

**[4002] A Technical Assistance System Empowering Profoundly Disabled Users to Live a More Independent and Self-Determined Life**

Paul Panek, Christian Beck, Gottfried Seisenbacher, Wolfgang L. Zagler

fortec – Research Group on Rehabilitation Technology, Vienna University of Technology, Institute of Industrial Electronics and Material Science (IEMW)



**This presentation contains ...**

- **Concept of Technical Assistance System**  
Architecture, 3 dedicated User Interfaces
- **Experiences from Field Tests**  
Multiple Impaired Children, Adults living independently, Student
- **Results and Outlook**  
Commercial version, further research, User's Day

**Fortec – Research Group on Rehabilitation Technology**

fortec was established in 1986 to intensify and consolidate efforts related to research and development of new technical solutions for disabled and elderly persons.

**Head:**  
**Ass.Prof. Dr. Wolfgang L. Zagler**



fortec belongs to the Institute of Industrial Electronics and Material Sciences at the Vienna University of Technology

**AUTONOMY is a Technical Assistance System which...**

...can be seen as Mediator between a severely disabled person and her/his physical and social environment

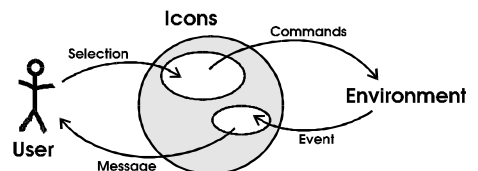
Aim:

- ❖ Increasing independence and autonomy
- ❖ Improving Quality of Life
- ❖ Provision of new ways in therapy and teaching

**The AUTONOMY research project**

- ❖ has integrated different functions: environmental control, AAC, computer-access, security and safety...
- ❖ into a modular and open system with...
- ❖ clear separation of user-interface and application.
- ❖ Tools were implemented for adapting the system functionality to the user requirements and...
- ❖ Tools to compose individual multimodal user-interfaces using carer's ideas and creativity

**Concept of interactive, bi-directional icons for MMI**



### 3 Groups of Users introduced to reduce technical workload of care person

**end-user**

person with special needs, using the assistance system

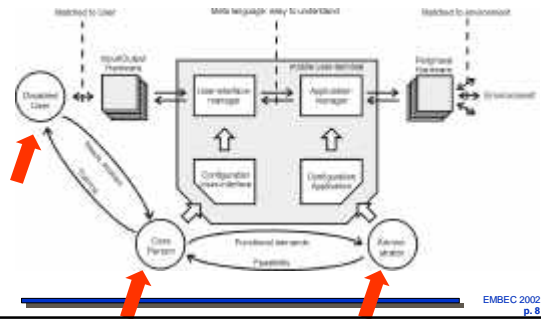
**care person (facilitator)**

therapist, teacher or family member responsible for the configuration and adaptation of the user-interface

**administrator (integrator)**

carrying out the technical set-up of the system

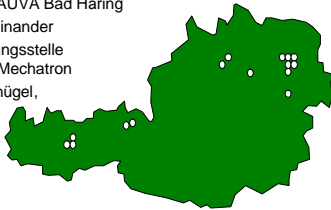
### Architecture of AUTONOMY



### Reference Installationen (1)

**national:**

- Tirol: Elisabethinum Axams (Pilot-Installation 1995), Innsbruck, Wörgl, AUVA Bad Häring
- OÖ: IDK Linz, miteinander
- NÖ: ARCS, Beratungsstelle Wr. Neustadt, Fa. Mechatron
- Wien: NLK Rosenhügel, Kanitzgasse, SPZ21, ÖTBH, LNK Gugging ...



### Reference Installationen (2)

**European Union:**

- ❖ Dundee (UK)
- ❖ Maastricht (NL)
- ❖ Langenau (DE)



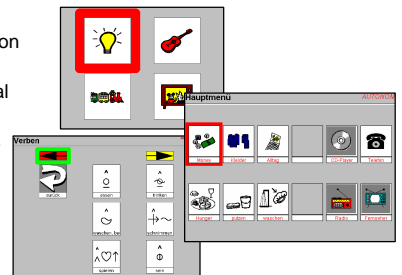
### Parts of the System:

- ❖ CD-ROM with software
- ❖ Infra-Red for Environmental Control
- ❖ Sensor-Box for connecting input switches
- ❖ ... and a Laptop or a PC

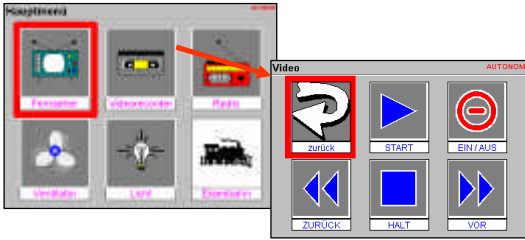


### Functionality – What can I do with it?

- ❖ Communication (AAC)
- ❖ Environmental control
- ❖ Access to PC
- ❖ security and safety



**Environmental Control – TV, VCR, CD-Player, ...**



**Communication with Symbols and/or Text Using Synthetic or Prerecorded Speech**



**Controlling a Phone via infra-red**



**Some Selected Applications of AUTONOMY in Activities of Daily Life (1995-2002)**

- Severely Motor & Multiple Impaired Children: Elisabethinum Axams, Tyrol (since 1995), Viennese school (since 1998)
- Non-Speaking wheelchair bound woman, living independently at private home in Vienna (since 1998)
- Home for the Elderly (Field Trial 1998)
- Patients after traumatic injury: AUVA Rehabilitation Centre Bad Haering in Tyrol (since 2000)
- MS Patient in privat flat in Vienna (Field Trial with occupation therapist, 2000-01)
- Non-Speaking wheelchair bound man, accessing PC and the internet via single switch, Vienna (since 2001)
- Single Switch Using Student, accessing PC for studying informatics and writing source code (since 2000)

**Using Autonomy in a Special Pedagogic Center Elisabethinum Axams**

- 1995: Installation of the Autonomy Room
- 1996-1997: Field Studies
- 1998: First Autonomy Equipped Computers in Classrooms
- 1999: Central Media Database on Server
- 2000: Remote Assistance and Remote Service Study (EU funded)

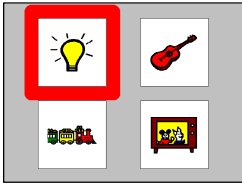


**Gernot**

- ❖ Restricted in perception
- ❖ 2 Switches (YES=SELECTION, NO=GO ON)
- ❖ As many senses as possible shall be touched



**Gernot 2**



- ❖ Four Large Symbols
- ❖ Thick red Frame
- ❖ Each symbol is combined with a sound - acoustic Feedback
- ❖ Scanning Operation



**Isabella**

Situation:

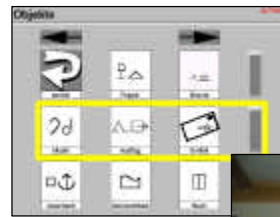
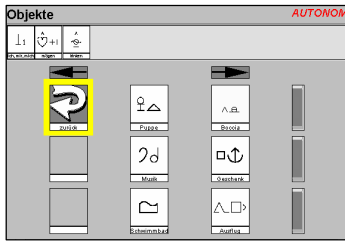
- ❖ Proximity Switch, turning head
- ❖ Scanning: 6 Sec per Symbol.
- ❖ Environmental Control and BLISS Communication
- ❖ 348 Symbols in 17 Levels



**Writing with BLISS**

Details:

- ❖ Simple Editor Line
- ❖ BLISS-Letters for pen-friend in Greece are printed out independently by user



**AUTONOMY – Room in Viennese Public School KANITZGASSE (23rd district)**



**Non-Speaking Severely Motor Disabled Person Using AUTONOMY system for communication, control and listening to lectures notes**  
 Input device: Head stick and/or Single Switch



private home, Vienna



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**Rehabilitation Centre in Tyrol - Patients after traumatic injuries AUVA Bad Häring**



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**MS Patient controlled TV, Radio, CD,...**



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**... via a chin joystick**



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**Hi, my name is Charly...**

„Hi ! Ich heiße Karli, ich bin froh dass ich Laptop und Autonom habe, denn damit geht es viel einfacher, alleine Texte zu schreiben. Ausserdem kann ich zuhause meine Geräte steuern. Schade ist, dass das Programm + Laptop so teuer ist, und ich dafür keine finanzielle Förderung von der Krankenkasse erhalten habe. Danke für Ihre Aufmerksamkeit ! “




Karl Doppelreiter, 22. November 2001

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**Charly's AUTONOMY main screen**



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**Single Switch Using Student (1)**

- Accessing via AUTONOMY a programming environment on another PC in order to do his studies of informatics at Vienna Univ. of Technology
- High Performance User:
  - ❖ appr. 3,600 Symbols in appr. 115 levels
  - ❖ Scanning intervall: 0.8 seconds
  - ❖ Continuous Usage over several hours per day

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### Single Switch Using Student (2)



Input via single foot switch, autom. Scanning, scan time 0.8 sec, appr. 3,600 icons (symbols) structured in appr. 115 menus (levels). Used for writing Source Code as to be done in the framework of informatics courses, personal report by student (in German) to be found on <http://www.fortec.tuwien.ac.at/seminar>

### Outlook and further Horizons

- Note: A product version of AUTONOMY is available since 1999.
- Depending on financial resources the research version of AUTONOMY is being modified in order to optimise usability in daily life:
- Mobile Usage on Wheelchair
- Modification to adapt the system to different lectures
- Improving the system to provide support for interactive communication during lectures



### Non-Speaking Person delivers Speech at AUTONOMY User's Day (Dec 14th, 2001) about her own experiences



### Data from Real Life Usage

Application	Icons	Levels
starting	2-4	1
ECS	20-50	4-8
AAC (symbols)	40-90	5-13
AAC & ECS	80-150	10-20
AAC (BLISS)	350	17
Independent Living	190	24
Independent Living with Access to PC	250	16
High Performance Access to PC	3,600	115

### Key Success Factors for excellent Acceptance by involved Persons

- ❖ Architecture considering the 3 different user groups
  - Frees care persons from technical tasks
- ❖ Flexibility to tailoring the system continuously
  - in iterative cycles to the on-going changing needs of disabled users
- ❖ Flexibility for covering a wide spectrum of users
  - from basic stimulation to independent living
  - very different levels of complexity (4 to 3,600 icons)
- ❖ easy to use / intuitive
  - most of the persons involved are not and do not want to become PC freaks
- ❖ High reliability
- ❖ Affordable version available (since 1999 on Austrian Market)
- ❖ Close co-operation between users, care persons and technicians

### Acknowledgments

Our research activities in the area of technical assistance systems have received funding in part by FFF, OeNB, BMWV, Legrand Austria, European Union, Siemens Nixdorf, Rector's Office of the Vienna University of Technology, Bundessozialamt Vienna and i3s3 Institute Linz

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**Contact**

**Fortec – Research Group for Rehabilitation Technology**

Head: Ass. Prof. Dr. Wolfgang L. Zagler  
 Institute of Industrial Electronics and Material Science  
 Vienna University of Technology  
 Favoritenstrasse 11/366-1B, A-1040 Vienna  
 Tel: +43 -1- 58801-76611, Fax: +43 -1- 58801-36697  
 Email: [fortec@fortec.tuwien.ac.at](mailto:fortec@fortec.tuwien.ac.at)  
 Web: <http://www.fortec.tuwien.ac.at>  
 Wolfgang Zagler: Tel: +43 -1- 58801-76611, Email: [zw@fortec.tuwien.ac.at](mailto:zw@fortec.tuwien.ac.at)  
 Paul Panek: Tel: +43 -1- 58801-76613, Email: [panek@fortec.tuwien.ac.at](mailto:panek@fortec.tuwien.ac.at)

**<http://www.fortec.tuwien.ac.at/autonomy>**

**User's Day:**  
**<http://www.fortec.tuwien.ac.at/seminar>**



**Users in The Netherlands**



**Fransiscusoord, Valkenburg a/d Geul, NL**

**Users in The Netherlands**



**Fransiscusoord, Valkenburg a/d Geul, NL**