2025-2026 Internship Proposal at TIMA Laboratory
Advancing Automatic Assertion Mining using Neural Networks

Abstract:

Assertion-based verification is a powerful technique for verifying hardware design correctness, yet writing high-quality assertions manually remains a time-consuming and error-prone task. This project aims to develop an automated assertion miner that leverages artificial intelligence and neural network models to infer meaningful temporal properties directly from simulation trace and design behavior. By integrating learning-based pattern recognition and semantic analysis, the approach will automatically identify relationships between signals and generate assertions that improve verification coverage and bug detection efficiency. The outcome of this work will contribute to advancing intelligent, data-driven verification methodologies for modern hardware systems.

Project description:

This internship focuses on advancing assertion-based verification through the development of an automatic assertion miner powered by neural networks. The intern will design and implement methods for mining assertions from simulation traces of designs under verification. The objective is to create an assertion miner capable of achieving high design behavior coverage while addressing the limitations of existing state-of-the-art approaches. During the internship, the student will gain experience in formal and assertion-based verification techniques and will use Python and hardware description languages such as SystemVerilog to implement and evaluate the proposed solutions.

Tasks of the internship:

- Develop a tool for automatically extracting and analyzing the FSM of designs under verification.
- Implement an automatic assertion miner using transformers and neural networks.
- Integrate the FSM extractor tool into the miner for enhanced design behavior coverage.
- Collect and analyze experimental results to evaluate the performance of the developed tools.
- Compare the proposed miner with traditional approaches in terms of computational efficiency and fault detection capabilities.

Scientific environment:

The candidate will work within the TIMA Laboratory (https://tima.univ-grenoble-alpes.fr/) in collaboration with the AMfoRS (Architectures and Methods for Resilient Systems) research group.

Profile & requested skills:

We are looking for a highly motivated Engineering School or M2 Master's student. Applicants must hold a Master 1 degree (or equivalent) obtained within the last three years at the application deadline, in a related field such as computer science, microelectronics technologies, hardware verification (formal and assertion-based), or emerging advances in Artificial Intelligence. Proven experience with Transformers, familiarity with tools such as QuestaSim and JasperGold, and strong programming skills in Python and Verilog/SystemVerilog are required. Interpersonal skills, dynamism, rigor, and teamwork abilities will be highly valued. Candidates should be fluent in English and have strong English writing skills.

Allowance: Internship allowance will be provided.

Application instructions:

If you are interested in the topic please send your complete application to: mohammadreza.heidari-iman@univ-grenoble-alpes.fr, and katell.morin-allory@univ-grenoble-alpes.fr.

A complete application consists of:

Cover letter: A brief motivation statement by the applicant, explaining their connection to the position, how the position aligns with their background, and how it supports their future career goals (maximum 1 page).

CV: Academic and professional background, detailing relevant experience, particularly research.

Relevance for Application: The applicant should include a clear description of how his or her scholarly backgroundand expertise apply to the project outlined above and how they might add value to it.

Our laboratory welcomes applicants with diverse backgrounds and experiences. We regard gender equality and diversity as a strength and an asset.

Depending on the student's motivation, the internship may lead to a doctoral project.

Contacts:

Mohammad Reza Heidari Iman
Postdoctoral Researcher at TIMA Laboratory
Université Grenoble Alpes
Grenoble, France
Email: mohammadreza.heidari-iman@univ-grenoble-alpes.fr

Katell Morin-Allory
Professor
Université Grenoble Alpes
Grenoble, France
Email: katell.morin-allory@univ-grenoble-alpes.fr