

## Research Overview

Dr. He's research focuses on how to ensure the high dependability of software systems. His research areas include formal methods and software testing techniques.

Over the past 20 years, Dr. He has worked on a variety of formal models and methods, including denotational semantics, algebraic specifications, temporal logic, and Petri nets. Dr. He has done extensive research on the theory, analysis, and applications of Petri nets:

- (1) Integrated Petri nets with other formal methods, including algebraic specifications, temporal logic, and Z;
- (2) Extended high-level Petri nets with hierarchical structures and object-oriented concepts;
- (3) Developed analysis techniques for high-level Petri nets, including temporal reasoning, structural induction, behavior-related refinement, model-checking, and testing techniques;
- (4) Applied Petri nets to model and analyze software architecture designs;
- (5) Used Petri nets to define the formal semantics of a variety of UML diagrams; and
- (6) Explored methods to generate C++ and Java code from high-level Petri nets.

Dr. He has also investigated software testing methods. He was among the first researchers to apply integer programming techniques for regression testing. More recently, he has been working on a testing theory for concurrent systems by using complete partially ordered sets to define behavioral observation schemes to capture testing adequacy criteria.

Dr. He's research has been supported by the NSF, ONR, and NASA. He is among the top 15 most prolific authors on Petri nets worldwide (<http://www.informatik.uni-hamburg.de/TGI/pnbib/other/prolific.html>). He has been ranked among the top 15 scholars in Software and System Engineering worldwide during 1999 – 2003 by the Journal of System and Software (<http://www.cs.fiu.edu/faculty/hex/top-scholars.pdf>).

Dr. He is the Director of the Center for Advanced Distributed System Engineering (CADSE <http://cadse.cs.fiu.edu/>) of the School of Computer Science at FIU. He served as the organizing chair of the 26<sup>th</sup> International Conference on Applications and Theory of Petri Nets and Other Models of Concurrency (<http://www.cs.fiu.edu/atpn2005/>) held at FIU in June 2005.