio Systems AB
- Hjälpmedelsinstitutet
- Levande Böcker i Norden AB
- Luftfartsverket
- PipeBeach AB
- Polycom Technologies AB
- SAAB
- Svenska Handelsbanken AB
- Sveriges Radio AB
- Telia Promotor AB
- Telia Research AB
- Trio Informationssystem AB
- Vattenfall AB, and

Music acoustics group

The group is involved in four new projects sponsored by the European Commission. Thus, the group has been awarded the status of a **Marie Curie Training Site**, which can pay visit by doctoral students in the area of music acoustics from universities in other European countries.

The project Music Orchestration Systems in Algorithmic Research and Technology (**MOSART**), started the first of September, is a network for co-operation in research and doctoral education in the area of music and sound, *[http://www.diku.dk/research-groups/musinf/-mosart/]*. The principal coordinator is Jens Arnspang, Copenhagen. The project is closely related to the Director Musices grammar for music performance.

The project Multisensory Expressive Gesture Applications (**MEGA**) is also closely related to the Director Musices grammar. It focusses on the relationship between music and gestures, *[http://www.megaproject.org/].* The project was started the first of November and its principal co-ordinator is Antonio Camurri, Genova.

The Sounding Object (**SOB**) project aims at developing realistic and musically useful sound models *[http://www.soundobject.org/].* The project started in January 1, 2001, with Davide Rochesso, Verona, as the principal co-ordinator.

Johan Sundberg continued his cooperation with *Det Jyske Musikkonservatorium*, Aarhus, Denmark. The topic concerns whether or not professional opera singers of different classifications sing with a velopharyngeal opening. The projects is carried out as together with singing teachers Peer Birch, Aarhus, Bodil Gümoes and Hanne Stavad, Copenhagen, and the phoniatrician Svend Prytz, Copenhagen. A manuscript on the measurements has been finalised and submitted.

Johan Sundberg also continued the research project on singing styles used in popular music in cooperation with Drs Tom Cleveland and Ed Stone, *Vanderbilt Voice Centre*, Nashville, Tennessee. During a visit in Nashville in January they studied voice source differences in a professional female singer who sang the same songs in the classical and Broadway-musical styles.

Johan Sundberg spent some days also at the *Institut für Stimmforschung* at the *Hochschule für Musik Carl Maria von Weber*, Dresden. This project concerns singers' ability to stay in tune when their auditory feedback is eliminated, e.g., by a loud orchestral accompaniment. He also discussed a new research project on a scientific analysis of a unique material of more than 300 X-ray profiles of the heads of singers who were admitted to a solo singer education at this conservatory. The project is carried out by a young, energetic student, Friederike Schneider.

Anders Friberg and Johan Sundberg spent a week in Zürich working together with Max Mathews, Stanford University, and Gerald Bennett, professor of composition at the Zürich Music Conservatory. The aim was to combine Mathews' sequencer system, the *Radio Baton,* with the Director Musices generative grammar of music performance.

Roberto Bresin and Anders Friberg were invited as guest researchers by professor Gerhard Widmer at the Austrian Research Institute for Artificial Intelligence (ÖFAI). The project concerned the Director Musices performance grammar. Friberg stayed a week and Bresin one month, analysing staccato and legato articulation in a great number of professional performances of piano music recorded on Synclavier and Bösendorfer pianos.

Hearing Technology Group

The Hearing Technology group is engaged in European co-operation as a full partner within SPECO (A Multimedia Multilingual Teaching and Training System for Speech- and Hearing-Impaired Children). We have a close co-operation with the National Acoustic Laboratories (NAL) in Sydney, where one member of the group is now a visiting researcher. We also maintain an exchange program with AG Medizinische Physik at the University of Oldenburg.

We have close contacts with the hearing-instrument industry. GNResound has supported some of our work on signal processing algorithms for hearing aids.

We co-operate with Swedish audiological clinics and with all educational programmes for clinical general audiologists in Sweden. We participate in teaching and research supervision related to signal processing in hearing aids and methods for the fitting and evaluation of personal aids for hearing-impaired persons. We also co-operate with teachers at schools for the deaf concerning methods for speech training.