

CV for Joakim Gustafson

1.0 INTRODUCTION

1.1 Name:

Joakim Gustafson

1.2 Date of birth

August 17, 1966

1.3 Gender

Male

1.4 Living address and telephone number

Trillans väg 37, 131 49, Nacka. Mobile: 070 206 08 17

1.5 Work address, telephone number, email

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1.6 Present employment

Biträdande lektor i Talteknologi, (Future Faculty Associate professor), at the Dept. of Speech, Music and Hearing, (TMH, KTH CSC) since 2007-07-01.

1.7 Previous employments

Doctoral student at the department of Speech, Music and Hearing (TMH/KTH) 1993-2000

Industrial researcher in speech technology at the Telia R&D department, 2000-2007

2.0 EXAMS AND EVALUATIONS

2.1 University degrees

Civ. Ing. Electrical engineering (with computer science orientation) at KTH, 1995.

Tech. Lic. Technical licentiate degree in speech communication 1996
(title: *A Swedish Name Pronunciation System*)

Tech. Doc. Technical doctorate degree in speech communication 2002
(Title: *Developing Multimodal Spoken Dialogue Systems - Empirical Studies of Spoken Human-Computer Interactions*)

2.2 Docent conferment

Docent Docent in speech technology 2009
(Title on seminar: *A keyboard..how quaint! – Building the Next Generation intuitive speech interfaces*)

3.0 SCIENTIFIC ACHIEVEMENTS

3.1 Brief account of own research profile

Over the past 18 years, I have gathered experience from working on all aspects of spoken language technology, in research as well as commercial settings. In the dialogue system projects I have participated in I have used as well as participated in the development of core technology components, such as speech recognition, speech synthesis, multimodal output generation, spoken language processing and dialogue management. I have presented papers at 24 international workshops and conferences, and participated actively in four EU projects and in two national multi-site projects. I have co-written EU-proposal on 11 occasions (6 times as coordinator) and proposals for national funding agencies on 6 occasions (VR, KK, FAS and RJ). At Telia Research, I participated in four development projects involving close collaboration with external companies. Taken together, these activities have given me an extensive network, both nationally and internationally, at research institutes as well as companies in my field. My core research interests are in the overall design of complete spoken dialogue systems, including empirical studies and evaluation of these systems through usability studies, as well as analysis of human-human conversational behavior. I have been able to pursue these research interests on account of my ability to collaborate with and inspire others, in order for us to do things we could not have done on our own. I have special interests in building publically available spoken dialogue systems and system that makes use of several modalities. I have conducted studies on how users are influenced by system behaviors, with the purpose of improving the system's understanding capabilities. However, my goal is to build conversational systems that do not force its users to interact in a special computer-directed manner, but rather ones that allow users to interact with a human metaphor in mind.

I did my undergraduate studies at the electrical engineering program at KTH 1987-1992. In addition, I took courses in linguistics at the Stockholm University. In 1992, I completed my undergraduate thesis work at TMH. In 1993 got a position at TMH, working in the EU project *Onomastica*, in which I developed a Swedish name pronunciation system, resulting in my licentiate thesis in 1996. In 1995 I started working with dialogue analysis, multimodal output and dialogue design in the *Waxholm* project (Carlson et al., 1995). In 1997, I participated in the *Olga* project (multi-site project: TMH, SICS, NADA and SU), where I developed the speech recognition grammars and worked on multimodal output generation together with Jonas Beskow. In 1997 I started the development of the *Gulan dialogue laboratory toolkit* together with Kåre Sjölander, and continued its development as part of the multi-site project *Swedish Dialogue Systems* (Gustafson et al. 1998). In 1998, TMH participated with an installation for the "*Cultural Capital of Europe*" at Stockholm Akademiska Forum in Kulturhuset. In conjunction with this, I initiated the *August project* where I led the development work (Gustafson et al., 1999). The aim was to build a synthetic August Strindberg that visitors could talk with. Apart from the system design, I built the dialogue and understanding parts of the system in collaboration with Nikolaj Lindberg. The system was used to collect and analyze more than 10.000 utterances from the general public, dialogue data which I analyzed in collaboration with Linda Bell. (Gustafson and Bell, 2000). In 1999, I started my collaboration with Johan Boye and Mats Wirén, at Telia Research who at the time participated in the Center for Speech Technology (CTT). Together with other colleagues we developed *Adapt*, which was a multimodal spoken dialogue system used to find apartments for sale in Stockholm (Gustafson et al., 2000).

In 2000, I was offered a position at Telia Research as a senior researcher in their multimodal group. My main role was to initiate and lead new research projects at Telia Research. Initially, I finished the development of *Adapt* by continuing my collaboration with Jens Edlund at CTT (Gustafson et al., 2002). In 2001, I participated in an internal Telia project, *TänkOm*, where we collaborated with industrial design companies, a computer game company (Liquid Media) and the Telecom museum in Stockholm. In the project we built an apartment of the future that the museum visitors could enter. I worked on the development of an animated agent called *Pixie* that visitors could talk with to play a game and to control the apartment. In order to handle speech from children in the exhibition *Kåre Sjölande* and I developed a method for improving the speech recognition rates for young speakers, (Gustafson and Sjölander, 2002). The system was open for the public for more than two years resulting in more than 100.000 utterances from the visitors. We transcribed and analyzed about 25.000 of these in order to study how children interact with computers (Bell and Gustafson, 2003). In 2002 I defended my PhD thesis, which contained research work done both at KTH and Telia. In 2001, I was the co-author to the EU project application *NICE*. The project got funded 2002, and the consortium consisted of Liquid Media, University of Odense, LIMSI and Philips. The goal of the *NICE* project was to build a computer game where children could talk to 3D animated fairy-tale characters in H-C Andersen's fairy-tale world. I was the project leader of the Telia part of the *NICE* project, and I collaborated with Johan Boye on the system and dialogue design (Boye and Gustafson, 2005, Boye, Gustafson and Wiren, 2005); with Kåre Sjölander to develop a Swedish unit selection synthesizer (Gustafson and Sjölander, 2004) and with Liquid Media for the multimodal output generation part of the system (Gustafson et al., 2005).

My secondary role was to act as expert in the development and roll-out of speech-based applications. In this capacity, I worked in projects with the aim of investigating the commercial aspects of spoken dialogue applications, as well as in projects where we performed usability studies on deployed applications. In 2006 I was project leader for a project where we did Swedish adaptations and performed usability tests of a system developed by the US company V-enable, in which customers used their voices to search for and download multimodal content on mobile phones. I also headed the subsequent deployment project which aimed at launching this system on a new web portal, (www.innovationworld.com), where TeliaSonera presented and distributed new products and services. The project involved 25 people, from five internal units and three external companies. This is one example of a business development process where I have been involved from beginning to end. Another example is the introduction of an automated call routing system for Telia's customer care line. While visiting AT&T in 2001, we got to know that AT&T was launching a call routing system for their customer care. I and my colleagues then spent three years convincing the management at Telia to add such a system in their customer care. This led to a successful pilot test in 2005, in which I participated as a spoken dialogue expert. I then participated in the business requirements study that led to the decision of developing an automated call routing system in the customer care line. In 2006 the system was launched in collaboration with the world's largest speech technology company (Nuance), and I participated as a dialogue expert support in the development project. In conjunction with the data collection for the deployed call routing system, I also initiated a research project, in which we performed a small WoZ collection on the usefulness of using a human metaphor in call routing systems (Gustafson, Heldner and Edlund, 2008). Lastly, I initiated a project in 2006 that investigated the possibility to deploy a speech-based problem-solving spoken dialogue system for the broadband support line. As usual, the first part of the project was educational: convincing both the technical staff and management in the broadband department that it would be feasible and profitable to develop a speech based problem-solving system in their support line. I then participated in the negotiations with an American company (SpeechCycle) that had deployed similar systems in the US. In the end Telia decided to run an internal project that investigated the possibility to build the problem solving dialogue system in-house, using the dialogue technology developed by Johan Boye in the NICE project.

Since July 2007 I have a position as a Future Faculty Biträdande Lektor at TMH, and in June 2009 I became docent in speech technology. I have taken four pedagogical courses and been a teacher myself in seven different courses for both undergraduate and graduate students. I have co-authored 14 project proposals for getting external funding. I am currently supervising two PhD students, and I have continued my connection with the commercial side of spoken dialogue systems by supervising Master thesis students at two of the largest speech application companies in Sweden. I have worked on the development of tools for exploring and examining spoken dialogue systems with a human metaphor (Edlund, Gustafson and Heldner, 2008). The purpose is to acquire the data and knowledge necessary to build systems that allow more natural interaction. In order to examine conversational and expressive functions of prosody I have developed the EXPROS tool (Gustafson and Edlund, 2008). We have used this re-synthesis tool to produce stimuli for preliminary perceptual studies of speaking style (Strangert and Gustafson, 2008) and grounding status (Edlund and Gustafson 2010). The tool has also been used to synthesis cue phrases (Hjalmarsson, 2009). In order to acquire data for the development of more human-like spoken dialogue, I have also developed a WoZ tool that enable a human operator the control the flow and involvement of an ongoing human-human dialogue. These tools were used by my Master Thesis student (Gustafson and Merkes, 2009). I have also done work within the VR project Simulekt, where I together with Jonas Beskow have built dialect voices using HMM synthesis (Schötz et al, 2010). I have worked in the EU project *MonAMI*, which aims at evaluating the usefulness of ECA technology for the disabled and elderly. My contribution is in the the development and evaluation of a speech application in the calendar domain, including modules for audiovisual interaction control (Skantze & Gustafson, 2009). I have presented the Reminder at international/national workshops/conferences. I have co-authored four deliverables and I presented KTH's work at two annual review meetings (in Brussels 2008 and Saragossa 2009). These contributions were described in the review reports in the following way: *"It [the deliverable] is logically structured, well written and complements the impressive presentation given at the review meeting"*. I have also arranged a workshop in speech interface design, and I will assist in the upcoming field trials. Finally, I am currently actively participating in a number of newly started projects:

- **IURO** (Interactive Urban Robot, 2010-2013), an EU project where we will develop a mobile robot that asks humans for directions in the streets of Munich.
- **SAVIR** (Situating Audio Visual Interaction with Robots, 2010-2013), a SRA/TNG project where we will collaborate with CVAP in order to build a robot that can talk with a human in order to get help in interpreting visual scenes.
- **Talsyntes för samtal** (2010-2013), a VR funded project where I am project leader and perform research work.
- **Samtalets prosodi** (2010-2013), an RJ project where I have a small part the first year (due to my work load 2010)
- **Jindigo** (Java-based Incremental Dialog Framework, 2009-2010), a CSC-funded Young Faculty project for developing open source dialog tools (<http://www.speech.kth.se/jindigo/>) and a project course.

3.2 Brief account of planned research effort

Below is an overview of topics of research I plan to pursue, with pointers to current and planned projects:

Spoken dialogue systems with a human metaphor

We have in recent studies examined the usefulness of developing human-like spoken dialogue systems (Edlund et al. 2008 and Gustafson et al. 2008). The aim is to build and study spoken dialogue systems that can be understood through a human metaphor, or as Cassell (2007)¹ puts it “*a machine that acts human enough that we respond to it as we respond to another human*”. Humans are often quite willing participants, and the human metaphor allows us to draw on this by borrowing from other areas. For example, the gaming, film and fiction industries rely heavily on willing ‘suspension of disbelief’ – the ability to ignore minor inconsistencies in order to enjoy a work of fiction (e.g. Hayes-Roth, 2004)². While our goal of human-likeness may eventually turn out to be overly ambitious, it has already been useful to us by guiding our research efforts towards gaps in our knowledge about human conversation. It is for example evident that state-of-the-art speech technology neither sounds like a conversational partner, nor understands fundamental aspects of human conversational behavior. A massive amount of cross-disciplinary research is needed to realize the visionary goal. Although we have a long way to go, we learn useful lessons from every step. Our group is currently involved in a half-dozen national and international research projects orchestrated towards our goal.

In this area we will collect and analyze human-human dialogues in order to get the knowledge necessary to build or simulate more human-like dialogue systems. An initial requirement for making substantial progress is access to spontaneous conversations. We have already collected about 60 hours of audio, video and motion capture data in conversations within the project Spontal: Multimodal database of spontaneous speech in dialog (Edlund, et al., 2010). As part of the RJ funded project *Prosody in conversation* we will investigate the human-human interactions in the Spontal corpus in order to find out how prosodic features contributes to the joint interaction control in conversations. The project will investigate how people talking to each other decide who should speak when, and the role of prosody in making these joint decisions. A detailed model of the prosody involved in interaction control is crucial both for producing appropriate conversational behavior and for understanding human conversational behavior. Both are required in order to reach our visionary goal, and represent the artificial conversational partner in the roles of speaker and listener in a conversation, respectively.

Spoken dialogue systems with conversational abilities

Today’s state-of-the-art talking computers do not sound like they are having a conversation even if they say the same thing a human in the same situation would. One problem is that many of the conversational cues are removed in speech synthesis (e.g. hesitations and filled pauses). As part of the VR funded project *Introducing interactional phenomena in speech synthesis* we will recreate human interactional vocal behavior in speech synthesis in three phases. The first phase we will reintroduce interactional tokens are traditionally lacking in speech synthesis voices, e.g. conversational grunts and audible breathing. In the second phase we will turn our attention to events that occur in the transitions between speech and silence and back – transitions that vary depending on the situation. In the third phase, we will evaluate reactions to a dialogue system making use of the synthesized cues developed in the first two phases. In semiautomatic dialogue systems modeling speaking and listening as parallel and mutually aware processes, we will use two scenarios to verify and validate our results: the attentive speaker – an interruptible virtual narrator making use of synthesized cues for hesitation and end-of contribution; and the active listener – an information gathering system, aiming to encourage the user to continue speaking (cf. Gustafson, Heldner, & Edlund, 2008).

When people talk to each other, their prosody is used for more than deciding who talks when. It also signals the speaker’s attitude towards the issues under discussion, it distinguishes the new and important information from the old and referential and it places contrastive focus. If we really want to be able to understand and generate conversational speech it is crucial that we gain more knowledge about how prosody is used in human dialogues. To date, we still have incomplete knowledge about how prosody is used in human-human spoken interaction, and less still about how it can be utilized in human-computer interfaces utilizing the speech channel. I would like to research prosodic aspects important for spoken dialogue components, and I would like to evaluate the effect of doing so on users that interact with dialogue systems that make extensive use of prosody. I would also like to investigate which aspects of prosody that actually can be manipulated in a dialogue system given the state of current technology. In order to be able increase the momentum in this area I have initiated a consortium that plans to write a proposal about developing prosody proficient components for spoken dialogue systems. We plan to submit the proposal to the upcoming EU ICT/FP/ call targeted at Language technology.

¹ Cassell, J. (2007). Body language: lessons from the near-human. In Riskin, J. (Ed.), *Genesis Redux: Essays on the history and philosophy of artificial life* (pp. 346-374). University of Chicago Press.

² Hayes-Roth, B. (2004). What Makes Characters Seem Life-Like?. In Prendinger, H., & Ishizuka, M. (Eds.), *Life-Like Characters: Tools, Affective Functions, and Applications* (pp. 447-462). Germany: Springer.

Situated face-to-face interaction

Face-to-face conversation involves other sources of information than the speech channel, perhaps most notably a visual channel with gaze, nods, other gestures, posture, proxemics etc. that forms an intrinsic part of the communication. Thus, further investigations about how humans converse are motivated from basic and applied research perspectives alike. From a practical point of view the visual channel will become more important as speech interfaces are becoming standard for robots. I am currently involved in two projects that aim at developing a speech interface for robots. In the SRA project *Situated audiovisual interaction with robots*, the goal is to build a research platform which combines spoken dialogue technology with visual object recognition in a robot. The platform will enable research on: true mixed initiative, collaborative human-robot interaction, cognitive modeling of visual scenes and allowing robots to learn by audiovisual interaction with humans. In the EU project IURO the aim is to build a robot that can approach pedestrians in the streets of Munich, and ask for directions to its destination. Apart from understanding the route directions, a lot of effort from our part in the project deals with crowd control and managing the interaction using audio visual turn management cues.

Easy-to-use tools for building spoken dialogue system

In the past few years, web users have been steadily shifting from consuming copyrighted material to creating their own dynamic multimedia content (the shift is sometimes referred to as Web 2.0). As consumers increasingly also become producers, tools for structured content creation and selection-based media creation are needed. Users spend enormous amounts of time creating multimedia content, with publicly available tools. If we could build easy-to-use dialogue creation tools, we might get people to build the kind of spoken dialogue system they enjoy interacting with, which is something we can learn from, in addition to being good for consumers. These tools could either be statistical tools that learn from the users' verbal interactions with a spoken dialogue system, (primarily simple chat and socializing dialogues), or they could be simple dialogue design tools where e.g. goal-fulfilling dialogue contributions can be verbalized and saved for later usage in task-oriented dialogue in collaborative dialogues. If we could build these dialogue tools they could for example be useful as part of educational systems or for developing customizable speech based helper applications that guide people in performing simple tasks.

In order to fulfill this goal I have received a 500 kSEK faculty grant targeted at Young Faculty from CSC. Within the project I will together with Gabriel Skantze make our dialogue system tools available as open source, and develop a project course where students will use these tools to build fully functioning conversational interfaces. Gabriel Skantze's part of the project is to develop the framework Jindigo that will allow non-experts to develop and experiment with incremental spoken dialog systems that process its input and output word-by-word instead of utterance-by-utterance. This allows, among other things, a more natural, rapid turn-taking. Together we will develop project assignments and the manuals needed to use the Jindigo toolkit for these.

3.3 List of publications

3.3.1 Peer-reviewed articles in Journals

1. Edlund, J., Gustafson, J., Heldner, M., and Hjalmarsson, A. (2008) "Towards more human-like spoken dialogue systems" J. of Speech Communication, Special Issue on Evaluating new methods and models for advanced speech-based interactive systems. *
2. Boye, J., Gustafson, J. and Wiren, M. (2006) "Robust spoken language understanding in a computer game", J. of Speech Communication, special issue on spoken language understanding, Volume48, Issues 3-4, March-April 2006, Pages 335-353.*
3. Gustafson, J. and Bell, L. (2000) "Speech Technology on Trial: Experiences from the August System", Journal of Natural Language Engineering: Special issue on Best Practice in Spoken Dialogue Systems.

3.3.2 Conference contributions

4. Johnson-Roberson, M., Bohg, J., Kragic, D., Skantze, G., Gustafson, J., & Carlson, R. (in press) "Enhanced Visual Scene Understanding through Human-Robot Dialog", In Proceedings of AAAI 2010 Fall Symposium: Dialog with Robots. Arlington.
5. Neiberg, D., and Gustafson, J. (in press) "The Prosody of Swedish Conversational Grunts", In Proc Interspeech 2010, Special Session on Social Signals in Speech.
6. Gustafson, J., & Neiberg, D. (in press) "Prosodic cues to engagement in non-lexical response tokens in Swedish", In proc of DiSS-LPSS.
7. Neiberg, D., and Gustafson, J. (in press). "Modeling Conversational Interaction Using Coupled Markov Chains", In proc of DiSS-LPSS.
8. Beskow, J., Edlund, J., Gustafson, J., Heldner, M., Hjalmarsson, A. and House, D. (2010) "Research focus: Interactional aspects of spoken face-to-face communication", Fonetik 2010, Lund, Sweden.
9. Schötz, S., Beskow, J., Bruce, G., Granström, B. and Gustafson, J. (2010) "Simulating Intonation in Regional Varieties of Swedish", Speech Prosody 2010, Chicago, USA.
10. Gustafson, J. and Merkes, M. (2009) "Eliciting interactional phenomena in human-human dialogues" In Proceedings of SigDial 2009. London, UK.
11. Skantze, G. and Gustafson, J. (2009) "Attention and Interaction Control in a Human-Human-Computer Dialogue Setting" In Proceedings of SigDial 2009. London, UK.
12. Beskow, J., Edlund, J., Granström, B., Gustafson, J., Skantze, G., and Tobiasson, H. (2009). "The MonAMI Reminder: a spoken dialogue system for face-to-face interaction". In proceedings of Interspeech 2009. Brighton, U.K.
13. Beskow, J., and Gustafson, J., "Experiments with synthesis of Swedish dialects", Poster abstract in proceedings of Fonetik 2009.
14. Beskow, J., Edlund, J., Granström, B., Gustafson, J., and Skantze, G. (2008) "Innovative interfaces in MonAMI: the KTH Reminder" In Proc. of the 4th IEEE Workshop on Perception and Interactive Technologies for Speech-Based Systems. Kloster Irsee, Germany.
15. Gustafson, J., and Edlund, J. (2008) "EXPROS: a toolkit for exploratory experimentation with prosody in customized diphone voices" In Proc. of the 4th IEEE Workshop on Perception and Interactive Technologies for Speech-Based Systems. Kloster Irsee, Germany.
16. Gustafson, J., Heldner, M., and Edlund, J. (2008) "Potential benefits of human-like dialogue behaviour in the call routing domain" Proc. of the 4th IEEE Workshop on Perception and Interactive Technologies for Speech-Based Systems. Kloster Irsee, Germany.*
17. Strangert, E. and Gustafson, J. (2008) "Subject ratings, acoustic measurements and synthesis of good-speaker characteristics" In Proceedings of Interspeech 2008. Brisbane, Australia.
18. Strangert, E. and Gustafson, J. (2008) "Improving speaker skill in a resynthesis experiment". In Proceedings of FONETIK 2008. Gothenburg, Sweden.
19. Gustafson, J. and Edlund, J. (2008) "EXPROS: Tools for exploratory experimentation with prosody", In Proceedings of FONETIK 2008. Gothenburg, Sweden.
20. Beskow, J., Edlund, J., Granström, B., Gustafson, J., Jonsson, O., and Skantze, G. (2008) "Speech technology in the European project MonAMI" In Proc. of FONETIK 2008, Gothenburg, Sweden.
21. Bell, L. and Gustafson, J. (2007) "Children's convergence in referring expressions to graphical objects in a speech-enabled computer game", In Proceedings of Interspeech, Antwerp, Belgium.*
22. Edlund, J., Heldner, M., and Gustafson, J. (2007) "Two faces of spoken dialogue systems" In M. F. McTear, K. Jokinen, J. Larson, R. López-Cózar and Z. Callejas (Eds.), Interspeech 2006 - ICSLP Satellite Workshop Dialogue on Dialogues: Multidisciplinary Evaluation of Advanced Speech-based Interactive Systems (pp. 51-54). Pittsburgh PA, USA.
23. Boye, J., and Gustafson, J. (2005) "How to do dialogue in a fairy-tale world", Proceedings of the sixth SIGdial Workshop on Discourse and Dialogue, Lisbon, 2005*

24. Bell, L., Boye, J., Gustafson, J., Heldner, M., Lindström, A. and Wiren, M. (2005) "The Swedish NICE Corpus – Spoken dialogues between children and embodied characters in a computer game scenario", proceedings of Interspeech05, Lisbon.*
25. Gustafson, J., Boye, J., Fredriksson, M., Johannesson, L., and Königsmann, J. (2005) "Providing computer game characters with conversational abilities," in Proc.of Intelligent Virtual Agent (IVA05). Kos, Greece.*
26. Boye, J., Mats Wiren, M., and Gustafson, J. (2004) "Contextual Reasoning in Multimodal Dialogue Systems: Two Case Studies", Proceedings of The 8th Workshop on the Semantics and Pragmatics of Dialogue Catalogue'04 , Barcelona, July 19-21, 2004.
27. Gustafson, J. and Sjölander, K. (2004) "Voice creation for conversational fairy-tale characters", Proceedings of the 5th ISCA Speech Synthesis Workshop, Carnegie Mellon University, 2004.*
28. Gustafson, J., Bell, L., Boye, J., Lindström, A. and Wiren, M. (2004) "The NICE Fairy-tale Game System", In proceedings of SIGdial 04, Boston.
29. Bell, L. and Gustafson, J. (2003) "Child and Adult Speaker Adaptation during Error Resolution in a Publicly Available Spoken Dialogue System", In proceedings of Eurospeech 03, Geneve, Schweiz.*
30. Bell, L., Gustafson, J. and Heldner, M. (2003) "Prosodic adaptation in human–computer interaction", Proceedings of ICPhS 03, Barcelona, Spain.*
31. Gustafson, J. and Sjölander, K. (2002) "Voice Transformations For Improving Children's Speech Recognition In A Publicly Available Dialogue System", Proceedings of ICSLP02, Colorado USA.
32. Gustafson, J., Bell, L., Boye, J., Edlund, J. and Wiren, M. (2002) "Constraint Manipulation And Visualization In A Multimodal Dialogue System", Proceedings of the ISCA Workshop Multi-Modal Dialogue in Mobile Environments Kloster Irsee, Germany
33. Bell, L, Boye, J, and Gustafson, J. (2001) "Real-time Handling of Fragmented Utterances", Proceedings of NAACL 2001.
34. Lindberg, N., and Gustafson, J. (2000) "Example based shallow semantic analysis in the August spoken dialogue system", STL-QPSR 1/00
35. Bell, L., Boye, J., Gustafson, J., and Wiren, M. (2000) "Modality Convergence in a Multimodal Dialogue System", Proceedings of GötaLog 2000, Göteborg, Sweden.
36. Gustafson, J., Bell, L., Beskow, J., Boye, J., Carlson, R., Edlund, J., Granström, B., House, D. and Wirén M. (2000) "AdApt – a multimodal conversational dialogue system in an apartment domain", Proc. of ICSLP 2000.
37. Bell, L. and Gustafson, J. (2000) "Positive and Negative User Feedback in a Spoken Dialogue Corpus", In proceedings of ICSLP 2000 Beijing, China.
38. Bell, L., Eklund, R. and Gustafson, J. (2000) "A Comparison of Disfluency Distribution in a Unimodal and a Multimodal Speech Interface", Proceedings of ICSLP 2000 Beijing, China.
39. Gustafson, J., Sjölander, K., Beskow, J., Granström, B. and Carlson, R. (1999) "Creating web-based exercises for spoken language technology", Invited tutorial session in proceedings of IDS'99, Kloster Irsee, Germany
40. Gustafson, J., Lundeberg, M. and Liljencrants, J. (1999) "Experiences from the development of August - a multimodal spoken dialogue system", in proceedings of , Kloster Irsee, Germany
41. Bell, L. and Gustafson, J. (1999) "Utterance types in the August System", in proceedings of IDS'99.
42. Bell, L. and Gustafson, J. (1999) "Repetition and its phonetic realizations: investigating a Swedish database of spontaneous computer directed speech", in Proc. of ICPhS' 99, Budapest, Hungary.
43. Bell, L. and Gustafson, J. (1999) "Interaction with an animated agent in a spoken dialogue system", in proceedings of Eurospeech '99 , Budapest, Hungary.
44. Gustafson, J., Lindberg, N., and Lundeberg, M. (1999) "The August spoken dialogue system", in proceedings of Eurospeech '99, Budapest, Hungary.
45. Sjölander, K., Gustafson, J., Beskow, J., Granström, B. and Carlson, R. (1999) "Web-based educational tools for speech technology", in proceedings of Matisse 99 (ESCA/SOCRATES Workshop on Method and Tool Innovations for Speech Science Education)
46. Gustafson, J., Elmberg, P., Carlson R. and Jönsson, A. (1998) "An Educational Dialogue System With a User Controllable Dialogue Manager", ICSLP98,Sydney, Australia.
47. Sjölander, K., Beskow, J., Gustafson, J., Lewin, E., Carlson, R., and Granström, B. (1998) "Web-based Educational Tools for Speech Technology", ICSLP98,Sydney, Australia.
48. Carlson, R., Granström, B., Gustafson, J., Levin, E. and Sjölander, K. (1998) "Hands-on Speech Technology on the Web", in proceedings of the ELSNET in Wonderland conference.
49. Gustafson, J., Larsson, A., Carlson, R. and Hellman, K. (1997) "How do System Questions Influence Lexical Choices in User Answers?", In proceedings of Eurospeech '97, Rhodes, Greece.
50. Sjölander, K. and Gustafson, J. (1997) "An Integrated System for Teaching Spoken Dialogue Systems Technology", In proceedings of Eurospeech '97, Rhodes, Greece.

51. Gustafson, J. (1995) "Using Two-level Morphology To Transcribe Swedish Names ", Eurospeech '95, Madrid, Spain 1995
52. Bertenstam, J. Blomberg, M., Carlson, R., Elenius, K, Granström, B., Gustafson, J., Hunnicutt, S., Högberg, J., Lindell, R., Neovius, L., de Serpa-Leitao, A., Nord, L. and Ström, N. (1995) "The Waxholm Application Data-Base", in proceedings of Eurospeech '95, in Madrid, 1995
53. Gustafson, J. (1995) "Transcribing names with foreign origin in the ONOMASTICA project", in proceedings of ICPhS'95 in Stockholm, 1995.
54. Carlson, R., Hunnicutt, S. and Gustafson, J. (1995) "Dialogue management in the Waxholm system", Proc. Spoken Dialogue Systems, Vigsø
55. Bertenstam, J. Blomberg, M., Carlson, R., Elenius, K, Granström, B., Gustafson, J., Hunnicutt, S., Högberg, J., Lindell, R., Neovius, L., de Serpa-Leitao, A., Nord, L. and Ström, N. (1995) "The Waxholm system - a progress report", Proc. Spoken Dialogue Systems, Vigsø
56. Gustafson, J. (1994) "ONOMASTICA - Creating a multi-lingual dictionary of European names", In FONETIK '94, Papers from the 8th Swedish Phonetics Conference, May 24-26, Lund, Sweden,
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3.3.3 Review articles, book chapters, books

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60. Beskow, J, Edlund, J, Granström, B, Gustafson, J. & House, D. (2010): "Face-to-face interaction and the KTH Cooking Show". In Esposito, Anna, Campbell, Nick, Vogel, Carl, Hussain, Amir, & Nijholt, Anton (Eds.), Development of Multimodal Interfaces: Active Listening and Synchrony . Berlin / Heidelberg: Springer, 2010.
61. Edlund, J., Heldner, M., and Gustafson, J. (2005) "Utterance segmentation and turn-taking in spoken dialogue systems". In B. Fisseni, H.-C. Schmitz, B. Schröder and P. Wagner (Eds.), Sprachtechnologie, mobile kommunikation und linguistische ressourcen (pp. 576-587). Frankfurt am Main, Germany: Peter Lang.*
62. Gustafson, J. (2002) "Developing Multimodal Spoken Dialogue Systems - Empirical Studies of Spoken Human-Computer Interactions", PhD thesis, KTH, Stockholm.
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3.4.1 Approved grants from Swedish research councils

Co-authored an RJ application called “Samtalets prosodi” that will be funded 2010-2013. Mattias Heldner is the main project leader and Joakim Gustafson and Gabriel Skantze are co-leaders.

Authored a VR project application called “Talsyntes för samtal” that will be funded 2010-2013. Joakim is the main Project leader and Jonas Beskow and Jens Edlund are co-leaders.

3.4.1 Approved grants from EU (FP7-ICT-2009-4)

Co-authored the IURO EU applications that will get funded 2010-2013. Coordinated by Technische Universität München (TUM). The consortium consists of TUM, KTH, Eidgenössische Technische Hochschule Zürich, Universität Salzburg, ACCREA Engineering.

3.5 Other scientific achievements

3.5.1 Active participation in international conferences/workshops 03-10

I have since my PhD been part of the *program committee* of 26 workshops and conferences (Interspeech, SigDial, ACL, IJCAI, HLT-NAACL, SemDial, KRPD, ICMI, Coling, PIT and IWSDS) . Lately I have been part of the program committee of *IWSDS2009 (International Workshop Series On Spoken Dialogue Systems Technology)*, *ICMI-MLMI 2009, KRPD'09, ICMI-MLMI 2010, ACL2010, SEMDIAL 2010, IWSDS2010, Interspeech 2010 and a chapter in the IWSDS09 workshop Springer book “Spoken Dialogue Systems Technology and Design”, ACM Transactions on Speech and Language Processing 2010.*

I have been part of the *organizing committee* of the

- *The international conference on multimodal systems (ICMI08)* at Crete, October 2008.
- *The international SEMDIAL workshop (DiaHolmia)* in Stockholm, June 2009.
- *A special session at Interspeech'09 called "Active Listening & Synchrony"*, in Brighton, September 2009.

I have since my PhD participated as *presenting author of contributions* at these workshops and conferences:

2003

- *Eurospeech'03 conference*, Geneve, Schweiz – presentation of paper about child data collected in the TänkOm project.

2004

- *The fifth SIGdial Workshop on Discourse and Dialogue*, Boston, US – presentation and live demo of the NICE system.

2005

- *The sixth SIGdial Workshop on Discourse and Dialogue*, Lisabon, Portugal – presentation and live demo of the NICE system.
- *Interspeech'05 conference*, Lisabon, Portugal – presentation of the NICE dialogue corpus.
- *The Intelligent Virtual Agent workshop (IVA05)*. Kos, Greece – presentation and live demo of the NICE system.

2007

- *Interspeech'07*, Antwerp, Belgium – presentation of analyses done on the NICE corpus.

2008

- *The 4th IEEE Workshop on Perception and Interactive Technologies for Speech-Based Systems (PIT)*, Kloster Irsee, Germany – Session chair during the workshop. Presentation and live demo of the MonAmi Reminder, presentation of the EXPROS tool, presentation of the work done on using a human metaphor in a commercial call routing system.
- *International Conference on Multimodal Interfaces (ICMI08)*, Crete, Greece – Part of Organizing Committee (demo chair). Presentation and live demo of the MonAmi Reminder.
- *The Swedish Phonetics Conference*, Gothenburg, Sweden - presentation and live demo of the MonAmi Reminder.
- *The Nordic Prosody Conference*, Helsinki, Finland – poster about study on grounding using the EXPROS tool.
- *The Scandinavian Language Technology Conference (SLTC08)*, Stockholm, Sweden – presentation of the MonAmi Reminder.

2009

- *The Swedish Phonetics Conference, Stockholm, Sweden* – presentation of synthesis work done within the VR project Simulekt.
- *DiaHolmia 2009* - organizer and presentation of Monami Reminder
- *Interspeech 09* - special session co-chair and presentation of MonAmi Reminder
- *SigDial 2009* – presentation of MonAmi Reminder and dialogue study

3.5.5 Editorial board in international journals

I am member of the Editorial Board of the journal Speech Communication.

3.5.5 Reviewing assignments for journals

Speech Communication, occasionally since 2004

IEEE transactions on Multimedia, first time 2008

Computer Speech and Language, first time 2008

ACM Transactions on Speech and Language Processing, first time 2010

3.5.6 Assignments as public examiner/opponent

I am part of the grading committee for Yingying Huang, a doctoral student of Yngve Sundblad at CSC, KTH. The thesis defense will take place June 10, 2010.

3.5.7 Assignments as outside expert

In December 2009 I participated as speech technology expert in roundtable discussions in Luxemburg about the design of an upcoming new call about Language Technology that is planned to be part of the ICT FP7 2011-2012 Work Programme. Calls for proposals will be launched in the second half of 2010, and then in 2011. I participated in a working group called “*Natural interaction, including conversational systems*”.

I am part of the visions group Interactive Systems in the META-NET Network of Excellence.

3.6 Scientific merits outside of the university

I spent almost seven years as a senior researcher at Telia Research. In this capacity I was both expert help in evaluation and development of commercial applications, and I conducted research in internal as well as external multi-site projects. As an indication of the level of my research at Telia, I was invited as an industrial researcher to give presentations about my research at the following occasions:

2001

AT&T (New Jersey, NY)

Bell labs (New Jersey, NY),

2002

RIACS/NASA (Mountain View, CA)

Stanford University (Palo Alto, CA)

CSLR Univ. of Colorado (Boulder, Colorado)

2006

AT&T (New Jersey, NY)

Columbia University (New York, NY)

IBM Watson Research Center (Yorktown Heights, NY)

The W3C Multimodal Interaction Activity group meeting at Opera (Oslo, Norway)

4.0 PEDAGOGICAL ACHIEVEMENTS

4.1 Account of own pedagogical experience

I have given lectures and held in laboratory exercises in speech technology courses targeted both at undergraduate students and PhD students since 1995. I have also developed educational tools that were aimed at giving the students hands-on experiences with all aspects of spoken dialogue systems. I have a wide spectrum of pedagogical experience: lecturing undergraduate students at Swedish universities (KTH, LiU, UU, UMU, GU and SU) and at Odense university in Denmark, graduate students at graduate courses and international summer school (with Swedish as well as international participants), researchers attending invited talks at international research centers (AT&T, Bell labs, IBM, RIACS/NASA and Stanford), management and visiting industrial leaders at TeliaSonera, members of staff (TeliaSonera, Telemuseum, Liquid Media and SIAT) and school children at Tekniska museet and KTH. This has taught me the importance of adjusting the presentation according to the needs of the audience.

I have been lecturer and held hands-on exercises in the PhD courses within the following European summer schools:

- *Multilinguality in Speech and Language Processing*, 3rd European Summer School on Language and Speech Communication, Edinburgh, Scotland, 1995.
- *Dialogue Systems*, 4th European Summer School on Language and Speech Communication, Budapest, Hungary, 1996
- *Multimodality in Language and Speech Systems*, MiLaSS 7th European Summer School on Language and Speech Communication, Stockholm, Sweden, 1999
- *Variation in speech production and perception*, a NordForsk/VISPP summer school, Kuressaare, Estonia, 2008.

In 1997 I started the development of the *Gulan* dialogue laboratory toolkit together with fellow PhD student Kåre Sjölander (Sjölander and Gustafson 1997). I continued to develop the toolkit, adding more modules as well as a central broker server that made the system more modularized, which facilitated collaboration with others in the development the different spoken dialogue system modules. I also wrote a manual and added laboratory assignments so that *Gulan* could be used in the speech technology course held by THM. In 1998 I participated in the NUTEK/HSFR Language Technology project SDS (Swedish Dialogue Systems). In this project I collaborated with Arne Jönson and his PhD students at NLPLAB in Linköping to add their dialogue module to the *Gulan* toolkit (Gustafson et al. 1998). This system has been used to teach spoken dialogue systems technology to undergraduate students in language technology courses at TMH and NADA at KTH, Stockholm University and Linköping University. I presented our web-based educational tools (including *Gulan*) at the ELSENET in Wonderland workshop 1998. In 1999 I held an invited speech about web-based educational tools at the IDS'99 multimodal workshop in Kloster Irsee, and I demonstrated the TMH educational speech toolkits at the Eurospeech'99 Education Arena. *Gulan* was also presented by Kåre Sjölander at Matisse 99 - ESCA/SOCRATES Workshop on Method and Tool Innovations for Speech Science Education, (Sjölander et al., 1999).

As an industrial researcher at Telia I often gave presentations at Telia's Vision's Centre in Farsta. These were either introductory lectures about speech or agent technology, or demonstrations and presentations about certain research projects (e.g. the EU project Nice). Over the almost seven years at Telia I participated in a large number internal events where I gave lectures for Telia management or staff from development units. As an example I was part of the *Telia home workshop* at several occasions, which was an internal event that presented new and innovative technologies for the home market. I also gave general speech technology lectures and presented our research dialogue systems for potential customers (e.g. Vägverket and Apoteket), as part of the development unit's sales pitch. I was also part of or headed several deployment projects, which required presentations for the internal project owners as well as external stakeholders. These were either introductory lectures about speech technology, or presentations about the projects themselves. One example is the process of convincing a never-ending line of internal managers at TeliaSonera of the usefulness of adding an automatic speech system in their customer care lines, which required a lot of pedagogical work. Another example was the music search project where I gave presentations both to internal management at different Telia units and to the external companies that were involved in the project. I was part of an internal speech technology network, where all managers of departments and projects related to speech services met a couple of times per year to exchange information. During projects with Tekniska Museet I held several public lectures at the museum about speech technology, either for children (e.g. Unga Spekulerar) or for the museum staff (e.g. as part of the TänkOm and NICE projects).

I also took courses at Telia, where the most relevant to my teaching at KTH was Praktisk Projektledning (Practical project management, given by the company Wenell). I will use knowledge from this course as well as my practical experiences of working as well as leading projects at Telia in my teaching of KTH students. I think it is important to prepare undergraduate and PhD students for how projects are planned and executed in industry.

Since I returned to KTH 2007 I have continued to give lectures about speech technology and dialogue systems at the following undergraduate courses: DH2413 (*Avancerad grafik och interaction*), DH2418 (*Språkteknologi*), DT1174 (*Ljud som informationsbärare*) at KTH, as well as the course Natural Language Processing (5LN701) that is given at Uppsala University. I am currently in charge of the following courses:

- *Speech technology* (DT2112) - an undergraduate course with students from KTH, Stockholm University and Linköping university. My next task will be to re-design this course so that it can become part of the new HMI master programme at KTH, as well as Master Programmes in Language Technology at Stockholm University, Uppsala University and Göteborgs University.
- *GSLT speech technology* - a graduate course in speech technology for the Graduate School of Language Technology
- *Automatisk analys och syntes av tal*, a joint undergraduate course for language technology students at Uppsala university, where I am in charge of the KTH part. Next year this will be replaced with our DT2112.

I have also been actively involved in the planning and execution of a PhD course in the NordForsk/VISPP summer school "*Variation in speech production and perception*", that was held in Kuressaare, Estonia in 2008. In this I was lecturer and I participated in the development of a new hands-on lab exercise that involved recording, analyzing and synthesizing multimodal conversations. The exercise included both sound recording and automatic head tracking. I was invited to give lectures about these exercises at the international course "*Development of Multimodal Interfaces*", that was arranged by COST 2102 at Trinity College 23-27 Mars 2009. This work resulted in a book chapter called "Face-to-face interaction and the KTH Cooking Show" (Beskow et al 2010). As part of the MonAMI project I and Helena Tobiasson arranged a workshop for members of the staff at SIAT (Hjälpmedelinstitutet), where we gave a crash course in speech interface design and user-centered design methods (Beskow et al 2009). The workshop also gave us further insight into the needs of our target group and how our MonAMI Reminder could assist them. For example, we learned that users with Alzheimer need to be able to ask repeatedly about what they are going to do and that old people with dementia need encouragement to get started with their daily activities.

I have been supervisor for three master thesis students, and I am currently discussing master thesis topics with two of the students that attended my course in speech technology this spring. Finally, I am since 2007 supervising two PhD students: supervisor for Jens Edlund and co-supervisor for Anna Hjälmarsson. Anna defended her thesis in September 2010 and Jens is scheduled to defend his thesis in January 2011.

It is important to perform student evaluations at the end of courses and course analyses after them. The goal of the student evaluations is not primarily to grade the teacher's lecturing skills (this is done as part of the docenture "läraryprov") or to determine if the teacher is likeable. The most important role of the student evaluations get input to the course analysis, which is an important tool for improving the course over time. I recently performed a course analysis for the undergraduate course I am in charge of since this year (see appendix). This year the course analysis was extra important, since we initiated the significant course changes we will have to carry out next year. Actually, the plans for the future for our speech technology courses both at undergraduate and postgraduate levels are exciting. Our undergraduate course (DT2112), will be available for students at master programs at KTH, Stockholm University, Uppsala University (and maybe Göteborgs Universitet). This means that we will have to schedule the course differently, making it more concentrated. We plan to have lectures in each sub-topic of the course before lunch with accompanying hands-on sessions in the afternoon. To prepare for this we reduced the number of lectures from 26 to 18. Even though we kept the examination intact, the number of students that passed the course was unchanged (75% this year compared to 71% last year), and the student evaluations showed that the students appreciated the course (see appendix). For the postgraduate course in speech technology, we have been asked by GSLT to make it into a distance course, with lecturing material and the speech technology toolkits used for home assignments available via the web. A lot of this is already in place, but we are currently investigating the best option for the lectures. If we go for distance lectures we plan to use Adobe Connect, either live or with recorded lectures with interspersed assignments. I have held a distance lecture using Adobe Connect in the Uppsala course Natural Language Processing, where the attending students were in class rooms in Uppsala and Göteborg, or at home.

4.3 Own teaching

1996-2000

- Development of the spoken dialog system laboratory toolkit (Gulan), documentation and exercises.
- Responsible for the laboratory course parts of language technology courses at TMH, Linköping university, NADA and ELSNET summer schools
- Lecturer at speech technology courses at TMH, NADA and the ELSNET summer schools

2007-2010

- In charge of DT2112 (Speech technology), undergraduate course with Student from KTH, Stockholm University and Linköping University. My current task is to re-design the course so that it can become part of Master Programmes in Language Technology at Stockholm University, Uppsala University and Göteborgs University.
- In charge of the KTH part of a joint undergraduate course with Uppsala university (Automatisk analys och syntes av tal) for language technology students at Uppsala university. Next year this will be replaced with our DT2112.
- In charge of the Speech Technology PhD course in GSLT (Graduate School of Language Technology)
- Supervisor in a course on project management (EH1010 Elektroprojekt), undergraduate course.
- Lecturer in the undergraduate courses DH2413 (Avancerad grafik och interaction), DH2418 (Språkteknologi) and DT1174 (Ljud som informationsbärare) at KTH and the undergraduate course Språkteknologi/Natural Language Processing at Uppsala University.
- Lecturer and laboratory exercise responsible in the VISPP'08 summer school in Kuressaare, PhD course.
- Lecturer in the international course “*Development of Multimodal Interfaces*”, that was arranged by COST 2102 at Trinity College.

4.4 Design of own course materials

- The Gulan toolkit, manuals and lab assignments (1997-2000)
- Lecture notes for a number of courses.(1998-2010)
- Laboratory exercise (system and assignments) about multimodal feedback for the VISPP'08 summer school. (2008)
- I am currently developing a project course together with Gabriel Skantze, which includes a dialogue toolkit, manuals, laboratory assignments and lecture notes. (2009-2010)

4.6 Pedagogical courses (15 hp)

- Grundläggande kommunikation och undervisning (GKU, 9L4001), 3hp KTH, 2006.
- Forskarhandledning (LH207V), 3 hp, 2007.
- Lärande och undervisning (LH201V) 7,5 hp 2009-2010
- KTH's Akademiska Erfarenhetsseminarium (ERFA), corr. 1.5 hp 2009-2010

4.8 Popular scientific presentations

- A number of public demonstrations of the August system at Kulturhuset 98-99.
- A large number of internal presentations and demonstrations of speech technology at Telia's visions center for internal and external groups.
- Presentation about speech and dialogue technology for the staff at the Stockholm Telecom Museum (2003).
- Presentation about speech and dialogue technology for children at the Stockholm Technical Museum, (Unga Spekulerar, 2004).
- Presentation of MonAmi at ID-dagarna, Swedish trade show on assistive technology, conference with 1600 participants (2008).

4.9 Supervision

4.9.1 Master Thesis students

Björn Söderström (IcePeak) Teleping - Automatic Evaluation of Spoken Dialogue Systems, 20 points 2008.

Kristian Ronge (VoiceProvider) Automatic Methods for Dialogue Classification and Prediction, 20 points 2008.

Miray Merkes (TMH) Methods for Eliciting spontaneous Dialogue Phenomena during recording of Speech Synthesis Voices, 20 points 2008-09.

Martin Johansson (TMH / IURO project) Managing computer-directed route directions, 20 points 2010-2011

4.9.3 PhD students

Daniel Neiberg, supervisor.

Jens Edlund, supervisor. Scheduled to defend his thesis in January 2011.

Past PhD students:

I co-supervised *Anna Hjalmarsson*, who defended her thesis in September 2010

4.9.4 Part of supervisor panel for PhD students

Laura Enflo

Samer Al Moubayed

4.10 Pedagogical merits gained from outside the academic sphere.

As an industrial researcher at Telia I often held presentations about speech technology, for customers as well as colleagues. As part of the development of new speech applications, I usually had to educate many levels of management in TeliaSonera in order get it funded. During projects with Tekniska Museet I held several public lectures at the museum about speech technology, either for children or for the museum staff. As the project leader of the Swedish part of the EU project NICE I had a close collaboration with the programmers and graphical designers at the computer game company Liquid Media. This was a two-way pedagogical process, where I taught them about speech technology and dialogue design, and they taught me about computer game design and development.

5.0 OTHER ASSIGNMENTS

5.1 Administrative assignments

I am the speech group representative in the coordinating board of the CSC *Human Communication* platform

I am currently responsible for the fire detection at TMH (Brandskyddsansvarig).

5.3 Extern contacts and work

No formal external assignments, but a large industrial and academic network in my field, both in Sweden and internationally.