

# Zoltán Micskei | Curriculum Vitae

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## Education and Degrees

- **PhD degree (summa cum laude)**  
Budapest University of Technology and Economics 2005–2008  
Dissertation: “Languages and frameworks for specifying test artifacts”, 2013 📄
- **MSc degree (with honor)**  
Budapest University of Technology and Economics, Fault-tolerant Systems specialization 2000–2005

## Positions

- **Associate professor (tenured):** Budapest University of Technology and Economics 2017–
- **Assistant professor:** Budapest University of Technology and Economics 2013–2017
- **Lecturer:** Budapest University of Technology and Economics 2009–2013
- **Research associate:** Budapest University of Technology and Economics 2008–2009

## Leadership roles

- **Department of Artificial Intelligence and Systems Engineering** **Deputy Head**  
Responsible for coordinating the R&D activities of the department (40 full-time faculty members) 2022–
- **Critical Systems Research Group (ftsrg)** **Leader**  
The group currently consists of 29 members, from which 11 hold a PhD degree. 🌐 2019–  
The mission of the group is to develop new methods and tools to help engineers create better systems.
- **Council of the Faculty** **Member**  
The highest decision making committee of the Faculty of 300 staff members and 5000 students. 2019–
- **Scientific Committee** **Member**  
Committee for the preparation of decisions concerning the Faculty’s scientific and innovation affairs. 2022–
- **Critical Systems minor (MSc)** **Coordinator**  
A 4 semester minor in the Master programme teaching development and verification of critical systems. 2023–
- **Systems Engineering specialization (BSc)** **Coordinator**  
A 3 semester specialization with the contributions of three departments chosen by 100 students. 2018–2024

## Research experience

*Research statement:* My main area is software and systems engineering, specializing in software testing and model-based engineering. My goal is to produce advanced, but practical testing and verification tools. I favor empirical research methods and open science principles.

## Awards and scholarships








- **Member:** Hungarian Young Academy 📄 2022  
The Academy elects 12 members every year under the age of 40 based on scientific excellence.
- **Ten Year Most Influential Paper:** Journal of Software and Systems Modeling (SoSyM) 📄 2021  
Editors-in-Chiefs announce an award for one regular paper having the most influence within the last ten years.
- **Kalmár Award:** John von Neumann Computer Society (NJSZT) 📄 2021  
The award recognizes professionals, who have achieved excellent results in the application of computer science.
- **Senior Member:** Association for Computing Machinery (ACM) 📄 2021

For demonstrating performance through technical leadership, and technical or professional contributions.

- **Scholarship for the Nation's Young Talents:** National Talent Program (NTP-NFTÖ-16) 2016
- **Schnell László Prize:** Schnell László Foundation 2007

## Selected publications

 Full list •  Google Scholar •  MTMT



- M. Elekes, V. Molnár, Z. Micskei. "To Do or Not to Do: Semantics and Patterns for Do Activities in UML PSSM State Machines", *IEEE Tran. on Software Engineering (TSE)*, 2124–2141, 2024.  10.1109/TSE.2024.3422845
- B. Horváth, V. Molnár, B. Graics, A. Hajdu, I. Ráth, A. Horváth, R. Karban, G. Trancho, Z. Micskei: "Pragmatic verification and validation of industrial executable SysML models", *Systems Engineering*, 693–714, 2023. 
- M. Elekes, V. Molnár, Z. Micskei. "Assessing the specification of modelling language semantics: a study on UML PSSM", *Software Quality Journal (SQJ)*, 575–617, 2023.  10.1007/s11219-023-09617-5
- Á. Hajdu, Z. Micskei. "Efficient Strategies for CEGAR-Based Model Checking", *J. of Automated Reasoning (JAR)*, 64, 1051–1091, 2020.  10.1007/s10817-019-09535-x
- D. Honfi, Z. Micskei. "Classifying generated white-box tests: an exploratory study", *Software Quality Journal (SQJ)*, 27(3), 1339–1380, 2019.  10.1007/s11219-019-09446-5
- L. Cseppentő, Z. Micskei. "Evaluating code-based test input generator tools", *Software Testing, Verification and Reliability (STVR)*, 27(6), 1–24, 2017.  10.1002/stvr.1627
- Z. Micskei and H. Waeselynck. "The many meanings of UML 2 Sequence Diagrams: a survey", *Software and Systems Modeling (SoSyM)*, 10(4), 489–514, 2011.  10.1007/s10270-010-0157-9

## Research projects

### International collaborative research projects (site leader, PI)



- **Environment for model-based rigorous adaptive co-design and operation of CPS** **Site leader**  
*EU ITEA3 18039, EMBrACE, 17 partners, own funding 93k €* 2020–2022
- **Addressing Verification and Validation Challenges in Future CPS (ADVANCE)** **Site leader**  
*EU H2020 RISE 823788, 7 partners, own funding 138k €* 2019–2022
- **Arrowhead Tools for Engineering of Digitalisation Solutions** **Co-PI**  
*EU H2020 ECSEL 823788, 80 partners, own funding 257k €* 2019–2022  
PI for BME: Pál Varga

### International collaborative research projects (contributor)

- **Reconfigurable ROS-based Resilient Reasoning Robotic Cooperating Systems (R5-COP)** **Task leader**  
*EU ARTEMIS 621447, 30 partners, project total costs 13M €* 2014–2017  
Led the development of a model-based regression testing method for autonomous systems.
- **Resilient Reasoning Robotic Co-operating Systems (R3-COP)** **Researcher**  
*EU ARTEMIS 100233, 27 partners, project total costs 17.5M €* 2010–2013  
Co-developed a method for generating test contexts for autonomous robots.
- **Security Engineering for lifelong Evolvable Systems (SecureChange)** **Researcher**  
*EU FP7 231101, 15 partners, project total funding 5M €* 2009–2010  
Coordinated the dissemination activities of the project.
- **Highly DEpendable ip-based NETworks and Services (HIDENETS)** **Researcher**  
*EU FP6 026979, 8 partners, project total funding 2.5M €* 2006–2008  
Co-developed TERMOS, a test requirement language for mobile systems. 
- **Resilience for Survivability in IST (ReSIST)** **Researcher**  
*EU FP6 026764 Network of Excellence, 21 partners, project total funding 4.5M €* 2006–2008  
We categorized the semantic choices and formal semantics proposed for UML 2 Sequence Diagrams. 



### Industrial R&D projects

- **Safety Science and Technology Competence Center** **Co-PI**  
*BME VIK and thyssenkrupp* 2021–2023  
With Tamás Dabóczy we coordinate 20 researchers working on safety and security of automotive systems.

- **Model Checking as a Service** **Lead**  
*IncQuery Labs, Budapest, Hungary* 2019–2021  
 We created a cloud-based environment that can verify SysML State Machines using hidden model checkers. 
- **Testing Automotive Systems and Code** **Lead**  
*thyssenkrupp E/E Competence Center, Budapest, Hungary* 2017
- **Comparing Robustness of HA middleware** **Researcher**  
*Nokia Research Center, Finland* 2005–2006  
 Co-developed a method for comparing the robustness of AIS-based middleware. 

## Tutoring

### PhD students

- **Ákos Hajdu**: Effective Domain-Specific Formal Verification Techniques (2020), PhD dissertation defended 
- **Dávid Honfi**: Evaluating and Improving White-Box Test Generation (2021), PhD dissertation defended 
- **Márton Elekes**: Assessing the quality of graph-based models and modeling languages (2020–2024)
- **Zsófia Ádám**: Improving the efficiency and applicability of model checking algorithms (2023–2027)




### Graduate and undergraduate students

- **Student scientific competition**: 1 × 1<sup>st</sup> prize (national), 1 × 1<sup>st</sup>, 4 × 2<sup>nd</sup>, 1 × 3<sup>rd</sup> prize (Faculty level)
- **Thesis works**: I supervised 21 MSc and 28 BSc thesis works.

## Research visits

- **ResilTech** **Pontedera, Italy**  
*Visiting researcher at ResilTech in the context of EU MSCA projects 3 × 1 months.* 2015–2016, 2022–2024
- **CNRS-LAAS** **Toulouse, France**  
*Visiting researcher at the TSF group of CNRS-LAAS research laboratory for 6 × 1 months.* 2006–2007

## Research datasets and tools

- **MBT**: dataset on model-based testing (MBT) and code-based test generation tools 
- **Autosolator**: a tool for automatically isolating dependencies during test generation 
- **SETTE**: a framework for evaluating and comparing test input generator tools 

## Services to the community

### Organizational Committee member

- International Symposium on DIStributed Computing (DISC), *General co-chair* 2019
- IEEE High Assurance Systems Engineering Symposium (HASE), *Panel co-chair* 2016
- Int. Workshop on Software Engineering for Resilient Systems (SERENE), *Publicity chair* 2014

### Program Committee member

- IEEE International Conference on Software Security and Reliability (QRS) 2023–2024
- Int. Conf. on Computer Safety, Reliability and Security (SafeComp) 2024–2025
- International Workshop on Modeling Language Engineering (MLE) 2023–2024
- International Conference on Conceptual Modeling (ER) 2017–2018
- High Assurance Systems Engineering Symposium (HASE) 2016, 2019
- Latin-American Symposium on Dependable Computing (LADC) 2018
- International Conference on System Analysis and Modelling (SAM) 2018
- International Conference on System Design Languages (SDL) 2017
- International Workshop on Executable Modeling (EXE) 2015–2018
- User Conference on Advanced Automated Testing (UCAAT) 2016
- European Dependable Computing Conference (EDCC) 2016

- International Workshop on Software Certification (WoSoCer) 2014
- International Conference on Testing Software and Systems (ICTSS) 2012–2014, 2016

### External reviewer for journals

- ACM Transactions on Software Engineering and Methodology (TOSEM), International Journal on Software and Systems Modeling (SoSyM), Journal of Systems and Software (JSS), IEEE Transactions on Reliability (TRel), Software Quality Journal (SQJ), Reliability Engineering & System Safety (RESS)

Moreover, I served as external reviewer for several conferences (MODELS, DSN PDS, SAC DADS, SRDS, ASE...).

### International grant evaluation

- Natural Sciences and Engineering Research Council of Canada (NSERC): Discovery Grant, 2022
- Israeli Science Foundation (ISF): Individual Research Grants, 2018

### Participation in PhD defense committees


- External reviewer: Ferenc Horvath (U. of Szeged, 2023), Peter Gal (U. of Szeged, 2023), Mirko Staderini (U. of Firenze, 2022), Nadera Aljawabrah (U. of Szeged, 2021), Dénes Bán (U. of Szeged, 2018)
- Member: Khalil Mebarkia (BME, 2023), Omar Al-Debagy (BME, 2022), Márton Vaitkus (BME, 2021), Li YangYuan (BME, 2020), György Rácz (BME, 2019)

### Membership in societies

- **ACM**: Association for Computing Machinery 2015–
- **NJSZT**: John von Neumann Computer Society 2013–

## Teaching experience

I have 15+ years of teaching experience and have developed and taught several undergraduate and graduate courses. I regularly coordinate the work of 5–10 teaching assistants for my courses.

*Teaching statement:* I prefer to include collaborative, project-based elements in my courses and offer flexibility for the students in their learning experience. See for example my SWSV course. 

### Courses (highlights)

- **Software Engineering** **Lead instructor**  
*VIMIAB04, Undergraduate, ~500 students* 2023–  
 Foundational course on software engineering for all students.
- **Software and systems verification (SWSV)** **Lead instructor**  
*VIMIMA01, Graduate, ~200 students* 2015–2022  
 Led and developed half of the material for the course about testing and test generation.
- **Intelligent system management** **Lead instructor**  
*VIMIA370, Undergraduate, ~200 students* 2009–2016  
 Led and developed most of the materials for the course on scripting and design for manageability.
- **Virtualization technologies and their applications** **Lead instructor**  
*VIMIAV89, Elective, ~20 students* 2009–2012  
 Led and developed half of the materials on the different kinds of virtualization (platform, OS, application...)
- **Operating systems** **Instructor**  
*VIMIA219, Undergraduate, ~400 students* 2007–2015  
 Developed the lecture and laboratory materials for the Windows and virtualization parts of the course.

### Teaching excellence

I regularly get high scores in student evaluations, I was in the TOP25 list of our university (~1000 faculty).

- **Excellent Young Instructor of the Faculty** 2016  
*Student Council of the Faculty of Electrical Engineering and Informatics*  
 The 5000+ students of the Faculty vote for the best teacher among the 200+ faculty members in two categories.

- **Dean's Commendation**  
*Dean of the Faculty of Electrical Engineering and Informatics* 2014  
 For outstanding teaching activities and developing excellent educational materials.
- **Best Young Instructor of the Department**  
*Schnell László Foundation* 2011, 2012  
 Awarded to a young faculty of the department (60+ members) for outstanding teaching activities.

## Professional experience

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


In the last 15 years I worked at different levels of the software and systems stack: ranging from configuring blade servers, managing VMware and Windows environments, debugging applications to doing .NET or web development.

### Trainings and consulting for companies.....

- **MBT**: I was one of the first to obtain an ISTQB Model-based Tester certification and I hold accredited trainings.
- **Unit testing**: Training about development testing, test design and mocking.
- **SysML/UML**: Introduction to modeling and model-based development with UML or SysML.

### Industrial talks.....

I regularly speak at professional events to present testing topics or our research results.

- **Testing the new generation of critical systems**  
*Thyssenkrupp SUP Conference, Budapest* 2022
- **Trustworthy and Explainable Artificial Intelligence**  
*ITBusiness Inside, Budapest* 2022
- **Overview of testing**  
*Test Team Leader seminar, Budapest* 2018, 2019
- **Empirical Evidence in Software Testing**  
*Hungarian Software Testing Forum (HUSTEF), Budapest, Hungary, (Poster session)*  2017
- **Evaluating Code-Based Test Input Generator Tools**  
*User Conference on Advanced Automated Testing (UCAAT), Budapest, Hungary*  2016
- **Model-based testing: goals and use cases**  
*Software Testing Conference, Budapest, Hungary* 2016
- **The Gap Between Academic Research and Industrial Practice in Software Testing**  
*Hungarian Software Testing Forum (HUSTEF), Budapest, Hungary*  2014
- **Generating Unit Tests Automatically from Source Code**  
*Test&Tea meetup, Budapest, Hungary*  2014
- **Testing Autonomous Systems in an EU Project**  
*Software Testing Conference, Budapest, Hungary* 2012
- **Using Model-based Testing in a Research Project**  
*Software Testing Conference, Budapest, Hungary* 2011