Dr. Viktoriya Degeler

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Summary

- A computer scientist with **research interests** in reasoning and decision making, smart environments, distributed IoT sensor data, digital twins, energy-efficient pervasive applications, context-awareness, AI, constraint satisfaction, planning, big data.
- Experienced **researcher**, track record of publications in high-profile peer-reviewed journals and conferences, including receiving best demonstration and best student paper awards. Serving PC member and organizing committee on a number of conferences, journal peer-reviewer.
- Strong **software development** background. Several years of experience as a software engineer.
- Experienced **lecturer**, taught courses with more than 300 students, designed a course herself. UTQ qualification obtained. Member of the Board of Examiners.
- Obtained (as the main applicant) €800'000 NWO **research grant** (2 PhDs + industrial collaboration), currently leading the ongoing project. Additionally, three smaller-scale (up to €100'000) research grants obtained as a co-applicant, with successfully finished projects.
- Experience in **leading and coordination** of research projects, from proposal writing to research and development to demonstrations and exploitation. Expert reviewer and monitor for Horizon 2020 and Horizon Europe calls.
- **Industrial** experience, a patent holder, AI department team lead, AI startup mentor.
- **Dutch** language at B1/B2 level.

Experience

- *Jul 2022 – present.* **Assistant professor, Data Management Technologies**. *University of Amsterdam*
  Research in the field of Data Representation, Reasoning Systems, AI Planning and Scheduling, Large-Scale Context-Aware systems. Teaching. Project Coordination.
- *Jun 2019 – Jun 2022.* **Assistant professor, Distributed Systems.** *University of Groningen, Groningen, the Netherlands.*
  Research in the field of Reasoning Systems, Distributed Systems, AI Planning and Scheduling, Large-Scale Context-Aware systems. Teaching. Project Coordination. Board of Examiners. Groningen Digital Business Center steering board.
- *Jan 2022 – Jun 2022.* **Associated member, Intelligent and Autonomous Systems**. *CWI, Amsterdam, the Netherlands*
  Collaboration in the field of AI for combinatorial optimization, rule extraction from data.
- *Jan 2018 – present.* **Expert proposal evaluator.** *European Commission Research Executive Agency*
  Evaluation of proposals and monitoring of project results under Horizon 2020/Europe research frameworks. The calls provide funding for high-risk/high-reward research and innovation activities of research organizations, industrial companies, startups and SMEs.
- *Oct 2017 – May 2019.* **Postdoctoral researcher, project coordinator.** *Delft University of Technology, Delft, the Netherlands*
  Intelligent transportation modelling and user behavior analytics. WP leader for H2020-framework project My-TRAC, which looks into personalized travelling recommender systems.

- *Jul 2017 – May 2019.* **Startup AI mentor.** *Rockstart startup accelerator, Amsterdam, the Netherlands*
  Technical mentorship of startups of the AI Accelerator track.
- *Jul 2016 – Jul 2017.* **Lead AI Engineer.** *Cupenya B.V., Amsterdam, Netherlands*
  Startup. Setting up Data Science/AI department of the company. Team Lead. Predictive analytics for business processes (predicting further actions, KPIs based on history, etc.) NLP/ML projects: similarity of incidents, suggested answers, classification of applied macros, action recommendation. Intern supervision.
- *Aug 2014 – June 2016.* **Research engineer.** *Airbus Group Innovations, Newport, UK*
  Applying AI methods to cyber security. Anomaly detection, danger theory applied to industrial control system and to smart manufacturing. Tech lead. Coordinating deliverables for EU research projects. Project proposals. Supervision of students and interns.
- *Feb 2014 – Jul 2014***. Research associate (Postdoc).** *Insight Centre for Data Analytics (DERI), National University of Ireland, Galway, Ireland*
  Creation of human-assisted smart systems for energy and water management. Automated smart environments with human involvement for gathering missing information. EU and Irish research projects.
- *Dec 2009 – Jan 2014.* **PhD student.** *University of Groningen, Groningen, the Netherlands.*
  PhD student in Distributed Systems research group. Main research activities: AI Reasoning component for the GreenerBuildings project: context-aware dynamic constraint satisfaction. Activity recognition. Error detection in context data. Scheduling and decision making for smart environments. Rule language design. Teaching assistance: Advanced Web Technologies, Web and Cloud Computing, Net Computing courses. PhD thesis: "Dynamic Rule-based Reasoning in Smart Environments"
- *Sep 2013 – Nov 2013.* **Visiting researcher.** *Sapienza University of Rome, Rome, Italy*
  Short-term visiting researcher. Data mining techniques for automated rule learning for smart homes.
- *Jun 2007 – Nov 2009*. **Sofware engineer.** *Freelance/contractor. Kiev, Ukraine*
  SimCorp: Software development in financial mathematics area.
  Materialise: R&D, 3D printing medical software for surgical operations planning.
  GlobalLogic: Software development for client-server applications.
- *Aug 2006 – Mar 2007.* **Research intern.** *Amadeus s.a.s., Sophia Antipolis, France*
  Production Planning department. Responsibilities: Research and modeling project to model distinct types of web-users' behavior when booking airline tickets. Clustering techniques and creation of a mathematical model for further analysis.

Education

- *Dec 2009 – Jan 2014.* **PhD. University of Groningen, Groningen, the Netherlands**
  Distributed Systems research group. PhD thesis: "Dynamic Rule-based Reasoning in Smart Environments"
- *Aug 2005 – Apr 2007.* **MSc. IT University of Göteborg/Chalmers University of Technology, Göteborg, Sweden.**
  Grant from Swedish Institute (Visby Programme, individual scholarship) for Master's level education. Master's Programme in Intelligent Systems Design. Degree: Master of Science in Applied Information Technology specializing in Intelligent Systems Design. Master's thesis: "Evolutionary Customer Behavior Patterns for users of Online Booking Engine".

- *Sep 2001 – Jul 2005.* **BSc. National Technical University "Kharkiv Polytechnic Institute", Kharkiv, Ukraine.**
  Laureate of a grant for higher education "Intellectual of the 21-st century". Department of Control and Informatics. Major: Systems Analysis and Control. Head of the university group. Bachelor's Degree with excellence in Applied Mathematics.
- *Sep 1996 – Jun 2001.* **Physics and Mathematics lyceum 27, Kharkiv, Ukraine.**
  Certificate with excellence. Title “Best Programmer of Physics and Mathematics Lyceum 2001”

Skills

- **Research Areas:** Intelligent Systems, Decision Making and Reasoning, Recommender Systems, Constraint Satisfaction, Knowledge Representation, Machine Learning, Optimization, Planning and Scheduling, Anomaly Detection, Natural Language Processing, Data Mining, Linked Data and Semantic Web, Smart Environments, Context-Aware Systems, Internet of Things, Human-Computer Interaction.
- **Programming Languages:** Python, Scala, Java, R, C++, C, Matlab/Octave, Pascal, APL.
- **Tools & Data Science:** SparkML, Scikit-Learn, Weka, RapidMiner, ProM, R, NLTK, Choco-solver, Minizinc, planning.domains.
- **Big Data:** Hadoop, Spark, AWS, Google Cloud Platform, SQL, NoSQL, MongoDB, Elastic Search, Apache Kafka, Rabbit MQ, Docker.
- **Other:** Maven, SBT, Akka, Spray, Play Framework, Flask, LaTeX, XML, JSON, RDF, UML, REST, HTML/CSS/JavaScript, Git, SVN, Mercurial.

Achievements

- **External funding obtained**
  - **DiTEC: Digital Twin for Evolutionary Changes in water networks - € 800k (70% NWO / 30% industrial co-funding), main applicant, NWO Smart Industry SI2020 call**
    DiTEC creates a digital twin of the water network and proposes an evolutionary approach to real-time monitoring of water networks that detects inconsistency between measured sensor data and the expected situation, and performs real-time model update without needing additional calibration. The project covers 2 PhD positions under my supervision, and is a collaboration of two universities and two industrial companies. I am the main applicant (PI) and the coordinator of this project.
  - **AI for Manufacturing SMEs and Students (AIMS2) – € 30k personal (€ 280k total), EIT Manufacturing Grant, 2020**
    This project delivers state-of-the-art AI education for Industry 4.0 using practical industry-relevant use cases to professionals and students in four countries, in co-operation with private companies. I am a co-PI in the consortium.
  - **KLIMATe – € 20k personal (€ 50k total), EIT Climate-KIC Pathfinder Grant, 2018**
    Project investigates behavioral profiles and market potential of travel companion decision support tools, both from supply (travelers) and demand (transport operators) side. Written in collaboration with University of Madrid, Spain. I am a co-PI and the project leader of TU Delft.
  - **My-TRAC@AMS – € 100k, 2017**
    The My-TRAC@AMS is a project designed as an extension of the My-TRAC H2020 project, to specifically investigate user choices during their first/last mile (to/from train stations) travel in Amsterdam. The funding of €100'000 awarded to our group in TU Delft by Amsterdam Institute for Advanced Metropolitan Solutions (AMS).

- **Awards**
  - University Teaching Qualification (UTQ, Basiskwalificatie Onderwijs), Delft University of Technology, 2021
  - Best Demonstration Award at SAI Intelligent Systems Conference (IntelliSys), 2015
  - Best Student Paper Award at IEEE 25th Int. Conf. on Tools with Artificial Intelligence (ICTAI), 2013
  - 1st place in Architectural challenge in Web Services Challenge'10 competition. (related paper presented during IEEE SOCA), 2010
  - A laureate of a grant from Swedish Institute (Visby Programme, individual scholarship) for Master's level education, Sweden, 2005.
  - A laureate of a grant for higher education "Intellectual of the 21st century", Ukraine, 2001
  - A title "Best Programmer of Physics and Mathematics Lyceum 2001", Ukraine
  - 2nd price in Ukrainian National Informatics Olympiad for school pupils, 2001
- **Patents**
  - MICROCONTROLLER with adaptive self-healing capability. Inventors: R. French, V. Degeler, K. Jones
    US pub. no.: US 2018/0314824, filed: 27.04.2018, pub. date: 01.11.2018
    GB pub. no. GB 2561881 A, filed: 27.04.2017, pub. date: 31.10.2018
- **PC member & Organizing Committee**
  - Computer Systems and Networking (CompSysNL), 2022
  - International Conference on Computer Communications and Networks (ICCCN), 2021-22
  - ACM International Conference on Information and Knowledge Management (CIKM), 2020-22
  - European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD), 2018
  - The 10th International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies UBICOMM, the Special Session on Context-awareness in Intelligent Systems and Smart Spaces (CISSS), 2016
  - IEEE International Conference on Service Oriented Computing & Applications (SOCA), 2015
- **Reviewer**
  - **Journals:** Future Generation Computer Systems, Transportation Research Part C: Emerging Technologies, International Journal of Vehicle Design, International Journal of Ad Hoc and Ubiquitous Computing, Public Transport
  - **Conferences:** CIKM 2020-2022, ICCCN 2021, TransitData 2019, ECML-PKDD 2018, CISSS 2016, Autosoft 2016, AI*IA 2015, SOCA 2015, Cloud and ICWS 2014, ICWS 2013, WISE 2013, ICONS 2012, GREENS 2012, ESOCC12, WISE 2012, DaMNet 2012, SAC 2011, Cloud 2011, ICWS 2011, ECOWS'11, WISE'11, SW2011, CoopIS 2011, AP2PS 2011, SOCA 2011, ICWS 2010, ICSOC 2010, CNSM 2010, CoopIS 2010, ServiceWave 2010, ECOWS2010.
- **Teaching**
  - **Knowledge and Data** – course coordinator, lecturer (2023)
    Topics: propositional and predicate logic, RDF and RDFS, SPARQL, querying knowledge graphs, OWL.
  - **Intelligent Agents and Automated Reasoning** – course designer, course coordinator, lecturer (2021/2022)
    Topics: Search, constraint satisfaction, games, adversarial search, logic and model checking, AI planning, knowledge representation and ontologies, reasoning under uncertainty.

- **Advanced Algorithms and Data Structures** – lecturer (2019-2022)
  Topics: Algorithms and complexity, growth of functions, heaps, binary trees, hash tables, graphs, divide and conquer, sorting, dynamic programming, greedy algorithms, NP-completeness.
- **Object-Oriented Programming** – course coordinator, lecturer (2020)
  Topics: imperative paradigm, Java, encapsulation, inheritance, polymorphism, overloading, constructors, interfaces, packages, templates, lambdas, exceptions, persistance and serialisability, MVC and observers.
- **Teaching assistance:**
  • Advanced Public Transport Operations and Modelling (2018/2019)
  • Web and Cloud Technology (2012, 2013)
  • Advanced Web Technology (2011)
  • Net Computing (2011)

- **Supervision**
  - **PhD**
    • E. Karabulut (ongoing), "Knowledge models and reasoning system for digital twins of critical infrastructures"
    • A. Tello (ongoing), "Towards Cognitive Digital Twins: Knowledge Graphs and Associative Learning for high-level activities recognition in Smart Environments"
    • M. Hadadian (ongoing) "Microservices for evolutionary changes in Data Analysis"
    • M. Lotfian Delouee (ongoing) "Event-Based Systems Meeting User Requirements in the Internet of Things"
  - Supervised **over 20 Master & Bachelor thesis** projects & internships.
- **Research projects**
  - DiTEC: Digital Twin for Evolutionary Changes in water networks, NWO – PI, coordinator
  - Evolutionary Changes in Data Analysis (ECIDA), NWO – researcher
  - AI for Manufacturing SMEs and Students (AIMS2), EIT Manufacturing – co-PI, task leader
  - KLIMATe (Market potential for a green multimodal decision support e-tool), EIT Climate – co-PI, task leader
  - My-TRAC@AMS, AMS – co-PI, task leader
  - My Travel Companion (My-TRAC), H2020 – work package leader, task leader
  - European Control System Security Incident Analysis Network (ECOSSIAN), FP7 – deputy work package leader, task leader
  - Waternomics, FP7 - researcher
  - SENSE (sensor network for energy efficiency), Enterprise Ireland - researcher
  - GreenerBuildings, FP7 – researcher, task leader
  - Smart Homes for All (SM4ALL), FP7 - researcher
- **Other**
  - Over 20 talks given at conferences, invited talks at diverse events, guest lectures at several universities.
  - ICT.OPEN 2022 – poster jury member
  - GDBC Digital Transformation Master Thesis Award 2020, 2021 – jury member
  - Member PhD Examination Committee of Azkario Rizky Pratama "Office Occupancy Detection based on Power Meters and BLE Beaconing", 2020

Publications

- R. Riesebos, V. Degeler and A. Tello, "Smartphone-Based Real-Time Indoor Positioning Using BLE Beacons," 2022 IEEE 18th International Conference on Automation Science and Engineering (CASE), 2022, pp. 1281-1288, doi: 10.1109/CASE49997.2022.9926639

- Lotfian Delouee, M., Koldehofe, B., & Degeler, V. (Accepted/In press). Towards adaptive quality-aware Complex Event Processing in the Internet of Things. In The 18th International Conference on Mobility, Sensing and Networking (MSN 2022) IEEE.
- Al-Saudi K, Degeler V, Medema M. (2021) Energy Consumption Patterns and Load Forecasting with Profiled CNN-LSTM Networks. *Processes*; 9(11):1870. https://doi.org/10.3390/pr9111870
- Tello, A. & Degeler, V. (2021) Digital Twins: An enabler for digital transformation. Chapter in "The Digital Transformation handbook", eds. T.Broekhuizen, T.Bijmolt, B.Baalmans, N.Fabian. Available: https://www.rug.nl/gdbc/white-paper-digital-twins.pdf
- Degeler, V., Heydenrijk-Ottens, L., Luo, D., van Oort, N., & van Lint, H. (2020). Unsupervised approach towards analysing the public transport bunching swings formation phenomenon. *Public Transport*, 1-23, https://doi.org/10.1007/s12469-020-00251-z
- Mantouka, E. G., Vlahogianni, E. I., Papacharalampous, A. E., Heydenrijk-Ottens, L., Shelat, S., Degeler, V., & van Lint, H. (2019). Understanding Travel Behavior through Travel Happiness. *Transportation Research Record,* 2673(4), 889-897.
- Viktoriya Degeler, Léonie Heydenrijk-Ottens, Ding Luo, Niels van Oort and Hans van Lint. Unsupervised approach to bunching swings phenomenon analysis, *Conference on Advanced Systems in Public Transport and TransitData (CASPT)*, Brisbane, Aus, 2018
- Léonie Heydenrijk-Ottens, Viktoriya Degeler, Ding Luo, Niels van Oort and Hans van Lint. Supervised learning: Predicting passenger load in public transport, *Conference on Advanced Systems in Public Transport and TransitData (CASPT)*, Brisbane, Aus, 2018
- E. Mantouka, A. Papacharalampous, I. Stroumpou, L. Heydenrijk, S. Shelat, P. Chamoso Santos, J. Guisado-Gamez, V. Degeler, E. Mitsakis, E. Vlahogianni, J. Larriba-Pey, Urban Travel Behaviour: A Cross-country Comparison, *7th Symposium of the European Association for Research in Transportation (hEART)*, 2018
- G. Di Pasquale, V. Degeler, A. Papacharalampous, E. Mantouka, J.L. Larriba, Multimodal travel companion enabled by Artificial Intelligence, *25th ITS World Congress*, 2018
- Richard French, Viktoriya Degeler and Kevin Jones. A Model of a Malware Infected Automated Guided Vehicle for Experimental Cyber-Physical Security, *SAI Computing* Conference, 2016.
- V. Degeler, R. French and K. Jones, "Self-Healing Intrusion Detection System Concept," *IEEE International Conference on Intelligent Data and Security (IDS)*, pp. 351-356, 2016.
- Viktoriya Degeler, Richard French and Kevin Jones. Combined Danger Signal and Anomaly-Based Threat Detection in Cyber-Physical Systems, 2nd *EAI International Conference on Safety and Security in Internet of Things* (SaSeIoT), 2015.
- Viktoriya Degeler, Richard French and Kevin Jones. Demonstrating Danger Theory Based Threat Detection for Robotic Manufacture Protection, *SAI Intelligent Systems Conference (IntelliSys)*, 283 – 284, 2015. ***Best Demonstration Award.***
- V. Degeler and A. Lazovik. Dynamic Constraint Satisfaction with Space Reduction in Smart Environments, *International Journal on Artificial Intelligence Tools*, 23(06), 2014.
- Viktoriya Degeler. *Dynamic Rule-Based Reasoning in Smart Environments, PhD thesis*, University of Groningen, 2014.
- V. Degeler and E. Curry. Human-Assisted Rule Satisfaction in Partially Observable Environments, In *11th IEEE International Conference on Ubiquitous Intelligence and Computing* (UIC 2014), IEEE, 2014.

- Edward Curry, Viktoriya Degeler, Eoghan Clifford, Daniel Coakley, Andrea Costa, Schalk-Jan Van Andel, Nick Van De Giesen, Christos Kouroupetroglou, Thomas Messervey, Jan Mink, Sander Smit, "Linked Water Data For Water Information Management", In *11th International Conference on Hydroinformatics* (HIC 2014), New York, New York, USA, 2014.
- Eoghan Clifford, Daniel Coakley, Edward Curry, Viktoriya Degeler, Andrea Costa, Thomas Messervey, Schalk-Jan Van Andel, Nick Van de Giesen, Christos Kouroupetroglou, Jan Mink, Sander Smit. Interactive Water Services: The Waternomics Approach, In *16th international conference Water Distribution Systems Analysis (WDSA)*, Elsevier, 2014.
- Viktoriya Degeler, Alexander Lazovik, Francesco Leotta, Massimo Mecella. Itemset-based Mining of Constraints for Enacting Smart Environments. *Symposium on Activity and Context Modeling and Recognition (ACOMORE)*, 2014.
- V. Degeler and A. Lazovik. Architecture pattern for context-aware smart environments, *"Creating Personal, Social and Urban Awareness through Pervasive Computing"*, eds. D. Riboni, B. Guo, P. Hu, IGI Global, 2013.
- V. Degeler, L. I. Lopera Gonzalez, M. Leva, P. Shrubsole, S. Bonomi, O. Amft, and A. Lazovik, Service-Oriented Architecture for Smart Environments, *IEEE International Conference on Service Oriented Computing and Applications (SOCA)*, 2013.
- V. Degeler and A. Lazovik. Dynamic Constraint Reasoning in Smart Environments. *IEEE Int. Conf. on Tools with Artificial Intelligence (ICTAI)*, 167-174, 2013. ***Best Student Paper Award.***
- T. A. Nguyen, V. Degeler, R. Contarino, A. Lazovik, D. Bucur, and M. Aiello. Towards Context Consistency in a Rule-Based Activity Recognition Architecture. In *Proceedings of the International Symposium on Ubiquitous Intelligence and Autonomic Systems*. 2013.
- I. Georgievski, V. Degeler, G. A. Pagani, T. A. Nguyen, A. Lazovik, and M. Aiello. Optimizing Energy Costs for Offices Connected to the Smart Grid. *IEEE Trans. on Smart Grid*, 3:2273-2285, 2012
- V. Degeler and A. Lazovik. (2012) Reduced Context Consistency Diagrams for Resolving Inconsistent Data. *EAI Endorsed Transactions on Ubiquitous Environments*, 12(10-12).
- F. Nizamic, V. Degeler, R. Groenboom, and A. Lazovik (2012) Policy-Based Scheduling of Cloud Services. *Scalable Computing: Practice and Experience*, 13(3):187-199.
- V. Degeler, A. Lazovik. Cost-efficient Context-aware Rule Maintenance. *IEEE Int. Conf. on Pervasive Computing and Communications Workshops*, 609-613, 2012.
- V. Degeler, A. Lazovik. Interpretation of Inconsistencies via Context Consistency Diagrams. *In 9th IEEE Int. Conf. on Pervasive Computing and Communications (PerCom)*, pp. 20-27, 2011.
- I. Georgievski, V. Degeler, G.A. Pagani, T.A. Nguyen, A. Lazovik, M. Aiello. Optimizing Offices for the Smart Grid. *Technical Report JBI preprint 2011-12-01, University of Groningen*.
- V. Degeler, I. Georgievski, A. Lazovik, and M. Aiello. Concept mapping for faster QoS-Aware Web Service Composition. *IEEE Service Oriented Computing and Applications*, pp. 1-4, 2010. ***1st place in Architectural challenge of Web Services Challenge'10***