Department of Computer Science
University of Houston

**SPRING SEMINAR 2012**

**WHEN:** **TUESDAY, MAY 22, 2O12**
**WHERE:** **PGH 232**
**TIME:** **11:00 AM**

**SPEAKER:** Dr. Bojan Cukic, West Virginia University

Host: Dr. Ioannis Kakadiaris

**TITLE:** In Pursuit of Software Faults: Status and Challenges

**Abstract:** The techniques to achieve and guarantee high and ultra high software reliability have been actively pursued goals of software engineering research for several decades. Two rather distinct approaches emerged. In one, state space exploration tools search for the existence of states and their combinations that, if reached during program execution, would violate some of the required properties. Model checking tools have become mature and are being used for verification of critical program sections. The other approach exploits statistical testing in a demonstration of the absence of failures. This approach suffers from well known theoretical and practical limitations: imprecise nature of operational distributions, difficulty in the construction of test oracles, massive testing requirements and ensuing limited statistical significance. Both approaches impose severe limitations on the cost effectiveness of verification and validation in practice.

In this talk, we will analyze the verification and validation techniques that improve the effectiveness of software verification. Empirical analysis of formal modeling approaches indicates that combinations of diverse tools can expose faults not detected by any of these tools in isolation. Further, using the example from biometric recognition, we demonstrate that domain specific model based analysis can lead to meaningful ultra high reliability assessment. We will further outline the most promising research directions for streamlining software verification and validation activities and remaining research challenges.

**BIO:** Dr. Bojan Cukic is a Robert C. Byrd Professor of Computer Science and Electrical Engineering at West Virginia University (WVU). He received PhD in Computer Science from the University of Houston. Dr. Cukic is the director of the Center for Identification Technology Research (CITeR) at WVU, a multi-university NSF Industry-University Cooperative Research Center addressing biometrics, identity management and credibility assessment. His research interests include software engineering with emphasis on verification and validation, information assurance and biometrics, and resilient computing.

Dr. Cukic received a US National Science Foundation Career award and a Tycho Brahe award for outstanding empirical research from the NASA Office of Safety and Mission Assurance. Dr. Cukic served as a program chair of IEEE Symposium of Reliable Distributed Systems (SRDE 2005), IEEE International Symposium on High Assurance Systems Engineering (HASE '07), IEEE International Symposium on Software Reliability Engineering (ISSRE '03 and '11) and as a guest editor of IEEE Software magazine. He is a member of the editorial board of Empirical Software Engineering journal and serves as a WVU representative at the University-Industry Demonstration Partnership of the National Academies.