Radouane BOUCHEKIR (Ph.D.)

Scientific Researcher in Software Dependability

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Scientific researcher specializing in formal verification and software dependability for AI-based systems. Experienced in developing assurance cases and certification methodologies across diverse applications, including automated valet parking and UAV flight planning. Skilled in integrating formal methods, theorem proving, SMT-based verification, and Bayesian analysis to enhance the reliability and safety of AI-based systems. Adept at working in multidisciplinary, international collaborations and contributing to innovative tool development, research projects, and industry partnerships.

Work Experience

2022 – Currently
SCIENTIFIC RESEARCHER
fortiss (TUM) – Germany

Conducted research on the formal verification of AI-based systems (symbolic AI, Learning enabled components LECs, GenAI), developing assurance cases and ML certification methodologies. Contributed to projects like FOCETA and KIEZ 4.0 and worked on tools such as ETB Evidential Tool Bus and OpenGuard.

- **FOCETA**: Developed assurance cases for Automated Valet Parking (AVP) and certification strategies for Learning-Enabled Components (LECs) using formal methods.
- **KIEZ 4.0**: Applied theorem proving and SMT-based verification for AI-driven UAV flight planning in collaboration with Airbus Defense.
- **Certibus**: Extended ETB (Evidential Tool Bus) for automated assurance case generation and maintenance in partnership with SRI, .
- **Dyn-SC**: Developed an ontology for assurance case formalization and used Bayesian networks to compute safety confidence based on ODD and safety evidence.
- **OpenGuard**: Currently working on LLM safety guardrails, focusing on hallucination detection, context alignment, and toxicity avoidance.

2019 - 2022
HEAD OF DEPARTMENT FLIGHT DATA MANAGEMENT
AIR ALGERIE – ALGERIA

Managed a team of 10 flight analysts overseeing AIR ALGERIE's flight data, schedules, and sales strategies, ensuring accurate flight creation, optimizing pricing and class availability, and handling passenger re-accommodation during disruptions.

2015 - Currently
PART TIME TEACHER
USTHB - ALGERIA

Teaching and Supervising CS students. Courses taught: Formal Verification, Information and Communication Techniques, Algorithms and Data Structures.

2015 - 2019
FLIGHT DATA ANALYST
AIR ALGERIE – ALGERIA

Managed and controlled AIR ALGERIE's schedule using Amadeus systems, administered user access for Revenue Management Systems as an LSS Admin, and developed Java applications for flight operations, including PNR-GOV generation and schedule verification.

2013 - 2014
SYSTEM ENGINEER AND DATA BASE ADMIN
PEPSI - ALGRIERS, ALGERIA

2013 – 2022
TEACHER
EFIEG, ALGRIERS, Algeria

Teaching programming language (C, C++ and Java) at a private school EFIEG.

Education

Feb. 2021 – Ph.D. in Computer Science
USTHB - University of Science and Technology Houari Boumediene
In my thesis, we proposed a novel approach combining compositional verification including model learning and symbolic representation to address the state space explosion problem in the verification of complex probabilistic systems.

Jun. 2013 – Master's degree in CS (Software engineering)
USTHB - University of Science and Technology Houari Boumediene

Jun. 2011 – Licence degree in CS
USTHB - University of Science and Technology Houari Boumediene

Jul. 2008 – Baccalaureate Science.

Selected Publication

N. Shankar, R. Bouchekir, et al. "**Continuous safety & security evidence generation, curation and assurance case construction using the evidential tool bus.**", 2024 AIAA DATC/IEEE 43rd Digital Avionics Systems Conference (DASC). IEEE, 2024. 🗗

M. Guzman, R. Bouchekir "**On Safety Assurance of Symbolic Artificial Intelligence.**", 2024 IEEE 24th International Conference on Software Quality, Reliability, and Security Companion (QRS-C). IEEE, 2024. 🗗

R. Bouchekir et al. "**SGSN: Tool Support for GSN Development.**", International Conference on Computing Systems and Applications. Cham: Springer Nature Switzerland, 2024. 🗗

S. Lev, R. Bouchekir et al. "**Towards continuous assurance case creation for ads with the evidential tool bus.**", *European Dependable Computing Conference. Cham: Springer Nature Switzerland, 2024.* 🗗

R. Bouchekir, M. Guzman "**Formal verification for safe AI-based flight planning for UAVs.**", *2023 53rd Annual IEEE/IFIP International Conference on Dependable Systems and Networks Workshops (DSN-W). IEEE, 2023.* 🗗

R. Bouchekir, and M.C. Boukala, "**Learning-based symbolic assume-guarantee reasoning for Markov decision process by using interval Markov process**", Innovations in Systems and Software Engineering (NASA Journal), June 2018. 🗗

R. Bouchekir and M.C. Boukala, "**Toward Implicit Learning for the Compositional Verification of Markov Decision Processes**", 12th International Conference on Verification and Evaluation of Computer and Communication Systems (VeCoS), Grenoble-France, August 2018. 🗗

R. Bouchekir and M.C. Boukala, "**Automated Compositional Verification for Probabilistic Systems through Implicit Learning**", First international conference on Embedded and Distributed Systems (EDIS), Oran-Algeria, December 2017

R. Bouchekir, S. Boukhedouma, and M.C. Boukala, "**Symbolic probabilistic analysis and verification of inter organizational workflow**", International Conference on Information Technology for Organizations Development (IT4OD), Fez-Morocco, May 2016. 🗗

R. Bouchekir, S. Boukhedouma, and M.C. Boukala, "**Automatic Compositional Verification of Probabilistic Safety Properties for Inter-organizational Workflow Processes**", 6th International Conference on Simulation and Modeling Methodologies, Technologies and Applications (SIMULTECH), Lisbon-Portugal, July 2016. 🗗

Academic Internship

2016 - INTERNSHIP AT MASARYK UNIVERSITY - CZECH REPUBLIC

This internship, supervised by **Prof. Jiri Barnat** at **Masaryk University, Brno, Czech Republic**, focused on conducting a **state-of-the-art review** of **distributed and parallel probabilistic model checking**.

Teaching and Supervision

Teaching

University-Year	Cycle	Subject
USTHB-2025	First year Licence	Algorithm and data structures
USTHB-2024	First year Licence	Algorithm and data structures, Information and Communication Techniques
USTHB-2023	First year Licence	Algorithm and data structures, Information and Communication Techniques
USTHB-2022	Licence year Licence	Algorithm and data structures, Information and Communication Techniques
	First year Master	Formal Verification and Model-checking

Supervision

University-Year	Cycle	Title
USTHB-2025	Doctorate	Co-supervision with Prof. Dr. Boukala MC, subject: Use of formal methods for the verification of Learning Enabled Components.
USTHB-2024	Master	Runtime verification of DNN
USTHB-2023	Licence	Development of tool support for GSN (Goal Structuring Notation) Development
USTHB-2022	Licence	Development of website for the hotel reservation during COVID.

Professional Training

Sep. 2023 – PeopleCert – Munich. PRINCE2, Foundation certificate in Project Management.

Sep. 2023 – Haufe Akademie – Munich. Präsentation Grundlagentraining.

Mar. to Jun. 2021 – Microsoft & Zaka. AI Ready program.

Jun. 2021 – Microsoft – Certification. Microsoft Certified Azure AI Fundamentals.

May. 2021 – Microsoft – Certification. Microsoft Certified Azure Data Fundamentals.

Feb. 2019 – Amadeus - Nice France. Amadeus availability management.

Sep. 2018 – Amadeus - Ben Aknoun Algeria. Amadeus reservation system.

Sep. 2018 – Amadeus - Nice France. Amadeus carrier preferred display management.

Jun. 2017 – Amadeus - Nice France. Logon security server admin.

Jul. 2017 – Amadeus - Nice France. Amadeus new generation management - NGI admin.

Jul. 2017 – Amadeus - Nice France. Codeshare setup and management.

Aug. 2017 – Amadeus - Nice France. DCS-NGI link and troubleshooting.

Additional Realizations

2023 – Project: Finalization of the Certibus project in collaboration with SRI and release of ETB.

2021 – Project: Implementation of Disruption Transfer to Other Airline (Ability to transfer passengers from Air Algerie flights to Other Airlines).

2020 – Project: Implementation of Enhanced Re-accommodation (protect passengers after schedule irregularities).

2018 – Project: Implementation of Amadeus RMS (Revenue Management System).

2018 – Setup: Setup of LSS (Login Security Server) for RMS (Revenue Management System).

2018 – Project: Implementation of Codeshare setup with Tirkish Airline.

2017 – Project: Member of stream of PSS (Passenger Service System) Amadeus Migration.

2017 – Project: Implementation of PNR GOV for FR, KSA, UK, CA, UAE, CA and AT.

2021 – Competition: I-Recycle, a Deep Learning based application for recycling processes.

Technical Skills

Formal verification
SMT-based verification (Z3, Yices), probabilistic model-checking (PRISM).

Programming languages
C, Java, Python, Dart, SQL, PHP/MySQL, HTML/CSS, JS.

Engineering tools
DBMS (Postgres, Oracle, SQL Server), Development (Eclipse, Git, Net Beans, Visual Studio), Information System (MERISE), Software Engineering (OOP, UML, UP), Web App Engineering (VsCode, NodeJS, VueJS).

Development
Mobile development (FLUTTER), web development (HTML, CSS, JAVA SCRIPT, PHP, BOOTSTRAP), distributed applications (J2EE, MPI), protocols (JAVA APIS, XML, SOAP), App servers (TOMCAT, JBOSS, GLASSFISH), tools (PRISM model checker).

Airline industry
Airlines reservation systems (MERCATOR reservation system, AMADEUS reservation system), airlines inventory systems (MERCATOR inventory system, AMADEUS Altea inventory system), airlines security management (AMADEUS LSS, AMADEUS ACE), airlines carrier preferred display, enhanced re- accommodation process, passenger customer value. Amadeus Revenue Management System. Availability and Distribution Management.

Transferable Skills

Languages:
English: good. **French:** native speaker. **Arabic:** native speaker. **German:** pre-intermediate (A2) ⬀⬀.

Project management:
Managing scientific research projects (bachelor and Master's projects), Software engineering projects (Airline industry projects), including leadership, communication, time management, negotiating, team management, and critical thinking, Ability to multi-task and prioritize under ever changing and challenging workloads, Ability to quickly understand complex problems and devise effective solutions,

Teamwork:
Chairing meetings (up to 10 people), collaborative editing (ShareLatex, Google Docs/Sheets/MindMup), collaborative planning and organizing (Trello).