Research groups of biosignal analysis in the Polish Academy of Sciences

WHO WE ARE:

We are two research groups (GBAF, LBAF) working in the **biosignal analysis** field in the institutes of Polish Academy of Sciences. Group of Biosignal Analysis Fundamentals (GBAF) belongs to the Medical Research Center, while Laboratory of Biosignal Analysis Fundamentals (LBAF) belongs to the Institute of Biocybernetics and Biomedical Engineering. Our two research groups are actively involved with research in both **biomedicine** and **bioengineering,** specializing in new nonlinear methods of biosignal analysis for assisting medical assessment and diagnostics. For example, we have proposed new method of measuring the depth of anaesthesia. GBAF and LBAF goals are to achieve results that can not be obtained with 'classical' linear methods.

COLLABORATION INTERESTS:

GBAF and LBAF are interested in implementation of newly proposed algorithms in order to calculate biosignals' characteristics that become helpful in medical assessment and diagnostics and also in vigilance monitoring.
Potential role: data analyser, project partner

WHAT MAKES US A GOOD PARTNER

- We are a higly interdisciplinary group, well collaborating with medical doctors, engineers, biologists, psychologists, and physicists
- We are anchored in two big research Institutes of the Polish Academy of Sciences
- We have broad national and international collaboration
- Our workforce is highly qualified
- We have wide experience in applying modern nonlinear and symbolic analytical methods

AREAS FOR R&D COLLABORATION:

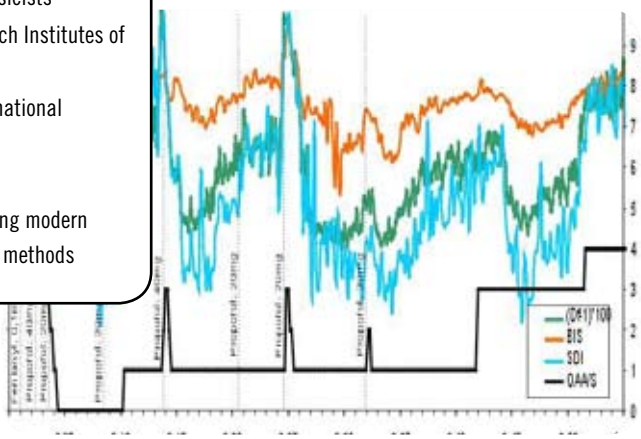
- Biosignal analysis using nonlinear and symbolic methods
- Hybrid modeling of regulatory processes
- Analysis of respiratory signals
- Sleep analysis (polysomnograms)
- Heart-rate analysis
- Measuring of the depth of anaesthesia
- Monitoring patients in ICU.
- Quality assessment of surfaces of nanosensors, implants, etc.
- Complexity of processes vs.connectivity and topology of system structure
- Applications in economy, psychology, and social sciences

MAIN ACHIEVEMENTS:

New method of measuring the depth of anaesthesia, competitive to BIS (patent pending)
Sleep stager based on EEG-signal fractal dimension for assessment of sleep disorders
Vigilance monitoring of truck and car drivers
Combination of hybrid modeling of biosystems with nonlinear data processing

REFERENCE PROJECTS:

GBAF and LBAF have been involved in a number of projects supported by the EU and by Polish Government.



Selection of EU projects:

EUROATTRACTOR: European Interdisciplinary Schools on Nonlinear Dynamics for System and Signal Analysis (2000, 2001, 2002) in FP5. LBAF initiated and coordinated this project.
SENSATION (FP6): Advanced SENSor Development for ATtentION, Stress, Vigilance & Sleep/ Wakefulness Monitoring - GBAF is the only Project Partner from Poland.
ENOC - Electric Neuronal Oscillations and Cognition - COST B27 Action. Prof. W.Klonowski who is the leader of both LBAF and GBAF is a member of ENOC Management Committee and the Chairman of the Theoretical Working Group.

Selection of other projects:

Computerized EEG-analysis using chaos theory - applications in neuropsychiatry diagnostics. LBAF was the leader of the research project that was sponsored by the Polish Committee of Scientific Research.
Computer-assisted analysis of polysomnograms using nonlinear dynamics methods: LBAF was the leader of the research project that was sponsored by the Ministry for Science and Higher Education.
SENSATION: GBAF is the Leader of special research project (SPUB) that is sponsored by the Ministry for Science and Information.
ENOC: LBAF obtained a special grant for research on respiratory biofeedback applied for treatment of stuttering patients.

OTHER INFORMATION:

Names of the research departments:
GBAF - Group of Biosignal Analysis Fundamentals, MRC PAS.
LBAF – Lab. of Biosignal Analysis Fundamentals, IBBE PAS.
Name of organisation: Polish Academy of Sciences
Organisation type: Public research institutes
Country: Poland
Number of researchers: 9
Working languages: English, Polish

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