LICOLAB

Language, Information, and Communication Laboratory
Department of Slavic Studies, Slavic Philology, and Communication
Faculty of Arts, Pavol Jozef Šafárik University in Košice

Head of Department: doc. PhDr. Marianna Sedláková, PhD.
Professional Guarantor of the Laboratory: doc. Mgr. Renáta Gregová, PhD.

Technical Specialist: Ing. Eva Kiktová, PhD.

Dr. h. c. prof. PhDr. Ján Sabol, DrSc.: **emeritus professor**
prof. Ing. Július Zimmermann, CSc.: **emeritus professor**

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Purpose of the laboratory

The research experimental workplace LICOLAB (Language, Information and Communication Laboratory) at the Department of Slovak Studies, Slavic Philology and Communication of the Faculty of Arts of UPJŠ was founded in 1969 for the needs of all language departments at the Faculty of Arts of Pavol Jozef Šafárik University in Košice. Its founders, prof. PhDr. Ján Sabol, DrSc., and prof. Ing. Július Zimmermann, CSc., work at the workplace as emeritus professors. Since its inception, the laboratory has been focused on acoustic phonetics, methodically it is focused on the analysis and resynthesis of the speech signal in the time and frequency domain. In addition to standard algorithms for measuring FFT spectra and spectrograms, cepstral and LPC analysis, LICOLAB has its own procedures for continuous, discrete and packet wavelet analysis and speech signal resynthesis. In recent years, the laboratory has solved the tasks of perceptual phonetics – measuring the perception of speech signal by clinical audiometry methods on calibrated devices. Tasks related to the detection of anticipatory cores in simultaneous and consecutive interpreting by HMM methods – hidden Markov models and statistical methods of machine learning – are also solved. Machine learning methods are used in the recognition of some suprasegments.

The laboratory also carries out intensive interlinguistic research – general linguistics, information theory, communication theory, literary science, semiotics and the interconnection of the individual layers of acoustic signal on the background of the relationship between the individual and the universal (especially within phonetics, phonology and morphology) according to synthetic phonological theory by prof. J. Sabol, stylistic aspects of acoustic signal and especially sound structure of media communication.

In order to maintain a high level of hardware and software equipment of the workplace, interdisciplinary projects bringing practical use and being financially supported (e.g., by the agencies APVV, VEGA, etc.) are predominantly solved in LICOLAB.

Technical equipment of the laboratory

LICOLAB consists of three separate rooms: the laboratory centre, the recording studio and the phonetics auditorium, which is also intended for perception tests.

The following devices are installed **in the LICOLAB centre**:

Hardware:

Behringer X32 compact digital mixing console.
Yamaha AS1100 low frequency amplifier.
Bowers & Wilkins 683 S2 speakers.
A/D converters: ART Voice Channel; ART Pro MPA II; Ωmega Lexicon; Steinberg UR22.
Audiometers: Otometrics Madsen Astera 2; MedRx Avant A20.
Audio Calibrator G.R.A.S.
BOSS BR-1200 digital recorder.

Software:

Computer Speech Lab CSL 4500 with Analysis Synthesis Lab ASL libraries; Analysis of Dysphonia ADSV; Multidimensional Voice Program MDVP; Sona Match SNM.
Adobe Master Collection CS5.
Adobe Audition CS6.
Matlab R2019a with toolboxes: Signal Processing Tbx; Wavelet Tbx; Fuzzy Logic Tbx; Statistics and Machine Learning Tbx; Matlab Compiler.
Speech signal analyser S_Tools STx.
Statistical programme SPSS Statistics.
Native Instruments sound editor.
Psychoacoustic test programme Otoconsult A&E 2012.

The recording studio has the following facilities:
Neumann condenser microphones; RODE; Sennheiser; Sennheiser wireless microphone.
TASCAM DR-100 MK III recorder; TASCAM HD P2.
Sony PMW EX1R camera.

The following devices are installed **in the phonetics auditorium:**

Hardware:

16 pcs HP Pavillon 570 PC with external sound unit Sound Blaster SBX.
Mackie Prof X 12V2 mixing console.

Software:

MultiSpeech speech analyser.
Speech signal analyser S_Tools STx.
Adobe Master Collection CS5.

Science and research:

1. analysis of selected suprasegments by the methods of machine learning
dissertation thesis
PhD student: Mgr. Jana Frankovská
thesis title: *Measurement of suprasegments in English and Slovak by the method of machine learning*
supervisor: doc. Mgr. Renáta Gregová, PhD.
consultants: prof. Ing. Július Zimmermann, CSc., Ing. Eva Kiktová, PhD.

2. acoustic and perceptual analysis of speech
dissertation thesis
PhD student (external): Mgr. Dmytro Mykolajovyč Hrycu

thesis title: *An Acoustic and Perceptual Analysis of Onomatopoeia in the Sample of Indo-European Languages*
supervisor: doc. Mgr. Renáta Gregová, PhD.
consultants: prof. Ing. Július Zimmermann, CSc., Ing. Eva Kiktová, PhD.

Current research projects:

Project No.: VEGA 1/0344/21 Adaptive matrix tests in audiometry and perceptual phonetics (1. 1. 2021 – 31. 12. 2023). Principal investigator: Ing. Eva Kiktová, PhD., Faculty of Arts, Pavol Jozef Šafárik University in Košice.

Project No: APVV-19-0003 Onomatopoeia – what is in a name? (2020 – 2024). Principal investigator: prof. PaedDr. Lívia Körtvélyessy, PhD, Faculty of Arts, Pavol Jozef Šafárik University in Košice.

Project No.: VVGS-2020-1487 Innovation of Slovak as a Foreign Language for Specific Purpose Course by using e-learning education materials in the context of blended learning application (01. 07. 2020 – 30. 06. 2021). Principal investigator: Ing. Mgr. Ingrid Madárová, PhD., Language Training Centre, Faculty of Arts, Pavol Jozef Šafárik University in Košice.

Completed research projects:

Project No: APVV-15-0307 Anticipation Phonetic Strategies for Simultaneous and Consecutive Interpreting (07/2016 – 12/2020). Principal investigator: prof. Dr. Rudolph Sock, PhD. Faculty of Arts, Pavol Jozef Šafárik University in Košice/Université de Strasbourg.

Project No.: APVV-15-0492 Speech Audiometry in the Romani Language (07/2016 – 12/2019). Principal investigator: prof. Ing. Július Zimmermann, CSc., Faculty of Arts, Pavol Jozef Šafárik University in Košice.

Project No: VEGA 1/0273/16 A Comparative Analysis of the Distinctive Features of Phonemes in Slovak, English and German (01/2016-12/2018). Principal investigator: doc. Mgr. Renáta Gregová, PhD., Faculty of Arts, Pavol Jozef Šafárik University in Košice.

Project No: APVV-0077-11 Audiometric Lingual Tests (07/2012-12/2015). Principal investigator: prof. Ing. Július Zimmermann, CSc., Faculty of Arts, Pavol Jozef Šafárik University in Košice.

Project: VEGA No. 1/0938/12 Wavelet analysis of acoustic speech signal (1/2012-12/2014). Principal investigator: prof. Ing. Július Zimmermann, CSs., Faculty of Arts, Pavol Jozef Šafárik University in Košice.

Project VEGA 1/0283/09 Synthetic phonological theory. Current state and perspectives (2009 – 2011). Principal investigator: prof. PhDr. Ján Sabol, DrSc., Faculty of Arts, Pavol Jozef Šafárik University in Košice.

Collaborating institutions:
   o Institute of Phonetics, Faculty of Arts, Charles University in Prague;
   o Ľ. Štúr Institute of Linguistics, Slovak Academy of Sciences in Bratislava;
   o Faculty of Arts, Comenius University in Bratislava;
   o Lilpa – Linguistique, langes, parole, Université de Strasbourg;
   o Department of Otolaryngology, Head and Neck Surgery, Inselspital, University of Bern, Switzerland;
   o Jagelonian University in Krakow;
   o Faculty of Electrical Engineering, Technical University in Košice;

- Faculty of Arts, University of Zagreb, Croatia;
- International Commission for Phonetics and Phonology of Slavic languages at the International Committee of Slavists.