INTERNSHIP PROGRAM FOR INTERNATIONAL STUDENTS

INTERNSHIP SUBJECT FORM

Name of the Host Laboratory	Computer Science Laboratory (LIX), Ecole Polytechnique
Website of the Host Laboratory	https://www.lix.polytechnique.fr
Research Group	Cosynus (http://www.lix.polytechnique.fr/cosynus/)
Internship Supervisor	Sergio Mover (sergio.mover@lix.polytechnique.fr)
Internship Subject	Automatic Formal Verification for Polynomial Hybrid Systems
Student's level	☒ Advanced Undergraduate Students (3rd or 4th year) ☒ Master's students (1st or 2nd year) ☒ PhD students
Proposed Duration	☒ 3 months ☒ 4 months ☒ 5 months ☒ 6 months
Prerequisites	The students should have a background in Computer Science, Computer Engineering, or Mathematics, and preferably have some specific background in: - Mathematical logic; and - Formal methods (e.g., abstract interpretation, model checking, theorem proving…) The student should also have a good programming experience (e.g., using different programming languages, mainly Python and C++, and version control software, like git).
Internship description (max. 15 lines)	Cyber-Physical Systems (CPS) are formed by digital components (i.e., computers) interacting with the physical environment (i.e., moving a robot arm, operating a chemical plant). Examples of CPS are autonomous vehicles (e.g., self-driving cars or drones) and medical devices (e.g., pacemakers, insulin pumps...). Formal verification can find mistakes in the early design of a CPS, avoiding additional costs in the later implementation and deployment phases. The goal of this internship is to develop an automatic verification algorithm for an expressive class of CPS. In particular, in the internship, the student will focus on the automatic refinement of the abstraction of a polynomial dynamical system. The student will work on both theoretical (e.g., showing progress properties for the proposed abstraction) and implementation (e.g., implementing the algorithm and evaluating its performance) aspects of the problem.

$The boxes marked with cross implies eligible