Balázs Vass

PhD in Informatics
Born: 10.01.1992, Odorheiu Secuiesc, Romania
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web: my webpage
Public profiles: Google Scholar, Scopus, Web of Science, ResearchGate

Curriculum Vitae

Professional carreer

01/10/2023-	Associate professor, Department of Mathematics and Computer Science of the Hungarian Line, Faculty of Mathematics and Computer Science, Babeş-Bolyai University, Cluj Napoca, Romania
01/07/2022-	Assistant Research Fellow (50%), HUN-REN-BME (HUNgarian REsearch Network Office for Research Groups & BME) Information Systems Research Group, Budapest, Hungary
01/09/2020-	Assistant lecturer (from 1/09/2023 onwards, in $12,5\%$), Budapest University of Technology and Economics (BME), Faculty of Electrical Engineering and Informatics (VIK), Department of Telecommunications and Media informatics (TMIT), Budapest, Hungary

Education

01/09/2016-31/08/2020	Ph.D. student, Budapest University of Technology and Economics, Budapest, Hungary. Dissertation title: Modeling and Enumerating Geographically Correlated Failure Events in Communication Networks. ***Ph.D. award date:*** 24/02/2022. Distinction: Summa cum laude.
01/09/2016-31/08/2020	Student at EIT Digital Doctoral School (supplementary Ph.D. programme). Topic: Network failure protection. Industrial partner: Ericsson Technologies Hungary. Defence planned: Q1 of 2024.
01/09/2014-31/08/2016	M.Sc. student in Applied Mathematics, Eötvös Loránd University (ELTE), Budapest, Hungary. Degree: good.
01/09/2011-31/08/2014	B.Sc. student in Mathematics, Eötvös Loránd University, Budapest, Hungary. Degree: excellent.

Visits (research expeditions)

02/12/2019-07/12/2019	COST RECODIS Short Term Scientific Mission (STSM) at University of Coimbra, Portugal, visiting Teresa Gomes
01/04/2019-30/06/2019	EIT Digital geographical mobility, Politehnica University of Bucharest, Romania, visiting Costin Raiciu (ERC winner)
04/03/2019-31/03/2019	EIT Digital geographical mobility, Hebrew University of Jerusalem, Israel, visiting David Hay
01/01/2019-01/03/2019	EIT Digital geographical mobility, University of Vienna, Austria, visiting Stefan Schmid (ERC winner)
08/01/2018-14/01/2018	COST RECODIS STSM at University of Southern Denmark, Odense, Denmark, visiting Martin Zachariasen

Main research interests

Networking, graph theory, combinatorial and computational geometry, polynomial time disaster-disjoint routing algorithms

Publications

My Google Scholar profile lists 284 citations, an h-index of 11, and an i10-index of 12. According to Scopus, I have 174 citations, an h-index of 8 (or, without self-citations an h-index of 7). My WoS profile reports 108 citations, and an h-index of 6. The author versions of all my publications are available here. My Erdős number is 3 through academist Lajos Rónyai and the Gödel and Knuth prize laureate László Babai (see the Erdős number project). In the following, I present my works.

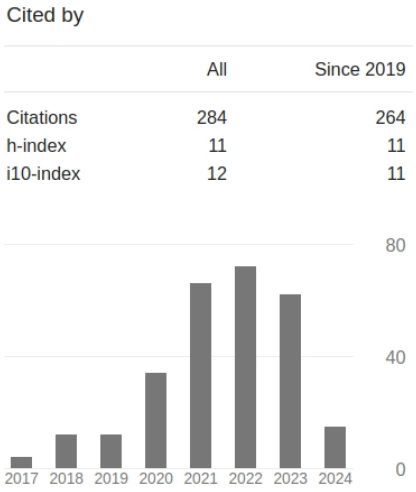

Figure 0.1: Statistics on my Google Scholar profile (as of March 2024)

Book

B. Vass, "*Regional Failure Events in Communication Networks: Models, Algorithms and Applications*", in Springer Theses series, Springer, September 2022. https://doi.org/10.1007/978-3-031-14256-7 ***State-of-the-art failure models disseminated through this series 'Recognizing Outstanding Ph.D. Research'.***

Book chapters

B. Vass, J. Tapolcai, D. Hay, J. Oostenbrink, F. A. Kuipers "*How to Model and Enumerate Geographically Correlated Failure Events in Communication Networks*," In: J. Rak, D. Hutchison (eds) Guide to Disaster-Resilient Communication Networks. Computer Communications and Networks. Springer, Cham, 2020. https://doi.org/10.1007/978-3-030-44685-7_4. ***Tutorial on regional failure modelling.***

T. Gomes, L. Martins, R. Girao-Silva, D. Tipper, A. Pašić, **B. Vass**, L. Garrote, U. Nunes, M. Zachariasen, J. Rak, "*Enhancing Availability for Critical Services*", In: Computer Communications and Networks. Springer, Cham, 2020. ***Tutorial on availability enhancement in communication networks.***

T. Gomes, D. Santos, R. Girão-Silva, L. Martins, B. Nedic, M. Gunkel, F. Dikbiyik, **B. Vass**, J. Tapolcai, J. Rak, "*Disaster-Resilient Routing Schemes for Regional Failures*", in Computer Communications and Networks. Springer, Cham, 2020. ***Tutorial on disaster-disjoint routing approaches.***

Papers in peer-reviewed scientific journals

B. Vass, B. É. Nagy, B. Bányi, and J. Tapolcai, "*The Complexity Landscape of Disaster-Aware Network Extension Problems*," in Networks, Wiley, 2023, pp. 1-14, doi: https://doi.org/10.1002/net.22199

B. Vass, E. R. Bérczi-Kovács, Á. Barabás, Z. L. Hajdú and J. Tapolcai, "*A Whirling Dervish: Polynomial-Time Algorithm for the Regional SRLG-Disjoint Paths Problem*," in IEEE/ACM Transactions on Networking, doi: 10.1109/TNET.2023.3276815.

B. Vass, J. Tapolcai and E. R. Bérczi-Kovács, "*Enumerating Maximal Shared Risk Link Groups of Circular Disk Failures Hitting k Nodes*," in IEEE/ACM Transactions on Networking, vol. 29, no. 4, pp. 1648-1661, Aug. 2021, doi: 10.1109/TNET.2021.3070100. ***Disaster failure model if limited geometric information on the network is known.***

A. Pašić, R. Girão-Silva, F. Mogyorósi, **B. Vass**, T. Gomes, P. Babarczi, P. Revisnyei, J. Tapolcai, J. Rak "eFRADIR: An Enhanced FRAmework for DIsaster Resilience", IEEE Access, 2021. ***Complex disaster resilient network upgrade framework.***

B. Vass, J. Tapolcai, Z. Heszberger, J. Bíró, D. Hay, F. A. Kuipers, J. Oostenbrink, A. Valentini, L. Rónyai, "*Probabilistic Shared Risk Link Groups Modeling Correlated Resource Failures Caused by Disasters*," in IEEE Journal on Selected Areas in Communications, vol. 39, no. 9, pp. 2672-2687, Sept. 2021, doi:

10.1109/JSAC.2021.3064652. ***First regional failure model explicitly taking in consideration the correlation of link failures.***

J. Tapolcai, L. Rónyai, **B. Vass** and L. Gyimóthi, "*Fast Enumeration of Regional Link Failures Caused by Disasters With Limited Size*," in IEEE/ACM Transactions on Networking, vol. 28, no. 6, pp. 2421-2434, Dec. 2020, doi: 10.1109/TNET.2020.3009297. ***Near-linear time regional disaster enumeration if the geometric embedding of the network is known.***

B. Vass, L. Németh, J. Tapolcai, "*The Earth is Nearly Flat: Precise and Approximate Algorithms for Detecting Vulnerable Regions of Networks in Plane and on Sphere*," in Wiley Networks, vol. 75., no. 4, pp. 340-355, June 2020, doi: 10.1002/net.21936. ***Assessing the effect of treating backbone networks as if embedded in the plane.***

Papers in peer-reviewed conference and workshop proceedings

B. Vass, E. Bérczi-Kovács, P. Gyimesi, and J. Tapolcai, "*Efficient Computing of Disaster-Disjoint Paths: Greedy and Beyond*," in IEEE INFOCOM WKSHPS, Vancouver, Canada, 2024 *(accepted)*

E. Bérczi-Kovács, P. Gyimesi, **B. Vass**, and J. Tapolcai, "*Efficient Algorithm for Region-Disjoint Survivable Routing in Backbone Networks*," in IEEE INFOCOM, Vancouver, Canada, 2024 *(accepted)*

B. Vass, B. Bránvi, B. É. Nagy, J. Tapolcai, "On the Complexity of Disaster-Aware Network Extension Problems," in Int. Workshop on Resilient Networks Design and Modeling (RNDM), Compiegne, France, 2022. ***Formal proof of NP-hardness of some network extension problem formulations.***

B. Vass, E. Bérczi-Kovács, Á. Barabás, Z. L. Hajdú, and J. Tapolcai, "*Polynomial-Time Algorithm for the Regional SRLG-disjoint Paths Problem*," in Proc. IEEE INFOCOM, London, United Kingdom, 2022.

B. Vass, and J. Tapolcai, "Essence of Geographically Correlated Failure Events in Communication Networks," in IEEE/IFIP Network Operations and Management Symposium, 2022.

B. Vass, E. Bérczi-Kovács, C. Raiciu, G. Rétvári, "Compiling Packet Programs to Reconfigurable Switches: Theory and Algorithms", P4 Workshop in Europe (EuroP4 '20), Barcelona, Spain, 2020. ***NP-hardness and inapproximability proofs, and near-linear time constant-approximations on the problem.***

B. Németh, Y.-A. Pignolet, M. Rost, S. Schmid, **B. Vass**, "Cost-Efficient Embedding of Virtual Networks With and Without Routing Flexibility", IEEE IFIP Networking, Paris, France, 2020. ***Polynomial-time constant approximation on the problem.***

D. Haja, **B. Vass**, L. Toka, "Towards making big data applications network-aware in edge-cloud systems", IEEE 8th International Conference on Cloud Networking (CloudNet), Coimbra, Portugal, 2019.

A. Valentini, **B. Vass**, J. Oostenbrink, L. Csák, F. A. Kuipers, B. Pace, D. Hay and J. Tapolcai, "*Network Resiliency Against Earthquakes*," 2019 11th International Workshop on Resilient Networks Design and Modeling (RNDM), 2019, pp. 1-7, doi: 10.1109/RNDM48015.2019.8949088. ***State-of-the-art assessment of the effect of earthquakes to communication networks.***

A. Pašić, R. Girao-Silva, **B. Vass**, T. Gomes, F. Mogyorósi, P. Babarczi, J. Tapolcai, "FRADIR-II: An Improved Framework for Disaster Resilience", IEEE Int. Workshop on Resilient Networks Design and Modeling (RNDM), Nicosia, Cyprus, 2019.

D. Haja, **B. Vass**, L. Toka, "Improving Big Data Application Performance in Edge-Cloud Systems", IEEE 12th International Conference on Cloud Computing (CLOUD), Milan, Italy, 2019

B. Vass, L. Németh, M. Zachariasen, A. de Sousa and J. Tapolcai, "*Vulnerable Regions of Networks on Sphere*," 2018 10th International Workshop on Resilient Networks Design and Modeling (RNDM), 2018, pp. 1-8, doi: 10.1109/RNDM.2018.8489836.

A. Pašić, R. Girão-Silva, **B. Vass**, T. Gomes, and P. Babarczi, "FRADIR: A Novel Framework for Disaster Resilience", IEEE Int. Workshop on Resilient Networks Design and Modeling (RNDM), Longyearbyen (Svalbard), Norway, 2018.

J. Tapolcai, **B. Vass**, Z. Heszberger, J. Biró, D. Hay, F. A. Kuipers, and L. Rónyai, "*A Tractable Stochastic Model of Correlated Link Failures Caused by Disasters*," IEEE INFOCOM 2018 - IEEE Conference on Comp. Communications, 2018, pp. 2105-2113, doi: 10.1109/INFOCOM.2018.8486218.

J. Tapolcai, L. Rónyai, **B. Vass** and L. Gyimóthi, "*List of shared risk link groups representing regional failures with limited size*," IEEE INFOCOM 2017 - IEEE Conference on Computer Communications, 2017, pp. 1-9, doi: 10.1109/INFOCOM.2017.8057040.

B. Vass, E. Bérczi-Kovács and J. Tapolcai, "*Enumerating Shared Risk Link Groups of Circular Disk Failures Hitting k Nodes*," DRCN 2017 - Design of Reliable Communication Networks; 13th International Conference, 2017, pp. 1-9.

B. Vass, E. R. Bérczi-Kovács and J. Tapolcai, "*Enumerating circular disk failures covering a single node*," 2016 8th International Workshop on Resilient Networks Design and Modeling (RNDM), 2016, pp. 189-195, doi: 10.1109/RNDM.2016.7608286.

B. Vass, E. Bérczi-Kovács and J. Tapolcai, "*Shared Risk Link Group Enumeration of Node Excluding Disaster Failures*," 2016 International Conference on Networking and Network Applications (NaNA), 2016, pp. 349-354, doi: 10.1109/NaNA.2016.87. ***Winner of Best Paper Award.***

B. Vass, "*Shared Risk Link Groups of disaster failures*," 2016 IEEE Conference on Computer Comm. Workshops (INFOCOM WKSHPS), 2016, pp. 628-629, doi: 10.1109/INFCOMW.2016.7562152.

Invited speaker

10/12/2019	How to Model and Enumerate Geographically Correlated Failure Events in Communication Networks' and 'A Framework for Disaster Resilience' on Training School on Design of Disaster-resilient Communication Networks in Brussels, Belgium (Premises of COST Association)

Organisation of international conferences

Technical Program Committee member of IEEE INFOCOM 2023 and 2024.

Granted patent

The researcher has no patents yet. However, his work "A Tractable Stochastic Model of Correlated Link Failures Caused by Disasters" is cited in Google's US Patent 10,938,631, titled "Quantitative analysis of physical risk due to geospatial proximity of network infrastructure" by A. Schlosberg, L. Hiemke, and D. Schmid, 2021.

Examples of participation in industrial innovation

01/01/2021- 31/12/2021	Participation in project "Real-time Cloud: A Real-time Software Switch" of Ericsson Technologies Hungary (ETH) in cooperation with the High Speed Networks Laboratory (HSNLab) operating at BME. The researcher is a member of HSNLab, which has an annual number of around 10 common projects with ETH; being the mathematician in the team, he participated informally in the case of some of these innovative projects.

Prizes and awards

19/04/2018	Best-in-Session Presentation Award at IEEE INFOCOM
25/07/2016	Best Paper at Int. Conference on Networks and Network Applications (IEEE NaNA)
26/05/2016	Special Award of the Scientific Association for Infocommunications at Mesterpróba
27/11/2015	1st place at Scientific Students' Associations Conference at ELTE. Topic: Bounded Size Network Failure Enumeration

Funding received so far

As PI, I have received cca. EUR 168000 so far. I was part of project proposals that got a cumulative funding of cca. EUR 810000.

As PI

2024-	Recipient of the MSCA Postdoctoral Fellowship dedicated for excellent young researchers in the EU. Topic: Quality of Service enhancement using resilient routing and machine learning. (cca. EUR 150000)
01/09/2023-31/08/2024	Recipient of the New National Excellence Program (ÚNKP) 2023 Hungarian national scholarship dedicated for excellent young researchers. Topic: Program embedding to reconfigurable switches. (HUF 2.4 million, or cca. EUR 6000)
01/09/2022-31/08/2023	Recipient of the New National Excellence Program (ÚNKP) 2022 Hungarian national scholarship dedicated for excellent young researchers. Topic: Resilient routing. (HUF 2.4 million, or cca. EUR 6000)
01/09/2021-31/08/2022	Recipient of the New National Excellence Program (ÚNKP) 2021. Topic: Programmable packet scheduling. (HUF 2.4 million, or cca. EUR 6000)

As Co-I

01/01/2024-31/12/2027	OTKA no. K146347 (led by János Tapolcai, BME) (cca. HUF 48 million, or cca. EUR 120000)
01/07/2022-	ELKH-BME Information Systems Research Group (led by Miklós Telek, BME) (for 5 years, annual cca. HUF 35 million, or cca. EUR 90000)
01/12/2020-	OTKA no. ANN135606 (led by Gábor Rétvári, BME) (HUF 48 million, or cca. EUR 120000)
01/09/2018-31/08/2022	OTKA no. K128062 (led by János Tapolcai, BME) (cca. HUF 48 million, or cca. EUR 120000)

Joined to the already running project

01/03/2016-29/02/2020	COST Action CA15127 (RECODIS) (led by Jacek Rak, Politechnika Gdańska)
01/07/2016-31/08/2018	OTKA no. K108947 (led by András Recski, BME)
01/07/2016-06/30/2017	MTA-BME Future Internet Lendület Research Group (led by János Tapolcai, BME)

Supervising and mentoring activities

Scientific Students' Associations (TDK) Conferences

2024	Péter Gyimesi 1st prize on the ELTE IK Informatics institutional conference, right to nominate to the nation-wide conference
2023	Ádám Fraknói 1st prize on the Hungarian national, 1st prize on the ELTE IK Informatics institutional conference
2023	Zsombor Hajdú & Ábel Barabás (joint work) 2nd prize on the Hungarian national, 1st prize on the ELTE IK Informatics institutional conference
2021	Csaba Sarkadi, 2nd prize (BME VIK Informatics)

Theses supervised (B.Sc. and M.Sc.)

2022-	3 students per year

Other items of interest

Reviewing activity

2023 –	at IEEE Transactions on Dependable and Secure Computing	
2022 –	at IEEE/HTE Infocommnications Journal	
2022 –	at IEEE Transactions on Network and Service Management	
2021 –	at IEEE Access	
2020 –	at IEEE/ACM Transactions on Networking	

Teaching

2023 –	Data structures and algorithms (theoretical lecture and practical course)	UBB FMCS
2023 –	Algorithms and programming (theoretical lecture and practical course)	UBB FMCS
2023 –	Mathematical and Computational logic (practical course)	UBB FMCS
2021 – 2023	Communication Networks II (practical course)	BME TMIT
2016 –	Modeling Seminar for Engineers (practical course)	BME TMIT
2016 – 2023	University Experience (practical course)	BME TMIT

Memberships

2016–	Institute of Electrical and Electronics Engineers (IEEE)
2016–	IEEE Communications Society (ComSoc)
2021–	Association for Computing Machinery (ACM)

Language skills

English:	Fluent
Romanian:	Fluent
Hungarian:	Native speaker

Hobbies

Running, folk dancing, playing music, hiking