

Advanced Topics in Software Testing, Debugging, and Program Analysis

Overview

Today's software systems suffer from poor reliability. NIST estimates that \$60 billion is lost annually in the US due to software errors, and such errors in transportation, medicine, and other areas can put lives at risk. This indicates that our techniques to ensure software reliability are far from the level of maturity attained by other engineering disciplines that create critical infrastructure. The situation is likely to get worse, as the complexity of software systems increases without a comparable increase in the effectiveness of software quality tools and techniques. Testing is the useful technology used by the software industry to make software reliable. Studies show that testing accounts for more than half of the total software development cost in the industry. Although testing is a widely used and a well-established technique for building reliable software, existing methods for testing are mostly ad hoc and ineffective--serious bugs are often exposed post-deployment. Some recent technologies and tools have combined ideas from program analysis, automated theorem proving, constraint solving, and formal methods and have shown great promises in making software reliable and secure. In this course, we will study this new trend with a special focus on automated bug finding and debugging of sequential and concurrent programs.

This course is organised in two modules that should be taken together. The topics in Module A will expose the participants to the advanced topics in software testing, debugging, and program analysis like Automated test generation using concolic testing and symbolic execution, Dynamic program slicing, Finding concurrency bugs using dynamic program analysis, Delta debugging, and Systematic testing and model checking of multithreaded programs. In Module B, the application of the Dynamic program analysis is emphasised. The topics in the module include Dynamic program analysis applied to JavaScript programs, Dynamic program analysis for finding memory and performance bugs in JavaScript programs.

Course participants will learn these topics through lectures and hands-on experiments. Also, case studies and assignments will be shared to stimulate research motivation of participants.

Modules	A: Advanced topics in software testing, debugging, and program analysis: July 26 - July 29 B: Application of Dynamic Programming Analysis & Test : July 30-July 31 Number of participants for the course will be limited to fifty.
You Should Attend If...	<ul style="list-style-type: none">▪ you are a software engineer or research scientist interested in testing.▪ you are a test engineer interested in learning the application of Dynamic Programming analysis in your profession.▪ you are a student or faculty of the academic institution interested in learning how doing research on software testing or want to work with dynamic programming analysis for finding memory and performance bugs in JavaScript programs.
Fees	The participation fees for taking the course is as follows: Participants from abroad: US \$200 Industry/ Research Organisations: INR 6000 Academic Institutions: INR 4000 PhD Scholars or above: INR 2000 UG/PG students: INR 1500 The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Dr. Koushik Sen is an associate professor in the Department of Electrical Engineering and Computer Sciences at the University of California, Berkeley. His research interest lies in Software Engineering, Programming Languages, and Formal methods. He is interested in developing software tools and methodologies that improve programmer productivity and software quality. He is best known for his work on “DART: Directed Automated Random Testing” and concolic testing. He has received a NSF CAREER Award in 2008, a Haifa Verification Conference (HVC) Award in 2009, a IFIP TC2 Manfred Paul Award for Excellence in Software: Theory and Practice in 2010, a Sloan Foundation Fellowship in 2011, a Professor R. Narasimhan Lecture Award in 2014, and an Okawa Foundation Research Grant in 2015. He has won several ACM SIGSOFT Distinguished Paper Awards. He received the C.L. and Jane W-S. Liu Award in 2004, the C. W. Gear Outstanding Graduate Award in 2005, and the David J. Kuck Outstanding Ph.D. Thesis Award in 2007, and a Distinguished Alumni Educator Award in 2014 from the UIUC Department of Computer Science. He holds a B. Tech from Indian Institute of Technology, Kanpur, and M.S. and Ph.D. in CS from University of Illinois at Urbana-Champaign.



Dr. Bibhash Sen is an Assistant Professor of National Institute of Technology, Durgapur. He received his PhD from Indian Institute of Engineering Science and Technology (IIST), Shibpur in 2015. His research interest includes Software testing, design and testing of QCA, reversible logic.



Dr. Suchismita Roy is an Associate Professor of National Institute of Technology, Durgapur. She received her PhD from Indian Institute of Technology Kharagpur (IIT), Kharagpur in 2008. Her research interest includes SAT based solution for timing and power in VLSI.

Course Co-ordinators

Dr. Bibhash Sen

Phone: 0343-2754237 / 9434788161

E-mail: bibhash.sen@cse.nitdgp.ac.in

And

Dr. Suchismita Roy

Phone: 9434788122

E-mail: suchismita.roy@cse.nitdgp.ac.in

.....
For registration Visit:

<http://www.gian.iitkgp.ac.in/GREGN/index>