

2021 IEEE/ACM International Conference on Automation of Software Test (AST 2021)

**Virtual Conference
22 – 30 May 2021**



**IEEE Catalog Number: CFP2115D-POD
ISBN: 978-1-6654-1196-7**

**Copyright © 2021 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP2115D-POD
ISBN (Print-On-Demand):	978-1-6654-1196-7
ISBN (Online):	978-1-6654-3567-3

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

2021 IEEE/ACM International Conference on Automation of Software Test (AST) **AST 2021**

Table of Contents

Message from the AST 2021 Program Chairs	viii
Organizing Committee	ix
Steering Committee	x
Program Committee	xi

Test Generation

Automatic Property-Based Testing of GraphQL APIs	1
<i>Stefan Karlsson (ABB AB, Mälardalen University, Sweden), Adnan Čaušević (ABB AB, Sweden), and Daniel Sundmark (Mälardalen University, Sweden)</i>	
Automated Performance Testing Based on Active Deep Learning	11
<i>Ali Sedaghatbaf (RISE Research Institutes of Sweden, Sweden), Mahshid Helali Moghadam (RISE Research Institutes of Sweden, Sweden), and Mehrdad Saadatmand (RISE Research Institutes of Sweden, Sweden)</i>	
Model-Based Automation of Test Script Generation Across Product Variants: A Railway Perspective	20
<i>Alessio Bucaioni (Mälardalen University), Fabio Di Silvestro (Bombardier Transportation), Inderjeet Singh (Bombardier Transportation), Mehrdad Saadatmand (Research Institutes of Sweden), Henry Muccini (University of L'Aquila), and Thorvaldur Jochumsson (Bombardier Transportation)</i>	
Using Machine Learning to Build Test Oracles: An Industrial Case Study on Elevators Dispatching Algorithms	30
<i>Aitor Arrieta (Mondragon University), Jon Ayerdi (Mondragon University), Miren Illarramendi (Mondragon University), Aitor Agirre (Ikerlan), Goiuria Sagardui (Mondragon University), and Maite Arratibel (Orona)</i>	
Automatically Assessing and Extending Code Coverage for NPM Packages	40
<i>Haiyang Sun (Università della Svizzera Italiana, Switzerland), Andrea Rosà (Università della Svizzera Italiana, Switzerland), Daniele Bonetta (Oracle Labs, Netherlands), and Walter Binder (Università della Svizzera Italiana, Switzerland)</i>	

Mutation Testing and Debugging

- SuMo: A Mutation Testing Strategy for Solidity Smart Contracts .50.....
Morena Barboni (IASI-CNR, Italy), Andrea Morichetta (University of Camerino, Italy), and Andrea Polini (University of Camerino, Italy)
- Extending Hierarchical Delta Debugging with Hoisting .60.....
Dániel Vince (University of Szeged, Hungary), Renáta Hodován (University of Szeged, Hungary), Daniella Bársony (University of Szeged, Hungary), and Ákos Kiss (University of Szeged, Hungary)

Testing for Specific Domains

- An Evolutionary Approach to Adapt Tests Across Mobile Apps .70.....
Leonardo Mariani (University of Milano Bicocca, Italy), Mauro Pezzè (Università della Svizzera italiana, Switzerland; Schaffhausen Institute of Technology, Switzerland), Valerio Terragni (Università della Svizzera italiana, Switzerland), and Daniele Zuddas (Università della Svizzera italiana, Switzerland)
- Multimodal Surprise Adequacy Analysis of Inputs for Natural Language Processing DNN Models.80
Seah Kim (KAIST) and Shin Yoo (KAIST)
- A Survey of Video Game Testing .90.....
Cristiano Politowski (Concordia University, Canada), Fabio Petrillo (Université du Québec à Chicoutimi, Canada), and Yann-Gael Guéhéneuc (Concordia University, Canada)
- Test Suites as a Source of Training Data for Static Analysis Alert Classifiers .100.....
Lori Flynn (Carnegie Mellon University, USA), William Snaveley (Carnegie Mellon University, USA), and Zachary Kurtz (Carnegie Mellon University, USA)

Short Papers

- Continuous Testing Improvement Model .109.....
Maximiliano Agustin Mascheroni (Universidad Nacional de La Plata, Argentina), Emanuel Irrazábal (Universidad Nacional del Nordeste, Argentina), and Gustavo Rossi (Universidad Nacional de La Plata, Argentina)
- Extreme Mutation Testing in Practice: An Industrial Case Study .113.....
Maik Betka (University of Stuttgart, Germany) and Stefan Wagner (University of Stuttgart, Germany)
- Towards Exhaustive Branch Coverage with PathCrawler .117.....
Nicky Williams (Université Paris Saclay, France)
- A Framework for the Automation of Testing Computer Vision Systems .121.....
Franz Wotawa (Graz University of Technology, Austria), Lorenz Klampfl (Graz University of Technology, Austria), and Ledio Jahaj (Graz University of Technology, Austria)
- Automated User Experience Testing through Multi-dimensional Performance Impact Analysis .125
Chidera Biringa (University of Massachusetts Dartmouth, USA) and Gökhan Kul (University of Massachusetts Dartmouth, USA)

Author Index 129.....