



Name of the Institution:  
Budapest University of Technology and Economics

Web: [www.mit.bme.hu](http://www.mit.bme.hu) www.bme.hu

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Name of the TEMPUS CRH-BME representative (for your Institution):  
prof. Dr. Ákos Jobbágy

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**BME GROUP/LABORATORY PRESENTATION**

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Budapest University of Technology and Economics (BME) was founded in 1782. Presently, BME has eight faculties, 1,100 staff members and 24,000 students. Faculty of Electrical Engineering was founded in 1949.

The Department of Measurement and Information Systems at Budapest University of Technology and Economics (BUTE DMIS) was founded in 1954. The main research areas of the Department are embedded systems, intelligent systems and dependable computing. BUTE DMIS has been involved in biomedical research and education since 1970. Research includes device development (pulmonary testing equipment, electroencephalograph, control of blood-gas analyzer and automatic haematological analyzer, simple passive marker based analyzer) as well as algorithm development for medical image processing (mammographic and X-ray chest images), biomedical decision support, molecular biological data preprocessing and -omic data analysis.

Application of movement analysis for the objective assessment of patients with neural diseases started in 1993. The department has a motion analysis laboratory equipped with a precision image-based motion analyser (PRIMAS), able to determine the position of markers in 3D 100 times/s. Motion analysers of this kind are expensive while their specifications are far better than necessary for a number of biomedical applications. A simple and cheap, passive marker-based motion analyser has been developed at the department (PAM), able to determine the position of markers 50 times/s in 2D. This information is sufficient for clinical applications and the device is affordable even for clinical wards.

The motion analysers of the department have been used for objectively staging patients with neural diseases. 10 Parkinsonian patients and about 30 healthy control subjects were tested while performing well defined finger- hand- and arm movements. Up to now about 200 recordings have been made from the finger tapping movement. Other movement patterns, twiddling, pinching and circling as well as pointing have been tested.

Biomedical engineering has been taught by the department since the early 1970's. Biomedical instrumentation, medical image processing, bioinformatics and intelligent systems are the main fields.

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**BME EDUCATION**

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**COURSES AVAILABLE IN ENGLISH? (IF YES, ON WHICH LEVEL?)**

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• BSc:	• MSc:	• PhD:
ECTS: Total number		
• BSc: --	• MSc: 120	• PhD:

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## MAIN BME INTERESTS

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- home health monitoring, medical image processing, movement analysis
  - biomedical decision support, data analysis, biomarker discovery
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## IMPORTANT PROJECTS

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### National

- Objective evaluation of movement disorders* OTKA (Hungarian National Scientific Fund) (principal investigator: Jobbágy Ákos)
- Home health monitoring* GVOP AKF (Hungarian Operative Program for Economic Competitiveness) (leader of the consortium: Jobbágy Ákos)
- Continuous home health monitoring* OTKA (principal investigator: Jobbágy Ákos)
- Modelling arterial blood flow* OTKA (participant: Jobbágy Ákos)
- Aid to biomedical engineering education*. FEFA (Hungarian Fund for Higher Education), 1995, (principal investigator of the department: Jobbágy Ákos)
- Development of a patient simulator* FKFP (principal investigator of the department: Jobbágy Ákos)
- Development of an advisory system for medical diagnosis using images(CAD system development for mammographic image analysis)* GVOP AKF (Hungarian Operative Program for Economic Competitiveness), 2001-04 (principal investigator: Horváth Gábor)
- Development of a CAD System for Screening X-ray Chest Radiography* KMOP (Hungarian Operative Program for Economic Competitiveness) 2008-2011. (principal investigator: Horváth Gábor)
- Bioinformatic services for genetic association studies using high-performance grid computation* (GENAGRID), NKTH-GENAGRID-TECH\_08-A1/2-2008-0120, 2008-2012, (principal investigator of the department: Péter Antal)
- Bayesian methods for the generalized feature subset selection problem and their biomedical applications*, OTKAPD-76348, 2008-2011, (principal investigator: Péter Antal)
- Genetic factors of age-related decline in cognitive performance* (Sasvári-Székely Mária), OTKA-81466, 2010-2014 (participant at the department: Péter Antal)
- Comprehensive study of the pathogenesis of severe asthma* (Szalai Csaba), OTKA-81941, 2010-2014, (participant at the department: Péter Antal)
- Type 2 diabetes mellitus and the central nervous system - a genomic approach* (Rónai Zsolt). OTKA-83766, 2011-2015 (participant at the department: Péter Antal)

### International

- PRIMAS.EC: Precision Real-time Motion Analysis System at Economical Cost* (Hungarian principal investigator: Jobbágy Ákos) 1994-95 COPERNICUS
- Development of signal processing algorithms to compensate the non-ideal projection of passive marker-based motion analysers* OTKA-NWO (The Netherlands Organization for Scientific Research) N 25107 1998-1999, (Hungarian principal investigator: Jobbágy Ákos)
- Intelligent Instrumentation for Home-health Monitoring*, Hungarian – Croatian scientific cooperation, 2008-09, (Hungarian principal investigator: Jobbágy Ákos)

### Patents

- Bretz KJ, Jobbágy Á, Bretz K Berendezés a kéz és az ujjak remegésének, az ujjak erőkifejtésének mérésére (*Equipment to assess the tremor of hand and fingers and the grip force of fingers*)  
Nr: U0600144, Year of publication: 2007
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## RECENT PUBLICATIONS (LAST 2 YEARS)

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Valálik I, Jobbágy Á, Csókay A, Bognár L: Effectiveness of Unilateral Pallidotomy for Meige Syndrome Confirmed by Motion Analysis. STEREOTACTIC AND FUNCTIONAL NEUROSURGERY 89:(3) pp. 157-161. (2011) IF: 1,451

Valálik I, Jobbágy Á, Csókay A, Bognár L Quantitative measurement and analysis of oral, facial and head dyskinesia, dystonia and tremor. JOURNAL OF NEURAL TRANSMISSION 117:(10) p. 1246. (2010)

- Jobbágy Á, Harcos P, Fazekas G, Valálik I Mozgásérzékelő eszközök neurológiai betegségekben szenvedők aktuális állapotának elemzésére. IDEGGYÓGYÁSZATI SZEMLE-CLINICAL NEUROSCIENCE 63:(3-4) pp. 125-128. (2010)
- Jobbágy Á, Nagy Á Measure of Similarity of ECG Cycles. In: Bamidis PN, Pallikarakis N (ed.) MEDICON 2010. Halkidiki, Greece, 2010.05.27-2010.05.31. (International Federation for Medical and Biological Engineering) Springer, pp. 17-20.
- Mersich A, Jobbágy Á Identification of cuff transfer function increases indirect blood pressure measurement accuracy. PHYSIOLOGICAL MEASUREMENT 30:(3) pp. 323-333. (2009) IF: 1,430
- Jantek B, Jobbágy Á, Szemán J, Schultheisz J, Bacsó P (szerk.) Habilitation Aid for Children with Balance Disorders. München, Germany, 2009.09.07-2009.09.12. Springer-Verlag, 2009. 9-12. p.
- Csókay A, Valálik I, Jobbágy Á Robotkéztechnika alkalmazása a mikroszkópos idegsebészeti műtéteknél. IDEGGYÓGYÁSZATI SZEMLE-CLINICAL NEUROSCIENCE 62:(1-2) pp. 48-52. (2009)
- Csókay A, Valálik I, Jobbágy Á Early experiences with a novel (robot hand) technique in the course of microneurosurgery. SURGICAL NEUROLOGY 71:(4) pp. 469-472. (2009) IF: 1,382
- Jobbágy Á, Csordás P, Mersich A Blood Pressure Measurement: Assessment of a Variable Quantity ZDRAVSTVENI VESTNIK (ISSN: 0350-0063) 80:(4) pp. 316-324. (2011)
- M. Altrichter, Z.. Ludányi and G. Horváth "Joint Analysis of Multiple Mammographic Views in CAD Systems for Breast Cancer Detection" Proceedings of the 14th Scandinavian Conference, SCIA 2005, Joensuu, Finland, June 19-22, 2005. Lecture Notes in Computer Science, Springer ISSN: 0302-9743. Computer Science, Volume 3540 / 2005, (Eds: Heikki Kalviainen, Jussi Parkkinen, Arto Kaarna) pp. 760-769.
- M. Altrichter and G. Horváth: "The Refinement of Microcalcification Cluster Assessment by Joint Analysis of MLO and CC Views" Digital Mammography, Proc. of the 8th International Workshop, IWDM 2006, Manchester, UK. Lecture Notes in Computer Science, Springer ISSN: 0302-9743. Volume LNCS 4046, (Eds: Susan M. Astley, Michael Brady, Chris Rose and Reyer Zwiggelaar) pp. 509-516.
- Horváth G, Pataki B, Horváth Á, Máday P, Orbán G, Horváth Á, Simkó G, Juhász S. „A CAD System for Screening X-ray Chest Radiography” In: World Congress on Medical Physics and Biomedical Engineering. Munich, Germany, 2009.09.07-2009.09.12. Springer, pp. 210-213. (IFMBE Proceedings; 25/5.) Information and Communication in Medicine, Telemedicine and e-Health

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P. Antal, A. Millinghoffer, G. Hullám, G. Hajós, Cs. Szalai, A. Falus: A bioinformatic platform for a Bayesian, multiphased, multilevel analysis in immunogenomics, in *Bioinformatics for Immunomics*, Ed.: M.N.Davies, S.Ranganathan, D.R.Flower, Springer, 2009

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Semsei A.F, Antal P, Szalai Cs.: Strengths and weaknesses of gene association studies in childhood acute lymphoblastic leukemia, *Leuk Res.*, 2009, doi:10.1016/j.leukres.2009.07.036, IF: 2.39

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