ARMSTRONG FOUNDJEM

https://foundjem.github.io/ foundjem@ieee.org +1 (514)655-0942 foundjem gScholar

My research intersects software ecosystems sustainability, affective computing, the trustworthiness of AI safety-critical systems, and software engineering for machine learning applications, including foundational models, AIWare, and Agentware. I mine massive datasets, including software repositories, and apply socio-technical data science techniques to uncover patterns and empirically make informed decisions. I obtained my Ph.D. at Queen's University in June 2022, advised by Prof. Bram Adams.

CURRENT POSITION

Postdoctoral fellow: "Towards certifiable safety-critical AI systems using learning algorithms"

DEEL Project — Polytechnique Montreal
Under the supervision of Professors Giulio Antoniol, Ettore Merlo, and Foutse Khomh.

August 2022 – Ongoing Montreal, CA

This research focuses on the trustworthiness and certifiability of safety-critical systems and deep learning models. Also, I mentor Ph.D. and MSc. students on related topics, such as FMs for automatically generating software test cases, counterfactual analysis in deep learning models, Rule-based Repair for Machine Learning systems, etc. I also organize lab meetings, workshops, conferences, etc.

EDUCATION

Ph.D SW Engineering: "Software Ecosystem Sustainability, a Socio-Technical Perspective"

MCIS Lab — Queen's University (Q) and Polytechnique Montreal (P) (Scholarships: $21.5K ↦ Graduate Fellowship (Q), $32K ↦ Pierre Arbour Foundation (P), $57K ↦ Fondation Universitaire (P))

Affiliated to MCIS laboratory at Queen's University and advised by Prof. Bram Adams

Winter Winter 2018 – Spring 2022 Kingston, CA

- GPA: 4.3/4.3

M.A.Sc., SW Engineering: "Towards Improving the Reliability of Live Migration Operations in Clouds"

SWAT Lab — Polytechnique Montreal (Scholarships: $18K ↦ Pierre Arbour Foundation $34K ↦ Fondation Universitaire)

Affiliated to SWAT laboratory at Polytechnique Montreal and advised by Prof. Foutse Khomh

Winter 2015 – Spring 2017 Montréal CA)

B.Sc. Computer Science Major with co-op

Bishop's University (Scholarship: 3K ↦ Entrance and City of Sherbrooke Scholarships)

Fall 2012 – Summer 2015 Sherbrooke, CA)

DEC. Computer Science Major with co-op

LaSalle College

Fall 2009 – Summer 2012 Montréal, CA)

Advanced Diploma Micro-Electronics

City & Guilds of London Institute

Fall 2004 – Summer 2006 London, UK)

Licentiate Electrical/Electronics Engineering

City & Guilds of London Institute

Fall 2001 – Summer 2003 London, UK)

CERTIFICATIONS

Machine Learning

Vector Institute – University of Toronto

Fall 2022 — Toronto, CA

- GPA: 100/100 – Excellent
- Selected best Capstone project – Fall 2022
  The project addresses the need for multi-class and multi-label classification problems using fine-tuned BERT, LSTM, RNN, etc., on unstructured data.

Deep Learning Workshop – Applied Computer Vision

IVADO-Mila – University of Montreal

Fall 2022 — Montreal, CA

- Workshop

PUBLICATIONS

2024

✍ "DEpendable and ExpLainable Learning: from Research to Industry"
Grégory Flandin, **Armstrong Foundjem**, Franck Mamalet, Yann Batiste Pequignot
IEEE Computational Intelligence Magazine . article, pages:1-13, under review, 2024

✍ "A Grounded Theory of Trustworthy AI in Safety-Critical Systems"
Armstrong Foundjem, Patrick Foalem, Foutse Khomh, Ahmed E. Hassan
TOSEM Journal article, pages:1-52, In-progress, 2024

✍ "Automated Techniques for Mining Software Requirements from AI Regulations –A case study of the EU AI ACTs"
Laila Abodinar, **Armstrong Foundjem**, Patrick Foalem, Foutse Khomh
TOSEM Journal article, pages:1-49, In-progress, 2024

✍ "Reliable Malware Analysis and Detection using Topological Data Analysis"
Armstrong Foundjem, Lionel Tidjon, Leuson Da Silva, Foutse Khomh
IEEE Trans. Inf. Forensics Secur. article, pages:1-19, under review, 2024

✍ "Threat Assessment in Machine Learning based Systems"
Armstrong Foundjem, Lionel Tidjon, Leuson Da Silva, Foutse Khomh
TOSEM Journal article, pages:1-36, under review, 2024

✍ "Adversarial Attack Classification and Robustness Testing for Code Generation Models"
Yang Liu, **Armstrong Foundjem**, Foutse Khomh, Heng Li
EMSE Journal article, pages:1-38, under review, 2024

✍ "An empirical study of testing machine learning in the wild"
Moses Openja, Foutse Khomh, **Armstrong Foundjem**, Zhen Ming (Jack) Jiang, Mouna Abidi, Ahmed E. Hassan
TOSEM Journal article, pages:1-65, accepted to appear, 2024

2023

✍ "Deep Learning Model Reuse in the HuggingFace Community: Challenges, Benefit and Trends"
Mina Taraghi, Gianolli Dorcelus, **Armstrong Foundjem**, Florian Tambon and Foutse Khomh
SANER 2023 (Conference paper) Rank: A

✍ "A Grounded Theory of Cross-community SECOs: Feedback Diversity vs. Synchronization"
Armstrong Foundjem, Ellis E. Eghan, Bram Adams
TSE 2023 (Journal article, pages: 1-19). Impact factor: 9.9, 1st ranked journal. Online: www.computer.org

2022

✍ "Software Ecosystem Sustainability, a Socio-Technical Perspective"
Armstrong Foundjem
(Ph.D. Thesis). Online: Queen's Graduate Theses and Dissertations

✍ "A mixed-methods analysis of micro-collaborative coding practices in OpenStack"
Armstrong Foundjem, Eleni Constantinou, Tom Mens, Bram Adams
Empirical Software Engineering: 2022 (Journal article, pages: 1-57). Impact factor: 8.41, 2nd ranked[1] journal. Online: link.springer.com

[1]https://research.com/journals-rankings/computer-science/software-programming

2021

✍ "Release synchronization in software ecosystems"
Armstrong Foundjem, Bram Adams
Empirical Software Engineering: 2021 (Journal article, pages: 1-50). Online: link.springer.com

✍ "Onboarding vs. Diversity, Productivity, and Quality: Empirical Study of the OpenStack Ecosystem"
Armstrong Foundjem, Ellis E. Eghan, Bram Adams
ICSE 2021 research track (Conference paper, pages: 1033-1045). Rank: A* ranked[2], Online: www.computer.org

✍ "An Open Dataset for Onboarding new Contributors: Empirical Study of OpenStack Ecosystem"
Armstrong Foundjem, Ellis Eghan, and Bram Adams
ICSE-Companion 2021 (Replication package, pages: 240-241). Online: www.computer.org

2019

✍ "Release synchronization in software ecosystems"
Armstrong Foundjem
ICSE-Companion 2019, (Companion Proceedings, Pages:135-137). Online: ieeexplore.ieee.org

2017

✍ **"Broadcast vs. Unicast Review Technology: Does It Matter?"**
Armstrong Foundjem, Foutse Khomh and Bram Adams
ICST 2017, research track (Conference paper, pages: 219-229). Rank A, Online:ieeexplore.ieee.org

✍ **"Towards Improving the Reliability of Live Migration Operations in OpenStack Clouds"**
Armstrong Foundjem
(Thesis). Online: publications.polymtl.ca

PROGRAM COMMITTEES

38th Annual Conference on Neural Information Processing Systems (NeurIPS 2024)
Datasets and Benchmarks Track
Reviewing technical papers

Dec-2024 — Vancouver, Canada

39th Annual Conference on Artificial Intelligence (AAAI 2024)
Workshop on Datasets and Evaluators of AI Safety Track
Reviewing technical papers

Dec-2024 — Philadelphia, Pennsylvania, USA

47th IEEE/ACM International Conference on Software Engineering (ICSE 2025)
New Ideas and Emerging Results (ICSE 2025 NIER)
Reviewing technical papers

April-2025 — Ottawa, Canada

32nd IEEE International Conference on Software Analysis, Evolution, and Reengineering (SANER 2025)
Reviewing research papers

March-2025 — Montreal, Canada

Empirical Software Engineering, since 2023
Reviewing journal papers

October-2023 — Journal papers

Journal of Software: Evolution and Process, since 2023
Reviewing journal papers

May-2023 — Journal papers

[2] http://portal.core.edu.au/conf-ranks/

Mining Software Repositories (MSR) 2021–2024
Junior PC member — Reviewing research papers

May-2021/2022 Virtual/In-person

PC Chair AI/HPC and Machine Learning, Open Infrastructure Summit
Reviewing technical presentation in the AI/HPC/ML track.

11-2019, 10-2020, 06-2022, 06-2022 Denver, US, Virtual, virtual, Vancouver

- As the chair, I oversee submissions of different specializations, i.e., AI, HPC, etc., and ensure that reviewers focus on the deliberation process, and I facilitate to speed up the review process.

ACADEMIC EXPERIENCE

Since my M.A.Sc., Ph.D., and postdoc at PolyMtl, I have been a teaching assistant/ Instructor at the (under)graduate ($U_{1...4}/G$)-levels, responsible for preparing lectures, labs, and hands-on tutorials.

Instructor (U_4/G) — Ingénierie de la qualité en Logiciel, Log8371
Polytechnique Montreal

Winter 2020/2023/2024 Montreal, CA

Topics: Software Quality Assurance, Components of the SQA system, Testing, CI/CD pipeline, Quality of Code - Maintainability, Software Performance, Auto scaling, Risk management, etc.

Industrial scale testing | State-of-the-arts frameworks | Quiz | Final Exam

Instructor (G) — Sécurité dans les environnements infonuagiques, Inf8102
Polytechnique Montreal

Fall 2023 Montreal, CA

Key concepts of cloud computing. Operational safety and security in the cloud. Identity and access management. Secure configuration management. Data protection and automation. Networking and logging. Compliance, incident response, and penetration testing. Security in mobile cloud environments.

Cloud Security | Vulnerabilities & incidence management | Security in Mobile & Edge Computing | Final Project

Teaching Assistant (U4) — Conception of dynamic website, Log4420
Polytechnique Montreal

Fall 2015 – Fall 2016 Montreal, CA

Design complex and dynamic websites that generate content and manage user interactions. Overview of web architecture and HyperText Transfer Protocol (HTTP), Understanding Markup/style sheet languages such as HTML5, Pug, CSS; back-end servers-side such as Node.js, express; client sides such as Angular2, and database such as MongoDB.

Weekly deliverables | Assignments | Final Project | Online evaluation

Teaching Assistant (U3) — Software Engineering Processes, Log3000
Polytechnique Montreal

Fall/Winter ↔ 2016/2017/2018/2019 Montréal, CA

Topics include: Software engineering process. Phases of the software life cycle. Tools and methods of support to the process. Overview of different software development process philosophies. Technical disciplines of the software engineering process.

Process evaluation/improvement | Representation of the processes | Meta model | Empirical analysis of processes

Teaching Assistant (U1)— Introduction to Software Engineering,Log1000
Polytechnique Montreal

Fall 2015 — Fall 2016 Montréal, CA

Selected topics: Characteristics of a Software artifact; Configuration management and build systems; Software development life-cycle Models; Phases of the Life cycle: analyses, specification, conception, realization, tests, and maintenance;

Definition of requirements: explicitness, user constraints, system boundaries, consistency, completeness, verifiability, durability, and maintenance.

Extra Office hours | Effective communication | Tolerance and patience | Inclusiveness | Active learning activities

PROFESSIONAL EXPERIENCE

9480-2808 Québec inc. (Institut Éco-Logiciels d'Intelligence Durabilité) i²EL

December 2021 – Ongoing — Montreal, CA

I provide consultation services to organizations and software ecosystems, including onboarding support, upskilling programs, and mentorship. By mining, analyzing, and visualizing large datasets, I enable informed decision-making that supports sustainability objectives, such as reducing carbon footprints and ensuring long-term operational resilience.

Consultancy | Research | Sustainability | Human-in-the-loop AI

Towards improving DevVel across Microsoft — Productivity and Intelligence Lab. (Research Intern)
Microsoft Research

June 2021 — Oct. 2021 — Redmond, US

- I investigated ways to improve onboarding time to make new hires more productive within the first three months of joining Microsoft.
- Using a mixed-method analysis, I interviewed 20 managers globally across Microsoft, sent out a survey to 3K engineers, and then analyzed the code base activities of 20 top ecosystems within Microsoft.
- Initial findings suggest three critical roadblocks to reducing developer velocity time (DevVel: the time required to make a first acceptable pull request).

Ecosystem onboarding | Developer velocity | Productivity | Mixed-method research

Mentoring intent for Google Summer of Code (GSoC), core/maintainer in the evolution working group, CHAOSS Project
Linux Foundation

May 2018 — Ongoing — US

- I serve the community as a Board Member and actively participated in defining and releasing metrics for open-source projects, enabling the CHAOSS community's growth within the industry and academia.
- I was the ethics commissioner for two years, ensuring our open source community remains inclusive and diverse.

Board member | mentor GSoC | Open source community | Defining metrics | Promotes Diversity & Inclusion

Onboarding new contributors/software developers
Open-Infrastructure Foundation

2018 — Ongoing — Berlin, Germany

- I am a mentor at the Open-Infrastructure Foundation. Facilitating new contributors to get started as software developers in the OpenStack codebase.

mentor | OpenStack Upstream Institute | Open source community | Software ecosystem

Facilitated the release synchronization process of ecosystem releases
OpenStack Ecosystem

May 2015 - Ongoing — Texas, US

- I actively participate in the release team that facilitates the coordination of cross-project teams to a well-polished product throughout a release cycle.
- As a foundation member and core in the release team, I actively participate in weekly review, voluntary, and housekeeping activities within the ecosystem that have to improve its overall quality and impact on end-users.

Release Synchronization | Core Reviewer | Quality control

Building black boxes for vehicles that reconstruct accident scenario and drivers' behaviors
LASSENA Research Laboratory (Undergrad Intern)

May 2014 — Dec. 2014 Montreal, CA

- Improved simulator performance and generated reports in near-release time.
- Team lead, software engineering. I used agile methodology to speed up development for constantly changing requirements.

'Black-box' | Agile development | System Analyst | Vehicle Tracking | Accident Diagnostic

Analyzing use-cases and building a web portal for an online stock market
Idema Placement (College Intern)

May 2012 - August 2012 Montreal, CA

- I optimized a stock market platform `iShares` that improved investment in the stock market.

Stock market | Web portal | College intern | System Analyst

Applying my analytical and programming skills to developer geographic data processing engine
META (*Facebook*) Head Office (Intern)

Jan. 2013 - June 2013 California, US

- I learn Scala and Python on the go to develop solutions for high-performance applications.

System Analyst | Developer | Geographic Information System | Intern

Analyzing results from site survey to propose technical/technological requirements
Pastel Telecoms S.A (Electrical Engineer)

June 2005 - Dec. 2009 Douala, CMR

- I adopted a local solution to build transmission units for clients with changing needs, yielding an annual saving of US $28K.
- Built a smart power monitoring device to ensure our based stations stay connected in an environment suffering from constant power failure.
- Implementing security over our networking infrastructure and providing high bandwidth connections.

System Analyst | Vehicle Tracking | Accident Diagnostic | Reconstruction System

Providing consultation services to governmental, non-governmental organizations on standards.
Society of Engineers (incorporated) UK

Apr. 2001 - May 2005

Consultant | Management | Engineering | Critical planning

TECHNICAL SKILLS

Critical/Analytical Thinking ⇒	Reasoning about data using AI/ML techniques, Grounded theory, data visualization, and reporting to support decision-making and solve complex problems.
Programming Languages ⇒	Python, C++, Java, JavaScript, Julia, R, SQL series, Shell scripting.
DevOps & MLOps ⇒	Using containers (Docker), K8s, Cloud, and automation to deploy Models using release strategies such as Shadow Launches, Blue-green, Rolling Updates, etc.
Productivity ⇒	Emacs + Org-mode, LaTeX, Activity/ Tasks management, Scientific and technical writings. Collaborative code practice and teamwork practices
AIWare ⇒	Building RAG Systems, Agentic solutions, and Fine-tuning Models.
HPC ⇒	Running scientific workloads and benchmarking on clusters.

VOLUNTEERING

MLCommons AI Risk & Reliability, and Scientific Working Group

Nov. 2023 - Ongoing | Remote

I am the lead of the "Masakhane" research project, which focuses on incorporating African languages into MLCommons benchmarks based on linguistic coverage, evaluator availability (human and machine), and demographic considerations. Also, I actively contributes to AI safety evaluations and related research.
- Defining benchmarks for specific AI use-cases.
- Contributing to Scientific analysis on AI safety and energy (carbon footprint) discussions and actions.

Benchmarking | AI/ML | Prompt enginnering | safety-critical systems | Science | HPC

Mentoring and Evaluating junior researchers' projects across Canada (National/International Judge) Youth Science Canada/Canada Wide Science Fair

May 2016 - Ongoing | Canada

- Applying critical/analytical skills to evaluate selected best scientific projects across diverse scholarship in Canada.
- Read a high volume of scientific reports within a limited time frame to make informed decisions on the quality and originality of the projects.
- Served as chair in different teams, coordinating and collaborating with top Canadian scientists and professionals.
- Face challenges with diverse and state-of-the-art topics ranging from Machine learning, A.I, Physics, Mathematics, Bioinformatics, and Robotics.

Communication | Interpersonal Skills | Critical thinking | Science Judge

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Student Volunteer: Ensuring a smooth conference run by allocating resources to participants, 42nd International Conference on Software Engineering ICSE 2020, July 2020

Virtual conference |

- I contributed to the success of the conference by being proactive and reporting timely coordinators.
- Synchronize with teams to manage different time zones and to facilitate authors throughout their presentations.
- Facilitates audiences/participants through a Q&A session to ensure a maximum response rate.

Student Volunteer | Planning | Managing resources | Communication | Active listening

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Final projects evaluation (U4) Engineering McGill University Montreal

Winter 2016 - 2018 | Montreal, CA

- Evaluating final year multi-disciplinary projects for undergraduate Engineering students, spanning all the engineering fields taught at McGill.

Decision making | Science Judge | Time Management

Student volunteer: Providing a wide variety of assistance to participants of the URSI conference General Assembly and Scientific Symposium of the International Union of Radio Science (URSI) - GASS

August 2017 | Montreal, CA

- I provided a wide variety of help to the URSI conference. I served at the front desk registration and helped reduce the wait time for attendees to get themselves registered.
- I collaborated with the coordinators and other students to assist participants' (speakers/attendees) needs.

Student volunteer | Conference | Team spirit | Time Management

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Green Code Challenge France

Winter 2015 | Paris, Fr.

- Successfully mobilizing a team of talented research scientists/engineering students to an international competition on green software: `www.youtube.com`, and we won the 5th place out of 82 teams.

Green Code Challenge | International competition | Team lead | Extreme programming

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WORKSHOP & TRAINING

Speaker:
AIware Leadership Bootcamp 2024

11-2024 Queen's University Downtown Toronto Campus Canada

– Presenting works on (1) Trustworthiness of AI safety-critical systems and (2) Assessment of AI regulation Acts a case study of EU AI Act.

AIWare | Bootcamp | Leadeeship | Hands-on | Collaborating

Mentor: ICSE's Student Mentoring Workshop (SMeW)
ICSE 2023

16-2023/05 Melbourne, Australia

- SMeW aims to encourage and attract students to research careers in SE, to demystify the graduate school experience, and to offer first-hand perspectives on the graduate study from recent Ph.D.

Mentoring | Collaborating | Consulting | Networking

Mentor: Training new contributors to start contributing to the OpenStack code base
Open Infrastructure Upstream Institute

11-2017/05-2018/11-2018/11-2019 Sydney/Vancouver/Berlin/Shanghai

- Mentoring new contributors to submit their first change request successfully; quickly guiding them through the documentation and contribution process

Onboarding | Teamwork | Mentoring | Hands-on | Collaborating

Student Volunteer: Coordinate a workshop on software engineering for ML professionals
Software Engineering for Machine Learning Applications (SEMLA)

June. 2018 – March 2020 Montreal, CA

- I guided participants to deploy their applications using blue-green and Canary deployment successfully.
- Also, I gave a second hands-on tutorial on versioning machine-learning applications during training and validations for reproducibility.

Workshop | Teamwork | Tutorial | Time Management

REFERENCES

Available upon request