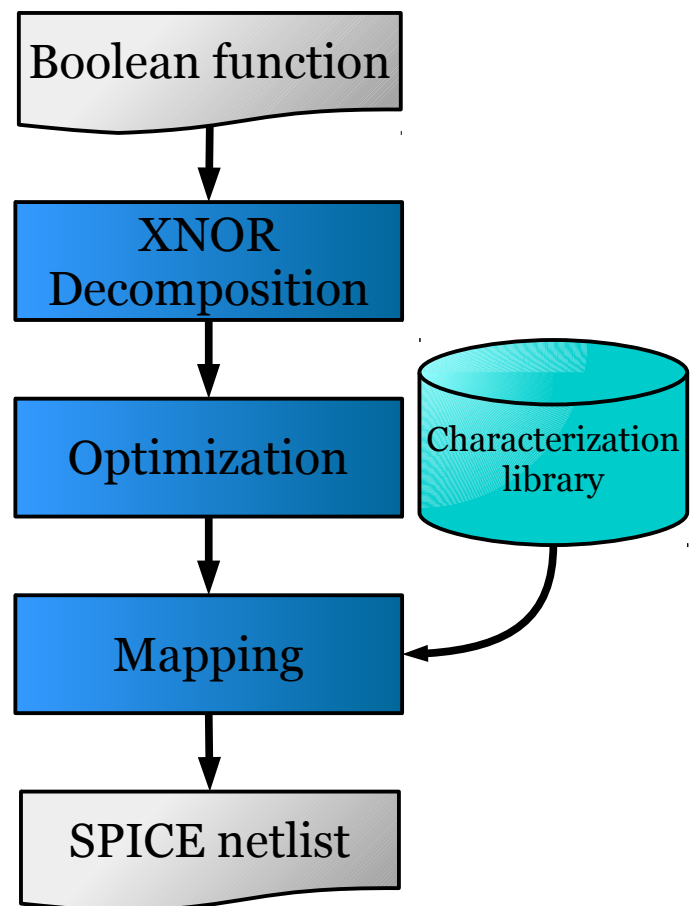


# GEMINI

## A New Synthesis and Optimization Tool for Graphene-Based Digital Devices

Gemini is a synthesis and optimization software for graphene-based digital devices. Given a combinational circuit description through its boolean representation, Gemini produces a SPICE netlist mapped with graphene PN-Junction gates. The software is composed of a parser library to handle input circuit descriptions, a characterization library of graphene gates used in the synthesis process, a Biconditional Binary Decision Diagram library used to manipulate logic networks in Pass-XNOR logic, and a number of optimization algorithms designed to produce better results in terms of area and thus power consumption. As a stand-alone software or as a library easy to integrate into state-of-the-art tools, Gemini represents a first step of an enabling technology for future synthesis and optimization processes for graphene-based devices.



Graphene is an allotrope of carbon consisting of a single-layer, two-dimensional hexagonal lattice structure of carbon atoms. Single layer sheets of graphene show electrical properties, i.e. the availability of an electrostatically controlled PN-Junction upon which it is possible to design multi-function reconfigurable logic gates, that could enable the creation of a new class of smart ICs.



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