CURRICULUM VITAE

Name:	Ambrus Miklós ZELEI, PhD
Place and date of birth:	Budapest, Hungary, 16. 03. 1983.
Workplace:	Department of Whole Vehicle Engineering Audi Hungaria Faculty of Vehicle Engineering, Széchenyi István University,
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STUDIES

PhD, Department of Applied Mechanics, Budapest University of Technology and Economics	2015
MSc, Teacher of Engineering Sciences, Budapest University of Technology and Economics	2009
MSc, Mechanical Engineering, Budapest University of Technology and Economics Specialization of Applied mechanics and Fluid mechanics thesis work at University of Bristol, UK	2007

POSITIONS

Associate Professor, Audi Hungaria Department of Whole Vehicle Engineering	2022–
Research associate, MTA-BME Human Balancing Research Group	2017–2022
Research associate, MTA-BME Rsrch gr. on Dynamics of Machines and Vehicles	2015–2022
Research assistant, MTA-BME Rsrch gr. on Dynamics of Machines and Vehicles	2010–2015

RESEARCH PROJECTS AND WORKING EXPERIENCE

Project manager and scripter in 4 software development projects (Customer: Audi Hungaria) 2022–

NKFIH-FK18 128636 (Principal Investigator) 2018–

> Dynamics of human and artificial legged locomotion – running towards model-based predictions.

Developement of the ACG-SIM aircraft simulator robot (motion control and human sensing) 2017–

Magnus eFusion – Siemens Electric Aircraft Battery Pack Vibration Tests 2015–2019

Innovative Teaching and Popularization of Robotics for 6-18 Age-Group 2015–

EVRYON project (FP7-ITC-2007.8.5 #231451) 2011–2012

> Project aim: development of a novel approach for the design of wearable robots. My work was about the dynamical modeling and control design of the servo driver system.

INNOCSEKK project (INNO_08_KM-HIDARAML) 2009–2010

> The project aim was to develop a method for the coupled simulation of the wind induced flutter instability of aeroelastic structures, especially bridges. My work was about analytical stability calculations for reduced bridge models and calculation of flutter derivatives based on experimental data.

ACROBOTER project (FP6-IST-2006-045530) 2008–2011

> Project aim: development of a new service robot platform which is based on a radically new robot locomotion technology. My work was about the dynamical modeling and motion control of the under-actuated ACROBOTER robot.

Professional practice at Knorr-Bremse Fékrendszerek Kft., Budapest, Hungary. 2006, one month
Testing of control software of commercial vehicle brake system

Professional practice at Paks Nuclear Power Plant, Paks, Hungary. 2001, one month
Working with metal-cutting machines

ELMŰ, Electric Power Supplier Company, Budapest, Hungary. 2000, one month
Power networks, public lighting maintenance

Teaching assistant at Department of Applied Mechanics in academic year 2005/2006, spring

Teaching assistant at Department of Applied Mechanics in academic year 2005/2006, autumn

TEACHING ACTIVITIES

About 900 contant hours, out of which 400 in English, about 50 hours online material

Lecturer (Széchenyi Univ.): Core elements of Whole Vehicle development (MSc, Hu/En); 2022–
CAE Methods (MSc, Hu/En); Engine, Motor and Vehile Testing (MSc, En),
Systemic Engineering Vehicle Design (BSc, En), Technical Reading and Writing (BSc, En)

Lecturer (BME): Basics of Mechanisms (BSc, Hu); Mechanisms (MSc, Hu/En); 2014–2022
Dynamics of Mechanical Systems (MSc, Hun.); Dynamics of Robotmechanisms (BSc, En)

Tutor in (BME, BSc, Hu): statics; strength of materials; dynamics; vibrations; finite element method	2007–2014
Supervised BSc theses:	34
Supervised MSc theses:	24
Supervised PhD projects:	2 (2 ongoing)
Supervised TDK (University Scientific Student's Conference) works:	26 (places: 1st: 7, 2nd: 6, 3rd: 7)
Supervised OTDK (National Scientific Student's Conference) works:	10 (places: 1st: 1, 2nd: 2, 3rd: 2)

SCIENTIFIC AWARDS

Special award for supervisors, National Scientific Student's Conference, 2011.

1st and 2nd places of National Scientific Student's Conference (OTDK) 2007, Section Technical Sciences

1st place of National Scientific Student's Conference (OTDK) 2007, Section Pedagogy and Education Technology

1st, 1st, 2nd, 3rd places of University Scientific Student's Conference (TDK, BME GPK) 2004–2006, Section Applied Mechanics

1st place of University Scientific Student's Conference (TDK, BME GTK) 2006, Section Ergonomics and Psychology

LANGUAGE SKILLS

English (fluent speaking and writing) • German (pre-intermediate) • Russian (beginner)

EXPERIENCE ABROAD

Nanjing University of Aeronautics and Astronautics, China, Guest researcher, 2 weeks & 1 week	2014 & 2019
University of Texas at Dallas, USA, Guest researcher, 1 month	2009
University of Bristol, UK. 1 semester, MSc Thesis	2007

RESEARCH INTEREST

Digitally controlled dynamic systems • Control of underactuated and redundant mechanical systems • Dynamics of aero-elastic systems • Dynamical systems with time-delay • Parametric excitation, non-autonomous systems • Multibody dynamics, mechanisms • Dynamics of human walking and running

PUBLICATIONS

Above 20 international peer-reviewed journal papers, above 40 talks at international conferences.

SELECTED PAPERS:

[1] Zana, R. R. and Zelei, A.: Feedback motion control of a spatial double pendulum manipulator relying on swept laser based pose estimation, ***International Journal of Optomechatronics*** **15(1)**:32-60, 2021, doi: 10.1080/15599612.2021.1890284.

[2] Patkó, D. and Zelei, A.: Velocity and acceleration level inverse kinematic calculation alternatives for redundant manipulators, ***Meccanica*** **56**:887-900, 2021, doi: 10.1007/s11012-020-01305-z.

[3] Zelei, A., Milton, J., Stépán, G., Insperger, T.: Response to perturbation during quiet standing resembles delayed state feedback optimized for performance and robustness, ***Scientific Reports*** **11**:11392, 2021, doi: 10.1038/s41598-021-90305-4.

[4] Zelei, A., Krauskopf, B., Piiroinen, P. T., Insperger, T.: Stable periodic motion of a controlled segmented leg model of pedal locomotion with inelastic ground-foot collision. ***Nonlinear Dynamics*** **97(3)**, 2019, doi:10.1007/s11071-019-04911-z.

[5] László Bencsik, László L. Kovács and Ambrus Zelei: Stabilization of Internal Dynamics of Underactuated Systems by Periodic Servo-Constraints. ***International Journal of Structural Stability and Dynamics*** **17(5)**, 2017, doi:10.1142/s0219455417400041.

[6] Ambrus Zelei, Laszlo Bencsik and Gabor Stepan: Handling actuator saturation as underactuation - case study with Acroboter service robot. ***Journal of Computational Nonlinear Dynamics*** **12(3)**, 031011. 2016, doi:10.1115/1.4034868.

[7] László Bencsik, Ambrus Zelei: Effects of human running cadence and experimental validation of the bouncing ball model. *Mechanical Systems and Signal Processing* **89**, 78-87, 2016, doi: 10.1016/j.ymssp.2016.08.001.

[8] Zsolt Szabo, Ambrus Zelei, Gábor Stépán: Stability of an elastic supported flat plate subjected to potential flow. ***Periodica Polytechnica – Mechanical Engineering*** **56(2)**, 99-103, 2012.

[9] L. L. Kovács, A. Zelei, G. Stépán: Computed torque control of an under-actuated service robot platform modeled by natural coordinates. ***Communications in Nonlinear Science and Numerical Simulation*** **16(5)** 2205-2217, 2010.

[10] A Zelei, G Stépán: The influence of parametric excitation on floating bodies. ***PAMM*** **8(1)** 10929-10930, 2008.

May, 2023, Szombathely, HUNGARY

Ambrus Miklós Zelei, PhD