BENTLEY J
OAKES

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KEY ACADEMIC SKILLS SUMMARY

Researcher - Lead and co-author of 28 publications with 210+ citations on Google Scholar.
Collaborator - Involved in multiple international academic and industrial collaborations.
Teacher/Mentor - Extensive experience teaching courses and mentoring graduate students.
Community-Builder - Member of multiple organizing/program committees.

EDUCATION

Doctor of Philosophy (PhD), Computer Science **2019**
McGill University - Montréal, Canada
Title: A Symbolic Execution-Based Approach To Model Transformation Verification using Structural Contracts
Supervisors: Hans Vangheluwe and Clark Verbrugge

Master of Science, Computer Science **2013**
McGill University - Montréal, Canada
Title: Practical and Theoretical Issues of Evolving Behaviour Trees for a Turn-Based Game
Supervisor: Clark Verbrugge

Bachelor of Science, Computer Science **2011**
University of Manitoba - Winnipeg, Canada
Honours Level, Co-op option with three work-terms:

> **Assistant Software Engineer** **Fall 2009, Summer 2010**
> *Electronic Arts Inc.*, Montréal, Canada
> *Role:* Prototyping artificial intelligence in commercial video games.
>
> **Assistant Software Engineer** **Winter 2009**
> *Blackberry Limited (RIM)*, Waterloo, Canada
> *Role:* Implementing cryptographic communication protocols.

RESEARCH EXPERIENCE

Post-Doctoral Researcher

Université de Montréal - Montréal, Canada **Sept. 2021 to Present**
Lab: GEODES Software Engineering Research Group
Supervisors: Houari Sahraoui and Michalis Famelis
Research topic: Assisting non-machine learning experts in constructing machine learning solutions by synthesizing tailored computational workflows.

University of Antwerp - Antwerp, Belgium **Sept. 2018 to July 2021**
Labs: Antwerp Systems and Software Modelling, and Constrained Systems Lab
Supervisors: Hans Vangheluwe and Joachim Denil
Research topics: Verification and validation of cyber-physical systems, model-driven engineering, multi-paradigm modelling, co-simulation, and digital twins.

Visiting Researcher

Université de Montréal - Montréal, Canada **May 2018**
Host: Eugene Syriani, GEODES Software Engineering Research Group
Research topic: Developing an interface between the AToMPM modelling tool and the ModelVerse modelling repository.

fortiss GmbH - Munich, Germany **July to Aug. 2016**
Host: Levi Lúcio
Research topic: Formalizing representations of model transformation languages.

General Motors Technical Center - Warren, USA **Oct. to Dec. 2014**
Host: Ramesh Sethu
Research topics: Applying model transformations for code/model modernization at an industrial scale, and industrial intellectual property concerns.

TEACHING EXPERIENCE

Guest Lecturer **Nov. 28, 2022**

Polytechnique Montréal - Montréal, Canada
LOG6953DE - Model-Driven Software Engineering
Professor: Mohammad Hamdaqa
Lecture topics: Model-driven engineering, usage and verification of model transformations.

Teaching Assistant

University of Antwerp - Antwerp, Belgium
Professor: Hans Vangheluwe
Level: Graduate
2001WETMTR - Model-Driven Engineering **Fall 2020**
Role:
- Developed and graded practical assignments utilizing model-driven engineering tools.
- Held virtual and in-person lab sessions to assist students with tool usage.

2001WETMSI - Modelling of Software-Intensive Systems **Fall 2019**
Role: Developed and graded Petri Net assignment focusing on modelling and verification.

Course Lecturer/Coordinator — Winter 2015, 2017, and 2018

McGill University - Montréal, Canada
COMP 202 - Foundations of Programming - Six terms
Level: Undergraduate
Average enrollment per lecture: 189 students
Role:

- Developed and presented material for engaging course lectures covering Java programming topics, targeted towards students with no prior programming experience.
- Created multiple-choice, short answer, and long-answer questions and marking guides for course assignments and exams.
- Coordinated with other instructors and teaching assistants to ensure consistency in course material and meet teaching objectives.

Teaching Assistant — 2012 to 2014

McGill University - Montréal, Canada
COMP 202 - Foundations of Programming (x2)
COMP 250 - Introduction to Computer Science (x2)
COMP 251 - Data Structures and Algorithms (x3)
Level: Undergraduate
Role:

- Provided constructive criticism on assignments and offering helpful suggestions and resources via online class forums, tutoring appointments, and email.
- Marked exams and assignments in collaboration with other teaching assistants and provided feedback to lecturers.

COMMUNITY BUILDING

Organizer

Software Engineering at Montréal (SEMTL) — **Aug. 2022 - Present**
Summary: Regular mini-workshops of software engineering researchers in Montréal.
Website: https://semtl.github.io/
Attendance: ≈20 in Sept. 2022, ≈40 in Nov. 2022
Role:

- Leading organizational committee to define group vision and roadmap.
- Coordinating with meeting hosts on content, venue, date, and maintaining website.
- Hosted Sept. 2022 meeting and presented current research.

Organizing Committee Member

Annual Modeling and Simulation Conference (ANNSIM) — **2022, 2023**
Cyber-Physical Systems Track Co-Chair
Model Driven Engineering Languages and Systems (MODELS) — **2022**
Posters Co-Chair

Session Chair

Model-Driven Engineering and Software Development (MODELSWARD) — **2021**

Journal Reviewer

Journal of Computer Languages (JCL) **2022**
Empirical Software Engineering (EMSE) **2022**
IEEE Transactions on Automation Science and Engineering (T-ASE) **2021**
Journal of Software and Systems Modeling (SoSyM) **2020 (x2), 2021**

Program Committee Member

Workshop on Artificial Intelligence and Model-Driven Engineering **2022**
International Workshop on Models and Evolution **2022**
ACM Student Research Competition **2022**
Annual Modeling and Simulation Conference (ANNSIM) **2021, 2022**
Spring Simulation Conference **2020**
Summer Simulation Conference **2019, 2020**

Vice President of Finance **2012 - 2015**

Computer Science Graduate Society (CSGS)
McGill University - Montréal, Canada
Role: Coordinating dispersement of society resources and voting at Post Graduate Students' Society meetings.

SCHOLARSHIPS AND AWARDS

- *Journal of Software & Systems Modeling (SoSyM) Top 1% Reviewer* **2020, 2021**
- *Best Student Paper Award* at SIMULTECH **2019**
  for the paper *HintCO – Hint-based configuration of co-simulations*
- *NSERC Postgraduate Scholarship - Doctoral (PGS D)*, **2015 to 2016**
  Natural Sciences and Engineering Research Council of Canada
- *Lorne Trottier Science Accelerator Fellowship*, McGill University **2015, 2016**
- *Harold H. Helm Fellowship*, McGill University **2013, 2014**
- *Grad Excellence Award in Computer Science*, McGill University **2012, 2014**

PUBLICATIONS

Links:

Peer-Reviewed Journals

- [Oakes2018a] **B. Oakes**, J. Troya, L. Lúcio, and M. Wimmer, "Full contract verification for ATL using symbolic execution," *Software and System Modeling*, vol. 17, no. 3, pp. 815–849, 2018

Book Chapters

- [Oakes2022] **B. Oakes**, A. Parsai, B. Meyers, I. David, S. Van Mierlo, S. Demeyer, J. Denil, P. De Meulenaere, and H. Vangheluwe, "A digital twin description framework and its mapping to Asset Administration Shell," *arXiv preprint arXiv:2209.12661*, 2022. To appear in Springer book of best papers from MODELSWARD 2021/2022

- [Karaduman2022] B. Karaduman, **B. Oakes**, R. Eslampanah, J. Denil, H. Vangheluwe, and M. Challenger, "An architecture and reference implementation for WSN-Based IoT systems," in *Emerging Trends in IoT and Integration with Data Science, Cloud Computing, and Big Data Analytics*, pp. 80–103, IGI Global, 2022
- [Oakes2020] **B. Oakes**, C. Gomes, F. R. Holzinger, M. Benedikt, J. Denil, and H. Vangheluwe, "Hint-based configuration of co-simulations with algebraic loops," in *9th International Conference, SIMULTECH 2019 Prague, Czech Republic, July 29-31, 2019, Revised Selected Papers*, vol. 1260, pp. 1–28, Springer, 2020

Peer-reviewed Conferences

- [Dhaouadi2022] M. Dhaouadi, **B. Oakes**, and M. Famelis, "End-to-end rationale reconstruction," in *Proceedings of the International Conference on Automated Software Engineering (NIER track)*, 2022. To appear
- [Oakes2021a] **B. Oakes**, M. Moradi, S. V. Mierlo, H. Vangheluwe, and J. Denil, "Machine learning-based fault injection for hazard analysis and risk assessment," in *International Conference on Computer Safety, Reliability, and Security*, pp. 178–192, Springer, 2021
- [Oakes2021] **B. Oakes**, A. Parsai., S. V. Mierlo., S. Demeyer., J. Denil., P. D. Meulenaere., and H. Vangheluwe., "Improving digital twin experience reports," in *Proceedings of the 9th International Conference on Model-Driven Engineering and Software Development - Volume 1: MODELSWARD,*, pp. 179–190, INSTICC, SciTePress, 2021
- [VanMierlo2020] S. Van Mierlo, **B. Oakes**, B. Van Acker, R. Eslampanah, J. Denil, and H. Vangheluwe, "Exploring validity frames in practice," in *Proceedings of the First International Conference, ICSMM 2020, Bergen, Norway, June 25–26, 2020*, pp. 131–148, Springer, Cham, 2020
- [Gomes2019] C. Gomes, **B. Oakes**, M. Moradi, A. T. Gámiz, J. C. Mendo, S. Dutré, J. Denil, and H. Vangheluwe, "HintCO – Hint-based configuration of co-simulations," in *Proceedings of the 9th International Conference on Simulation and Modeling Methodologies, Technologies and Applications - Volume 1: SIMULTECH,*, pp. 57–68, INSTICC, SciTePress, 2019. **Winner of the Best Student Paper Award**
- [Moradi2019] M. Moradi, C. Gomes, **B. Oakes**, and J. Denil, "Optimizing fault injection in FMI co-simulation through sensitivity partitioning," in *Proceedings of the 2019 Summer Simulation Conference*, SummerSim '19, (San Diego, CA, USA), pp. 1–12, Society for Computer Simulation International, 2019
- [Lucio2015] L. Lúcio, **B. Oakes**, C. Gomes, G. Selim, J. Dingel, J. Cordy, and H. Vangheluwe, "SyVOLT: Full model transformation verification using contracts," in *Model Driven Engineering Languages and Systems (MODELS)*, pp. 24–27, 2015
- [Oakes2015] **B. Oakes**, J. Troya, L. Lúcio, and M. Wimmer, "Fully verifying transformation contracts for declarative ATL," in *Model Driven Engineering Languages and Systems (MODELS)*, pp. 256–265, 2015
- [Selim2014] G. Selim, L. Lúcio, J. Cordy, J. Dingel, and **B. Oakes**, "Specification and verification of graph-based model transformation properties," in *Proceedings of International Conference on Graph Transformation*, pp. 113–129, Springer, 2014

Peer-reviewed Workshops

- [Oakes2021b] **B. Oakes**, B. Meyers, D. Janssens, and H. Vangheluwe, "Structuring and accessing knowledge for historical and streaming digital twins," in *First Workshop on Ontology-Driven Conceptual Modeling of Digital Twins*, pp. 1–13, 2021
- [Moradi2020] M. Moradi, **B. Oakes**, M. Saraoglu, A. Morozov, K. Janschek, and J. Denil, "Exploring fault parameter space using reinforcement learning-based fault injection," in *2020 50th Annual IEEE/IFIP International Conference on Dependable Systems and Networks Workshops (DSN-W)*, pp. 102–109, 2020
- [VanAcker2020] B. Van Acker, **B. Oakes**, M. Moradi, P. Demeulenaere, and J. Denil, "Validity frame concept as effort-cutting technique within the verification and validation of complex cyber-physical systems," in *Proceedings of the 23rd ACM/IEEE International Conference on Model Driven Engineering Languages and Systems: Companion Proceedings*, MODELS '20, (New York, NY, USA), Association for Computing Machinery, 2020
- [Bernaerts2019] M. Bernaerts, **B. Oakes**, K. Vanherpen, B. Aelvoet, H. Vangheluwe, and J. Denil, "Validating industrial requirements with a contract-based approach," in *2019 ACM/IEEE 22nd International Conference on Model Driven Engineering Languages and Systems Companion (MODELS-C)*, pp. 18–27, Sept. 2019
- [Meyers2019] B. Meyers, K. Gadeyne, **B. Oakes**, M. Bernaerts, H. Vangheluwe, and J. Denil, "A model-driven engineering framework to support the functional safety process," in *2019 ACM/IEEE 22nd International Conference on Model Driven Engineering Languages and Systems Companion (MODELS-C)*, pp. 619–623, Sept. 2019
- [Oakes2019] **B. Oakes**, R. Franceschini, S. Van Mierlo, and H. Vangheluwe, "The computational notebook paradigm for multi-paradigm modeling," in *2019 ACM/IEEE 22nd International Conference on Model Driven Engineering Languages and Systems Companion (MODELS-C)*, pp. 449–454, Sept. 2019
- [Oakes2018b] **B. Oakes**, C. Verbrugge, L. Lúcio, and H. Vangheluwe, "Debugging of model transformations and contracts in SyVOLT," in *Proceedings of the MDEbug Workshop at Model Driven Engineering Languages and Systems (MODELS)*, pp. 532–537, 2018
- [Selim2015] G. Selim, J. Cordy, J. Dingel, L. Lúcio, and **B. Oakes**, "Finding and fixing bugs in model transformations with formal verification: An experience report," in *Proceedings of Analysis of Model Transformations Workshop at Model Driven Engineering Languages and Systems*, pp. 26–35, 2015

Technical Reports and Theses

- [Oakes2018] **B. Oakes**, *A Symbolic Execution-Based Approach to Model Transformation Verification Using Structural Contracts*. PhD thesis, McGill University, 2018
- [Lucio2014] L. Lúcio, **B. Oakes**, and H. Vangheluwe, "A technique for symbolically verifying properties of graph-based model transformations," Tech. Rep. SOCS-TR-2014.1, McGill University, 2014
- [Oakes2014] **B. Oakes**, "Optimizing Simulink models," Tech. Rep. CS-TR-2014.5, McGill University, 2014
- [Oakes2013] **B. Oakes**, *Practical and Theoretical Issues of Evolving Behaviour Trees for a Turn-Based Game*. PhD thesis, McGill University, Aug. 2013

– [Oakes2012a] **B. Oakes**, “Embedding causal block diagrams within behaviour trees,” Tech. Rep. COMP 522 - Modelling and Simulation Course Project, McGill University, Apr. 2012