Bielefeld Gesture Workshop 1997

Gesture- and Sign-Language Based Communication in Human-Computer Interaction

Prof. Dr. Ipke Wachsmuth, Martin Fröhlich

The program for the workshop as to be held at the Centre for Interdisciplinary Research (ZiF) from September 17-19, 1997.

Welcome to the Bielefeld Gesture Workshop 1997.

ZiF

Location

The Workshop will be held at the Centre for Interdisciplinary Research (Zentrum für interdisziplinäre Forschung, ZiF) in the Main Conference Hall, situated in the rear of the building at the upper floor.

Workshop Program and Side Program

In addition to the official workshop program we offer some opportunities to visit the city of Bielefeld and some landmarks in the vicinity. These offers, referred to as the side program below, are not included in the workshop fee. You are heartily invited to take part at your own costs and risk.

Wednesday September 17, 1997

Wed: 11:00 — 12:20

1. OPENING

Wed: 11.00 — 11:30

Wachsmuth, and Fröhlich
Organisers
GREETING WORDS FROM THE ORGANISERS

Wed: 11:30 — 12:10 — 12:20

Alistair Edwards, University of York (UK)
OPENING LECTURE: CURRENT EFFORTS IN GESTURE AND SIGN LANGUAGE RECOGNITION

Abstract: Gesture recognition is a very broad field. There are essentially three forms of gesture which one might want to recognize by computer: natural gestures used to support spoken communication; specialized gestures designed as a means of communicating or supplementing other forms of computer input; sign language. This presentation will concentrate on sign language. Sign language is studied for its own sake (an automatic sign language recognition engine would be a useful communication tool) and because it provides a particular paradigm for gestures. The idea of a system which will automatically translate sign language into speech or text is a very seductive one but there are a number of difficult problems to be addressed. Technical problems include: gesture capture, classification, segmentation. However, even once these have been solved there is a whole new set of linguistic problems to be addressed. The grammar of sign language is completely different from that of spoken languages so that word-for-word translation is not sufficient.This talk will review progress in sign language recognition, how some of the above problems have been tackled and how others might be addressed in the future.

Wed: 12:30 — 14:00

2. Lunch (at the ZiF)

Wed: 14:00 — 16:00

3. Afternoon Session

Wed: 14:00 — 14:30 — 14:40

Ingeborg van Gijn, University of Leiden, Sotaro Kita, Max-Planck Institute for Psycholinguistics, Leiden/Nijmegen, Harry van der Hulst, University of Leiden, (The Netherlands)

FORM CHARACTERISTICS OF GESTURES AND SIGNS

Abstract: The paper investigates how forms of unconventionalized spontaneous gestures are organized, and how the organization is similar to, and different from that of sign language. The work is based on transcriptions of more than 180 gesture tokens produced by Dutch speakers. [#4]

Wed: 14:40 — 15:10 — 15:20

Axel Kramer, Fragment Art & Research, New York City (USA)

CLASSIFYING TWO DIMENSIONAL GESTURES IN INTERFACE SYSTEMS

Abstract: A classification scheme for two-dimensional gestures in interactive systems is presented. The focus of the contribution is to classify interactive properties of gestures as a starting point to investigate their limits and benefits to users.[#20]

Wed: 15:20 — 15:50 — 16:00

Monica Bordegoni, Universita' degli Studi di Parma (Italy)

GESTURE-BASED AND HAPTIC INTERACTION FOR HUMAN SKILL ACQUISITION

Abstract: This contribution presents current research aiming at studying gesture-based and haptic interaction for the purpose of analysing human skill and mapping it into a skilled robotics system. The tasks considered include grasping and manipulating non-rigid objects.[#24]

Wed: 16:00 — 16:30

4. *Coffee, Tea, and Biscuits*

Wed: 16:30 — 18:30

5. *Evening Session*

Wed: 16:30 — 17:00 — 17:10

Gerhard Rigoll, Andreas Kosmala, and Stefan Eickeler, University of Duisburg (Germany)
HIGH PERFORMANCE REAL-TIME GESTURE RECOGNITION USING HIDDEN MARKOV MODELS

Abstract: An advanced real-time system for high performance gesture recognition is presented which is capable of recognizing complex dynamic gestures, such as hand waving, spin, pointing, or head moving. Recognition is based on image sequence processing and statistical pattern recognition using HMM's.[#1]

Wed: 17:10 — 17:40 — 17:50

Frank G. Hofmann, and Günter Hommel, Berlin University of Technology (Germany)
VELOCITY PROFILE BASED RECOGNITION OF DYNAMIC GESTURES WITH DISCRETE HIDDEN MARKOV MODELS

Abstract: A method is presented for the recognition of dynamic gestures with HMMs from a continuous stream of gesture input data. The segmentation problem is addressed by extracting velocity profiles from the data and using their extrema as segmentation cues.[#5]

Wed: 17:50 — 18:20 — 18:30

Marcell Assan, and Kirsti Grobel, Aachen University of Technology (Germany)
VIDEO-BASED SIGN LANGUAGE RECOGNITION USING HIDDEN MARKOV MODELS

Abstract: This contribution presents a signer-dependent system able to recognise about 250 isolated signs from the Sign Language of the Netherlands (SLN), using a single video camera. By means of threshold algorithms, colour code for gloves, skin, body, and background is generated for feature extraction.[#8]

Wed: 18:30 — 19:30

6. *Supper (at the ZiF)*

side program: Visit Bielefeld Klosterplatz, Beer Garden, Bars, Cafés; easily accessible by bus and tram.

Thursday September 18, 1997

Thu: 09.00 — 10:20

7. *Morning Session*

Thu: 09:00 — 09:30 — 09:40

Sylvie Gibet, LIMSI-CNRS Paris, J. Richardson, T. Lebourque, Université Paris-Sud, A. Braffort, LIMSI-CNRS Paris (France)
CORPUS OF 3D NATURAL MOVEMENTS AND SIGN-LANGUAGE PRIMITIVES OF MOVEMENT

Abstract: Work is described on the development of a corpus of basic hand-arm pointing gestures. The structure of the corpus is defined for natural pointing movements carried out in different directions, heights and amplitudes, and extended to movement primitives habitually used in sign-language communication.[#21]

Thu: 09:40 — 10:10 — 10:20

Franz Dotter, Klagenfurt (Austria)
SIGN LANGUAGES „BETWEEN" GESTURE (NONVERBAL BEHAVIOUR) AND SPOKEN LANGUAGE?

Abstract: Sign languages possibly contain a sign type unknown in spoken languages which has less fixed production rules than signs in spoken languages. Consequently, language universals and typology of existing theories, developed merely on the basis of spoken language research, have to be revised.[#13]

Thu: 10:20 — 11:00

8. COFFEE AND TEA

Thu: 11:00 — 12:20

9. NOON SESSION

Thu: 11:00 — 11:30 — 11:40

C.C.M. Hummels, G.J.F. Smets, and C.J. Overbeeke, Delft University of Technology / Heerlen Open University (The Netherlands)
AN INTUITIVE TWO-HANDED GESTURAL INTERFACE FOR COMPUTER SUPPORTED PRODUCT DESIGN

Abstract: An alternative way of gestural interaction is introduced which is based on the ecological theory of perception. An experiment was conducted to chart gestures designers make in creating products. The results are implemented into a scenario for a new 3D design application for virtual reality.[#14]

Thu: 11:40 — 12:10 — 12:20

Marc Latoschik, Ipke Wachsmuth, University of Bielefeld (Germany)
EXPLOITING DISTANT POINTING GESTURES AND POINT OF VIEW FOR OBJECT SELECTION IN A VIRTUAL ENVIRONMENT

Abstract: In this contribution a multimedia application is introduced that makes use of enhanced immersion techniques. An architecture for an extendable multimodal interface is described, and first results on the recognition of distant pointing gestures are presented.[#26]

Thu: 12:30 — 14:00

10. LUNCH (AT THE ZIF)

Thu: 14:00 — 16:00

11. AFTERNOON SESSION

Thu: 14:00 — 14:30 — 14:40

Claudia Nölker, Helge Ritter, University of Bielefeld (Germany)
DETECTION OF FINGERTIPS IN HUMAN HAND MOVEMENT SEQUENCES

Abstract: Presented is a hierarchical approach of neural networks to locate the positions of the fingertips in grey-scale images of human hands. The capabilities of the system are demonstrated in finding the pointing direction and detecting the fingertips in hand movement sequences.[#23]

Thu: 14:40 — 15:10 — 15:20

H.-J. Böhme, A. Brakensiek, U.-D. Braumann, M. Krabbes, and H.-M. Gross, Ilmenau University of Technology (Germany)
NEURAL ARCHITECTURE FOR GESTURE-BASED HUMAN-MACHINE-INTERACTION

Abstract: The context of this work is interaction with mobile robots, based on a neuronal architecture for visual, gesture-based communication. The paper describes a possible application scenario and the overall architecture of the planned system. First results are presented.[#9]

Thu: 15:20 — 15:50 — 16:00

Axel Varchmin, Robert Rae, and Helge Ritter, University of Bielefeld (Germany)
IMAGE BASED RECOGNITION OF GAZE DIRECTIONS USING ADAPTIVE METHODS

Abstract: Work is described on implementing a tracking system which determines gaze direction based on head and eye orientation. A target is to make the system user-independent by the use of facial features common to different users, like eyes, nose, mouth, and head posture.[#10]

Thu: 16:00 — 16:30

12. Coffee, Tea, and Biscuits

Thu: 16:30 — 18:30

13. Evening Session

Thu: 16:30 — 17:10

THE POSTER SESSION

Attended poster presentation. The posters will be on unattended display from (about) Wednesday noon until Friday noon.

Abstract: See Page 8 for the lists of exhibitors and abstracts of their work.

Thu: 17:10 — 17:40 — 17:50

M. Rauterberg, M. Bichsel, U. Leonhard, and M. Meier, Swiss Federal Institute of Technology (Switzerland)
COMPUTER VISION BASED INTERACTION WITH A PLANNING TOOL FOR CONSTRUCTION AND DESIGN

Abstract: A set of recommendations for the next generation of user interfaces: the Natural User Interface (NUI) is derived. The concept of NUI is presented in form of a runnable demonstrator: a computer vision-based interaction technique for a planning tool for construction and design tasks.[#25]

Thu: 18:00 — 18:40 — 18:50

Alan Daniel Wexelblat, MIT Media Lab (USA)
KEYNOTE LECTURE: GESTURE IN THE AGE OF THE INVISIBLE COMPUTER

Abstract: Computing is entering a new phase, as computers move into our homes and integrate themselves with every phase of our lives, from our televisions to our personal devices and clothing. This represents an unprecedented opportunity for work in natural gestural interaction. If gesture is to become an integral part of our interface with these new computers, then researchers in the field must change how we do business to position our work for the future. We must answer fundamental questions about our area of research and our techniques for conducting that research, such as: What are the common bases of gesture? (versus local/cultural/gender variations) What are the differences (if any) between conversational and narrative gesture? Can we build real-world systems with just deictic gestures? In addition to confronting difficult questions, we must vitalize a scattered research population, and entrench ourselves firmly in new research frontiers such as affective and wearable computing. If we fail to do this, gesture will be relegated to a footnote in interface history.

Thu: 19.00 — …

14. The Workshop Dinner at Voltmannshof

Let‘s have a good time while having a good meal.

Friday September 19, 1997

Fri: 09:00 — 10:20

15. Morning Session

Fri: 09:00 — 09:30 — 09:40

Karin H. Munk and Erik Granum, Laboratory for Image Analysis, Aalborg University (Denmark)
EXPLOITATION OF MOTION PATTERNS IN VISUAL GESTURE ANALYSIS

Abstract: For computer vision systems dealing with the understanding of motion, advantages may be obtainable if they to a sufficient degree can exploit a priori knowledge of likely motion patterns. Investigation of this hypothesis is presented in this paper. [#22]

Fri: 09:40 — 10:10 — 10:20

Kirsti Groble, and Hermann Hienz, Aachen University of Technology (Germany)
PARAMETER-ORIENTED APPROACH TO VIDEO-BASED SIGN LANGUAGE RECOGNITION

Abstract: The aim of this paper is to present a video-based system which is able to recognise isolated signs based on the manual parameters. Observing the whole signing space using a single video camera, all four manual parameters of the dominant hand are explicitly extracted.[#15]

Fri: 10:20 — 11:00

16. Coffee and Tea

Fri: 11:00 — 12:20

17. Noon Session

Fri: 11:00 — 11:30 — 11:40

Karen McKenzie Mills, and James L. Alty, Loughborough University (UK)
THE ROLE OF REDUNDANCY IN MULTIMODAL INPUT SYSTEMS

Abstract: The role of redundancy in a tri-modal input system is analysed. A prototype system accepting touch, 2D gesture, and speech input is described, and a truth maintenance and blackboard system architecture for modal integration is proposed for which first results are presented.[#2]

Fri: 11:40 — 12:10 — 12:20

Martin Fröhlich, Ipke Wachsmuth, University of Bielefeld (Germany)
GESTURE RECOGNITION OF THE UPPER LIMBS - AN AGENT BASED APPROACH

Abstract: An agent controlled dynamic body model is proposed which shall enable the recognition of body gestures from data delivered by position tracking devices. To adapt the model to different user parameters, anthropomorphic knowledge is used to reassign constraints to the dynamical model.[#11]

Fri: 12:30 — 14:00

18. Lunch (at the ZiF)

Fri: 14:00 — 16:00

19. Afternoon Session

Fri: 14:00 — 14:30 — 14:40

Markus Kohler, University of Dortmund (Germany)
SPECIAL TOPICS OF GESTURE RECOGNITION APPLIED IN INTELLIGENT HOME ENVIRONMENTS

Abstract: A gesture recognition system for controlling appliances in home environments is presented. The focus is on motion detection, object normalization and identification, and on the modelling and prediction of motion by use of Kalman filters, as prototypically realized in the ARGUS system.[#3]

Fri: 14:40 — 15:10 — 15:20

Shan Lu and Seiji Igi, Communications Research Laboratory, Hideaki Matsuo, Matsushita Electric Industrial Company, and Yuij Nagashima, Kogakuin University (Japan)
TOWARDS A DIALOGUE SYSTEM BASED ON RECOGNITION AND SYNTHESIS OF JAPANESE SIGN LANGUAGE

Abstract: A dialogue system with the capabilities of understanding and synthesizing JSL (Japanese Sign Language) is described in the context of developing a computer system that helps hearing impaired communicate with normal-speaking people.[#7]

Fri: 15:20 — 15:50 — 16:00

Hermann Hienz, and Kirsti Grobel, Aachen University of Technology (Germany)
AUTOMATIC ESTIMATION OF BODY REGIONS FROM VIDEO IMAGES

Abstract: A software module is introduced that is used in an automatic gesture recognition system for extracting relevant body regions from digitised video images. A threshold algorithm is used to segment the input image into body-contour, face, hands of the signer, and background.[#17]

Fri: 16:00 — 16:30

20. COFFEE, TEA, AND BISCUITS

Fri: 16:30 — 17:10

21. EVENING SESSION

Fri: 16:30 — 17:00 — 17:10

Frank Godenschweger, Thomas Strothotte, and Hubert Wagener, University of Magdeburg (Germany)
RENDERING GESTURES AS LINE DRAWINGS

Abstract: The contribution discusses computer generated illustrations and animation sequences of hand gestures useful in teaching sign language to deaf people. Algorithms for rendering 3D models of hands as line drawings and for designing animations of line drawn gestures are introduced.[#19]

Fri: 17:10

All participants
GENERAL DISCUSSION

Fri: Good Bye

Good bye from the Organisers

Fri: 19:00

side program: Dinner at Vahles Restaurant, original westphalian cooking

Saturday September 20, 1997

Sa: 14:00

side program: Walk from the historic town hall to the medieval castle, visit of the city's art gallery

The Poster Session (Thursday 16:30 – 17.00)

The posters will be on unattended display from (about) Wednesday noon until Friday noon.

Poster A:

Hideaki Matsuo, Matsushita Electronic Industrial Company, Seiji Igi, Shan Lu, Communications Research Laboratory, MPT, Yuij Nagashima, Kogakuin University, Yuji Takata, Terutaka Teshima, Matsushita Electronic Industrial Company (Japan)

Recognition Algorithm with non-contract for Japanese Sign-Language using Morphological Analysis

Abstract: Presented is work from sign language movement recognition based on stereo camera recording and converting sign language into code. Results from an experiment are presented in which sign language recognition is used at a window in the post office.[#6]

Poster B:

Siegfried Kaiser, University of Koblenz (Germany)

Gestures in small and medium sized conferences

Abstract: The major purposes of gestures in video conferences, transmitted via multi media conference systems, are analysed. It is argued that limited support for gesture in video conferences will not result in a reduced usage of multimedia conferences but will be replaced by verbalization.[#16]

Poster C:

canceled

canceled

G. J. Sweeney and A. C. Downton, University of Essex (UK)

Isolated sign recognition using sub-sign features

Abstract: Current sign language recognition systems work at the sign level which requires a 1:1 ratio between the number of „sign models“ and the lexicon size. In this contribution a method is presented which uses a small number of sub-sign models to recognise the lexicon.[#18]

Poster D:

Shuichi Nobe, University of Marketing and Distribution Sciences, Satoru Hayamizu, Osamu Hasegawa, Electrotechnical Laboratory, Hideaki Takahashi, National Institute of Multimedia Education (Japan)

Are listener-users paying attention to antrophomorphic agents‘ hand gestures? An evaluation using a gaze tracking method

Abstract: The information where a listener-user is looking and paying attention to is significant in the evaluation of human-agent-interaction systems. A pilot study was conducted, using a gaze tracking method, on relevant aspects of anthropomorphic agents‘ gestures in a real-time setting. [#27]

Poster E:

Jochen Triesch and Christoph von der Malsburg, University of Bochum (Germany)

A Gesture Interface for Robotics

Abstract: A gesture interface is presented, implemented on a real robot, which allows the user to give simple commands, e.g. how to grasp a particular object. Gesture interpretation is based on a refined person-independent analysis of hand motion and shape despite varying and complex backgrounds. [#28]

2796 | 2922 | 2914 | 6999

Information and Emergencies

Should you require further information, please do not hesitate to contact the workshop organisers on the local phone system (toll free): Trixi Valentin on 2796 (Workshop office at the ZiF), Prof. Ipke Wachsmuth on 2924, Martin Fröhlich on 2922. If we still cannot be found, then the general office of the AI-Workgroup on 6999 should be able to help you and will probably know where we are.

110 | 112 | (0-) 110 | (0-) 112

Medical and other Emergencies

The workshop organisers should be notified of all emergencies that occur. If we cannot be found, report all emergencies to the University by dialling 110 for medical help or 112 in case of fire. To reach the police from the internal phone system dial 0-110 (110 from public phones, toll free); to contact the cities emergency services in case of fire or accident dial 0-112 from the internal phone system (112 from public phones, toll free). The internal phone system connects to all university buildings including the ZiF.