Preface

The NASA Formal Methods (NFM) Symposium is a forum for theoreticians and practitioners from academia, industry, and government, with the goals of identifying challenges and providing solutions to achieving assurance in mission- and safety-critical systems. Examples of such systems at NASA include advanced separation assurance algorithms for aircraft, Next-Generation Air Transportation (NextGen), autonomous rendezvous and docking for spacecraft, on-board software for Unmanned Aerial Systems (UAS), UAS Traffic Management (UTM), autonomous robots, and systems for fault detection, diagnosis, and prognostics. The topics covered by the NASA Formal Methods Symposia include: model checking, theorem proving, SAT and SMT solving, symbolic execution, automated testing and simulation, model-based development, static and dynamic analysis techniques, runtime verification, safety assurance, fault tolerance, compositional verification techniques, cyber security, specification formalisms, requirements analysis, certification, and applications of formal methods in systems development.

This volume contains the papers presented at NFM 2016, the 8th NASA Formal Methods Symposium, co-organized by NASA Ames Research Center and the University of Minnesota Software Engineering Center, in Minneapolis, MN, June 7–9, 2016. Previous symposia were held in Pasadena, CA (2015), Houston, TX (2014), Moffett Field, CA (2013), Norfolk, VA (2012), Pasadena, CA (2011), Washington, DC (2010), and Moffett Field, CA (2009). The series started as the Langley Formal Methods Workshop, and was held under that name in 1990, 1992, 1995, 1997, 2000, and 2008. Papers were solicited for NFM 2016 under two categories: regular papers describing fully developed work and complete results or case studies, and short papers describing tools, experience reports, and work in progress or preliminary results. The symposium received 70 submissions for review (51 regular papers and 19 short papers) out of which 29 were accepted for publication (19 as regular papers and 10 as short papers). These submissions went through a rigorous reviewing process, where each paper was first independently reviewed by three reviewers and then subsequently discussed by the Program Committee.

In addition to the refereed papers, the symposium featured three invited presentations: "Using Formal Methods to Eliminate Exploitable Bugs" by Kathleen Fisher, Professor in the Computer Science Department at Tufts University; "Where Formal Methods Might Find Application on Future NASA Missions" by Michael L. Aguilar, NASA Technical Fellow in Software Engineering and the NASA Engineering and Safety Center Discipline Expert in Software, NASA Langley Research Center; and "Murphy Was Here" by Kevin Driscoll, Engineering Fellow, Honeywell. The symposium also featured breakout sessions to explore the application of formal methods to future NASA missions and to connect the dots between capabilities that need to be matured for NASA missions and formal methods.

The organizers are grateful to the authors for submitting their work to NFM 2016 and to the invited speakers for sharing their insights. NFM 2016 would not have been possible without the collaboration of the outstanding Program Committee and additional reviewers, the support of the Steering Committee, the efforts of the staff at the University of Minnesota and NASA Ames Research Center who made this event possible, and the general support of the NASA Formal Methods community.

The NFM 2016 website can be found at: http://nasaformalmethods.org.

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