Sidi Mohamed Beillahi

Postdoctoral Researcher
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❖ Summary

I am interested in algorithmic verification, formal verification, and programming languages. I develop new techniques to improve the reliability of software systems. I work in a variety of application areas including concurrent programs, distributed systems, blockchain, smart contracts, and asynchronous programs.

❖ Education

Doctorate — Computer Science   *Dec 2017 – Mar 2021*
  Thesis Title: **Automated Verification of Programs Running on top of Distributed Systems**   University of Paris, France
  Advisors: Ahmed Bouajjani and Constantin Enea

Master of Applied Science — Computer Engineering   *Sep 2014 – Nov 2016*
  Thesis Title: **Towards the Design Automation of Quantum Circuits**   Concordia University, Canada
  Advisor: Sofiène Tahar

Engineer's Degree — Polytechnicien   *Sep 2011 – Jun 2014*
  Thesis Title: **Formalization of Signal-Flow Graphs in HOL**   Tunisia Polytechnic School, Tunisia
  Advisor: Sofiène Tahar

DEUPC — Mathematics and Physics   *Sep 2009 – Jun 2011*
      Sfax Preparatory Engineering Institute
      University of Sfax, Tunisia

❖ Experience

Postdoctoral Researcher, University of Toronto   *Jun 2021 – present*
  Advisors: Fan Long and Andreas Veneris   Toronto, Canada

Research Assistant, University of Paris   *Dec 2017 – May 2021*
  Advisors: Ahmed Bouajjani and Constantin Enea   Paris, France

Teaching Assistant, University of Paris   *Sep 2018 – Jan 2021*

Research Intern, SRI International   *Apr 2019 – Aug 2019*
  Advisor: Michael Emmi   New York City, USA

Software Programmer, TRU Simulation + Training   *May 2017 – Dec 2017*
      Montréal, Canada

Research Assistant, Concordia University   *Mar 2014 – Nov 2016*
  Advisor: Sofiène Tahar   Montréal, Canada

Teaching Assistant, Concordia University   *Sep 2015 – May 2016*

Research Engineer, Marinvent inc.   *Mar 2016 – Nov 2016*
  Advisor: Sofiène Tahar   Montréal, Canada

Intern, STMicroelectronics   *Jul 2013 – Aug 2013*
  Advisor: Mohamed Ben Ahmed   Tunis, Tunisia

Intern, Mauritel S.A   *Aug 2012 – Aug 2012*
  Advisor: Mohamed Moujtaba   Nouakchott, Mauritania

❖ Awards and Recognitions

- Best Undergraduate Thesis, Tunisia Polytechnic School, 2014.
- Ranked 31st in the National Grandes Ecoles Exam, Tunisia, 2011.
- Olympian in the International Mathematical Olympiad, Germany, 2009.
- Ranked 3rd in the National Mathematical Olympiad, Mauritania, 2009.
- Ranked 1st in the National Bac Exam in Mathematics, Mauritania, 2009.

❖ Grants and Scholarships

- VMW Scholarship Award for CAV 2016, USD 650.
- Concordia Graduate Student Association Conference Funding for CAV 2016, CAD 100.
- Concordia University Conference and Exposition Award for NFM 2016, CAD 1,000.
- Graduate Student Support Program, Concordia University, 2014 – 2016, CAD 20,000.
- National Scholarship, Mauritania, 2009 – 2014, EUR 13,500.
- Scholarship Award to Participate in the International Mathematical Olympiad, Mauritania, 2009, EUR 1,000.

❖ Service

- Co-organizer, IRIF Verification Seminar, Mar 2020 – July 2020.
- Artificat Evaluation Committees: POPL 2021, CAV 2021, OOPSLA 2021, POPL 2022, OOPSLA 2022.
- Extended Review Committees: OOPSLA 2022.
- Sub-Reviewer: FTSCS 2016, VMCAI 2020, CAV 2020, Blockchain 2021, ICBC 2022, ICDCS 2022.
- Student Volunteer: CAV 2016.

❖ Journal Publications

J2
Robustness Against Transactional Causal Consistency
Feb 2021
Sidi Mohamed Beillahi, Ahmed Bouajjani, Constantin Enea
Logical Methods in Computer Science, 17(1): 12:1 – 12:42
Invited special issue for selected papers from CONCUR 2019

J1
A Modeling and Verification Framework for Optical Quantum Circuit
Mar 2019
Sidi Mohamed Beillahi, Mohamed Yousri Mahmoud, Sofiène Tahar
Formal Aspects of Computing, 31(3): 321 – 351

❖ Conference Publications

C11
SigVM: Toward Fully Autonomous Smart Contracts
2021
Zihan Zhao, Sidi Mohamed Beillahi, Ryan Song, Yuxi Cai, Andreas Veneris, Fan Long
under submission, 2021

C10
Automated Synthesis of Asynchronizations
2021
Sidi Mohamed Beillahi, Ahmed Bouajjani, Constantin Enea, Shuvendu Lahiri
under submission, 2021

C9
Automated Auditing of Price Gouging TOD Vulnerabilities in Smart Contracts
May 2022
Sidi Mohamed Beillahi, Eric Keilty, Keerthi Nelaturu, Andreas Veneris, Fan Long
In Proc. IEEE International Conference on Blockchain and Cryptocurrency (ICBC), 2022

C8
LMPTs: Eliminating Storage Bottlenecks for Processing Blockchain Transactions
May 2022
Jemin Andrew Choi, Sidi Mohamed Beillahi, Peilun Li, Andreas Veneris, Fan Long
In Proc. IEEE International Conference on Blockchain and Cryptocurrency (ICBC), 2022

C7	**Smart Contracts Refinement for Gas Optimization** Keerthi Nelaturu, Sidi Mohamed Beillahi, Fan Long, Andreas Veneris *In Proc. 3rd Conference on Blockchain Research & Applications for Innovative Networks and Services (BRAINS), 2021*	*Sep 2021*
C6	**Checking Robustness Between Weak Transactional Consistency Models** Sidi Mohamed Beillahi, Ahmed Bouajjani, Constantin Enea *In Proc. 30th European Symposium on Programming (ESOP), 2021*	*Mar 2021*
C5	**Behavioral Simulation for Smart Contracts** Sidi Mohamed Beillahi, Gabriela Ciocarlie, Michael Emmi, Constantin Enea *In Proc. 41st annual ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI), 2020*	*Jun 2020*
C4	**Robustness Against Transactional Causal Consistency** Sidi Mohamed Beillahi, Ahmed Bouajjani, Constantin Enea *In Proc. 30th International Conference on Concurrency Theory (CONCUR), 2019*	*Sep 2019*
C3	**Checking Robustness Against Snapshot Isolation** Sidi Mohamed Beillahi, Ahmed Bouajjani, Constantin Enea *In Proc. 31st International Conference on Computer Aided Verification (CAV), 2019*	*Jul 2019*
C2	**Hierarchical Verification of Quantum Circuits** Sidi Mohamed Beillahi, Mohamed Yousri Mahmoud, Sofiène Tahar *In Proc. 8th International Symposium NASA Formal Methods (NFM), 2016*	*Jun 2016*
C1	**Formal Analysis of Power Electronic Systems** Sidi Mohamed Beillahi, Umair Siddique, Sofiène Tahar *In Proc. 17th International Conference on Formal Engineering Methods (ICFEM), 2015*	*Nov 2015*

❖ Workshop Publications

W3	**Formal Analysis of Engineering Systems Based on Signal-Flow-Graph Theory** Sidi Mohamed Beillahi, Umair Siddique, Sofiène Tahar *In Proc. 9th International Workshop Numerical Software Verification (NSV-CAV), 2016*	*Jul 2016*
W2	**On the Formal Analysis of Photonic Signal Processing Systems** Umair Siddique, Sidi Mohamed Beillahi, Sofiène Tahar *In Proc. 20th International Workshop Formal Methods for Industrial Critical Systems (FMICS), 2015*	*Jun 2015*
W1	**A Tool for the Formal Verification of Quantum Optical Computing Systems** Sidi Mohamed Beillahi, Mohamed Yousri Mahmoud, Sofiène Tahar *In Proc. Automated Reasoning Workshop (ARW), 2015*	*Apr 2015*

❖ Teaching

- Teaching Assistantships at University of Paris

  - Automata and Lexical Analysis for 2nd Year Computer Science Students, Sep 2020 – Dec 2020.
  - Principles of Binary Machines for 1st Year Computer Science Students, Sep 2020 – Dec 2020.
  - Java Programming for 1st Year Computer Science Students, Sep 2019 – Dec 2019.
  - Principles of Object-Oriented Programming in Java for 2nd Year Computer Science Students, Sep 2019 – Dec 2019.
  - Python Programming for 1st Year Social Science Students, Sep 2018 – Dec 2018.
  - Relational Databases and SQL for 2nd Year Computer Science Students, Sep 2018 – Dec 2018.

- Teaching Assistantships at Concordia University

  - Hardward Functional Verification for Graduate and Senior Undergraduate Students, Jan 2016 – Apr 2016.

- Computer Architecture and Design for Graduate Students, Jan 2016 – Apr 2016.
- Digital Design for Undergraduate Students, Jan 2016 – Apr 2016.
- Microprocessors and their Applications for Graduate Students, Sep 2015 – Dec 2015.

❖ Supervision

- Keerthi Nelaturu, Ph.D. student, University of Toronto
- Zihan Zhao, MASc student, University of Toronto
- Zhiyang Chen, MASc student, University of Toronto
- Eric Keilty, MASc student, University of Toronto
- Srisht Fateh Singh, MASc student, University of Toronto
- Hossein Ghotbaddini, MASc student, University of Toronto

❖ Talks

Checking Robustness Between Weak Transactional Consistency Models
ANR Project AdeCoDS Meeting, LIP6, Sorbonne University (virtual)	*Jun 2021*
IRIF Verification Seminar, University of Paris (virtual)	*May 2021*
ESOP 2021, Luxembourg, Luxembourg (virtual)	*Mar 2021*

Behavioral Simulation for Smart Contracts
GROUP SEMINAR, University of Toronto (virtual)	*Dec 2021*
SEMINAR UM6P-CS, Morocco (virtual)	*Jul 2020*
PLDI 2020, London, UK (virtual)	*Jun 2020*

Robustness Against Transactional Causal Consistency
IRIF Verification Seminar, University of Paris	*Dec 2019*
CONCUR 2019, Amsterdam, Netherlands	*Sep 2019*

Checking Robustness Against Snapshot Isolation
ANR Project AdeCoDS Kick-off Meeting, IRIF, University of Paris	*Nov 2019*
CAV 2019, New York City, USA	*Jul 2019*

Formal Analysis of Engineering Systems Based on Signal-Flow-Graph Theory *Jul 2016*
NSV-CAV 2016   Toronto, Canada

Hierarchical Verification of Quantum Circuits *Jun 2016*
NFM 2016   Minneapolis, USA

Formal Analysis of Power Electronic Systems *Oct 2015*
Hardware Verification Group Meeting   Concordia University

On the Formal Analysis of Photonic Signal Processing Systems *May 2015*
Hardware Verification Group Meeting   Concordia University