



## Zoltán Horváth

**Nationality:** Hungarian | **Gender:** Male | **Email address:** [horvathz@sze.hu](mailto:horvathz@sze.hu) |

**Address:** Egyetem tér 1., 9026, Győr, Hungary (Work)

### WORK EXPERIENCE

14/08/1989 – CURRENT Győr, Hungary

**PROFESSOR OF MATHEMATICS AND COMPUTATIONAL SCIENCES SZÉCHENYI ISTVÁN UNIVERSITY**

Research in numerical methods, optimization, and scientific computations.

Teaching graduate and undergraduate students: lectures, seminars in industrial mathematics, digital twins, and pure mathematics courses.

Supervisor of the Computer Science MSc curriculum.

PI in several industrial projects per year, mainly with large companies.

Full professor since 2013. Professor of appl. sciences: 1999-2013, associate prof.: 1996-1999, adjunct: 1993-1996, assistant prof.: 1989-1993.

**Department** Mathematics and Computational Sciences | **Address** Győr, Hungary

28/02/2006 – CURRENT Győr, Hungary

**HEAD OF DEPARTMENT OF MATHEMATICS AND COMPUTATIONAL SCIENCES SZÉCHENYI ISTVÁN UNIVERSITY**

31/12/2021 – CURRENT Győr, Hungary

**DEAN OF FACULTY OF MECHANICAL ENGINEERING, INFORMATION TECHNOLOGY, AND ELECTRICAL ENGINEERING SZÉCHENYI ISTVÁN UNIVERSITY**

The main topics of educational curricula, research, and cooperation with industry:

automotive, industrial automation, robotics, UAV, AI, industrial mathematics, computer science, computer science in engineering, telecommunication, 5G/6G, cybersecurity, and computer networks.

**Department** Faculty of Mechanical Engineering, Information Technology, and Electrical Engineering |

**Address** Győr, Hungary

### EDUCATION AND TRAINING

1983 – 1989 Budapest, Hungary

**MATHEMATICIAN MSC** Eötvös Loránd University (ELTE)

**Address** Budapest, Hungary

1989 – 1992 Budapest, Hungary

**COMPUTER SCIENTIST IN MATHEMATICAL MODELLING MSC** Eötvös Loránd University (ELTE)

**Address** Budapest, Hungary

1995 Budapest, Hungary

**MATHEMATICS AND COMPUTATIONAL SCIENCES PHD** Eötvös Loránd University (ELTE)

**Address** Budapest, Hungary

**Address** Budapest, Hungary

## ● **ADDITIONAL INFORMATION**

---

### **PROJECTS**

30/09/2016 – 30/10/2018

**MSO4SC - Mathematical Modelling, Simulation, and Optimization for Societal Challenges with Scientific Computing H2020-project: role: scientific coordinator**

**Project Acronym:** MSO4SC

**Project Title:** Mathematical Modelling, Simulation and Optimization for Societal Challenges with Scientific Computing

**Project Number:** 731063

**Instrument:** Collaborative Project

**Thematic Priority** H2020-EINFRA-2016-1

30/11/2018 – 27/02/2022

**HiDALGO Centre of Excellence – HPC and Big Data Technologies for Global Systems HiDALGO** – HPC and Big Data Technologies for Global Systems – is a European project funded by the Horizon 2020 Framework Programme of the European Union.

**Project Number:** 824115

**Product of the project:** development of the urban air pollution (UAP) simulation platform, which simulates traffic, traffic emitted pollution, air flow and dispersion of the emitted pollutants in cities' 3D geometry, which is generated by UAP scripts from OpenStreetMap. Deployment of the software, its execution on real HPC hardware, and results visualization are automated from a web portal. An AI-based reduced order code have been developed for the 3D compressible Navier-Stokes equation that runs efficiently on GPGPUs resulting in more than 10.000 times faster simulation of airflow and dispersion for cities with fine resolution (2 meter at ground level for a city with size 5 km by 5 km by 0.8 km) than the same code on a full CPU-node.

01/01/2023 – CURRENT

**HiDALGO2 Centre of Excellence – HPC and Big Data Technologies for Global Systems** Climate change has long since been an undeniable phenomenon observed up close at many places on Earth. Climate change influences our everyday life, and thus has also an increasing impact on our quality of life. One of the key reasons is the dynamic development of societies which for decades significantly impacts the natural environment. This can be dramatically experienced nowadays by violent weather phenomena (e.g. storms, rainfalls). These problems are addressed by Global Challenges (GC). GC requires interdisciplinary expertise, and demands for solutions at scale due to their inherent complexity. Thus, HiDALGO2 aims to explore synergies between modelling, data acquisition, simulation, data analysis and visualisation along with achieving better scalability on current and future HPC and AI infrastructures to deliver highlyscalable solutions that can effectively utilise pre-exascale systems. The project focuses on five use cases from the environmental area: improving air quality in urban agglomerations, energy efficiency of buildings, renewable energy sources, wildfires and meteo-hydrological forecasting. The common feature of the modelling of the above simulations is the use of numerical analysis of fluid flows by Computational Fluid Dynamics (CFD) method, which is typically very compute-intensive. HiDALGO2 puts high emphasis on issues related to the scalability of solutions, the best adaptation of the software to the infrastructure (co-design) by using the appropriate benchmarking methodology and algorithmic optimization methods. This enables the efficient use of top-notch HPC systems to simulate complex structures with much greater accuracy not achievable for calculations using Cloud solutions. The quality of our solutions is assessed by uncertainty analysis carried out in ensemble runs mode. HiDALGO2 actively contributes to user communities from the EU by addressing the skills gap and sharing knowledge under organised specialised workflows and training.

### **PUBLICATIONS**

[The MSODE Strategic Research Agenda](#) – 2020

Role: coordinator of the SRA of the EU-MATHS-IN.

---

[List of publications](#)

---

## NETWORKS AND MEMBERSHIPS

2014 – CURRENT

### **EU-MATHS-IN executive board member**

07/12/2020 – CURRENT

**EU-MATHS-IN president** EU-MATHS-IN aims to leverage the impact of mathematics on innovations in key technologies by enhanced communication and information exchange between and among the involved stakeholders on a European level.

It shall become a **dedicated one-stop shop** to coordinate and facilitate the required exchanges in the field of application-driven mathematical research and its exploitation for innovations in industry, science, and society.

For this, it shall build an e-infrastructure that provides tailored access to information and facilitates communication and exchange by player-specific sets of services.

It will act as a facilitator, translator, educator, and link between and among the various players and their communities in Europe.

Link: <https://eu-maths-in.eu/> .

10/12/2013 – CURRENT

**HU-MATHS-IN president** The Hungarian Service Network of Mathematics for Industry and Innovation is a cooperation of 22 Hungarian interdisciplinary mathematical research groups with the aim of providing services with mathematical solutions to companies and organizations of all sectors. The research groups have joined the Network from seven major universities and two research institutes. HU-MATHS-IN welcomes the research and innovation challenges of industry in its One-Stop-Shop. HU-MATHS-IN is strongly integrated in EU-MATHS-IN, the European network with the same purpose. For further information on organization, concluded projects and the One-Stop-Shop, please visit <http://hu-maths-in.hu> .