



Isabela Bîrs

Work permit: Romanian **Nationality:** Romanian **Date of birth:** 08/05/1992 **Place of birth:** Sibiu, Romania

Phone number: (+40) 743646637 **Email address:** isabela.birs@aut.utcluj.ro

Work: Memorandumului 28, 400114 Cluj-Napoca (Romania)

WORK EXPERIENCE

 **Ghent University, Belgium**

Postdoctoral Researcher

[2024 – Current]

- research in the field of fractional order control systems

 **Technical University of Cluj-Napoca, Romania**

Lecturer

[2023 – Current]

teaching Control Engineering and Advanced Control Strategies for Industry 5.0

 **Technical University of Cluj-Napoca, Romania**

Teaching and research assistant

[2015 – 2023]

Continuous Process Control, System Theory and Control Engineering

EDUCATION AND TRAINING

Doctor of Engineering, FWO-SB doctoral fellow, grant no. 1S04719N

Ghent University, Belgium [2018 – 2022]

Thesis: Fractional order models enable control strategies based on material properties

Doctor of Science

Technical University of Cluj- Napoca, Romania [2017 – 2021]

Final grade: Summa cum Laude |

Thesis: Advanced fractional order control strategies for poorly damped processes

Master's Degree in Advanced Process Control

Technical University of Cluj- Napoca, Romania [2015 – 2017]

Bachelor of Science in System Engineering

Technical University of Cluj- Napoca, Romania [2011 – 2015]

LANGUAGE SKILLS

Mother tongue(s): Romanian

Other language(s):

English

LISTENING C2 READING C2 WRITING C2

SPOKEN PRODUCTION C2 SPOKEN INTERACTION C2

French

LISTENING B1 READING B1 WRITING B1

SPOKEN PRODUCTION A2 SPOKEN INTERACTION B1

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

PUBLICATIONS

[132 publications with 1066 citations](#)

HONOURS AND AWARDS

[2019]

EU-COST Action no. 15225 mobility funding program winner supporting a mobility of two weeks in the period September 2-16, 2019 to the research group of Prof. Riccardo Caponneto, University of Catania, Sicily, Italy.

[2019] International Federation of Automatic Control

Finalist (Second place) of the Young Author Award 2019, Philadelphia, USA for the paper: **Isabela R. Birs**, Mihaela Ghita, Maria Ghita, Dana Copot, Cristina I. Muresan, Clara M. Ionescu "An Interdisciplinary, Low-Cost Methodological Framework for Analyzing Dynamical Material Properties for Control- Related Applications", IFAC PAPERSONLINE, vol. 52, no. 9, ELSEVIER, 2019, pp. 159-64, awarded in Philadelphia, USA, 2019.

PROJECTS

[2025 – 2026]

TE-2023-0831, Principal Investigator, "Digitalization of event-based surgical protocols for system identification and robust control in general anesthesia", won through national competition and financed by UEFISCDI Romania

[2022 – 2024]

PD-2021-0204, Principal Investigator, "Development of event-based fractional order control strategies in general anesthesia", won through national competition and financed by UEFISCDI Romania

[2020 – 2022]

TE-2019-0745, Research Assistant, "Autotuning strategies of poorly damped processes"

[2018 – 2020]

TE-2016-1396, Research Assistant, "Robust fractional order control strategies based on events for optimized reallocation of resources in cyber-physic system"

[2017 – 2018]

TE-2016-1396, Research Assistant, "Scalable nanorobot prototype for non-Newtonian fluids using fractional order modelling and control"

[2016 – 2017]

TE-2014-4-0598, Research Assistant, "Novel fractional order control strategies for vibration suppression in aeroplane wings"

SCHOLARSHIPS

[09/2018 – 12/2018]

Doctoral scholarship from Special University Funds at Ghent University to prepare FWO proposal and kickoff doctoral training (sept – dec 2018) –BOF STG020-18 “MIMOPREC”: Multivariable Multiloop Optimization of predictive Control.

[2019 – 2022]

FWO SB doctoral fellow, (project MOCONEF, 1S04719N)

[2024 – 2026]

FWO Postdoctoral Junior Researcher, Ghent University, Belgium (project (1203224N)

TOP 5 SCIENTIFIC ACHIEVEMENTS

Fractional order event based control

The development of a novel control strategy, fractional order event-based control, which generalized classical integer order event based control paradigms to any arbitrary order. The main theoretical findings, practical implementations and validations for Vertical Take-Off and Landing platforms are published in Birs, I., Nascu, I., Ionescu, C., Muresan, C., Event based fractional order PID control, Journal of Advanced Research, vol. 25, pp.191- 203, 2020.

Non-Newtonian fluid interactions experimental framework

The design and construction of an experimental framework (circulatory system and transiting vehicle) for modeling and control related to non-Newtonian fluid interactions (such as blood). Development and validation of fractional order controllers, proving the superiority of fractional order control for blood-like fluids in I. Birs, C. Muresan, O. Prodan, S. Folea, C. Ionescu, An Experimental Approach towards Motion Modeling and Control of a Vehicle Transiting a Non-Newtonian Environment, Fractal and Fractional, Vol. 5(3), pp. 104, 2021.

Time delay systems

An in depth study of fractional order control strategies for time delay systems (as is the case of general anesthesia) published in Birs, I., Muresan, C.I., Nascu, I., Ionescu, C. A Survey of Recent Advances in Fractional Order Control for Time Delay Systems, IEEE Access, vol. 7, no. 1, pp. 30951-30965, 2019.

Non-Newtonian fluid interactions model in liquid steel manufacturing

Development of a mathematical framework starting from Navier-Stokes non-Newtonian fluid flow leading to a fractional order general model for complex non-Newtonian dynamics. The study features real-life applicability in liquid steel manufacturing (partnership with Arcelor-Mittal), pharma tablet manufacturing and targeted drug delivery. Main findings are published in Birs, I., Copot, D., Muresan, C.I., Nascu, I., Ionescu, C. Identification For Control of Suspended Objects In Non-Newtonian Fluids, Fractional Calculus and Applied Analysis, vol. 22, no.5, pp. 1378– 1394, 2019.

Vibration suppression

Development and testing of various control methodologies in the presence/absence of a process model applied to vibration suppression in airplane wings and vertical take off and landing stabilization.