



MASARYK UNIVERSITY

SUPPORT CENTRE FOR STUDENTS WITH SPECIAL NEEDS

Polygraf - Universal Access to Presentations and Lectures

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Masaryk University

- **Founded: 1919**
- **Staff: 4700**
- **Faculties: 9**
- **Students: 45000**



- **107 students with hearing disability**
- **5 deaf teachers**
- **60 users of transcription services**

Dispatching transcription services

- dispatching services:
 - staff: 30 STT reporters, 3 dispatchers
 - scheduled courses for registered students: service provided automatically whenever a disabled person is registered
 - other events: on-demand service (upon request from teachers and students)

Professional training for STTRs

- annual competition for STTR's posts includes:
 - tests of typing speed and accuracy,
 - communication skills and general knowledge
- training courses
 - workshops for current transcribers (a training course pilot)
 - 2 years training course
- regular current STTRs certifications
 - system for testing current transcribers (annually, same criteria)



The background

Speech-to-text reporting at Masaryk University

- Provided and organised by Teiresias – Support Centre for Students with Special Needs
- providing services for growing number of hearing impaired students
- former solutions of speech-to-text reporting for groups:
 - Computer with two screens connected
 - VNC screen sharing with up to 3 laptop computers
 - Complicated setup, could comfortably serve only up to 3 students

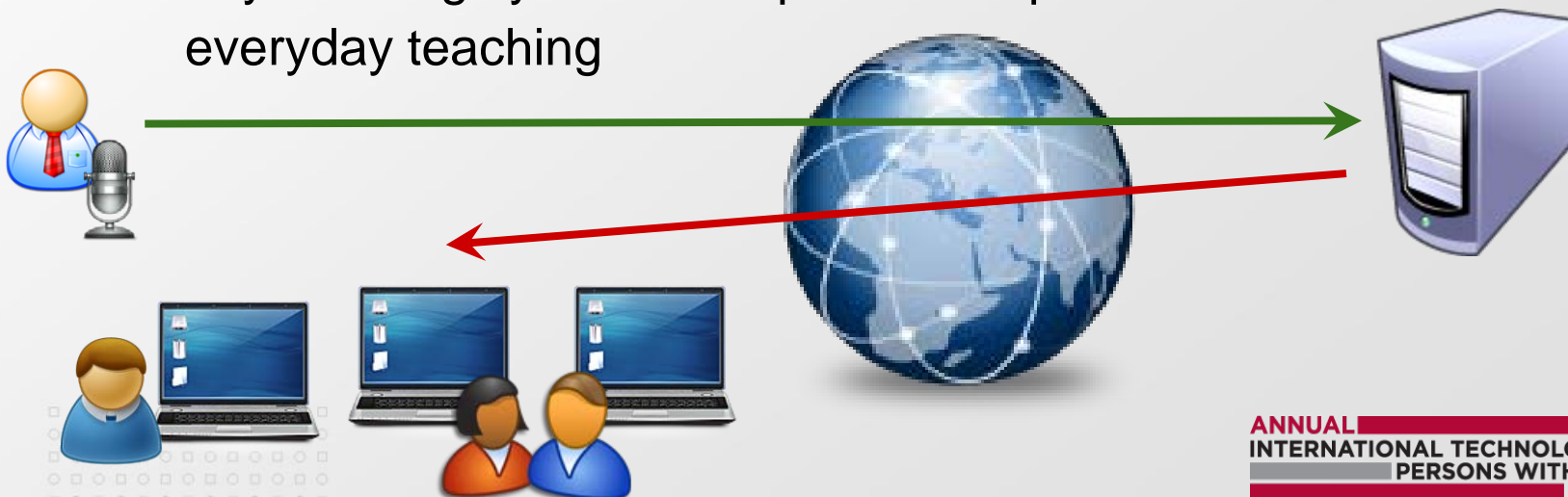


Requirements to a new solution

- simple and fast preparation of the technical environment
- independence of the technical infrastructure
- synchronisation of the users text displayed in real time
- adjustable appearance
- possibility of at least a basic two-way communication
- compatibility with the Czech and English languages

Analysis of existing systems

- intentionally skipped automatic speech recognition (speech-to-text recognition) because:
 - lack of accuracy speech recognition (in terms of professional vocabulary used in high schools)
 - to achieve higher accuracy is dependent on a number of technical conditions
 - any "training system" to a particular speaker is not realistic for everyday teaching



Systems involving a human reporter

- eScribe
- Google Documents
- Bee Communications
- dependence on Internet connection in teaching space
- greater requirements to the preparation of the technical environment
- the need to capture and transfer the speaker's voice and visual presentation material
- indirect contact with the speaker and user



Polygraf - the first version

Development of our own system - Polygraf

Key Features:

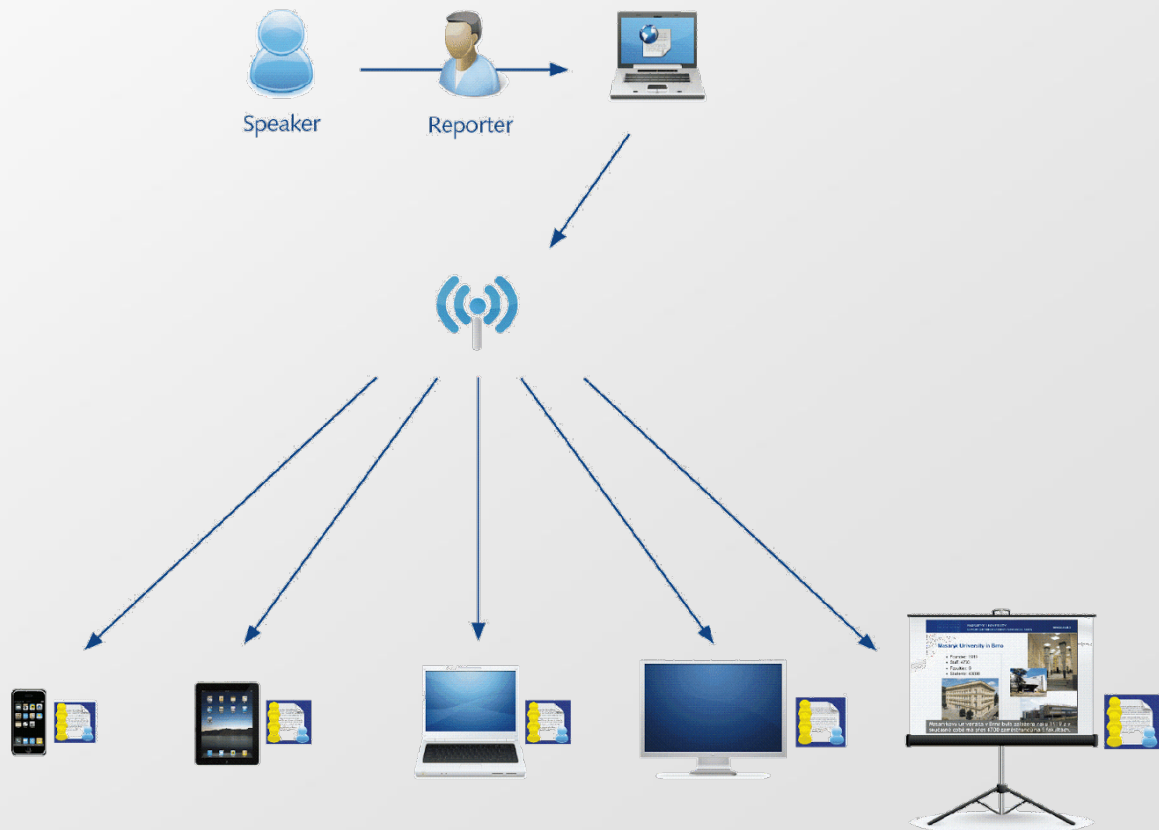
- consists of only three portable hardware components
- does not require internet connection, specific network configuration, or your own server
- works with MS Word text editor, which many reporters work with in the Czech Republic
- uses the iPad and its principal user comfort
- It's possible to view the transcript on devices running iOS, MS Windows as well as Android
- allows two-way communication

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Polygraf – diagram



Polygraf – hardware components

- **the reporter's computer**
 - a laptop or PC with the *MS Windows* and *MS Word* (version 2003 and later)
- **Wi-Fi access point**
 - no need of Internet connectivity for this wireless network.



Polygraf – hardware components

- **for users:**
 - any device with iOS operating system
 - a laptop or tablet with MS Windows
 - any Android device running Android 2.1 and later



Polygraf – software components

- **Polygraf Word AddIn (for the reporter's computer)**



installed separately alongside the Word (version 2003 and later) to “share” the text report to the users’ devices.

- **Polygraf (for the users' handheld devices)**



handles the reception of the text report as well as the mirrored screen and it continuously updates and displays according to the user's custom setting.

- **Polygraf Captions (for the speaker's computer)**



an optional application to display the reported text as closed captions (subtitles), which can be attached to a speaker's presentation

Polygraf - Formattings

Formatting options made by the reporter

(Formatting is refreshed in typing pauses)

Transferred

- font family
- font style (bold, italics, underline)
- line spacing
- paragraph indentation
- tables (limited)

Not transferred

- colors
- pictures, images, text area
- page layout

Polygraf - Customization

customizable view of a text report

- font family and font style
- line-spacing, colors

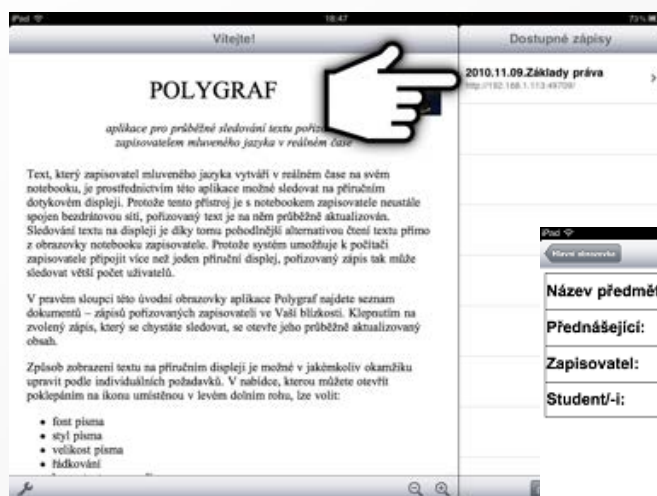
sign language support for static texts such as *Help* or *Initial welcome text*

- translation of the documentation into sign language(s)
- video files to be downloaded, first

language of user interface:

- Czech, English, German, Polish, Italian

Polygraf - Visualisation of transcripts



select a transcript to
be visualized

2010.11.09.Základy práva

Název předmětu:	Základy práva	
Přednášející:		Datum: 9.11.2010
Zapisovatel:		Den: úterý
Student/-i:		

ZÁPIS Z PŘEDNÁŠKY (semináře, cvičení)



The opened document
can be visualized in
individual way

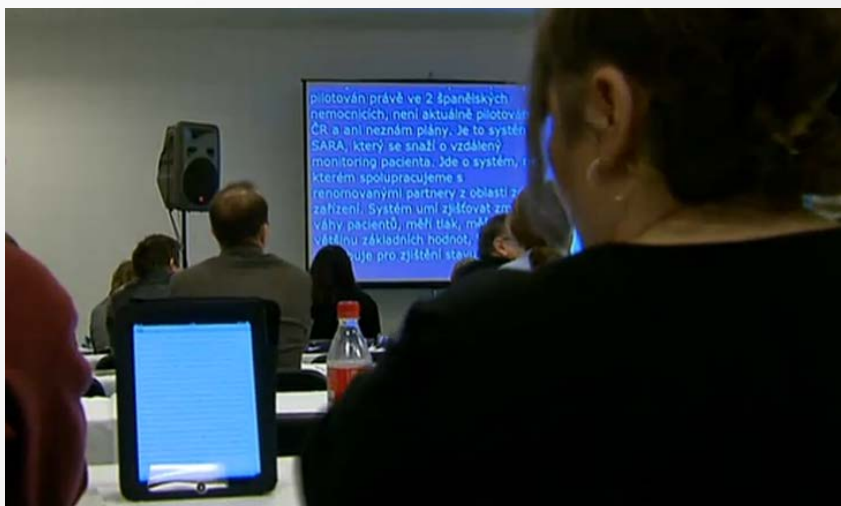


the layout of the UI as
well as the interface can
be adapted according to
users needs

Polygraf - Customization

The user's handheld devices could be also used as

- when connected to a data projector, it is a source of the report displayed publicly for audience without user interface on the screen





Polygraf - the second version

Polygraf v2 – new functionality

mirroring of presentation screen

- access to presentations in enlarged form displayed on a handheld device
- users with visual impairment can follow the presentation more easily and individually
- adjustable:
 - magnification ratio, color-inverting
 - image update time

Polygraf v2 – new functionality

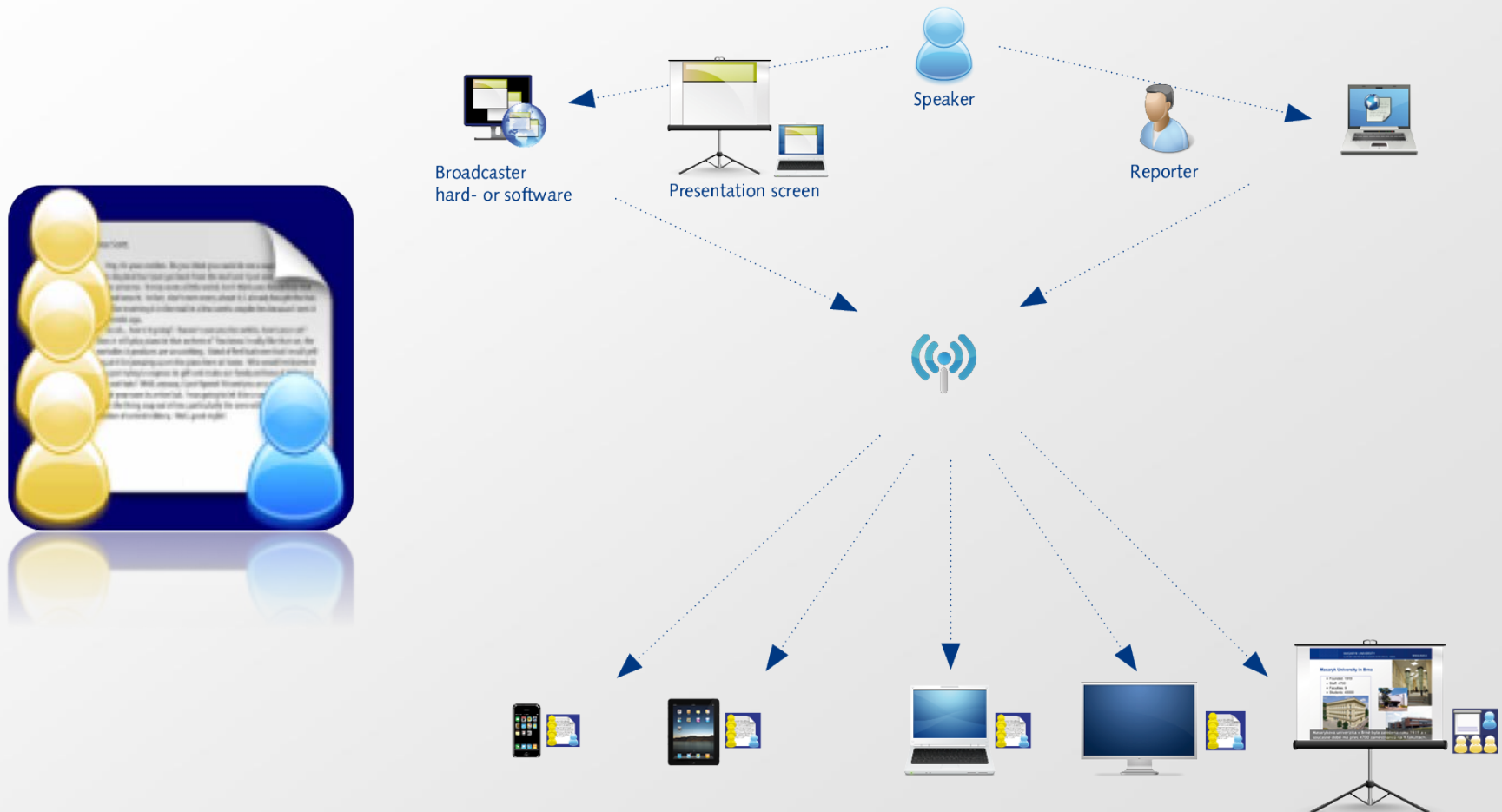
mirroring of presentation screen

- access to presentations in enlarged form displayed on a handheld device
- users with visual impairment can follow the presentation more easily and individually
- adjustable:
 - magnification ratio, color-inverting
 - image update time

closed captions added to the mirrored presentation screen

- comfortable for hard of hearing users
text report together with the presentation can be followed at once

Polygraf v2 – diagram



Polygraf v2 – hardware components

A screen capturing device for the speaker's computer

a broadcasting device capturing the video signal and providing it through network interface. (optionally, can be substituted by the software)

A powerful, reliable Wi-Fi access point providing bandwidth for several clients

no need of Internet connectivity for this wireless network.



Polygraf v2 – software components

- **Polygraf Software Broadcaster**



for the speaker's computer, captures the screen and provides it through network interface

image is updated in intervals

(optionally, can be substituted by the software)

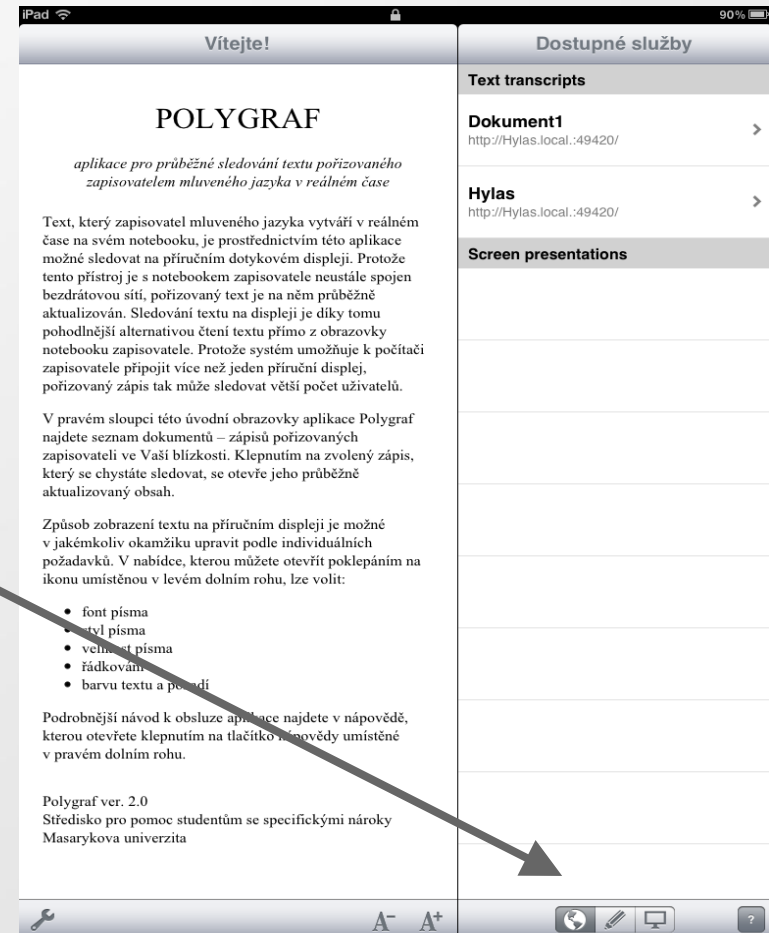
Polygraf v2 – Userinterface

New user interface

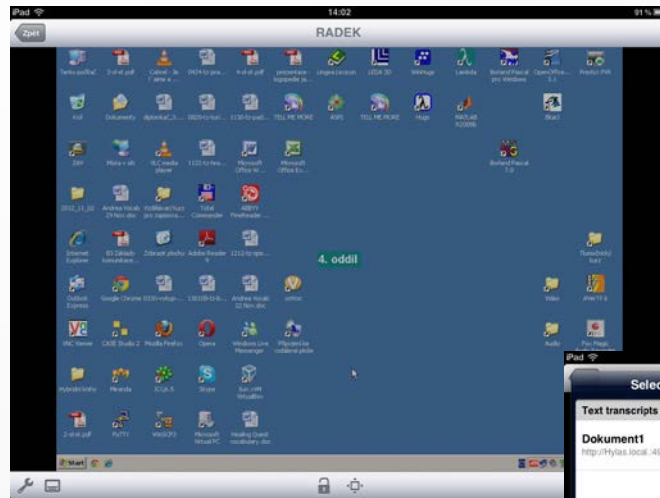
- new elements have been added
- slight update of the interface



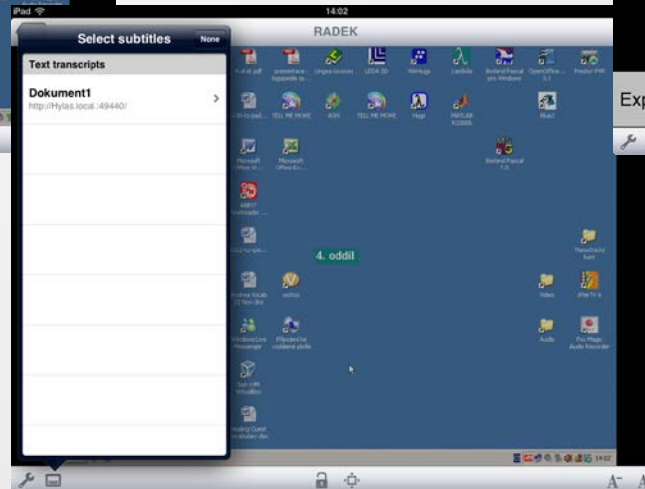
1. show all available services
2. show *transcripts* only
3. show *presentation screen mirrorings* only



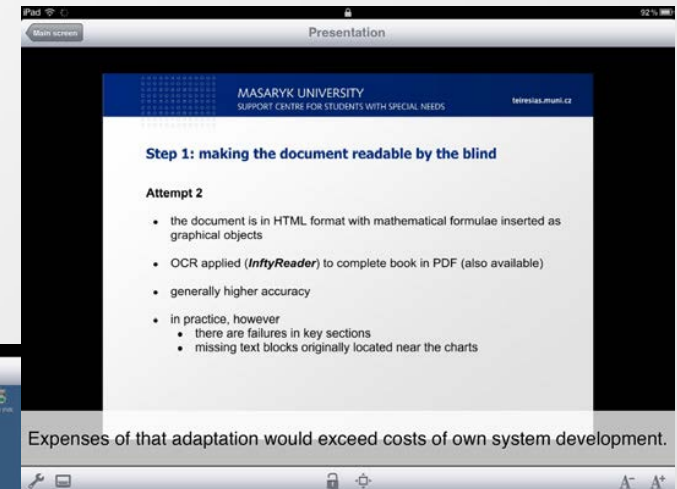
Polygraf v2 – Presentation screen mirroring



enter the presentation
screen mirroring from
the document
selection at the main
page



select the transcription
document to be visualized



the transcript is shown
as closed caption
overlying the
presentation

Polygraf v2 – presentation of overlaid by CC

The principle

MASARYK UNIVERSITY
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teiresias.muni.cz

Masaryk University in Brno

- Founded: 1919
- Staff: 4700
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- Students: 43000

Masaryk University in Brno was founded in 1919 and currently it has over 4700 employees among 9 faculties.

Presentation

Transcript as subtitles

Not used in University setting

- content gets overlaid by transcripts
- Lecturers are worried to lose the attention of the students

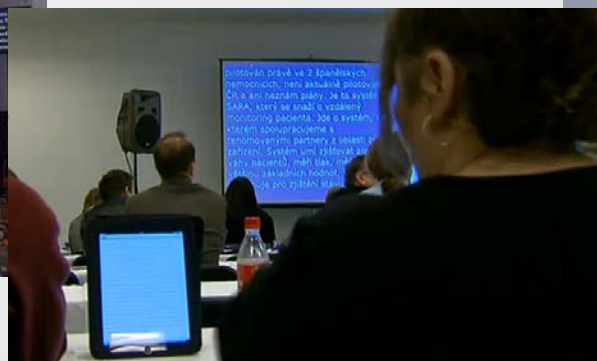


Polygraf - Usage and Practical Experience

Polygraf – Usage and Practical Experience

- used throughout the last three academic years in lectures of Masaryk University
- in total amount approx. 300 lectures (3–6 students attending each of them)
- usage at conferences:
 - Universal Learning Design 2011, Brno
introduction of Polygraf
 - ICCHP 2012, ULD track
 - Universal Learning Design 2013, Brno
introduction of Polygraf v2
- used in several countries e.g. Sweden, Netherlands, South Africa, ...

Polygraf – Usage and Practical Experience





A short summary

Advantages on Polygraf system

- independance of the person with disability during the presentation or lecture from the service provider
- accessibility and comfort for non disabled persons gets combined
- easy setup in a controlled environment
- universal application useable for the individual approaches to transcript as well as the public presentation on larger LCD



Challenges on Polygraf system

- influenced by environmental circumstances such as Wi-Fi traffic (conferences like CSUN may be critical providing a reliable network connection)
 - using different technologies then Wi-Fi may be implemented
- cost intensive hardware for the screen capturing required for an easy setup on side of presenter
- distant reporting not implemented (yet)



Polygraf – Future developments

- Android as well as Windows client improvement
 - a version 2 for Android is in preparation
 - Windows and special Windows Phone are challenges yet due to the complex requirements of software frameworks besides the application itself
- own broadcaster hardware with limited but required features
- adding settings for the better use of Polygraf with braille displays
 - adapting the algorithm to display the text according to amount of displayable characters on braille displays
- increasing the possibilities for students with dyslexia

Thank you for your attention.

www.teiresias.muni.cz/polygraf
(demo version available)

Please let us know your opinion and questions

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