Saba Daneshgar

Experience

Feb. 2020 – present **Postdoctoral Researcher**, *Ghent University, Faculty of Bioscience engineering, Department of Data Analysis and Mathematical Modeling, BIOMATH group (Model based optimization of bioprocesses)*

- Development of a Digital Twin (DT) for the Eindhoven WRRF
- Development of a hybrid model for the Eindhoven WRRF
- LESSWATT LIFE project: Development of a modeling protocol for Carbon Footprint (CF) minimization in WRRFs
- Developing CFD-based compartmental models of bioreactors
- Model-based soft-sensor development for a continuous pharmaceutical process

Feb. 2019 – Jan. 2020 **Postdoctoral Researcher**, *University of Verona, Faculty of Engineering, Department of Biotechnologies*

- INTCATCH H2020 project: Monitoring and treatment of Combined sewer overflows (CSOs)
- Monitoring and control of partial nitritation process in sequencing batch reactors (SBRs)

Oct. 2017 – Apr. 2018 **Visiting PhD Candidate**, *Université Laval, Department of Civil and Water Engineering, modelEau group*

Response surface methodology (RSM) and Design of Experiments (DoE) combined with chemical equilibrium modeling for optimization of phosphate chemical precipitation process

Oct. 2015 – Feb. 2019 **PhD Candidate**, *University of Pavia, Department of Civil Engineering and Architecture*

- Continuous online phosphorus recovery from aerobic bio-P liquor through chemical precipitation: pilot-scale study
- Mechanistic modeling of bio-P removal process with side-stream chemical precipitation

Sep. 2014 – Apr. 2015 **Research Assistant**, *Italian National Research Council, Institute for Electromagnetic Sensing of the Environment*

- Remote sensing observations for monitoring water quality in coastal zones,
- Statistical analysis of remote sensing data

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Education

2015 – 2019 **PhD**, *University of Pavia, Department of Civil Engineering and Architecture*
Dissertation: Phosphate recovery from aerobic wastewater Bio-P sludge through precipitation process: Understanding, experimentation and optimization

2012 – 2015 **Master in Environmental and Geomatic Engineering**, *Politecnico di Milano*, Thesis: Remote sensing observations for monitoring coastal zones: Volturno river mouth case study

2007 – 2012 **Bachelor in Chemical Engineering**, *Iran University of Science and Engineering (IUST)*

Educational Activities

Teaching

2021 – Present Co-lecturer of the course of "Digitalization for resource recovery", master in bioscience engineering at Ghent University, ECTS: 6

2017 – 2018 Lectures for the course of "water-energy sustainable development", master in environmental engineering at University of Pavia

2017 – 2018 Lectures for the course of "water and wastewater treatment processes", master in environmental engineering at University of Pavia

Supervision PhD Level

2022 – 2026* Cristian Camilo Gomez, Automatic calibration for water and wastewater treatment systems, Ghent University

2020 – 2024* Marcello Serrao, Development of a hybrid model predictive control system for a biofiltration process, Université Laval

2020 – 2023* Albert Galizia Amoraga, Modelling and control of membrane bioreactors, University of Girona

2017 – 2021 Alice Botturi, An integrated approach for resource recovery from wastewater, University of Verona, Defense date: 12 September 2021

Supervision MS Level

2022 – 2023* Loes Verhaeghe, Hybrid modelling for water resource recovery facilities, Ghent University

2021 – 2022 Jasmine Tendaupenyu, Studying the impact of decentralized treatment system on WWTP performance and energy savings through modeling and simulation, Ghent University

2020 – 2021 Alessio Belmondo Bianchi, Data reconciliation and dynamic modeling of the WWTP Tilburg, Wageningen University

2019 – 2020 Marco Tani, Monitoring and control of partial nitritation process in SBRs, University of Verona

2019 – 2020 Vadim Scerbacov, Phosphate recovery from anaerobic digestate through struvite precipitation, University of Verona

** Expected defence year*

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Training and Organizational Activities

Workshops

2023 Organization of the YWP workshop, 11th IWA Symposium on modelling and integrated assessment (Watermatex2023), 23-27 September 2023, Quebec, Canada

2023 Organization of the full day workshop on "from CFD to compartmental modelling", 8th IWA Water Resource Recovery Modelling Seminar, Stellenbosch, South Africa, January 2023

2022 Organization of a half-day workshop on "Digital Twins and its applications" at IWA World Water Congress, September 2022, Copenhagen, Denmark

2020 – present Organization of dedicated Young Water Professional mentoring sessions at IWA Modelling and Integrated Assessmnet Specialist Group

2021 Organization of a full-day workshop on "Transition of WRRF models to digital twin applications" at IWA 7th Water Resource Recovery Modelling Seminar, August 2021, Switzerland (Virtual)

2021 Co-organizer of the "advancements on N_2O modeling in water resource recovery facilities" webinar, IWA Modeling and Integrated Assessment (MIA) Specialist Group

2021 Organizer of the LESSWATT LIFE project final dissemination event, Organized jointly by CAPTURE platform

2022-2023 Co-organization of multiple training sessions for operators and engineers of Waterschap de Dommel on "the use and applications of Eindhoven Digital Twin", Eindhoven, The Netherlands

2022 Co-organization of the working session at CAPTURE Water business platform day on "Digitalization in the water sector", Gent, Belgium

Funding and Grants

Co-budget holder

2023-2027 **WaterFRAME**, *FWO Strategisch Basisonderzoek*

Amount: 1800000 Euro

2022-2024 (ongoing) **Eindhoven Digital Twin**, *Utility - Waterschap De Dommel*

Amount: 104000 Euro

2020-2022 (completed) **SimAbs - Optimisation of continuous production process of antibodies**, *VLAIO*

Amount: 133000 Euro

Grant writing, no budget responsibilities

To submit **Simabs - Developing MPC for continuous production process of antibodies**, *VLAIO*

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Service

Committees

2023-2024 Member of the scientific committee, IWA 9th Water Resource Recovery Modelling Seminar, April 2024, Indiana, US

2023 Member of the scientific and organizing committee, 11th IWA Symposium on modelling and integrated assessment (Watermatex2023), 23-27 September 2023, Quebec, Canada

2023 Young Water Professional Chair, 11th IWA Symposium on modelling and integrated assessment (Watermatex2023), 23-27 September 2023, Quebec, Canada

2023 Member of the scientific committee, IWA 8th Water Resource Recovery Modelling Seminar, 18-23 January 2023, Stellenbosch, South Africa

2022 Member of the scientific committee, iEMSs 2022, 03 - 08 July 2022 Brussels, Belgium

2022 Member of the scientific and organizing committees, 7th YWP BeNeLux Conference, 04 - 06 April 2022, Delft, The Netherlands

2022 – present Member of the steering committee, IWA Digital Water Program

2021 – present Member of the management committee, IWA Modeling and Integrated Assessment (MIA) specialist group

2019 Member of the organizing committee, 3rd IWA Recource Recovery Conference, 08-12 September 2019, Venice, Italy

Technical sessions

2023 Moderator of the debate session on data quality pipelines and digital twins at IWA 8th Water Resource Recovery Modelling Seminar, 18-23 January 2023, Stellenbosch, South Africa

2022 Chair of a technical session at IWA Digital Water Summit, November 2022, Bilbao, Spain

2022 Panellist at the debate session on Digital water future at IWA Digital Water Summit, November 2022, Bilbao, Spain

2022 Chair of a technical session at IWA World Water Congress, September 2022, Copenhagen, Denmark

2015 – present

Contribution to peer-reviewed journals

- Reviewer: Science of Total Environment, Water Science and Technology, Sustainability, Processes, Journal of Environmental Chemical Engineering, Applied Sciences, Water
- Guest Editor: International Journal of Environmental Research and Public Health, Special Issue "Innovative Technologies and Strategies for Energy and Resource Recovery from Waste and Wastewater"
- Member of the editorial board of Frontiers in Environmenal Chemistry Journal

2019 – present **Frequent member of jury commissions for MS and PhD theses**

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Invited talks

2023 wwdata automated: automatic data processing and simulation workflow for Digital Twin applications. Hybrid Modelling Workshop, 8th IWA Resource Recovery Modelling Seminar (WRRmod2022+), Stellenbosch, South Africa, January 18-22, 2023

2023 Development of a digital twin for Eindhoven WRRF: technical aspects and challenges. Digital Twin workshop, 8th IWA Resource Recovery Modelling Seminar, Stellenbosch, South Africa, January 18-22, 2023

2023 Digital Twins and their applications for WRRFs. Young Water Professional (YWP) workshop, 8th IWA Resource Recovery Modelling Seminar, Stellenbosch, South Africa, January 18-22, 2023

2022 A model-based protocol for minimization of GHG emissions from WRRF. Young Water Professional (YWP) workshop. Young Water Professional BeNeLux conference, April 2022, Delft, The Netherlands

2021 LESSWATT model-based protocol for mitigation of N2O emissions. LESSWATT seminar, virtual, 31 March 2021

2021 Development of flowsheet biokinetic models for N2O mitigation model-based protocol. LESSWATT dissemination event, 19 October 2021

Professional Development Activities

Professional Educational Courses, *Ghent University*

2023 Training: Engels voor docenten

2023 Basisonderzoektraining

2020 – 2021 **Postdoc Talent Management Courses**, *Ghent University*

- Career Management
- Leadership
- Time Management
- Negotiation Skills

Awards

2015-2019 Cariplo Foundation PhD scholarship

Skills

WEST, Python	●●●●●
LaTeX, Git, Inkscape, MS Office	●●●●○
Linux, Bash, SQL	●●●○○
HTML/CSS, C	●●○○○

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Language

Persian (Native)	
English (C1)	
Italian (C1)	
Dutch (C1)	

Hobbies

Cycling, Running, Rock Climbing
Reading, Programming
Cooking, Playing music

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Scientific Publications

In preparation

Borzooei, S., **S. Daneshgar**, U. Rehman, E. Torfs amd, Ducchi, S., Peeters, R., Weijers, S., and Nopens, I. (in prepration). *Next generation compartmental models for applications in digital twinning of WRRFs*.

S. Daneshgar, Nopens, I., Amerlinck, Y., Amaral, A., Mulder, C. De, Nisio, A. Di, Bellandi, G., Gori, R., Caretti, C., Ducci, I., Rehman, U., Porro, J., and Torfs, E. (to submit). *An innovative model-based protocol for minimization of GHGs emissions in WRRFs*.

S. Daneshgar, Peeters, R., Weijers, S., Torfs, E., and Nopens, I. (in prepration). *Real-time hybrid model of Eindhoven WRRFs for digital twin applications*.

S. Daneshgar, Solon, K., Geuens, T., Dierckx, K., and Torfs, E. (in prepration). *A mechanistic model for continuous monoclonal antibody production process in perfusion bioreactor*.

Journal papers

S. Daneshgar, Cecconet, D., Capsoni, D., and Capodalgio, A.G. (2022). "Side-stream phosphorus recovery in activated sludge processes". In: *Water* 14, p. 1861.

Torfs, E., Nicolai, N., **S. Daneshgar**, Copp, J.B., Haimi, H., Ikumi, D., Johnson, B., Plosz, B.B., Snowling, S., Townley, L.R., Valverde-Perez, B., Vanrolleghem, P.A., Vezzaro, L., and Nopens, I. (2022). "The transition of WRRF models to Digital Twin applications". In: *Water Science and Technology* 85.10, pp. 2840–2853.

Botturi, A., Ozbayram, E.G., Tondera, K., Gilbert, N.I., Rouault, P., Caradot, N., Gutierrez, O., **S. Daneshgar**, Frison, N., Akyol, C., Foglia, A., Eusebi, A.L., and Fatone, F. (2020). "Combined sewer overflows: A critical review onbest practice and innovative solutions to mitigate impacts on environment and human health". In: *Critical Reviews in Environmental Science and Technology* 51, pp. 1585–1618.

Botturi, A., **S. Daneshgar**, Cordioli, A., Foglia, A., Eusebi, A.L., and Fatone, F. (2020). "An innovative compact system for advanced treatment of combined sewer overflows (CSOs) discharged into large lakes: pilot-scale validation". In: *Journal of Environmental Management* 256, p. 109937.

Tomei, M.C., Stazi, V., **S. Daneshgar**, and Capodalgio, A.G. (2020). "Holistic approach to phosphorus recovery from urban wastewater: enhanced biological removal combined with precipitation". In: *Sustainability* 12.2.

S. Daneshgar, Buttafava, A., Callegari, A., and Capodalgio, A.G. (2019). "Economic and energetic assessment of phosphorus recovery options from aerobic sludge". In: *Journal of Cleaner Production* 223, pp. 729–738.

S. Daneshgar, Vanrolleghem, P., Vaneeckhaute, C., Buttafava, A., and Capodalgio, A.G. (2019). "Optimization of P compounds recovery from aerobic sludge by chemical modeling and surface methodology combination". In: *Science of the Total Environment* 668, pp. 668–677.

Cecconet, D., Bolognesi, S., **S. Daneshgar**, Callegari, A., and Capodaglio, A.G. (2018). "Improved process understanding and optimization by multivariate statistical analysis of microbial fuel cells operation". In: *International Journal of Hydrogen Energy* 43, pp. 16719–16727.

S. Daneshgar, Buttafava, A., Capsoni, D., Callegari, A., and Capodalgio, A.G. (2018). "Impact of pH and ionic molar ratios on phosphorous forms precipitation and recovery from different wastewater sludges". In: *Resources* 7.71.

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S. Daneshgar, Callegari, A., Buttafava, A., and Capodalgio, A.G. (2018). "Simulations and Laboratory Tests for Assessing Phosphorus Recovery Efficiency from Sewage Sludge". In: *Resources* 7.54.

S. Daneshgar, Callegari, A., Capodalgio, A.G., and Vaccari, D. (2018). "The Potential Phosphorus Crisis: Resource Conservation and Possible Escape Technologies: A Review". In: *Resources* 7.37.

Conference papers

Bellandi, G., Muoio, R., **S. Daneshgar**, Torfs, E., Schemen, R., Dijk, P. Van, Weijers, S., Rehman, U., and Audenaert, W. (2023). "Integration of biological and ozonation models for the Eindhoven WWTP for optimal micropollutants removal, minimal bromate formation, and improved effluent quality". In: *8th IWA Water Resource Recovery Modelling Seminar*. Stellenbosch, South Africa.

Borzooei, S., **S. Daneshgar**, U. Rehman, E. Torfs amd, Ducchi, S., Peeters, R., Weijers, S., and Nopens, I. (2023). "Next generation compartmental models for applications in digital twinning of WRRFs". In: *8th IWA Water Resource Recovery Modelling Seminar*. Stellenbosch, South Africa.

S. Daneshgar, Porro, J., Tessier, M., Rehman, U., Weijers, S., Torfs, E., and Nopens, I. (2023). "Coupling an integrated CFD-ASMG1 model with machine learning/knowledge-based models for predicting N2O emissions of WRRFs". In: *8th IWA Water Resource Recovery Modelling Seminar*. Stellenbosch, South Africa.

S. Daneshgar, Nopens, I., Amerlinck, Y., Amaral, A., Mulder, C. De, Nisio, A. Di, Bellandi, G., Gori, R., Caretti, C., Ducci, I., Rehman, U., Porro, J., and Torfs, E. (2021). "LESSWATT model-based protocol for mitigation of N2O emissions". In: *Proceedings of the 5th IWA EcoSTP Conference*. Milan, Italy.

S. Daneshgar, Nopens, I., Amerlinck, Y., Amaral, A., Mulder, C. De, Nisio, A. Di, Bellandi, G., Gori, R., Caretti, C., Ducci, I., Rehman, U., Porro, J., and Torfs, E. (2021). "LESSWATT model-based protocol for mitigation of N2O emissions". In: *Singapore International Water Week*. Singapore, Singapore.

Botturi, A., Cordioli, A., **S. Daneshgar**, Licha, T., Eusebi, A.L., and Fatone, F. (2019). "Advanced compact treatment of combined sewer overflows (CSOs) for removing physical and chemical pollutants: case study of Lake Garda in northern Italy". In: *Proceedings of the IWA International Conference Smarter Catchment Monitoring, Cleaner Waters*. London, UK.

Botturi, A., **S. Daneshgar**, Eusebi, A.L., and Fatone, F. (2019). "Pilot-scale treatment of Combined Sewage Overflows (CSOs) and its further possible agricultural reuse". In: *Proceedings of the 3rd IWA Recource Recovery Conference*. Venice, Italy.

Botturi, A., **S. Daneshgar**, Ozbayram, E.G., Eusebi, A.L., and Fatone, F. (2019). "A review on Combined Sewer Overflows (CSOs) treatments: existing technologies, challenges and possible future studies". In: *Proceedings of the IWA International Conference Smarter Catchment Monitoring, Cleaner Waters*. London, UK.

S. Daneshgar, Buttafava, A., Callegari, A., and Capodalgio, A.G. (2019). "Pilot-Scale Study of Phosphate Precipitation Process from Synthetic Aerobic Sludge". In: *Proceedings of the 3rd IWA Recource Recovery Conference*. Venice, Italy.

S. Daneshgar, Buttafava, A., Callegari, A., and Capodalgio, A.G. (2018). "Effect of different reaction parameters on the struvite precipitation process of wastewater sludge". In: *Proceedings of the 4th IWA EcoSTP Conference*. London, ON, Canada.

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S. Daneshgar, Matta, E., Giardino, C., Bresciani, M., and Sona, G. (2015). "Remote Sensing Observations for Monitoring Coastal Zones: Volturno River Mouth Case study". In: *Proceedings of the XIX ASITA Conference*. Lecco, Italy.

Patents

Dierckx, K., Geuens, T., **S. Daneshghar**, Solon, K., and Torfs, E. (2022). "Methods for controlling a perfusion process in a bioreactor". Pat. P188004NL00.

Others

Johnson, B., **S. Daneshgar**, Torfs, E., Nopens, I., Polesel, F., Peeters, R., Weijers, S., Johnson, T., Menniti, A., Lesnick, K., Sparks, J., Bott, C., Villez, K., and Snowling, S. (2023). *How to implement WRRF digital twins for operations and maintenance: Real world experience*. Workshop. 8th IWA Water Resource Recovery Modelling Seminar.

S. Daneshgar, Pozo, D. Fernandes del, Potier, P., Gernaey, K., Yang, M., Bellandi, G., Elduayen-Echave, B., Borzooei, S., Wicks, J., Griborio, A., Remigi, E., Torfs, E., and Nopens, I. (2023). *From CFD to compartmental models: Is there a way to effectively divide and conquer?* Workshop. 8th IWA Water Resource Recovery Modelling Seminar.

Torfs, E., **S. Daneshgar**, Johnson, B., Nicolai, N., Porro, J., Snowling, S., Takacs, I., Vanrolleghem, P.A., and Nopens, I. (2022). *Transition of WRRF models to digital twin applications*. Workshop. 7th IWA Water Resource Recovery Modelling Seminar.

Torfs, E., Valverde-Perez, B., **S. Daneshgar**, Michelsen, P.S., Nicolai, N., Karmous-Edwards, G., Pedersen, A.N., Barba, J., George, B., Johnson, B., and Borup, M. (2022). *Digital twin applications across the water sector, developing good practice*. Workshop. IWA World Water Congress.

References

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- Francesco Fatone, Full Professor, Department of Material, Environmental Sciences and Urban Planning (SIMAU), Università Politecnica delle Marche, Ancona, Italy.
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- Andrea G. Capodaglio, Associate Professor, Department of Civil Engineering and Architecture, University of Pavia, Pavia, Italy.
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