Distinguished Speaker Series
Friday, February 10 at 11:30am, NTDP F285

Configurations Everywhere – the Good, Bad and the Ugly for Software Testing

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Abstract
Modern software systems have become highly-configurable, providing users with the ability to customize how they behave and giving them access to hundreds or even thousands of preferences that they can modify. This leads to the potential for millions or billions of program variants, each with a unique execution profile (the good). While beneficial for the user experience, configurability creates problems for the software tester, who must validate that the system behaves as expected. Research has shown that different configurations behave differently under the same exact tests cases, hence testing a single instance of a configurable system is insufficient for fault detection. At the same time, failures in software cost the worldwide economy billions of dollars annually (the bad). Confounding the problem of testing configurability is that identifying and modeling the configuration space of many systems may not be that easy – with options often hidden under multiple layers of a system's architecture, and implemented in different programming languages (the ugly).
In this talk I first provide some insights into problems with configurability and show how it impacts our ability to efficiently and effectively test our software. I then discuss some state of the art techniques such as intelligent sampling, and prioritization, which can help us to navigate this landscape efficiently. I also show some empirical results that suggest there is often a locality of where failures occur, and that despite the vast configuration spaces, there is some hope. I end by showing how we can potentially leverage this locality, and the properties innate to configurability, to develop self-adaptive software that reconfigures itself to avoid and guard against failures encountered in the field.

Bio
Myra Cohen is a Susan J. Rosowski Professor in Computer Science and Engineering at the University of Nebraska-Lincoln where she is a member of Laboratory for Empirically-based Software Quality Research, ESQUaReD. Her research expertise lies in testing of highly-configurable software, software product lines and testing graphical user interfaces, and in search-based software engineering. She received her PhD from the University of Auckland, New Zealand. She was the recipient of an NSF CAREER award and an AFOSR Young Investigator Award and has received 2 ACM distinguished pape awards. She has been involved in organizational roles and on program committees for multiple software engineering conferences, and was the general chair of the IEEE/ACM International Conference on Automated Software Engineering in 2015.