

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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MICROSOFT CORPORATION,  
Petitioner,

v.

QOMPLX LLC,  
Patent Owner.

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Case IPR2026-00184  
Patent 12,231,426

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**EXHIBIT 2037**

**SECOND DECLARATION OF SAM MALEK, PH.D.**

## TABLE OF CONTENTS

|                                                                                                                                                                                                             | <b>Page</b> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>I. INTRODUCTION.....</b>                                                                                                                                                                                 | <b>1</b>    |
| <b>II. QUALIFICATIONS .....</b>                                                                                                                                                                             | <b>1</b>    |
| <b>III. BASES OF OPINIONS.....</b>                                                                                                                                                                          | <b>7</b>    |
| <b>IV. APPLICABLE LEGAL STANDARDS .....</b>                                                                                                                                                                 | <b>12</b>   |
| <b>A. Level Of Ordinary Skill In The Art .....</b>                                                                                                                                                          | <b>12</b>   |
| <b>B. My Understanding Of Legal Standards .....</b>                                                                                                                                                         | <b>14</b>   |
| <b>V. CLAIMS-AT-ISSUE (CLAIMS 1-21, 23-28, 30).....</b>                                                                                                                                                     | <b>16</b>   |
| <b>VI. OPINIONS .....</b>                                                                                                                                                                                   | <b>16</b>   |
| <b>A. “Time-Series Database” (All Claims, All Grounds). .....</b>                                                                                                                                           | <b>16</b>   |
| 1. A “Time-Series Database” Is A Specialized Database<br>Optimized Or Especially Suited For Time-Series Data. ....                                                                                          | 18          |
| 2. Petitioner Does Not Support Its Implicit Construction Of A<br>“Time-Series Database.” .....                                                                                                              | 24          |
| 3. Petitioner Has Failed To Establish That Kirti’s Analytics And<br>Threat Intelligence Repository Is A “Time-Series Database.”.                                                                            | 27          |
| <b>B. “Determining Whether The Additional Verification Is Required<br/>          To Grant Access” After “Receiv[ing] A Request To<br/>          Authenticate A Client” (All Claims, All Grounds). .....</b> | <b>32</b>   |
| 1. The Claims Require That The “Determining Whether An<br>Additional Verification” Step Occurs After “Receiv[ing]” And<br>As Part Of Evaluating “A Request To Authenticate A Client.”<br>.....              | 32          |
| 2. Kirti’s Historical Threat Analysis Is Performed Independently<br>Of The Current Authentication Request.....                                                                                              | 38          |

|             |                                                                                                                                                                              |           |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 3.          | Kirti Does Not Determine That Additional Verification Is Required To Grant Access To The Current Authentication Request. ....                                                | 45        |
| <b>C.</b>   | <b>“Selecting The Additional Verification Method From A Plurality Of Verification Methods” (All Claims, All Grounds). ..</b>                                                 | <b>49</b> |
| 1.          | Kirti’s Remediation Actions Are Not Verification Methods (Ground 1). ....                                                                                                    | 50        |
| 2.          | Kirti-Coffin Does Not Teach Selecting An Additional Verification Method (Grounds 2 & 4).....                                                                                 | 52        |
| <b>D.</b>   | <b>The “Previous Authentication” Request(s) Include A “Second Identifier Not Associated With” “The First User Account”/“Any User Account” (All Claims, All Grounds).....</b> | <b>56</b> |
| 1.          | Petitioner Fails To Show that Kirti’s “Previous Access” Request(s) “Comprised” IP Addresses, Geolocations, Devices, And/Or Connectivity Types. ....                          | 58        |
| 2.          | Petitioner Fails To Show A Second Identifier “Not Associated With Any User Account” (Claims 19 & 26, All Grounds). ....                                                      | 62        |
| <b>E.</b>   | <b>“Determine That A Probable Cyberattack Is Detected” “Based On The Additional Verification Being Required To Grant Access” (Claims 5, 13, 23, 30; All Grounds).....</b>    | <b>64</b> |
| <b>VII.</b> | <b>CONCLUSION.....</b>                                                                                                                                                       | <b>70</b> |

## **I. INTRODUCTION**

1. My name is Sam Malek. I have been retained as an expert witness to provide my independent opinion in regard to the matters at issue in *inter partes* review of IPR2026-00182 and IPR2026-00184. I have been retained by Qomplx LLC (“Qomplx”), the Patent Owner in the above proceedings. Petitioner is Microsoft Corporation (“Microsoft” or “Petitioner”).

2. I am being compensated \$800 per hour for my time spent working in connection with this case. My compensation is in no way related to the outcome of this litigation. If called as a witness, I would testify as to the statements and opinions contained in this report.

3. I am not a legal expert and offer no opinions on the law. However, I have been informed by counsel of the various legal standards that apply, and I have applied those standards in arriving at my conclusions.

## **II. QUALIFICATIONS**

4. I have more than 25 years of experience in the field of computer science and software engineering. My professional career has been dedicated to issues relating to software design and architecture, including cloud computing architectures, distributed software systems, and software security.

5. I received a Bachelor of Science in Information and Computer Science from the University of California, Irvine in 2000, a Master of Science in

Computer Science from the University of Southern California in 2004, and a Ph.D. in Computer Science from the University of Southern California in 2007. My Ph.D. dissertation, titled “A User-Centric Approach for Improving a Distributed Software System’s Deployment Architecture,” concerned distributed software systems and specifically resulted in new algorithms and an architectural middleware for effective deployment of a component-based software system among a distributed set of computing nodes.

6. I am a Professor of Software Engineering in the School of Information and Computer Sciences at the University of California, Irvine (“UCI”). I joined the Department of Informatics at UCI as an associate professor in 2015 and was promoted to full professor with tenure in 2019. As a member of the faculty, I perform research, teach graduate and undergraduate courses in software architecture, design, and engineering, and supervise the research of postdoctoral associates and other students. I have taught software engineering and computer science courses in which I frequently cover topics related to the technologies at issue in this case, including data storage, distributed systems, software security, encryption, authentication, and verification.

7. Before my role at UCI, I taught at George Mason University, where I was an Associate Professor in the Computer Science Department from 2007 to

2015. Prior to that, I spent four years as a researcher at the University of Southern California, also focusing on software engineering and computer science.

8. Outside of teaching, I have held several leadership roles at various labs and research centers. For example, I currently serve as Director of the Software Engineering and Analysis Laboratory (“SEAL”) at UCI. SEAL is a lab engaged in research to automate software engineering activities. In particular, the lab focuses on the development of techniques and tools that aid with the construction, analysis, and maintenance of large-scale and dependable software systems. Additionally, from 2018 to 2022, I served as Director of the Institute for Software Research at UCI. The software systems and results produced in these research laboratories have been adopted for use by various private and public-sector organizations, including Boeing, Robert Bosch GmbH, the National Aeronautics and Space Administration (“NASA”), Department of Homeland Security (“DHS”), and the Federal Bureau of Investigations (“FBI”).

9. I have also served as the principal investigator of several federally funded research projects totaling more than 12 million dollars. For example, I led a team of researchers in a project sponsored by the United States Defense Advanced Research Projects Agency (“DARPA”) to develop a novel approach for protecting Android applications from Inter-Process Communication (“IPC”) security attacks. In another project sponsored by the Air Force Office of Scientific

Research, I developed a framework that monitors, organizes, and dynamically adapts distributed systems to ensure they continue operating effectively, even under conditions of impairment. A central focus of this project required ensuring the secure storage of mission-critical data in cloud environments. I also worked with NASA to develop a new distributed software system for sharing large amounts of data generated by NASA.

10. I have significant industry experience as a software engineer, software architect, and programmer at companies such as the Boeing Company (2005 to 2007), PriceWaterhouseCoopers Consulting (later acquired by IBM) (2000 to 2002), FieldCentrix (1999 to 2000), and Neural Computing Systems Lab (1998 to 1999). During my time in industry, I gained experience in the design, development, and management of large-scale software engineering efforts, including the development of systems that securely stored and retrieved large volumes of data in distributed environments. For example, while at Boeing, I was part of a team that designed autonomous aerial platforms, which were designed to provide real-time data transmission to remote operators and background servers. I also contributed to the development of solutions for securely transmitting and storing the data generated by such platforms on cloud-like military systems.

11. I am the author and co-author of close to 150 peer-reviewed articles. These publications have been cited more than 12,000 times according to Google

Scholar (scholar.google.com). Many of those publications relate to security and software architecture, including: “Forecasting Architectural Decay from Evolutionary History,” IEEE Transactions on Software Engineering (TSE), Vol. 32, No. 3, April 2023; Security and Software Engineering in Handbook of Software Engineering, Editors Kyo Chul Kang, Richard Taylor, and Sungdeok Cha, 2019; and “A Taxonomy and Qualitative Comparison of Program Analysis Techniques for Security Assessment of Android Software,” IEEE Transactions on Software Engineering (TSE), Vol. 43, No. 6, June 2017.

12. I serve, or have served, as chair, committee member, or reviewer for more than 150 software engineering journals, magazines, and conferences. For example, I have served as associate editor of the Institute of Electrical and Electronics Engineers (“IEEE”) Transactions on Software Engineering and Methodology, Association for Computing Machinery (“ACM”) Transactions on Autonomous and Adaptive Systems, and the Springer Journal of Computing. I am currently the Deputy Editor-in-Chief of the Springer Journal of Automated Software Engineering. In these roles I have refereed hundreds of articles submitted by the scientific community that deal with topics related to the technologies at issue in this case, including cloud storage, data security, and encryption.

13. I have received numerous awards for my work and research in the field of software architecture and computer science, including: The ACM

SIGSOFT Distinguished Paper Award at the International Conference of Software Engineering (2025); the Test of Time Award from the Association for Computing Machinery (2020); the CAREER award from the National Science Foundation (2013); the Emerging Researcher/Scholar/Creator Award from George Mason University (2013); the Outstanding Faculty Research Award from George Mason University (2011).

14. I have spoken on information security and software architecture issues at more than 60 scientific conferences, workshops, and symposia. For example, in 2020, I was invited by the Association for Computing Machinery to give a presentation entitled “The Threat in Your Pocket: Trends, Challenges, and Solutions in Mobile Application Security.” I also presented talks such as “Tools for Automated Detection and Assessment of Security Vulnerabilities in Mobile Applications” to the DHS’s Cyber Security Division R&D Showcase and Technical Workshop.

15. A detailed record of my professional qualifications is set forth in the attached Exhibit A, which is my *curriculum vitae*, including a list of publications, awards, research grants, and professional activities. My *curriculum vitae* also lists the matters in which I have served as an expert.

### III. BASES OF OPINIONS

16. In the course of conducting my analysis and forming my opinions, I have reviewed materials including those listed below:

- i. U.S. Patent No. 12,231,426 (Ex. 1001) (“the ’426 patent” or “’426”);
- ii. The prosecution history of the ’426 Patent (Ex. 1002)
- iii. The Declaration signed by Dr. John Black in IPR2026-00184 (Ex. 1003) (the “Black Declaration”);
- iv. The Petition by Microsoft in IPR2026-00184;
- v. The Preliminary Reply by Microsoft in IPR2026-00184;
- vi. U.S. Patent No. 10,063,654 (“Kirti”) (Ex. 1004);
- vii. David Coffin, *Expert Oracle and Java Security: Programming Secure Oracle Database Applications with Java*, Apress (2011) (“Coffin”) (Ex. 1005);
- viii. U.S. Patent No. 8,572,391 (“Golan”) (Ex. 1006);
- ix. U.S. Patent No. 7,979,899 (“Guo”) (Ex. 1007);
- x. International Publication No. WO 2015/109947 (“Zhang”) (Ex. 1008);
- xi. U.S. Patent No. 8,312,540 (“Kahn”) (Ex. 1009);
- xii. U.S. Patent No. 10,021,108 (“Mankovskii”) (Ex. 1010);
- xiii. U.S. Patent No. 7,908,645 (“Varghese”) (Ex. 1011);
- xiv. U.S. Patent Application Pub. No. 2007/0079135 (“Saito”) (Ex. 1012);

- xv. U.S. Patent No. 9,237,143 (“Dotan”) (Ex. 1014);
- xvi. U.S. Patent No. 9,148,424 (“Yang”) (Ex. 1015);
- xvii. U.S. Patent No. 9,319,419 (“Sprague”) (Ex. 1016);
- xviii. U.S. Patent Application Pub. No. 2008/0249947 (“Potter”) (Ex. 1017);
- xix. International Pub. No. WO 2015/158874 (“Enqvist”) (Ex. 1018);
- xx. U.S. Patent No. 5,774,525 (“Kanevsky”) (Ex. 1019);
- xxi. Olli Jarva, *Intelligent Two-Factor Authentication: Deciding Authentication Requirements Using Historical Context Data*, Aalto Univ. (May 13, 2014) (Ex. 1020);
- xxii. U.S. Patent No. 9,298,890 (“Bajenov”) (Ex. 1021);
- xxiii. Affidavit of Mina Ching dated October 14, 2025 (“Azure Wayback”) (Ex. 1022);
- xxiv. U.S. Patent No. 9,955,349 (“McClintock”) (Ex. 1023);
- xxv. U.S. Patent No. 11,184,766 (“Lord”) (Ex. 1024);
- xxvi. U.S. Patent No. 11,184,392 (“Thomas”) (Ex. 1025);
- xxvii. U.S. Patent No. 9,160,726 (“Kaufman”) (Ex. 1026);
- xxviii. U.S. Patent No. 9,122,866 (“Kolman”) (Ex. 1027);
- xxix. U.S. Patent Application Pub. No. 2003/0115142 (“Brickell”) (Ex. 1028);

- xxx. U.S. Patent Application Pub. No. 2014/0208419 (“Chang”) (Ex. 1029);
- xxxi. U.S. Patent Application Pub. No. 2018/0189470 (“Kim”) (Ex. 1030);
- xxxii. U.S. Patent Application Pub. No. 2014/0289833 (“Briceno”) (Ex. 1031);
- xxxiii. U.S. Patent Application Pub. No. 2016/0191512 (“Tatourian”) (Ex. 1032);
- xxxiv. U.S. Patent Application Pub. No. 2015/0150090 (“Carroll”) (Ex. 1033);
- xxxv. U.S. Patent Application Pub. No. 2017/0063896 (“Muddu”) (Ex. 1035);
- xxxvi. U.S. Patent No. 10,432,605 (“Lester”) (Ex. 1035);
- xxxvii. U.S. Patent Application Pub. No. 2010/0211996 (“McGeehan”) (Ex. 1036);
- xxxviii. U.S. Patent No. 9,779,236 (“Abrams”) (Ex. 1037);
- xxxix. U.S. Patent No. 9,639,678 (“Moore”) (Ex. 1038);
- xl. U.S. Patent No. 9,648,034 (“Bailey”) (Ex. 1039);
- xli. U.S. Patent Application Pub. No. 2018/0027006 (“Zimmermann”) (Ex. 1040);

- xlii. Shammi Ishara Hewamadduma, *Detection and Prevention of Possible Unauthorized Login Attempts Through Stolen Credentials from a Phishing Attack in an Online Banking System*, IEEE Int'l Conf. on Rsch. and Innovation in Info. Sys., at 13-18 (ICRIIS 2017) ("Hewamadduma") (Ex. 1041);
- xlili. U.S. Patent No. 8,266,682 ("Lee") (Ex. 1042);
- xliv. U.S. Patent No. 9,397,996 ("Roskind") (Ex. 1043);
- xlv. Affidavit of Mina Ching dated November 14, 2025 ("Phone Factor + Oracle Wayback") (Ex. 1044);
- xlvi. Declaration of Ingrid Hsieh-Yee dated December 16, 2025 (Ex. 1048);
- xlvii. Affidavit of Mina Ching dated November 14, 2025 ("Coffin Wayback") (Ex. 1049);
- xlvi. Lucas Jellema, *Just Launched: The Oracle Identity Cloud Service –for Authentication and Authorization Across the Cloud and on Premises*, AMIS Tech. Blog (Nov. 2, 2016) (Ex. 1050);
- xlix. John Ribeiro, *Oracle Will Acquire Cloud Security Vendor Palerra*, FoundryCo, Inc. (Sep. 18, 2016) (Ex. 1051);
- l. Sarah Kuranda, *Oracle Acquires Cloud Access Security Brokerage Startup Palerra*, The Channel Co. (Sep. 19, 2016) (Ex. 1052);

- li. *Hiding in Plain Sight: How a Cloud Access Security Broker With Built-In User Behavior Analytics Unmasks Insider Threats in the Cloud*, Oracle (Ex. 1053);
- lii. Ganesh Kirti, *Dealing With Dropbox: Unmasking Hackers With User Behavior Analytics*, Cloud Sec. Alliance (Sep. 7, 2016) (Ex. 1054);
- liii. Mitch Wagner, Oracle Buys Palerra to Boost Cloud Security, Informa TechTarget (Sep. 18, 2016) (Ex. 1055);
- liv. Complaint, *Qomplx LLC v. Microsoft Corp.*, Case No. 1:25-cv-01383-ADA (W.D. Tex.) (Aug. 8, 2025) (Ex. 1057);
- lv. Affidavit of Mina Ching dated December 12, 2025 (“2016 White Paper”) (Ex. 1058);
- lvi. U.S. Patent No. 10,742,647 (“Crabtree 647”) (Ex. 1059);
- lvii. Guohui Wang and T.S. Eugene Ng, *The Impact of Virtualization on Network Performance of Amazon EC2 Data Center*, IEEE INFOCOM 2010, at 1163-1171 (Mar. 2010) (“Wang NPL”) (Ex. 1060);
- lviii. U.S. Patent Application Pub. No. 2011/0314558 (“Song”) (Ex. 1061);
- lix. U.S. Patent No. 11,218,474 (“Crabtree 474”) (Ex. 1062);
- lx. U.S. Patent Application Pub. No. 2015/0319185 (“Kirti App.”) (Ex. 1063);
- lxi. Patent Comparison Chart (Ex. 1065);

lxii. Affidavit of Mina Ching dated December 24, 2025 (“APress-Coffin”) (Ex. 1066);

lxiii. The exhibits and other documents cited herein.

#### **IV. APPLICABLE LEGAL STANDARDS**

##### **A. Level Of Ordinary Skill In The Art**

17. My opinions in this declaration are based on the understandings of a person of ordinary skill in the art, which I understand is sometimes referred to as an “ordinary artisan” or by the acronyms “POSITA” or “PHOSITA,” as of the time of the invention, which I understand is here assumed by Microsoft to be the effective filing date (October 19, 2017) of the provisional application. Pet., 11. For the purposes of this declaration only, I accept Microsoft’s asserted earliest effective filing date. I understand that the person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art at the time of the invention. By “relevant,” I mean relevant to the challenged claims of the ’426 patent.

18. I understand that factual indicators of the level of ordinary skill in the art include the various prior art approaches employed, the types of problems encountered in the art, the rapidity with which innovations are made, the sophistication of the technology involved, and the educational background of those actively working in the field. I understand that, in assessing the level of skill of a

person of ordinary skill in the art, one should consider the type of problems encountered in the art, the prior solutions to those problems found in the prior art references, the rapidity with which innovations are made, the sophistication of the technology, the level of education of active workers in the field, and my own experience working with those of skill in the art at the time of the invention.

19. In this case, Dr. Black has asserted in his declaration that a person of ordinary skill in the art as of the time of the '426 patent would have had:

a bachelor's degree in computer science, or equivalent, with two to four years' experience designing, implementing, or otherwise working with cybersecurity technologies. More education, e.g., a Master's or Ph.D., would compensate for less work experience and vice versa.

Ex. 1003 [Black Decl.] ¶ 35.

20. For the purposes of this declaration, I accept Dr. Black's proposed qualifications of a POSITA.

21. As further discussed below, my opinions as stated in this declaration are valid even if the Board adopts a somewhat higher or somewhat lower level of ordinary skill in the art. For example, as will be discussed throughout my report, even a person with the level of knowledge or experience described by Dr. Black or adopted by the Board as described above would not have understood Kirti and/or Coffin to teach certain claimed features.

**B. My Understanding Of Legal Standards**

22. When considering the '426 patent and stating my opinions, I rely on the following legal standards as described to me by the attorneys for Qomplx.

23. I understand that a patent claim is unpatentable if the claimed invention was anticipated by a prior art reference or would have been obvious to a person of ordinary skill in the art at the time of the purported invention.

24. I understand that anticipation requires that every limitation of the claim at issue be disclosed, either expressly or under principles of inherency, in a single prior art reference.

25. I understand that inherency may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. Instead, it must be proved that the claim limitation not expressly found in the reference necessarily follows from what is found there.

26. I understand that an obviousness analysis involves comparing a claim to the prior art to determine whether the claimed invention would have been obvious to a person of ordinary skill in the art at the time of the invention in view of the prior art and in light of the general knowledge in the art as a whole. I also understand that obviousness is ultimately a legal conclusion based on underlying facts of four general types, all of which must be considered: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences

between the claimed invention and the prior art; and (4) any objective indicia of non-obviousness, including any praise of the invention.

27. I also understand that obviousness may be established under certain circumstances by combining or modifying the teachings of the prior art. Specific teachings, suggestions, or motivations to combine any first prior art reference with a second prior art reference can be explicit or implicit, but must have existed before the date of purported invention. I understand that prior art references themselves may be one source of a specific teaching or suggestion to combine features of the prior art, but that such suggestions or motivations to combine art may come from the knowledge that a person of ordinary skill in the art would have had.

28. I understand that a reference may be relied upon for all that it teaches, including uses beyond its primary purpose, but also including teachings that lead away from the invention. I understand that a reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, although the mere disclosure of alternative designs does not teach away.

29. I further understand that whether there is a reasonable expectation of success in combining references in a particular way is also relevant to the analysis.

30. I understand that it is improper to use hindsight to combine references or elements of references to reconstruct the invention using the claims as a guide. My analysis of the prior art is made from the perspective of a person of ordinary skill in the art at the time of the invention.

31. I am not offering any legal opinions in this declaration nor am I qualified to do so. I only consider such legal standards in framing my opinions and conclusions as well as placing assertions made by Petitioner in the Petition into the proper context. Additionally, from a subject matter perspective, I understand that the petitioner always has the burden of persuasion regarding a challenge of patentability of an invention under an inter partes review.

## **V. CLAIMS-AT-ISSUE (CLAIMS 1-21, 23-28, 30)**

32. I understand that Petitioner has challenged independent claims 1, 9, 19, 26, and their respective dependents based on the grounds below:

- Claims 1-21, 23-28, 30 based on obviousness over Kirti (Ground 1);
- Claims 1-21, 23-28, 30 based on obviousness over Kirti and Coffin (Ground 2).

## **VI. OPINIONS**

### **A. “Time-Series Database” (All Claims, All Grounds).**

33. Claim 1 requires:

Limitation [1.3] “store, in a multidimensional time-series database, information about the request,”

Limitation [1.6] “retrieving, from the multidimensional time-series database, historical information about previous access requests associated with the user account, and”

34. I understand that Petitioner and Dr. Black map the “multidimensional time-series database” (“MDTSDB”) to Kirti’s analytics and threat intelligence repository database as follows:

Kirti’s analytics and threat intelligence repository database is a multidimensional time-series database. It is multidimensional because each time point includes activity data for multiple parameters/attributes (e.g., IP address, login attempt result (success or failure), identifier (e.g., username), resources accessed, etc.). EX1004, 4:46-5:3, 10:25-50, 10:60-11:4, 12:1-18, 12:35-13:29, 13:44-59, 14:48-54, 16:28-40, 16:55-67, 17:9-55, 18:9-23, 18:38-41). And it is a time-series database at least because it includes the same activity data (i.e., values for the same parameters/attributes) for multiple time points. *E.g.*, EX1004, 13:27-30 (“[D]ata collected over time is used to build models of normal behavior (e.g., patterns of events and activity) and flag behavior that deviates from normal as abnormal behavior.”).

Pet., 31-32; Ex. 1003 [Black Decl.] ¶ 84. As can be seen above, Petitioner and Dr. Black argue that Kirti’s repository is a time-series database “because it includes the same activity for multiple time points.” I disagree for the reasons below.

1. A “Time-Series Database” Is A Specialized Database  
Optimized Or Especially Suited For Time-Series Data.

35. As the record demonstrates, a “time-series” database is a specialized database optimized or especially suited for time-series data, not merely a generic database that happens to contain timestamped information.

36. The claims recite “stor[ing] ... information” in and “retrieving ... historical information” from a multidimensional “time-series *database*.” Ex. 1001 [’426] cls. 1, 9, 19, 26. Notably the claims do not recite merely storing “time-series data” in any kind of database of the user’s choosing. Rather, the claims specify the use of a “time-series database.” “Time-series,” thus, describes the database, not simply the data that a user may store in the database.

37. Moreover, the ’426 patent incorporates by reference one of its parent applications, which resulted in the ’147 patent, titled “System for capture, analysis and storage of time series data from sensors with heterogeneous report interval profiles.” The ’147 patent teaches that “the sensor data is passed without transformation to the data management engine 120, where it is aggregated and organized for storage *in a specific type of data store 125 designed to handle the multidimensional time series data* resultant from sensor data.” Ex. 2032 [’147] 6:34-39; *see id.*, 7:20-25. It further explains that, due to the volume and continuous nature of such time series data, it cannot be stored arbitrarily, but

instead must be organized using timestamps and defined sampling intervals—*e.g.*, storing data “every 10 seconds, using the timestamp as the key.” *Id.*, 6:51-56.

38. The “specific type of data store,” thus, is “designed to handle the multidimensional time series data” and utilizes, for example, timestamp keys, to efficiently process time-series workloads. Accordingly, the intrinsic record describes a specialized database optimized or especially suited for time-series data, rather than a general-purpose database that merely stores data over time.

39. Consistent with the intrinsic evidence, the extrinsic evidence also confirms that a time-series database is a specialized database optimized or especially suited for time-series data. For example, a 2017 survey of time-series databases explains that although general Database Management Systems (“DBMSs”), including relational DBMSs, “have been successfully deployed in many situations,” they were “unsuitable to handle the velocity and volume of the time series produced by the large scale sensor networks deployed today.” Ex. 2039 [Jensen] 2. To address the increasing need to efficiently store and analyze time-series data, “specialized Time Series Management Systems (TSMSs) have been developed to overcome the limitations of general purpose Database Management Systems (DBMSs) for time[] series management.” *Id.* Jensen notes that “Time Series Database” is another common name for these systems. *Id.*, 2 n.1. The authors define a TSMS as a system “developed or extended for storing and

querying data in the form of time series.” *Id.*, 2. The survey further noted systems using different architectures—including systems with internal data stores, systems built upon external DBMSs, and systems extending existing relational databases—and evaluated, among other things, the workload for which each system was “designed and optimized.” *Id.*, 3-5.

40. Jensen thus reflects the same distinction described in the intrinsic record. A database does not become a time-series database merely because a user stores records collected at different times in it. Rather, a time-series database is specialized, optimized, or otherwise designed for management of time-series data. Jensen’s contrast is particularly instructive: a general-purpose DBMS may contain time-series data, yet Jensen nevertheless distinguishes such systems from the specialized time-series systems developed to efficiently store and query that data.

41. A database system generally includes software that manages the database, commonly referred to as a database-management system or database engine, as well as the underlying database store in which the data and associated structures are maintained. *See* Ex. 2040 [Graefe] 1 (explaining that the “storage manager is a software layer within a database management system” that exposes records in “storage structures” and manages access to data in permanent storage); Ex. 2038 [Black-Tr.] 19:22-21:18. Either—or both—of these components may allow a database system to be optimized or especially suited for time-series data.

42. For example, a database engine may be optimized for a particular type of data or workload by incorporating functionality tailored to that data, such as specialized storage structures, indexing, query-processing techniques, compression, or other features intended to improve the storage, retrieval, or analysis of that data. *See* Ex. 2041 [Database-Engines-Overview] 1-8; Ex. 2038 [Black-Tr.] 31:5-19 (explaining that adding “specific features to the engine itself” can make it “specialized” so that particular databases “work better,” are “faster,” or have other “desirable features”); 77:1-78:3 (specialized engine may be “particularly tuned to provide features” for a particular type of data); 83:14-84:3 (describing optimization through sorting, indexing, and “efficient algorithms”). Time-series database engines, therefore, may include features specifically directed to storing and querying time-series data more efficiently than a general-purpose database engine. *See* Ex. 2038 [Black-Tr.] 54:15-55:22 (specialized time-series engines may implement roll-ups to summarize historical data and conserve storage); 59:12-21 (roll-ups are one of a “list of different features” “specific to time series”); 82:17-83:12 (general-purpose engines are not “particularly directed toward” time-series data and lack features for a particular data type).

43. Another way a time-series database can be optimized for time-series data is through the design of the database store. Database stores can be designed to “organiz[e] and structur[e] data in a way that ensures efficiency, accuracy, and

usability.” Ex. 2042 [GeeksforGeeks] 1. Dr. Black similarly explained that designing a database includes determining “how to arrange all the data” in the data store, including its metadata, indexes, relationships, and schema. Ex. 2038 [Black-Tr.] 19:22-21:18. He further testified that this design process may involve determining “how we’re going to lay the data out on the disk such that the engine can manage it in the way that we want.” *Id.*, 29:1-14. A contemporaneous example of such a time-series database is the “LittleTable” system, which is a “relational database optimized for time-series data.” Ex. 2043 [LittleTable] 1. The LittleTable system was specifically designed around characteristics of time-series data, partitioning rows by timestamp, clustering data along a time dimension, and selecting its storage layout so that time-based information could be retrieved efficiently. *Id.*, 1-3.

44. Indeed, Dr. Black testified that a time-series database can be built using general-purpose database engines such as Cassandra, Redis, or even a relational database engine, but only by “designing and arranging the database appropriately.” Ex. 2038 [Black-Tr.] 27:15-28:6. He similarly testified that his understanding of a time-series database before the 2015-2020 time-range was that “the data store was arranged in a certain way using a generic general-purpose database engine,” and that a general-purpose database could be used as a time-series database only “if it’s organized in the correct way.” *Id.*, 30:13-31:19. By

Dr. Black’s own reasoning, merely storing time-series data in Cassandra, Redis, or a relational database engine, without taking specific steps to design and arrange the database appropriately, would not turn that database into a “time-series database.”

45. The term “time-series database” has also been used in numerous sources and primers to refer to specialized databases optimized for time-series data since at least 2017. For example, InfluxData explains that a “time series database (TSDB) is a database optimized for time-stamped or time series data” and is “built specifically for handling metrics and events ... that are time-stamped.” Ex. 2024 [InfluxData] 4. Similarly, DataCamp explains that time-series databases are “specialized databases designed to manage data that is organized and indexed by time,” and distinguishes them from “traditional databases ... optimized for general-purpose data storage.” Ex. 2025 [Datacamp] 1.

46. Other technical and academic sources confirm the same understanding. *See, e.g.*, Ex. 2026 [Grzesik] 3 (“Time series database (TSDB) is a database type designed and optimized to handle timestamped or time-series data”); Ex. 2027 [Literature Study: Timeseries Databases] 1 (describing time-series databases as “specialized” systems “optimize[d]” for time-indexed data); Ex. 2028 [A Guide to Time Series Databases] 1 (time-series databases “have been optimized for processing time series data”); Ex. 2030 [Honeycomb] 3 (time series database is “a specialized database that efficiently stores and retrieves time-stamped data”);

Ex. 2031 [What is a Time Series Database?] 1-2 (explaining that time-series databases are “specialized” systems “specifically designed” to handle time-stamped data).

47. These sources consistently describe time-series databases as databases specialized for time-indexed data, not general-purpose databases that happen to store time-stamped data. While, as Dr. Black testified, time-series databases become more powerful and sophisticated around the 2015-2020 time-range (Ex. 2038 [Black-Tr.] 30:5-31:1), the fundamental requirement that they be optimized or especially suited for storing and processing time-series data has not changed.

48. Thus, the evidence establishes that a time-series database is, through either its engine, the design and organization of its store, or both, a specialized database that is optimized or especially suited for time-series data. While a database need not use any particular engine, schema, or implementation to qualify as a time-series database, the mere presence of timestamped data in an otherwise ordinary database does not make that database a time-series database.

2. Petitioner Does Not Support Its Implicit Construction Of A “Time-Series Database.”

49. Petitioner and Dr. Black appear to apply an implicit construction of “time-series database” in which any database is a “time-series database” if it contains data associated with multiple points in time.

50. Indeed, Petitioner argues that “Kirti’s analytics and threat intelligence repository database ... *is a time-series database at least because it includes the same activity data* (i.e., values for the same parameters/attributes) *for multiple time points.*” Pet., 31-32. Petitioner, thus, derives its conclusion entirely from characteristics of the *data* stored within the *database*. Because repository 211 contains activity data associated with multiple points in time, Petitioner concludes that repository 211 “is a time-series database.” *Id.* But even assuming that “the same activity data (i.e., values for the same parameters/attributes) for multiple time points” qualifies as “time-series data,” Petitioner identifies nothing about the database itself that makes it a time-series database. Its analysis therefore assumes that storing time-series data is sufficient to make the database containing that data a time-series database.

51. But the claim language itself recites a “time-series *database*” not merely “time-series data.” Petitioner and Dr. Black’s analysis says nothing about the database itself. Rather, Petitioner states with no other support than Dr. Black’s substantially identical testimony that Kirti’s repository “is” a time-series database because it contains activity data at multiple points in time.

52. The presence of time-stamped data in a store does not itself make that store into a time-series database. Indeed, Dr. Black agrees with me. Critically, Dr. Black testified that although a time-series database can be built using a

“nonspecialized engine,” doing so requires “*designing and arranging the database appropriately.*” Ex. 2038 [Black-Tr.] 27:15-28:6. Consistent with that distinction, when asked whether an Outlook inbox containing regularly received, timestamped sensor data would be a time-series database, Dr. Black testified that “it depends” on implementation details, including whether it “prioritize[s] timestamp as a primary key and is organized around time.” *Id.*, 85:15-86:10. Similarly, when asked whether browser history stored in a SQL database constitutes a time-series database, Dr. Black again testified that “[i]t could be, depending on certain details,” including whether “the database is organized around the timestamp as a first-class object and index.” *Id.*, 91:1-21.

53. Thus, in my opinion, Dr. Black’s deposition testimony confirms that merely storing information associated with multiple points in time does not make a database a time-series database. Rather, Dr. Black testified that whether a database is a time-series database depends upon the design and organization of the database itself.

54. Indeed, Dr. Black testified that a general-purpose database may serve as a time-series database only “if it’s organized in the correct way.” Ex. 2038 [Black-Tr.] 30:13-31:19. Similarly, a time-series database may use a nonspecialized engine, but only by “designing and arranging the database appropriately.” Ex. 2038 [Black-Tr.] 27:15-28:6. In my opinion, this testimony

contradicts his declaration's underlying presumption that the nature of the stored data alone establishes that Kirti's repository is a time-series database.

3. Petitioner Has Failed To Establish That Kirti's Analytics And Threat Intelligence Repository Is A "Time-Series Database."

55. Petitioner and Dr. Black also fail to prove that Kirti's repository 211 is a specialized database optimized or especially suited for time-series data. Critically, I note that Kirti never says that repository 211 is a time-series database. Despite this, Petitioner and Dr. Black do not propose modifying or configuring repository 211 to create a time-series database. Rather, as I explained above, Petitioner and Dr. Black argue that Kirti's repository 211 "is" a time-series database because it "includes the same activity data (i.e., values for the same parameters/attributes) for multiple time points."

56. I have been informed and understand that because Petitioner and Dr. Black assert that Kirti's repository "is" a time-series database despite the fact that Kirti never identifies it as such, Petitioner's theory is one of inherency. As I described above in Section IV.B, I understand that inherency may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. Instead, it must be proved that the claim limitation not expressly found in the reference necessarily follows from what is found there. In my opinion, Petitioner does not make that

showing. Petitioner does not identify any design or organization for repository 211 to establish that it is optimized or especially suited for time-series data.

57. The design and configuration choices used to make a general-purpose database optimized or especially suited for time-series data are not implementation-independent. They depend, among other things, on the database technology and storage architecture selected. For example, a relational database system and a system implemented using Cassandra provide different data models, storage mechanisms, and mechanisms for organizing and retrieving data, and therefore involve different design and configuration choices when used for a time-series workload. Thus, one cannot infer merely from the data being stored that every database implementation capable of storing that data necessarily has been designed or organized as a time-series database.

58. Indeed, Kirti expressly leaves implementation choices open and states that repository 211 “may be *any database* or data repository with query capability” and that “any data warehouse infrastructure may be utilized as appropriate for the application.” Ex. 1004 [Kirti] 10:60-11:2.

59. Kirti mentions that “[i]n several embodiments of the invention, the analytics and threat intelligence repository database 211 is built in a NoSQL based infrastructure such as Cassandra or other distributed data processing system.” Ex. 1004 [Kirti] 10:63-67. I agree with Dr. Black that Cassandra is a database engine

meant for any type of data and that is not directed toward time-series data. Ex. 2038 [Black-Tr.] 75:7-19 (Cassandra is a “general-purpose database engine”); 82:17-83:12 (“general-purpose engine” is “an engine that is made to handle data well, regardless of the type of data. It’s not particularly directed toward ... geospatial data or document data or time-series data. It doesn’t have features for any particular type of data.”). And as Dr. Black further explained, using a nonspecialized engine to build a time-series database requires “designing and arranging the database appropriately.” *Id.*, 27:15-28:6. Petitioner identifies no such design or arrangement for repository 211. Thus, Kirti’s exemplary Cassandra implementation does not establish that repository 211 necessarily is a time-series database; Dr. Black’s testimony establishes that additional, undisclosed implementation choices would determine whether it is one.

60. Kirti’s discussion of “reformatting” and “structuring” the incoming activity data does not describe a time-series-oriented database design. Kirti explains that activity data received from different cloud applications may have different formats, such as JSON, log files, or database entries, and therefore normalizes and reformats that data into a “common format.” Ex. 1004 [Kirti] 11:5-18. Kirti does not say that the resulting format organizes the database around time, optimizes time-based retrieval, or otherwise supplies any feature characteristic of a database designed for time-series data.

61. Petitioner emphasizes that Kirti’s Figure 8C shows that it stores weeks of activity data and can generate reports showing events by date over four- and twelve-week periods, arguing that this “confirm[s]” repository 211’s “time-series nature.” Pet., 33. But that demonstrates only that Kirti can analyze timestamped information over time, not that the database from which the information was obtained is necessarily a time-series database. This reasoning appears circular to me, beginning by assuming the database’s “time-series nature” and then invoking reports generated from its data to “confirm[]” that assumed nature.

62. Kirti’s Figure 8C does not depict repository 211 or any aspect of its design or organization. Kirti describes Figure 8C simply as a user-interface chart displaying “a count of events by date” in categories such as failed logins, after-hours downloads, and activity at unusual times. Ex. 1004 [Kirti] 15:4-8. The figure shows aggregate event counts over selected time periods. It does not show the underlying database records, much less how repository 211 stores, indexes, partitions, keys, or otherwise organizes them. Nothing in Figure 8C establishes—necessarily or otherwise—that repository 211 is a time-series database.

63. Kirti’s own architecture further defeats Petitioner’s attempt to derive the nature of repository 211 from the analytics performed on its data. Kirti separately identifies repository 211, descriptive analytics application 207, and threat detection and prediction analytics application 212, and expressly states that

“[a]nalytics may be performed *using data stored* in the analytics and threat intelligence repository 211.” Ex. 1004 [Kirti] 5:38-54. Kirti likewise attributes analytics and report generation to MapReduce, Spark, Apache Hive, Hadoop, Mahout, R, scheduled jobs, and other analytics processes. *Id.*, 11:20-12:57. Thus, Petitioner points to functions performed *on data obtained from* repository 211 and asks the Board to infer from those functions an unstated characteristic of the repository itself. Kirti does not support that inference. The fact that separate analytics components can generate time-based reports from data stored in repository 211 says nothing about whether repository 211 itself is designed as a time-series database.

64. Moreover, when asked whether browser-history information stored in an SQL database could make that database a time-series database, Dr. Black testified that “*if it could be*, depending on certain details,” including whether “the database is organized around the timestamp as a first-class object and index.” Ex. 2038 [Black-Tr.] 91:1-21. Although he also identified reports over time as potentially relevant, his answer expressly depended on additional characteristics of the database itself. *Id.* Petitioner identifies no corresponding characteristic of repository 211.

65. Although Kirti references “time series,” this is not in relation with repository 211. Kirti identifies “time series” alongside “[d]ecision tree” and “naive

Bayes analysis” as examples of machine-learning techniques that may be used “to generate predictions.” Ex. 1004 [Kirti] 12:58-64. That disclosure concerns an analytical technique applied to data, not the type of database in which the data are stored.

66. In Petitioner’s Preliminary Reply, it argued that Kirti’s reports and use of access-request timing to calculate login velocity “confirm[] it is structured for time-based security analytics.” Preliminary Reply, 2-3. But “structured for time-based security analytics” is not the claimed limitation. The claims require a “time-series *database*,” and Petitioner maps that database specifically to repository 211. Pet., 31-32. The Preliminary Reply again identifies what Kirti’s analytics do with time-associated data; it still identifies no characteristic of repository 211 establishing that repository 211 necessarily is a time-series database.

67. Thus, Petitioner and Dr. Black fail to prove that Kirti’s repository 211 is a time-series database.

**B. “Determining Whether The Additional Verification Is Required To Grant Access” After “Receiv[ing] A Request To Authenticate A Client” (All Claims, All Grounds).**

1. The Claims Require That The “Determining Whether An Additional Verification” Step Occurs After “Receiv[ing]” And As Part Of Evaluating “A Request To Authenticate A Client.”

68. Claim 1 requires:

Limitation [1.1] “A computer system configured to execute software instructions stored on nontransitory machine-readable storage media, wherein the software instructions comprise instructions that:”

Limitation [1.2] “*receive a request to authenticate a client*, wherein the request comprises *an identifier and a password*,”

Limitation [1.3] “store, in a multidimensional time-series database, information about *the request*,”

Limitation [1.4] “determine whether *the password* corresponds to a user account identified by *the identifier*,”

Limitation [1.5] “*determine whether an additional verification is required to grant access*, wherein determining whether the additional verification is required to grant access comprises:”

Limitation [1.6] “*retrieving, from the multidimensional time-series database, historical information about previous access requests* associated with *the user account*, and”

...

Limitation [1.8] “based on the additional verification being required to grant access:”

Limitation [1.9] “select an additional verification method from a plurality of verification methods,”

Limitation [1.10] “cause the client to be prompted to complete the additional verification method, and”

69. The claim begins with limitation [1.2], which requires the system to “receive a request to authenticate a client, wherein the request comprises an identifier and a password.” The subsequent limitations repeatedly refer back to and operate upon that request and its components. For example, limitation [1.3] stores information about “*the* request,” and limitation [1.4] evaluates “*the* password” and “*the* identifier” provided in that request. Limitations [1.5]-[1.7] then determine whether “an *additional* verification is required to grant access,” including by “retrieving ... historical information about *previous* access requests associated with the user account.” Critically, Dr. Black testified and I agree that “the additional verification is additional relative to the verification of the ... identifier and password recited in [limitation [1.2]].” Ex. 2038 [Black-Tr.] 106:23-107:4. Dr. Black likewise testified that “previous” is temporally relative to the “current” authentication event recited in limitation [1.2]. *Id.*, 107:6-108:10 (the term “previous” “means previous to the current first limitation where a client is trying to be authenticated. This is an access request that was made previously to that in time. In other words, it happened before the current access request.”).

70. Thus, the logic and grammar of the claim tie the determination in limitations [1.5]-[1.7] to the current authentication request received in limitation [1.2]. The historical information may already exist—and may have been analyzed or otherwise processed before the current request—but the claim requires that

determining whether additional verification is required for that current request itself comprise retrieving the historical information from the MDTSDb. The claimed retrieval therefore is not a freestanding historical analysis that may occur independently of the current authentication request.

71. In other words, the system receives the current authentication request and then determines whether the client must complete verification additional to the identifier-and-password verification before access is granted. The claims specify how that determination is made: it “comprises” retrieving historical information and determining whether the user account is associated with the recited anomalous previous access request. Ex. 1001 [’426] cl. 1. The historical information itself need not be newly created or first analyzed after the current request. But an analysis performed independently of the current request is not itself the claimed determination whether additional verification is required to grant access for that request. The claim requires that the “retrieve” and “determine” steps happen after receiving the request to authenticate.

72. I note that although Dr. Black testified about the terms “previous” and “additional” in relation to the ’934 patent’s claim 1, his testimony also applies to the ’426 patent’s claim 1 as those limitations-in-question are identical.

73. The ’426 patent’s specification confirms the same request-driven sequence.

74. The '426 patent's Figure 6 depicts a process in which a **user first requests access** (steps 603 and 606) before **the server determines the required verification score** (step 615) and **verifies the user** (step 618):

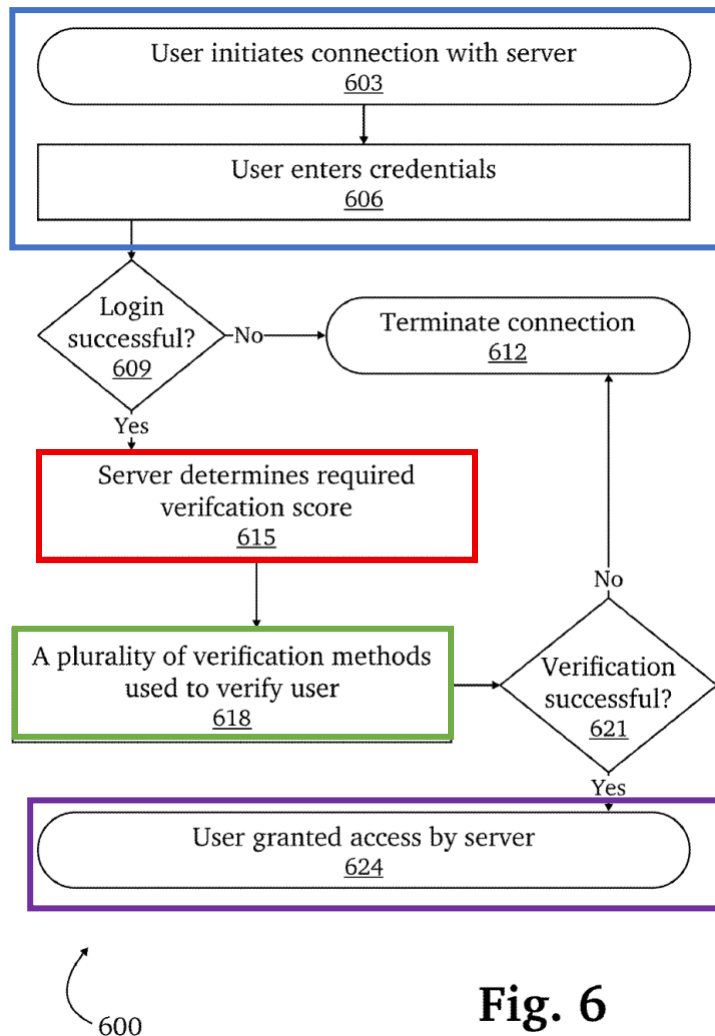


**Fig. 6**

Ex. 1001 ['426] Fig. 6 (annotated). If the verification is successful, **the user is granted access by the server** (step 624).

75. The '426 patent's corresponding written description also confirms this order. The '426 patent teaches that “[a]t an initial step 603, a user requests access

from a server.” Ex. 1001 [’426] 11:63-64. Then, “[a]t step 606, the server requests login credentials from the user.” *Id.*, 11:64-65. “***If the login is successful at step 609, the server dynamically determines a required verification score required*** before the user can access the server at step 615.” *Id.*, 12:1-4. Then, “[a]t step 618, a plurality of verification methods may be used to verify the user.” *Id.*, 12:8-11. “If the verification is successful at step 621, the user is granted access at step 624.” *Id.*, 12:18-19.

76. While Figure 6 does not separately illustrate every sub-operation recited in limitations [1.6]-[1.7], it nevertheless reflects the request-driven authentication architecture required by the claims. The server receives the user’s current access request and credentials, then determines the verification required for that access attempt, performs that verification, and grants access if verification succeeds. The claims further specify that the determination of whether additional verification is required “comprises” the historical-information retrieval recited in limitation [1.6].

77. The specification states that “[w]here a ***method*** is claimed below, the steps of the method are intended to be construed without any order unless it is impossible to perform a given step before another.” Ex. 1001 [’426] 18:5-7. To be clear, I do not have an opinion on whether every recited operation must occur in the precise order written. Nor do I have an opinion on whether historical

information cannot exist or be analyzed before the current authentication request. But, in my opinion, the claim language makes it “impossible to perform a given step before another”: the system receives the current authentication request and then determines whether verification additional to the identifier/password authentication is required to grant access, and that determination expressly “comprises” retrieving information about access requests before the current request. Moreover, I note that claims 1 and 19 are system claims. The specification’s statement concerns “[w]here a method is claimed,” and so does not alter the limitations of claims 1 and 19.

2. Kirti’s Historical Threat Analysis Is Performed Independently Of The Current Authentication Request.

78. I understand that Petitioner and Dr. Black argue that Kirti “teaches” the “determine whether an additional verification is required to grant access” limitation as follows:

Kirti teaches this claim element. The Kirti system analyzes a user’s historic login activity to identify potential threats and determine whether to apply “remedial measures, such as **adding additional steps to authentication.**” *E.g.*, EX1004, 5:25-37 (emphasis added); *see also id.*, 3:53-58 (system performs “threat detection” and recommends “appropriate responses to different categories of threat”), 3:58-4:3 (system determines “models of normal and/or abnormal behavior in user activity,” detects “patterns of suspicious activity,” and then

recommends “remedial measures”). Kirti teaches carrying out this remediation “automatically.” 25:49-52. EX1003, ¶86.

Pet., 34-35. Petitioner further argues that Kirti teaches limitations [1.6]-[1.7] because Kirti teaches “analytics and security intelligence processes” which allegedly “retriev[e] historic user login data from Kirti’s analytics and threat repository database” and use that information to detect anomalous behavior relative to baseline user profiles. *Id.*, 38-41. Nothing in those processes, however, identifies receiving the current authentication request as constituting the trigger for determining whether additional verification is required or for retrieving historical information.

79. Petitioner relies upon Kirti’s Figure 4 as demonstrating storing and retrieving activity data in repository 211. *See, e.g.*, Pet., 43-44. In Kirti’s Figure 4 process, a cloud data loader connects to cloud applications and collects activity data. Ex. 1004 [Kirti] 10:2-17, Fig. 4. Kirti explains that “[i]n several embodiments,” that collection “is scheduled to occur periodically (e.g., every 4 hours or every 6 hours).” *Id.*, 10:15-17. Dr. Black likewise characterized Figure 4 as a “burst of activity that occurs every four to six hours,” explaining that once its “collection, storage analysis, and report generation” are complete, “that task is complete” and the system waits until the next time the process runs. Ex. 2038

[Black-Tr.] 43:9-19. Kirti's Figure 4 process is not initiated by receipt of a request to authenticate a client.

80. Significantly, Petitioner relies on Kirti's disclosed batch processing. Petitioner argues that repository 211 receives new data "in batches (e.g., from the most recent 24-hour period)" and that even the newest information in the repository is therefore "historical." Pet., 39; Ex. 1003 [Black-Decl.] ¶ 95. That theory describes the periodic accumulation of past activity in repository 211. It still does not identify retrieval of historical information from repository 211 triggered by the current authentication request and performed as part of determining whether additional verification is required to grant access to that request.

81. In contrast to Kirti, the claims require that, as part of determining whether additional verification is required for the current authentication request, the system retrieves historical information from the MDTSDb. Kirti's Figure 4 process instead collects activity information from external cloud applications and places that information into repository 211. Nothing in Figure 4 teaches retrieving historical information from repository 211 because a current authentication request has been received.

82. Petitioner relies heavily upon Kirti's Figure 5B as allegedly "show[ing] an exemplary process in which activity data is retrieved and used to

generate threat models (step 506) that ‘include baseline user profiles over various periods of time.’” Pet., 42. But Figure 5B is not initiated in response to any authentication request. Indeed, no such request appears in the figure or Kirti’s corresponding description:

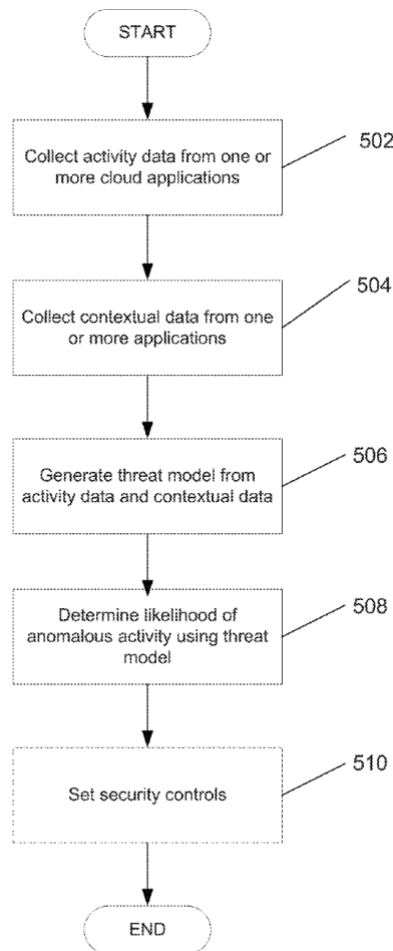


**FIG. 5B**

Ex. 1004 [Kirti] Fig. 5B.

83. Rather, as with Figure 4, Kirti’s system generates a threat model and sets appropriate security controls in steps 506-510 when data is collected from the

cloud applications in steps 502-504. Figure 5B begins by collecting activity and contextual data (steps 502-504), generates a threat model from that data (step 506), determines the likelihood of anomalous activity using the threat model (step 508), and then sets security controls (step 510). Ex. 1004 [Kirti] Fig. 5B, 24:8-50.

Nothing in Figure 5B or its description says an authentication request triggers it.

84. Petitioner also relies on Kirti's Figure 5, arguing that threat detection and prediction analytics application 212 retrieves historical activity data from repository 211 to "[d]iscover threats and risks." Pet., 44-45. But, as seen below, Figure 5 does not connect that retrieval to a current authentication request either.

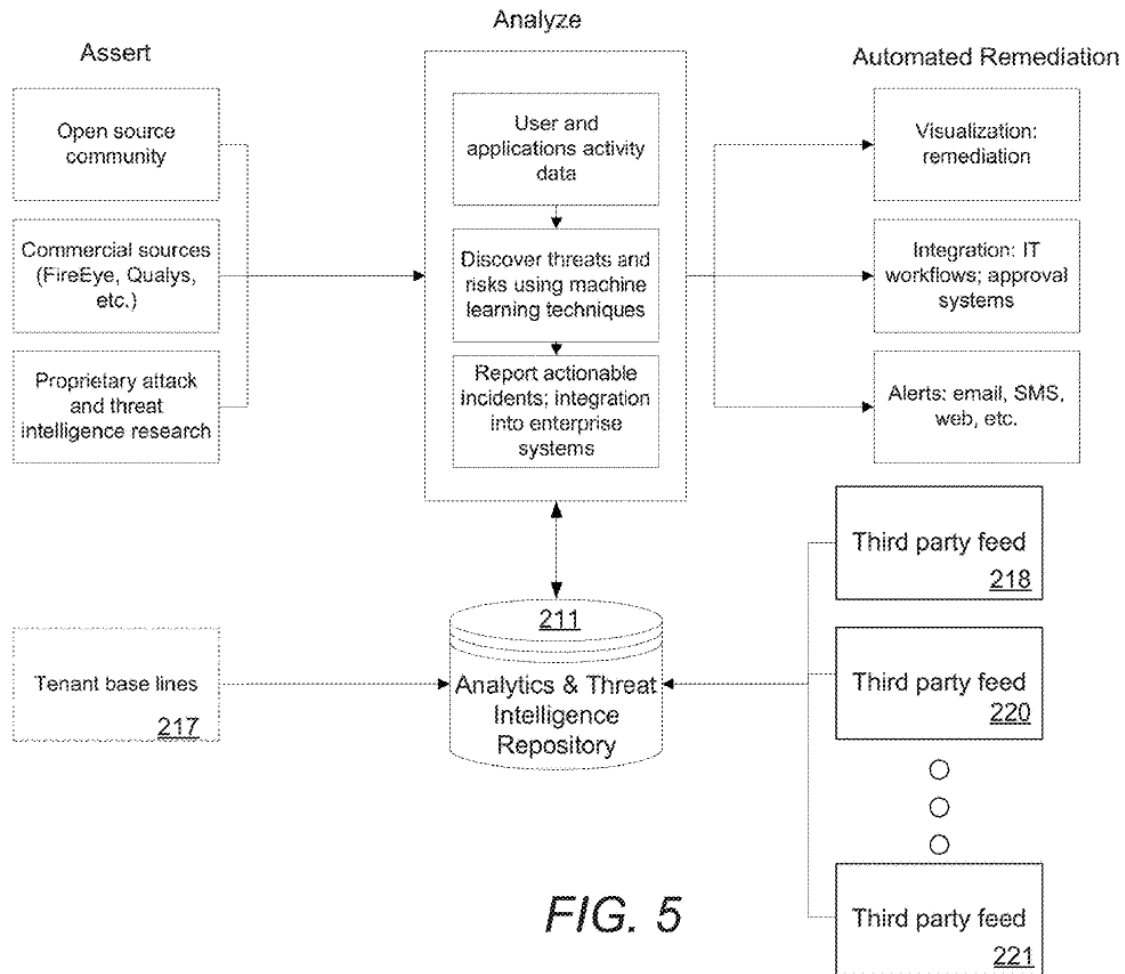


**FIG. 5**

Ex. 1004 [Kirti] Fig. 5. It shows repository 211 supplying data for threat analysis; it does not teach that the data is retrieved because a request to authenticate a client has been received or as part of determining whether additional verification is required to grant access to that request. Thus, Figure 5 supplies the retrieval from repository 211 that Petitioner identifies, but not the request-driven relationship the claims require.

85. Petitioner itself relies upon Kirti's batch architecture, arguing that repository 211 "receives new data in batches (e.g., from the most recent 24-hour

period)” and that “[t]hus, even the most recent data in the database is historical.”

Pet., 39. Petitioner’s cited evidence establishes at most that Kirti periodically collects and analyzes activity concerning multiple users independently of any particular authentication request. It does not establish that, upon receiving a current authentication request, Kirti retrieves historical information from repository 211 as part of deciding whether additional verification is required for that request.

86. Thus, Petitioner identifies two different kinds of retrieval in Kirti, neither of which establishes the claimed operation. Figure 4 periodically retrieves activity data from the cloud applications and stores that data in repository 211. Ex. 1004 [Kirti] 10:2-24, 10:57-61, Fig. 4. Figures 5 and 5B, in turn, use collected activity data for threat analysis, including retrieval of historical activity from repository 211. Pet., 42-45. But Petitioner identifies no disclosure tying that retrieval from repository 211 to receipt of a current authentication request or showing that it occurs as part of determining whether additional verification is required to grant access to that request. Kirti’s periodic collection and independent threat analysis therefore do not establish the request-driven determination the claims require.

87. Even assuming that pre-analyzing historical information is permissible, the claims still require the current determination to comprise retrieving historical information from the MDTsDB. And Dr. Black testified that

Kirti does not even say what happens to its threat model after Figure 5B. He suggested that the model could be stored to avoid repeating computations, but acknowledged that Kirti does not say whether it is stored, and whether it would be placed “into the repository 211 or a separate place” would be “a design decision.” Ex. 2038 [Black-Tr.] 57:21-58:24. Thus, even a theory based on pre-analyzed historical information does not establish that, upon receiving the current authentication request, Kirti retrieves the claimed historical information from repository 211 as part of deciding whether additional verification is required.

88. Thus, in my opinion, none of Kirti’s disclosures of various ways of collecting and analyzing user activity establishes the claimed request-driven operation: receiving the current authentication request and, as part of determining whether additional verification is required to grant access to that request, retrieving historical information from the MDTSDB.

3. Kirti Does Not Determine That Additional Verification Is Required To Grant Access To The Current Authentication Request.

89. Although Petitioner does not rely upon these disclosures in the Petition, Kirti states that “[i]n further embodiments, data is collected and retrieved in real time as events occur,” and that activity associated with certain “high risk events” may be retrieved “near real-time outside scheduled retrieval.” Ex. 1004 [Kirti] 10:19-24. But these do not cure the deficiency.

90. Kirti’s “real-time” disclosures are only connected to collecting and retrieving activity data, not to threat analysis. Ex. 1004 [Kirti] 10:19-24, 10:57-59. Kirti states that activity data may be “collected and retrieved in real time as events occur” and that certain high-risk activity may be retrieved “near real-time outside scheduled retrieval.” *Id.* Nothing in those passages states that Kirti analyzes the retrieved data in real time, much less that such analysis occurs as part of evaluating a current authentication request or determining whether additional authentication is required to grant access. Indeed, Kirti states that the retrieved data is subsequently stored in repository 211. *Id.*, 10:57-61.

91. Figure 5B determines the likelihood of anomalous activity and then generically “Set[s] security controls” at step 510. Ex. 1004 [Kirti] Fig. 5B. Kirti explains that the resulting risk scores may be used to “prioritize remediation actions,” giving as examples “resetting passwords, restricting access from foreign countries, and/or suspending accounts.” *Id.*, 24:39-50. Thus, even if Figure 5B were performed in real time, it would establish only that Kirti detects anomalous activity and selects some security response—not that Kirti determines that additional authentication is required. Kirti mentions “additional steps to authentication” and “elevated authentication or OTP validation” elsewhere, *id.*, 5:25-37, 28:31-34, but Petitioner identifies no disclosure tying those particular responses to the Figure 5B determination.

92. I understand that Petitioner and Dr. Black rely upon Kirti’s teaching of selecting a remediation method which includes “additional steps to authentication” as allegedly teaching “selecting an additional verification method from a plurality of verification methods.” Pet., 49-50. Petitioner then argues that it would have been obvious “[i]n the cases where the remedial action involved ‘additional steps to authentication,’ such as a one-time password, performing that authentication would necessarily involve prompting the client to complete the additional authentication and then determining whether it was corrected completely.” *Id.*, 50.<sup>1</sup>

93. Kirti discusses additional verification only twice. Pet., 22 (citing Ex. 1004 [Kirti] 28:33 and 5:34). Both disclosures concern a first cloud application

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<sup>1</sup> I note that Petitioner’s combination “combines Kirti’s threat detection and remediation system with Coffin’s implementation details on how to select and perform an additional verification process.” Pet., 20. Because Petitioner relies upon Kirti’s overall process of determining whether additional verification is required and only relies upon Coffin’s alleged teachings of “the specific types of measures,” Petitioner’s argument fails for both Kirti alone (Ground 1) and Kirti in combination with Coffin (Ground 2).

detecting a threat and alerting a second cloud application of the threat, which may thereafter impose additional authentication requirements. Kirti explains:

One cloud application can ***proactively warn another cloud application of a potential threat.*** ... When a threat is identified in a first cloud (e.g., a query from a blocked IP address), a cloud security monitoring and control system in accordance with embodiments of the invention can automatically ***notify a second cloud*** that is part of the business process. The notification can include a request or recommendation for a higher level of security controls, such as elevated authentication or OTP validation, in the business process.

Ex. 1004 [Kirti] 28:24-34.

94. Kirti's disclosure of single sign-on ("SSO") does not alter this distinction. Kirti states only that profile-linking algorithms may identify a single user across multiple clouds using a common identifier or an "SSO authentication mechanism," thereby allowing activities associated with that user to be correlated across applications. Ex. 1004 [Kirti] 13:47-51. But identifying the same user across clouds does not make separate authentication events a single authentication request. Kirti still describes a threat detected in one cloud followed by a notification to a second cloud, where heightened authentication may thereafter be imposed. *Id.*, 28:24-34. Nor does Kirti teach that, upon receiving an authentication request at the second cloud, the system retrieves historical information from repository 211 as part of determining whether additional

verification is required to grant that request. At most, the second cloud may impose additional verification based on the notification from the first cloud—not based on the claimed retrieval from repository 211.

95. Thus, Kirti’s additional verification is not used to determine whether to grant access to the authentication request being evaluated. It is instead a potential security response imposed by a different cloud after a threat has already been detected.

96. In my opinion, Petitioner and Dr. Black therefore fail to identify any disclosure in Kirti where, after receiving and as part of evaluating an authentication request, Kirti determines whether additional verification is required to grant access to that request—much less does so by retrieving historical information and prompting the client to complete the additional verification, as required by the claims.

**C. “Selecting The Additional Verification Method From A Plurality Of Verification Methods” (All Claims, All Grounds).**

97. Claim 1 requires:

Limitation [1.1] “A computer system configured to execute software instructions stored on nontransitory machine-readable storage media, wherein the software instructions comprise instructions that:”

Limitation [1.8] “based on the additional verification being required to grant access:”

Limitation [1.9] “select an additional verification method from a plurality of verification methods,”

98. I understand that Petitioner presents a theory under Kirti alone and a theory under Kirti in combination with Coffin. In my opinion, both theories fail.

1. Kirti’s Remediation Actions Are Not Verification Methods (Ground 1).

99. I understand that Petitioner and Dr. Black first argue that Kirti teaches this limitation as follows:

Kirti teaches recommending and performing a *remedial action* when a threat is detected and mentions that *one such remedial action* is “adding additional steps to authentication,” i.e., requiring completion of an additional verification step (e.g., enter a one-time password). *E.g.*, EX1004, 5:27-37, 28:24-36. EX1003, ¶107.

Kirti discloses manually or automatically selecting which one of a plurality of *remedial actions* to use. *E.g.*, EX1004, 5:27-37, 5:55-57 (“embodiments of the invention may include remediation functions that provide manual and/or automated processes in response to threats.”), 6:10-14, 14:64-67, 25:15-20, 25:45-52, 27:10-12. EX1003, ¶108.

Pet., 49-50; Ex. 1003 [Black Decl.] ¶¶ 107-108.

100. As can be seen above, Petitioner and Dr. Black do not identify the selection the claims require. Even accepting Petitioner’s characterization of “adding additional steps to authentication” as a verification method, Petitioner identifies *only one verification method* within a broader set of remediation actions.

Selecting that one action from a menu that also includes changing passwords, blocking IP addresses or senders, locking or deactivating accounts, and other security responses is not selecting a verification method “from *a plurality* of verification methods.”

101. Kirti’s selection among remedial actions is different from the selection required by the claims. Kirti describes a variety of responses that may be taken after a threat is identified. Those responses include, for example, blocking an IP address, resetting a password, suspending or locking an account, and adding additional authentication. Ex. 1004 [Kirti] 5:27-37, 25:45-49. These measures may all remediate a security threat, but they do so in different ways. Blocking an IP address or locking an account, for example, does not verify that a client is who the client claims to be.

102. Petitioner identifies only one member of Kirti’s remediation menu—“adding additional steps to authentication”—as an additional verification method. Pet., 49-50. Thus, even accepting Petitioner’s characterization of that action, Kirti discloses selecting one possible verification-related action from a plurality of remediation actions. It does not disclose a plurality of verification methods from which an additional verification method is selected.

103. Indeed, the rest of the claim language reinforces that point. The selected “additional verification method” is something the client is thereafter

“prompted to complete,” and the system determines whether that method “has been completed correctly.” Ex. 1001 [’426] cl. 1. Kirti’s other remedial actions—blocking an IP address, deactivating an account, resetting a password, or locking an account—are actions taken by the system to address a threat. They are not verification methods that the client is prompted to complete and that the system then determines were completed correctly. Nor is it sufficient that only one of Kirti’s remedial actions might qualify as a verification method. Petitioner has not identified even a second verification method in the set from which Kirti makes its alleged selection.

104. Thus, in my opinion, Petitioner’s theory based upon Kirti alone fails.

2. Kirti-Coffin Does Not Teach Selecting An Additional Verification Method (Grounds 2 & 4).

105. Apparently because Kirti “provides little implementation detail for” the steps of “selecting and performing additional verification,” Petitioner and Dr. Black alternatively argue that Kirti-Coffin teaches the limitation as follows:

Coffin includes an entire chapter on implementing “Two-Factor Authentication.” EX1005, 177-208. Therein, Coffin teaches additional verification/authentication methods such as: a “second password or PIN,” “a CAPTCHA,” an “answer [to] personal questions,” a “biometric scan[], like fingerprint, retina, or facial recognition,” and “pass codes sent to [] e-mail, pager, or cell phone”). EX1005, 177. Coffin also explains how to implement additional verification methods

that include a passcode, such as an SMS to a phone, a URL to a pager, and an email to supporting devices. *Id.*, 178-208. EX1003, ¶111.

Pet., 51-52; Ex. 1003 [Black Decl.] ¶ 111. As seen above, Petitioner and Dr. Black never identify a disclosure in which Coffin’s system selects among that plurality.

When Petitioner turns to the claimed “select[ing],” it relies upon a different disclosure:

Coffin also teaches a heuristic for selecting an additional verification method from the plurality of passcode verification methods: select the user’s pager and/or cell phone if these devices are available, otherwise select email. *E.g.*, EX1005, 183, 185, 200 (“By preference, [the system] will send the two-factor code to the user’s pager and cell phone. If neither of those is available, [the system] will send the code to the user’s e-mail.”), 201. It also was well known in the art to select an additional verification method from a plurality of verification method, for example, to ensure successful delivery of the additional verification based on the availability of the verification methods, cost, user preferences, etc. *Supra* Section IV.B.2. EX1003, ¶112.

Pet., 52; Ex. 1003 [Black Decl.] ¶ 112. Thus, the plurality Petitioner identifies and the set from which Coffin actually selects are different.

106. Indeed, immediately after characterizing Coffin’s choice of pager, cell phone, or email as selection of the “verification method,” Petitioner explains that, “[o]nce the additional verification method is selected,” Coffin sends the passcode to the selected device, after which the user is prompted to enter the passcode and

the system determines whether the entered code is correct. Pet., 52. In other words, the thing the client actually completes and the system validates is the passcode verification, while pager, cell phone, or email determines how that passcode reaches the user. Petitioner never explains why selecting a channel through which the same verification challenge is delivered constitutes selecting a different “verification method” for purposes of limitation [1.9].

107. Although Coffin lays out a list of the “many things that are being done in computer security to attempt to achieve” authentication, that list is disembodied and not tethered to any particular system. Ex. 1005 [Coffin] 177. In other words, Coffin’s list of authentication methods is not a “plurality of verification methods” from which a particular system will select an additional verification method as required by the claims. Rather, it is a list of methods being attempted in computer security. Unsurprisingly, Coffin never mentions or teaches how a system would “select an additional verification method” from Coffin’s general list of authentication methods.

108. Instead, the only selection Coffin discusses concerns where to send a passcode. If a pager or cell phone is available, Coffin sends the code there; otherwise it sends the code by email. Ex. 1005 [Coffin] 200. Regardless of that choice, the authentication process remains the same in the relevant respect: a passcode is generated and delivered to the user, the user supplies that code, and

Coffin determines whether the supplied code is correct. *Id.*, 183, 194, 200-01, 206-07. Thus, Coffin’s selection determines the channel or mechanism used to deliver the passcode. It does not disclose a system selecting, for example, between a passcode, biometric authentication, a CAPTCHA, and a personal question—the different authentication techniques Petitioner relies upon as its alleged “plurality of verification methods.”

109. From a technical perspective, changing the communication channel through which the same passcode is delivered does not necessarily change the authentication operation being performed. In Coffin’s disclosed implementation, whether the code arrives through a pager, cell phone, or email, the user is ultimately asked to supply the generated two-factor code and the system determines whether that supplied code is correct. The communication channel may affect matters such as availability or security, but Coffin does not disclose selecting among different authentication techniques based on its choice of delivery channel.

110. The ’426 patent further distinguishes the one-time-code verification from the mechanism used to deliver that code.

111. The specification states that “one-time-use codes 415g” may be sent “through a text message or email,” generated on-demand on a mobile device, or take the form of a uniquely generated hyperlink, and expressly characterizes these

alternatives as “[v]arious implementations of the one-time-use code.” Ex. 1001 [’426] 11:21-27. Similarly, the Background discusses “one-time use codes sent to a user’s mobile device or email” and then identifies a problem with “over-reliance on a single method of *delivery*.” *Id.*, 2:23-34. Consequently, the ’426 patent distinguishes between the “one-time-use code” method and the “method of delivery.”

112. Petitioner also invokes allegedly “well known” methods of selecting among different authentication methods based on risk, availability, cost, or user preference. Pet., 8-9, 51-52. But these other systems are not part of Petitioner’s grounds and do not demonstrate that the asserted combinations select among authentication techniques. The Petition does not explain how those unasserted systems alter Kirti’s remediation architecture or Coffin’s passcode-delivery implementation so that the resulting system selects among a plurality of verification methods. Nor does it identify which plurality of verification methods is configured for selection in the proposed combination and how that selection occurs.

113. Thus, in my opinion, Petitioner’s Kirti-Coffin theory also fails.

**D. The “Previous Authentication” Request(s) Include A “Second Identifier Not Associated With” “The First User Account”/“Any User Account” (All Claims, All Grounds).**

114. Claims 1 and 9 require:

Limitation [1.7] “determining, based at least on the historical information, whether the first user account is associated with a previous request to authenticate, wherein the previous request to authenticate comprised a second identifier not associated with the first user account”

Claims 19 and 26 similarly require:

Limitation [19.8] “determining, based at least on the historical information, whether the user account is associated with a plurality of previous requests to authenticate, wherein the plurality of previous requests to authenticate comprises at least one second identifier not associated with any user account”

115. I understand that Petitioner maps the claimed “second identifier” to Kirti’s “IP addresses, geolocation, devices, and/or connectivity types”:

Kirti teaches associating one or more IP addresses, geolocations, devices, and/or connectivity types with each user account. Within these associations, the user’s known IP addresses, geolocation, devices, and/or connectivity types serve as identifiers for the user’s account. Conversely, new, unknown, or suspicious IP addresses, geolocations, devices, and/or connectivity types are all identifiers not associated with the user account that may trigger additional authentication. EX1003, ¶106.

Pet., 47-49 (“identifiers (e.g., IP address, geolocation, device type)”). Petitioner’s argument fails.

1. Petitioner Fails To Show that Kirti’s “Previous Access” Request(s) “Comprised” IP Addresses, Geolocations, Devices, And/Or Connectivity Types.

116. The claim language itself distinguishes between the contents of a “request to authenticate” and information about that request. Limitation [1.2] requires receiving “*a request to authenticate a client*,” wherein the request comprises a first identifier and a password.” Ex. 1001 [’426] cl. 1. The claim then separately requires storing “information about the request” and retrieving “historical information about previous access requests.” *Id.* Finally, the claim requires determining whether the first user account is associated with “a previous request to authenticate, *wherein the previous request to authenticate comprised a second identifier.*” *Id.* I understand that in patent law, it is understood that the word “comprised” in a claim limitation means “including but not limited to.” Thus, the “previous request to authenticate” must “include” “a second identifier.”

117. Similarly, claims 19 and 26 require that the “plurality of previous requests to authenticate” “comprise[] at least one second identifier” rather than merely requiring historical information about those requests to comprise the second identifier. Thus, the claim uses “comprises” and “comprised” to identify what the current and previous authentication requests themselves include, while separately using “information about” when referring to information describing or associated with those requests. Historical information may, of course, record what

an earlier authentication request comprised. But the fact that historical information contains some additional fact concerning the request does not establish that the request itself comprised that information.

118. Dr. Black expressly distinguished the “request itself” from contextual information about the request. When discussing Kirti’s historical activity data, Dr. Black testified that “the request itself might simply be, ‘May I please log in? Here’s my username and password.’” Ex. 2038 [Black-Tr.] 99:17-100:15. By contrast, information such as when the request occurred, whether it succeeded, and “the IP address” is “information related to the request.” *Id.* Thus, Dr. Black distinguishes between what an authentication request contains and other information Kirti collects about that request.

119. More importantly, Dr. Black specifically confirmed that the very types of information Petitioner maps to the claimed “second identifier”—IP-address and device information—need not be part of an authentication request at all. He testified that a web server can collect an IP address and device type “even if you haven’t authenticated yourself,” because that information is “available outside of the client authentication stream.” Ex. 2038 [Black-Tr.] 105:25-106:15. Accordingly, an IP address or device may provide contextual information concerning the source or circumstances of a login without being included in the

request to authenticate itself. Dr. Black’s testimony therefore does not support Petitioner’s mapping; it confirms the distinction Petitioner’s mapping overlooks.

120. Despite this, I see no explanation from Petitioner of how Kirti’s “IP addresses, geolocations, devices, and/or connectivity types” *are part of the “previous access request” itself*. Instead, Petitioner merely states that “Kirti teaches determining whether a request *originated from* an IP address, geolocation, device and/or connection type that is not associated with the user account” and that Kirti can detect ““activities being originated in locations that are unexpected or outside of an established pattern.”” Pet., 47-49. In my opinion, showing where or how a request originated does not show what the request itself comprised. Petitioner identifies no evidence that the authentication request contained an IP address, geolocation, device, and/or connection type.

121. Indeed, I note that in describing the claims, Petitioner states that they require determining that a previous login attempt “comprised an identifier not associated with the user account.” Pet., 1. But in the very next sentence, Petitioner argues that Kirti allegedly teaches “flagging a previous access request that originated from an IP address, geolocation, device and/or connection type that is not associated with the user account.” *Id.*, 1-2. But a request “originat[ing] from” an IP address, device, location, or connection does not establish that the request itself “comprised” that characteristic.

122. Dr. Black too distinguishes between the request itself and information about the request. When discussing the historical activity data underlying Petitioner’s theory, Dr. Black explained that “the request was the request to log in,” whereas information such as “what time, whether it was successful or not, [and] the IP address” was “information about that request.” Ex. 2038 [Black-Tr.] 99:17-100:15. He then made the distinction explicit: “All of that information is information related to the request. But the request itself might simply be, ‘May I please log in? Here’s my username and password.’” *Id.* Thus, per Dr. Black, the IP address is on the information-about-the-request side of the distinction, not within “the request itself.”

123. Moreover, Kirti too distinguishes between the request itself and information about the request.

124. Kirti explains that geolocation may be obtained through “geographic resolution” which is “identifying or looking up a geographic location associated with an IP address” of an IP connection. Ex. 1004 [Kirti] 15:31-38. Thus, Kirti obtains the geolocation by looking it up from the IP address, not as a field contained in the authentication request. Likewise, Kirti characterizes information concerning “where a user is or is expected to be” and “how a user does or is expected to log in or access a cloud application (e.g., what type of device or connectivity)” as “contextual data” useful in determining the likelihood of a threat.

*Id.*, 16:25-37. These disclosures show that Kirti analyzes contextual circumstances surrounding login activity, not that the authentication request itself comprises those circumstances.

2. Petitioner Fails To Show A Second Identifier “Not Associated With Any User Account” (Claims 19 & 26, All Grounds).

125. I note that, in contrast to claims 1 and 9, claims 19 and 26 require that the recited plurality of previous requests to authenticate comprise “at least one second identifier *not associated with any user account.*” Ex. 1001 [’426] cls. 19, 26. Thus, for claims 19 and 26, it is not enough to show that the alleged second identifier is unassociated with the particular account being authenticated.

Petitioner must demonstrate that at least one such identifier is not associated with any user account.

126. But Petitioner never makes that showing. All Petitioner states for its claim 19 analysis is:

Claims 19-21 and 23-25 are substantively identical to claims 1-3 and 5-7, respectively, and are obvious for the same reasons as claims 1-3 and 5-7. *See* EX1065 (claims listing, showing claims 1-3 and 5-7, and 19-21 and 23-25 in columns 1 and 3, respectively); *supra* Sections VII.C.1–VII.C.3, VII.C.5-VII.C.7; EX1003, ¶143.

Pet., 71. And all Petitioner states for its claim 26 analysis is:

Claims 26-28 and 30 are method claims that recite elements identical or near-identical to those of system claims 1-3 and 5, respectively, and

are obvious for the same reasons as claims 1-3 and 5. *See* EX1065 (claims listing, showing claims 1-3 and 5-7, and 19-21 and 23-25 in columns 1 and 4, respectively); *supra* Sections VII.C.1–VII.C.3, VII.C.5; EX1003, ¶144.

*Id.*, 72. Thus, Petitioner’s analysis of claims 19 and 26 hinge entirely on its earlier analysis of claim 1.

127. For claim 1, Petitioner asserts that Kirti determines whether a previous request originated from an “IP address, geolocation, device and/or connection type that is not associated with the user account.” Pet., 47-49. Petitioner similarly concludes that “new, unknown, or suspicious IP addresses, geolocations, devices, and/or connectivity types are all identifiers not associated with the user account.” *Id.*, 49. But that establishes, at most, that the alleged identifier is not associated with *the user account being evaluated*. It does not establish that the identifier is unassociated with every other user account as well. Indeed, Petitioner identifies no IP address, geolocation, device, or connectivity type that it contends is “not associated with any user account.”

128. Petitioner’s own analysis of claim 4 illustrates precisely why the distinction matters. Claim 4 requires the second identifier to be “associated with a second user account,” and Petitioner posits a scenario in which a second employee uses his or her normal computer to attempt to access a first employee’s account. Pet., 57-58. In that scenario, Petitioner contends that “the device, IP address,

and/or geolocation is associated with the disgruntled employee's account (the second user account) not the administrator's account (the first user account)." Id., 58. Thus, under Petitioner's own theory, an alleged identifier may be "not associated with the first user account" while simultaneously being associated with another user account. Such an identifier may satisfy the different requirement Petitioner addresses for claim 1, but it cannot satisfy claims 19 and 26's requirement that the identifier be "not associated with any user account."

129. The Petition does not address this materially different limitation when discussing claims 19 and 26. Instead, it simply states that claims 19-21 are "substantively identical to claims 1-3" and that claims 26-28 are "identical or near-identical" to claims 1-3, and declares them obvious "for the same reasons." Pet., 71-72. But incorporating an analysis that establishes, at most, that an identifier is not associated with *one particular user account* does not establish that it is not associated with *any user account at all*.

**E. "Determine That A Probable Cyberattack Is Detected" "Based On The Additional Verification Being Required To Grant Access" (Claims 5, 13, 17, 23, 30; All Grounds).**

130. Claim 5 requires:

Limitation [5.2] "based on the additional verification being required to grant access:"

Limitation [5.3] "determine that a probable cyberattack is detected, and"

Limitation [5.4] “provide an alert”

Ex. 1001 [’426] cl. 5; *see also* cls. 13, 17, 23, 30.

131. I understand that Petitioner argues that Kirti teaches these claims because:

Kirti teaches that based on the additional verification being required to grant access (e.g., due to a series of failed login attempts, a login attempt from an unknown/suspicious IP address, etc.), determining that a probable cyberattack (e.g., a brute force attack) is detected. *E.g.*, EX1004, 13:12-17, 14:5-7 (“detect[ing] attacks and unknown threats”), 15:31-48, 15:49-59 (“Detection [of a brute force attack] may involve evaluating the velocity of failed login attempts ....”). EX1003, ¶123.

Because Kirti discloses to “update statistics” “on various user behavioral activities” (EX1004, 18:28-31), a POSITA would have understood or at least found it obvious that if Kirti’s system determined that a user needs to supply additional verification information due to an anomalous login attempt in the most recent batch of activity data, such as an attempt from an unknown/suspicious IP address (*see supra* Sections VII.C.1.d-VII.C.1.e; EX1004, 1:66-2:7, 5:57-6:5, 12:28-57, 15:31-48, 16:6-11, 16:60-17:8, 28:26-31, 29:31-36, FIG. 8C), the system would also determine that a probable cyberattack is detected if that same user account is associated with other anomalies, such as repeated failed login attempts, especially since Kirti teaches to identify certain types of cyberattacks, including brute force attacks (*e.g.*, EX1004, 15:23-16:24). Thus, a POSITA would have understood or at least found it obvious based on Kirti’s teachings to determine, for

example, that a probable brute force cyberattack is detected from a suspicious IP address based on that IP address being required to provide additional verification (because it is unknown/suspicious) and having failed multiple login attempts. EX1003, ¶124.

Pet., 58-59. In my opinion, this argument fails.

132. Again, the claim requires that a probable cyberattack is detected be “**based on** the additional verification being required to grant access.” Ex. 1001 [’426] cls. 5, 13, 17, 23, 30. It is not enough that the same suspicious activity independently causes both additional verification to be required and a cyberattack to be detected. The cyberattack determination must itself be “based on” the additional verification.

133. But Petitioner does not identify a disclosure in Kirti expressly establishing the claimed relationship. Instead, it argues that a POSITA would have understood or found it obvious that, if an anomalous login caused Kirti to require additional verification, Kirti would also detect a probable cyberattack if the same account exhibited other anomalies, such as repeated failed login attempts. Kirti, however, teaches the opposite relationship.

134. Kirti’s threat-remediation process begins by “**identifying (602) a threat**” and thereafter in steps **604-608, presenting an alert and identifying and performing an appropriate remediation action:**

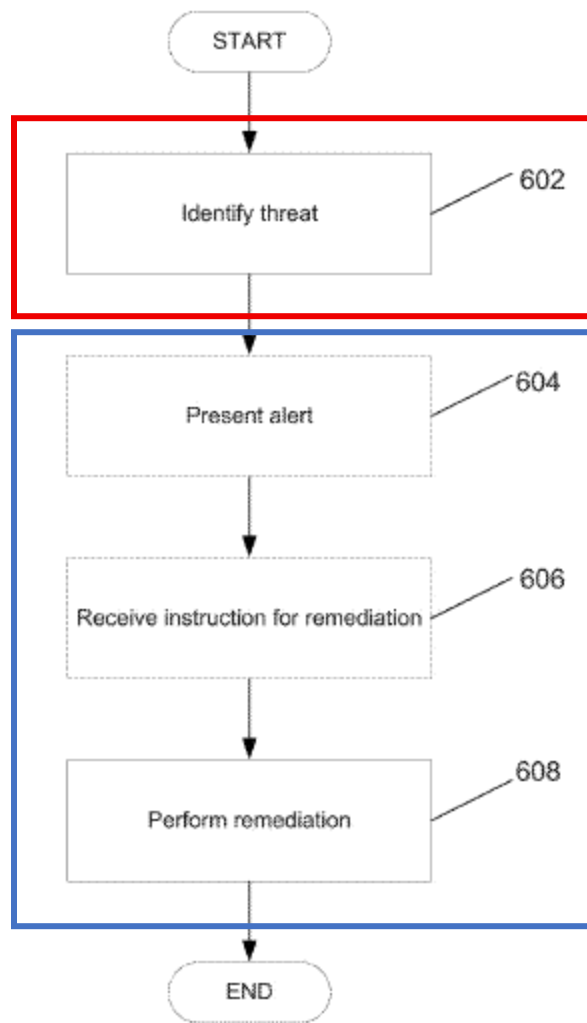


**FIG. 6**

Ex. 1004 [Kirti] 25:3-20, Fig. 6. Figure 5B likewise first “[g]enerate[s a] threat model” and “[d]etermine[s] likelihood of anomalous activity using threat

**model”** at steps 506-508 and then “[s]et[s] security controls” at step 510:

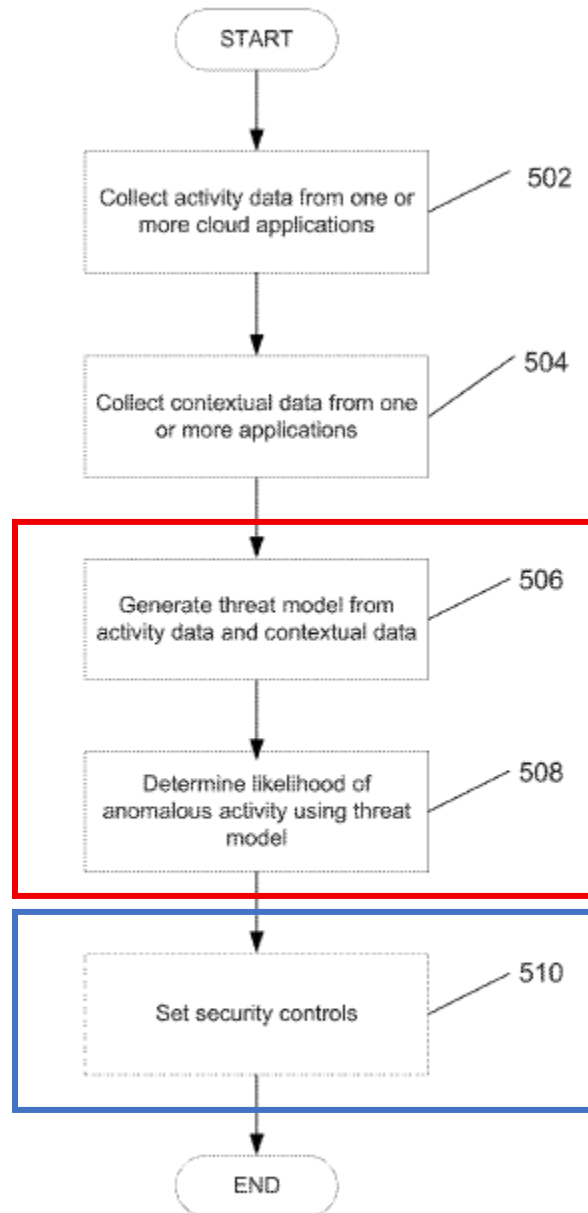


**FIG. 5B**

*Id.*, Fig. 5B, 24:33-50. Both disclosed processes therefore proceed in the same direction: Kirti first identifies a threat or anomaly and then determines an

appropriate response. Neither discloses determining that a probable cyberattack exists because the system has already determined that additional verification is required. And the additional-authentication disclosure on which Petitioner relies follows the same sequence: after a threat has been identified, the system may recommend heightened authentication as a security response. *Id.*, 28:24-34. In Kirti, therefore, threat detection supplies the reason for remediation; a determination requiring additional authentication does not supply the reason for detecting the threat.

135. Kirti analyzes observed activity to determine whether a potential security threat exists. After a threat or anomaly is detected, Kirti may determine an appropriate security response. Thus, the same underlying facts could potentially influence both Kirti's threat assessment and its remediation. But that does not mean Kirti detects the threat because it previously determined that additional authentication is required. To the contrary, Kirti teaches the opposite direction: the threat or anomalous behavior is identified first and supplies the reason for the subsequent remediation. Petitioner does not identify any disclosure in Kirti in which a decision requiring additional verification supplies the basis for determining that a probable cyberattack has been detected.

136. Dr. Black's testimony confirms this direction of operation. Discussing Kirti's Figure 5B, Dr. Black explained that the system compares a

user's current or recently collected activity with the user's past behavior and, if the activity "seems very divergent," "you might raise a flag." Ex. 2038 [Black-Tr.] 56:16-25. He further explained that Kirti's analysis then "determines the likelihood of anomalous activity," generates a risk score, and that those risk scores "can be used to prioritize" remediation. *Id.*, 57:9-16. Thus, under Dr. Black's own explanation of Kirti, the threat analysis precedes and supplies the basis for remediation—the opposite of the claimed relationship, in which the probable-cyberattack determination must be "based on the additional verification being required to grant access."

## VII. CONCLUSION

137. Although my complete opinions are set forth above, for convenience I summarize several points of my opinions in conclusion. For the foregoing reasons, based on my expertise and experience and the record of this case that I have reviewed, it is my opinion that:

- Claims 1-21, 23-28, and 30 are not obvious over Kirti (Ground 1);
- Claims 1-21, 23-28, and 30 are not obvious over Kirti and Coffin (Ground 2).

138. I understand that my opinions discussed above support a legal conclusion that claims 1-21, 23-28, and 30 are nonobvious.

In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required, I will appear for cross-examination within the United States during the time allotted.

I hereby declare that all statements made herein of my own knowledge are true and all statements made herein on information and belief were and are believed by me to be true, and that all statements herein were and are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that any such willful false statements may jeopardize the validity of the application or any patents issued thereon.

Respectfully submitted,

Dated: September 1, 2026

A handwritten signature in dark ink, appearing to read "Sam Malek", is written over a horizontal line.

Sam Malek, Ph.D.

# Exhibit A

## **SAM MALEK**

*Professor*

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### **TABLE OF CONTENTS**

|           |                                                    |           |
|-----------|----------------------------------------------------|-----------|
| <b>1</b>  | <b>EDUCATION .....</b>                             | <b>2</b>  |
| <b>2</b>  | <b>PROFESSIONAL HISTORY .....</b>                  | <b>2</b>  |
| <b>3</b>  | <b>HONORS, AWARDS, AND STATISTICS .....</b>        | <b>3</b>  |
| <b>4</b>  | <b>RESEARCH GRANTS, GIFTS, AND CONTRACTS .....</b> | <b>4</b>  |
| <b>5</b>  | <b>PUBLICATIONS .....</b>                          | <b>8</b>  |
| <b>6</b>  | <b>TEACHING .....</b>                              | <b>20</b> |
| <b>7</b>  | <b>SUPERVISED STUDENTS AND RESEARCHERS .....</b>   | <b>22</b> |
| <b>8</b>  | <b>FORMAL PRESENTATIONS .....</b>                  | <b>26</b> |
| <b>9</b>  | <b>PROFESSIONAL SERVICE .....</b>                  | <b>29</b> |
| <b>10</b> | <b>UNIVERSITY SERVICE .....</b>                    | <b>39</b> |
| <b>11</b> | <b>PROFESSIONAL ASSOCIATIONS .....</b>             | <b>40</b> |
| <b>12</b> | <b>PATENTS AND PATENT APPLICATIONS .....</b>       | <b>40</b> |
| <b>13</b> | <b>LITIGATION CONSULTING .....</b>                 | <b>40</b> |

## 1 EDUCATION

**Doctor of Philosophy** Computer Science August 2007  
University of Southern California  
Dissertation: *A User-Centric Approach for Improving a Distributed Software System's Deployment Architecture*

**Master of Science** Computer Science May 2004  
University of Southern California  
Emphasis on Software Engineering

**Bachelor of Science** Information and Computer Science December 2000  
University of California, Irvine

## 2 PROFESSIONAL HISTORY

August 2007 – present

Professor  
Department of Informatics  
Donald Bren School of Information and Computer Sciences  
University of California, Irvine  
(July 2015 – June 2019, Associate Professor at UC Irvine)  
(August 2013 – June 2015, Associate Professor at George Mason University)  
(August 2007 – July 2013, Assistant Professor at George Mason University)

August 2007 – present      Director  
Software Engineering and Analysis Laboratory  
University of California, Irvine  
(August 2007 – June 2015 at George Mason University)

|                        |                                                             |
|------------------------|-------------------------------------------------------------|
| October 2013 – present | Member<br>Cyberonix<br>(October 2013 – May 2025, President) |
|------------------------|-------------------------------------------------------------|

April 2014 – January 2023      Shareholder  
Quandary Peak Research

July 2018 – July 2022      Director  
Institute for Software Research  
University of California, Irvine  
(July 2015 – June 2018, Faculty Member)

August 2007 – June 2015      Faculty Member  
C4I Center  
George Mason University

January 2003 – May 2007   Graduate Research Assistant  
Computer Science Department  
University of Southern California

|                           |                                                                                                        |
|---------------------------|--------------------------------------------------------------------------------------------------------|
| April 2005 – May 2007     | Software Architect<br>Boeing Corporation<br>Huntington Beach, CA                                       |
| December 2000 – May 2002  | Software Engineer<br>PriceWaterhouseCoopers Consulting (IBM Global Business Services), Los Angeles, CA |
| August 1999 – Nov. 2000   | Software Engineer<br>FieldCentrix, Irvine, CA                                                          |
| May 1998 – September 1999 | Software Engineer<br>Neural Computing Systems Labs, Irvine, CA                                         |

### 3 HONORS, AWARDS, AND STATISTICS

- H-index: 56  
(scholar.google.com)
- Citations: 12,358  
(scholar.google.com)
- ACM SIGSOFT Distinguished Paper Award 2025  
47<sup>th</sup> IEEE/ACM International Conference on Software Engineering
- Test of Time Award 2020  
18<sup>th</sup> ACM SIGSOFT International Symposium on the Foundations of Software Engineering
- Mason Emerging Researcher/Scholar/Creator Award 2013  
George Mason University
- NSF CAREER Award 2013
- Outstanding Faculty Research Award 2011  
Computer Science Department, George Mason University
- DARPA Computer Science Study Group 2011 – 2014  
Selective early career award given annually to 12 academic panelists
- ACM Doctoral Dissertation Competition finalist 2007  
Nominated by the University of Southern California
- Outstanding Graduate Student Researcher Award 2005  
Computer Science Department, University of Southern California
- USC Viterbi School of Engineering Doctoral Fellow 2004 – 2008
- Magna Cum Laude 2000
- Cody Thorne Memorial Scholarship Award 1998  
Awarded annually to the youngest and highest scholastic student of the year
- Dean's Honor List 1997 – 2000

#### 4 RESEARCH GRANTS, GIFTS, AND CONTRACTS

- G32. National Science Foundation  
“STEM-APWD: Automated Software Engineering Techniques for Improving the Accessibility of Software”  
Duration: 01/01/2024 – 09/30/2026  
Investigators: Sam Malek (PI), Iftekhar Ahmed (Co-PI), and Stacy Branham (Co-PI)  
Award Amount: \$100,000
- G31. UCI, Academic Senate Council on Research, Computing and Libraries (CORCL) Award  
“Accelerating Software Security through AI-Driven Detection and Patching of Architectural Vulnerabilities”  
Duration: 3/25/2025 – 6/30/2025  
Investigator: Sam Malek (PI)  
Award Amount: \$3,352
- G30. UCI, Academic Senate Council on Research, Computing and Libraries (CORCL) Award  
“User Studies for Validating Automatically Detected Software Accessibility Issues”  
Duration: 4/14/2023 – 6/30/2023  
Investigator: Sam Malek (PI)  
Award Amount: \$2,758
- G29. National Science Foundation  
“Automated Software Engineering Techniques for Improving the Accessibility of Software”  
Duration: 10/1/2022 – 9/30/2026  
Investigator: Sam Malek (PI), Iftekhar Ahmed (Co-PI), and Stacy Branham (Co-PI)  
Award Amount: \$1,200,000
- G28. UCI, Academic Senate Council on Research, Computing and Libraries (CORCL) Award  
“Learning Neural Network Embedding of Apps for Foundational Advances in Software Engineering”  
Duration: 3/18/2022 – 6/30/2022  
Investigators: Sam Malek (PI)  
Award Amount: \$2,785
- G27. National Science Foundation  
“A General Framework for Automated Test Transfer”  
Duration: 10/1/2021 – 9/30/2025  
Investigators: Sam Malek (PI at UCI), Alessandro Orso (Lead PI at Georgia Tech), and Nenad Medvidovic (PI at USC)  
Award Amount: \$1,200,000
- G26. US Department of Education, Graduate Assistance in Areas of National Need Program (GAANN)  
“Graduate Fellowships in Cybersecurity at the University of California, Irvine”  
Duration: 10/1/2021 – 6/30/2024  
Investigators: Sam Malek (PI)  
Award Amount: \$1,141,425
- G25. UCI, School of Information and Computer Sciences Research Award  
“SAHARA: Software Analysis for Hardware Acceleration with Reconfigurable Architectures”

- Duration: 7/1/2021 – 6/30/2022  
Investigators: Joshua Garcia (PI), Sang-Woo Jun (Co-PI), Alberto Krone-Martins (Co-PI), Aparna Chandramowlishwaran (Co-PI), Sam Malek (Co-PI), Crista Lopes (Co-PI), Jim Bullock (Co-PI)  
Award Amount: \$75,000
- G24. National Science Foundation  
“Research Experiences for Undergraduates (REU) Supplement for Constructing a Community-Wide Software Architecture Infrastructure”  
Duration: 6/1/2021 – 8/31/2022  
Investigators: Sam Malek (PI) and Joshua Garcia (Co-PI)  
Award Amount: \$17,400
- G23. UCI, Academic Senate Council on Research, Computing and Libraries (CORCL) Award  
“Mobile Devices for Evaluating Accessibility of Mobile Apps through User Studies”  
Duration: 3/15/2021 – 6/30/2021  
Investigators: Sam Malek (PI)  
Award Amount: \$6,990
- G22. UCI, School of Information and Computer Sciences Research Award  
“Toward Stemming Accessibility Issues in Software”  
Duration: 7/1/2020 – 6/30/2021  
Investigators: Sam Malek (PI), Iftekhar Ahmed (Co-PI), Stacy Branham (Co-PI)  
Award Amount: \$75,000
- G21. Google  
“Mining Architectural Information to Stem Technical Debt”  
Duration: 10/3/2019 – 10/2/2020  
Investigators: Sam Malek (PI)  
Award Amount: \$42,500
- G20. National Science Foundation (NSF)  
“Constructing a Community-Wide Software Architecture Infrastructure”  
Duration: 9/1/2018 – 8/31/2022  
Investigators: Sam Malek (PI at UCI), Joshua Garcia (Co-PI at UCI), Nenad Medvidovic (Lead PI at USC), Mehdi Mirakhorli (PI at RIT), Rick Kazman (PI at UH), Yuanfang Cai (PI at Drexel), and Lu Xiao (PI at Stevens)  
Award Amount: \$1,660,000
- G19. Federal Bureau of Investigation (FBI)  
“Analysis of Android Application Packages for Security-Relevant Properties”  
Duration: 9/26/2016 – 9/25/2017  
Investigators: Sam Malek (PI)  
Award Amount: \$118,964
- G18. National Science Foundation (NSF)  
“Planning and Prototyping a Community-Wide Software Architecture Instrument”  
Duration: 8/1/2016 – 7/31/2018  
Investigators: Sam Malek (PI at UCI), Joshua Garcia (Co-PI at UCI), Nenad Medvidovic (Lead PI at USC), and Mehdi Mirakhorli (PI at RIT)  
Award Amount: \$130,000

- G17. National Science Foundation (NSF)  
“Efficient Formal Analysis of Evolving Software Systems”  
Duration: 7/1/2016 – 6/30/2020  
Investigators: Sam Malek (PI), Hamid Bagheri (Co-PI)  
Award Amount: \$499,170
- G16. Air Force Office of Scientific Research (AFOSR)  
“RASS: Resilient Autonomic Software Systems”  
Duration: 10/15/2015 – 10/14/2018  
Investigators: Sam Malek (PI at UCI), Daniel A. Menasce (Lead PI at GMU), Hassan Gomaa (Co-PI at GMU)  
Award Amount: \$1,016,641
- G15. Department of Homeland Security (DHS)  
“Tools for Automated Detection and Assessment of Security Vulnerabilities in Mobile Applications”  
Duration: 6/1/2014 – 5/31/2017  
Investigator: Sam Malek (Sole PI)  
Award Amount: \$500,000
- G14. National Security Agency (NSA)  
“Compositional Analysis of Android Apps for Security Vulnerabilities”  
Duration: 9/5/2014 – 4/24/2015  
Investigator: Sam Malek (Sole PI)  
Award Amount: \$200,000
- G13. National Security Agency (NSA)  
“Science of Secure Frameworks”  
Duration: 1/1/2014 – 12/31/2016  
Investigators: Sam Malek (PI at UCI), William Scherlis (Lead PI at CMU) and colleagues at CMU  
UCI Award Amount: \$195,000
- G12. Defense Advanced Research Projects Agency (DARPA)  
“Testing Privacy-Preserving Distributed Systems on DETERLab”  
Duration: 11/1/2013 – 2/28/2015  
Investigators: Sam Malek (PI at GMU), Nenad Medvidovic (Lead PI at USC), and Yuriy Brun (PI at UMass)  
Award Amount: \$300,000  
GMU Award Amount: \$84,000
- G11. Office of the Director of National Intelligence (ODNI)  
“Automated Approach for Detection and Mitigation of Security Vulnerabilities in Mobile Applications”  
Duration: 7/8/2013 – 7/7/2016  
Investigator: Sam Malek (Sole PI)  
Award Amount: \$359,372
- G10. Intelligence Advanced Research Projects Activity (IARPA)  
“sTile: Private Computing in the Open”

- Duration: 9/27/2013 – 9/26/2014  
Investigators: Sam Malek (PI at GMU), Nenad Medvidovic (Lead PI at USC), and Yuriy Brun (PI at UMass)  
Award Amount: \$300,000  
GMU Award Amount: \$84,000
- G9. National Science Foundation (NSF)  
“CAREER: A Mining-Based Approach for Consistent and Timely Adaptation of Component-Based Software”  
Duration: 2/1/2013 – 1/31/2019  
Investigator: Sam Malek (Sole PI)  
Award Amount: \$451,481
- G8. Army Research Office (ARO)  
“Architecture-Based Self-Securing Systems”  
Duration: 10/1/2012 – 9/30/2015  
Investigators: Sam Malek (PI at GMU), William Scherlis (Lead PI at CMU) and colleagues at CMU  
GMU Award Amount: \$200,000
- G7. Federal Bureau of Investigation (FBI)  
“Automated Security Testing and Analysis of Android Applications”  
Duration: 9/12/2012 – 9/11/2014  
Investigator: Sam Malek (Sole PI)  
Award Amount: \$90,000
- G6. Defense Advanced Research Projects Agency (DARPA)  
“Engineering Highly Adaptive Resilient Software Systems”  
Duration: 4/25/2011 – 5/31/2016  
Investigator: Sam Malek (Sole PI)  
Award Amount: \$949,065
- G5. National Science Foundation (NSF)  
“Mining the Execution History of a Software System to Infer the Best Time for its Adaptation”  
Duration: 2/1/2012 – 1/31/2014  
Investigator: Sam Malek (Sole PI)  
Award Amount: \$80,000
- G4. Science Applications International Corporation (SAIC)  
“COTS Very Small Computing Platforms - Tactical”  
Duration: 1/1/2010 – 6/30/2011  
Investigator: Sam Malek (Sole PI)  
Award Amount: \$224,470
- G3. Science Applications International Corporation (SAIC)  
“COTS Very Small Computing Platforms - Security”  
Duration: 1/1/2010 – 6/30/2011  
Investigator: Sam Malek (Sole PI)  
Award Amount: \$99,415
- G2. National Science Foundation (NSF)

“SASSY: Self-Architecting Software Systems”

Duration: 06/15/2008 – 06/1/2011

Investigators: Sam Malek (Co-PI at GMU), Daniel A. Menasce (PI at GMU), Hassan Gomaa (Co-PI at GMU), and Joao P. Sousa (Co-PI at GMU)

Award Amount: \$479,996

G1. US Army Topographic Engineering Center

Duration: 12/20/2006 – 12/20/2010

Investigators: Sam Malek (Co-PI at GMU), Michael Hieb (PI at GMU), and Mark Pullen (Co-PI at GMU)

Award Amount: \$133,187

## 5 PUBLICATIONS

### 5.1 JOURNAL ARTICLES

- J27. Negar Ghorbani, Joshua Garcia, and Sam Malek. “Bringing Architecture-Based Adaptation to the Mainstream.” *Elsevier Journal of Information and Software Technology (IST)*, Vol. 176, December 2024.
- J26. Negar Ghorbani, Tarandeep Singh, Joshua Garcia, and Sam Malek. “Darcy: Automatic Architectural Inconsistency Resolution in Java.” *IEEE Transactions on Software Engineering (TSE)*, Vol. 50, No. 6, June 2024.
- J25. Sejin Jung, Junbeom Yoo, and Sam Malek. “A Systematic Co-engineering of Safety and Security Analysis in Requirements Engineering Process.” *Elsevier International Journal of Critical Infrastructure Protection*, Vol 43, December 2023.
- J24. Negar Ghorbani, Reyhaneh Jabbarvand, Navid Salehnamadi, Joshua Garcia, and Sam Malek. “DeltaDroid: Dynamic Delivery Testing in Android.” *ACM Transactions on Software Engineering and Methodology (TOSEM)*, Vol. 32, No. 4, May 2023.
- J23. Jun-Wei Lin, Navid Salehnamadi, and Sam Malek. “ROUTE: Roads Not Taken in UI Testing.” *ACM Transactions on Software Engineering and Methodology (TOSEM)*, Vol. 32, No. 3, April 2023.
- J22. Joshua Garcia, Ehsan Kouroshfar, Negar Ghorbani, and Sam Malek. “Forecasting Architectural Decay from Evolutionary History.” *IEEE Transactions on Software Engineering (TSE)*, Vol. 48, No. 7, July 2022.
- J21. Hamid Bagheri, Jianghao Wang, Jarod Aerts, Negar Ghorbani, and Sam Malek. “Flair: Efficient Analysis of Android Inter-Component Vulnerabilities in Response to Incremental Changes.” *Springer Journal of Empirical Software Engineering (EMSE)*, Vol. 26, No. 54, April 2021.
- J20. Mahmoud Hammad, Hamid Bagheri, and Sam Malek. “DelDroid: An Automated Approach for Determination and Enforcement of Least-Privilege Architecture in Android.” *Journal of Systems and Software (JSS)*, Special Section on Architecting Autonomous and Smart Systems. Vol 149, March 2019.
- J19. Joshua Garcia, Mahmoud Hammad, and Sam Malek. “Lightweight, Obfuscation-Resilient Detection and Family Identification of Android Malware.” *ACM Transactions on Software Engineering and Methodology (TOSEM)*, Vol. 26, No. 3, January 2018. (Journal First)

- J18. Hamid Bagheri, Eunsuk Kang, Sam Malek, and Daniel Jackson. "A Formal Approach for Detection of Security Flaws in the Android Permission System." *Springer Journal on Formal Aspects of Computing*, Pages 1-20, November 2017.
- J17. Alireza Sadeghi, Hamid Bagheri, Joshua Garcia, and Sam Malek. "A Taxonomy and Qualitative Comparison of Program Analysis Techniques for Security Assessment of Android Software." *IEEE Transactions on Software Engineering (TSE)*, Vol. 43, No. 6, June 2017. (Journal First)
- J16. Alireza Sadeghi, Naeem Esfahani, and Sam Malek. "Ensuring the Consistency of Adaptation through Inter- and Intra-Component Dependency Analysis." *ACM Transactions on Software Engineering and Methodology (TOSEM)*, Vol. 26, No. 1, May 2017. (Journal First)
- J15. Hamid Bagheri, Joshua Garcia, Alireza Sadeghi, Sam Malek, and Nenad Medvidovic. "Software Architectural Principles in Contemporary Mobile Software: from Conception to Practice." *Journal of Systems and Software (JSS)*, Vol. 119, Pages 31-44, September 2016.
- J14. Naeem Esfahani, Eric Yuan, Kyle R. Canavera, and Sam Malek. "Inferring Software Component Interaction Dependencies for Adaptation Support." *ACM Transactions on Autonomous and Adaptive Systems (TAAS)*, Vol. 10, No. 4, February 2016.
- J13. Hamid Bagheri, Alireza Sadeghi, Joshua Garcia, and Sam Malek. "COVERT: Compositional Analysis of Android Inter-App Permission Leakage." *IEEE Transactions on Software Engineering (TSE)*, Vol. 41, No. 9, September 2015.
- J12. Eric Yuan, Naeem Esfahani, and Sam Malek. "A Systematic Survey of Self-Protecting Software Systems." *ACM Transactions on Autonomous and Adaptive Systems (TAAS)*, Vol. 8, No. 4, January 2014.
- J11. Deshan Cooray, Ehsan Kouroshfar, Sam Malek, and Roshanak Roshandel. "Proactive Self-Adaptation for Improving the Reliability of Mission-Critical, Embedded, and Mobile Software." *IEEE Transactions on Software Engineering (TSE)*, Vol. 39, No. 12, December 2013.
- J10. Naeem Esfahani, Ahmed Elkhodary, and Sam Malek. "A Learning-Based Framework for Engineering Feature-Oriented Self-Adaptive Software Systems." *IEEE Transactions on Software Engineering (TSE)*, Vol. 39, No. 11, November 2013.
- J9. Chris A. Mattmann, Nenad Medvidovic, Sam Malek, George Edwards, and Somo Banerjee. "A Middleware Platform for Providing Mobile and Embedded Computing Instruction to Software Engineering Students." *IEEE Transactions on Education*, Vol. 55, No. 3, pages 425-435, August 2012.
- J8. Naeem Esfahani, and Sam Malek. "Utilizing Architectural Styles to Enhance the Adaptation Support of Middleware Platforms." *Elsevier Journal of Information and Software Technology (IST)*, Vol. 54, No. 7, pages 786-801, July 2012.
- J7. Danny Weyns, Sam Malek, and Jesper Andersson. "FORMS: Unifying Reference Model for Formal Specification of Distributed Self-Adaptive Systems." *ACM Transactions on Autonomous and Adaptive Systems (TAAS) – Special Issue on Formal Methods for Pervasive, Self-Aware and Context-Aware Systems*, Vol. 7, No. 1, pages 1-61, April 2012.
- J6. Sam Malek, Nenad Medvidovic, and Marija Mikic-Rakic. "Improving a Distributed Software System's Quality of Service via Redeployment." *IEEE Transactions on Software Engineering (TSE)*, Vol. 38, No. 1, pages 73-100, January/February 2012.
- J5. Danny A. Menasce, Hassan Gomaa, Sam Malek, and Joao Pedro Sousa. "SASSY: A Framework for Self-Architecting Service Oriented Systems." *IEEE Software*, Vol. 28, No. 6, pages 78-85, November/December 2011.

- J4. Sam Malek, Harshini Ramnath Krishnan, and Jayalakshmi Srinivasan. "Enhancing Middleware Support for Architecture-Based Development through Compositional Weaving of Styles." *Journal of Systems and Software (JSS)*, Vol. 83, No. 12, pages 2513-2527, December 2010.
- J3. Sam Malek, George Edwards, Yuriy Brun, Hossein Tajalli, Joshua Garcia, Ivo Krka, Nenad Medvidovic, Marija Mikic-Rakic, Gaurav Sukhatme. "An Architecture-Driven Software Mobility Framework." *Journal of Systems and Software (JSS)*, special issue on Software Architecture and Mobility, Vol. 83, No. 6, pages 972-989, June 2010.
- J2. Sam Malek, Marija Mikic-Rakic, and Nenad Medvidovic. "A Style-Aware Architectural Middleware for Resource-Constrained, Distributed Systems." *IEEE Transactions on Software Engineering (TSE)*, Vol. 31, No. 3, pages 256-272, March 2005.
- J1. Nenad Medvidovic, Marija Mikic-Rakic, Nikunj Mehta, and Sam Malek. "Software Architectural Support for Handheld Computing." *IEEE Computer – Special Issue on Handheld Computing*, Vol. 36, No. 9, pages 66-73, September 2003.

## 5.2 CONFERENCE PUBLICATIONS

- C106. Moumita Asad, Rafed Muhammad Yasi, and Sam Malek. "Towards Explorative IRBL: Combining Semantic Retrieval with LLM-driven Iterative Code Exploration." In *proceedings of the 35<sup>th</sup> ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2026)*, Oakland, CA, October 2026. (24% acceptance rate)
- C105. Yirui He, Ziayo He, Syed Fatiul Huq, and Sam Malek. "ReFLAIR: Detecting Responsive Layout Reflow Issues using Multimodal Generative AI." In *proceedings of the ACM International Conference on the Foundations of Software Engineering (FSE 2026)*, Montreal, Canada, July 2026. (22% acceptance rate)
- C104. Syed Fatiul Huq, Ziyao He, Yirui He, and Sam Malek. "Bridging the Gap between Automated Intervention and Actual User Experience: A Mixed-Methods Study on Mobile Accessibility Issues for Screen Reader Users." In *proceedings of the ACM CHI Conference on Human Factors in Computing Systems (CHI 2026)*, Barcelona, Spain, April 2026. (25% acceptance rate)
- C103. Shubhi Jain, Syed Fatiul Huq, Ziyao He, and Sam Malek. "Automated Detection of Web Application Navigation Barriers for Screen Reader Users." In *proceedings of the 40<sup>th</sup> IEEE/ACM International Conference on Automated Software Engineering (ASE 2025)*, Seoul, South Korea, November 2025. (20% acceptance rate)
- C102. Ziyao He, Syed Fatiul Huq, and Sam Malek. "Enhancing Web Accessibility: Automated Detection of Issues with Generative AI." In *proceedings of the ACM International Conference on the Foundations of Software Engineering (FSE 2025)*, Trondheim, Norway, June 2025. (22% acceptance rate)
- C101. Benyamin Beyzaei, Saghar Talebipour, Ghazal Rafiei, Nenad Medvidovic, and Sam Malek. "Automated Test Transfer Across Android Apps Using Large Language Models." In *proceedings of the 34<sup>th</sup> ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2025)*, Trondheim, Norway, June 2025. (19% acceptance rate)
- C100. Forough Mehralian, Ziyao He, and Sam Malek. "Automated Accessibility Analysis of Dynamic Content Changes on Mobile Apps." In *proceedings of the 47<sup>th</sup> IEEE/ACM International Conference on Software Engineering (ICSE 2025)*, Ottawa, Canada, April 2025.
- C99. Syed Fatiul Huq, Mahan Tafreshipour, Kate Kalcevich, and Sam Malek. "Automated Generation of Accessibility Test Report from Recorded User Transcripts." In *proceedings of the 47<sup>th</sup>*

- IEEE/ACM International Conference on Software Engineering (ICSE 2025)*, Ottawa, Canada, April 2025.
- C98. Mahan Tafreshipour, Anmol Deshpande, Forough Mehralian, Iftekhar Ahmed, and Sam Malek. “Ma1ly: A Mutation Framework for Web Accessibility Testing.” In *proceedings of the 33<sup>rd</sup> ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2024)*, Vienna, Austria, September 2024.
- C97. Ziyao He, Syed Fatiul Huq, and Sam Malek. ““I tend to view ads almost like a pestilence”: On the Accessibility Implications of Mobile Ads for Blind Users.” In *proceedings of the 46<sup>th</sup> IEEE/ACM International Conference on Software Engineering (ICSE 2024)*, Lisbon, Portugal, April 2024. (22% acceptance rate)
- C96. Pooja Naresh Bhatia, and Sam Malek. “A Historical Review of Web Accessibility Using WAVE.” In *proceedings of the 5<sup>th</sup> Workshop on Gender Equality, Diversity, and Inclusion in Software Engineering (GE 2024)*, Lisbon, Portugal, April 2024.
- C95. Syed Fatiul Huq, Abdulaziz Alshayban, Ziayo He, and Sam Malek. “#AllyDev: Understanding Contemporary Software Accessibility Practices from Twitter Conversations.” In *proceedings of the ACM CHI Conference on Human Factors in Computing Systems (CHI 2023)*, Hamburg, Germany, April 2023. (28% acceptance rate)
- C94. Navid Salehnamadi, Ziyao He, and Sam Malek. “Assistive-Technology Aided Manual Accessibility Testing in Mobile Apps, Powered by Record-and-Replay.” In *proceedings of the ACM CHI Conference on Human Factors in Computing Systems (CHI 2023)*, Hamburg, Germany, April 2023. (28% acceptance rate)
- C93. Abdulaziz Alshayban, and Sam Malek. “AccessiText: Automated Detection of Text Accessibility Issues in Android Apps.” In *proceeding of the 30<sup>th</sup> ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE 2022)*, Singapore, November 2022. (22% acceptance rate)
- C92. Forough Mehralian, Navid Salehnamadi, Syed Fatiul Huq, and Sam Malek. “Too Much Accessibility is Harmful! Automated Detection and Analysis of Overly Accessible Elements in Mobile Apps.” In *proceedings of the 37<sup>th</sup> IEEE/ACM International Conference on Automated Software Engineering (ASE 2022)*, Michigan, United States, October 2022. (21% acceptance rate)
- C91. Navid Salehnamadi, Forough Mehralian, and Sam Malek. “Groundhog: An Automated Accessibility Crawler for Mobile Apps.” In *proceedings of the 37<sup>th</sup> IEEE/ACM International Conference on Automated Software Engineering (ASE 2022)*, Michigan, United States, October 2022. (21% acceptance rate)
- C90. Jun-Wei Lin and Sam Malek. “GUI Test Transfer from Web to Android.” In *proceedings of the 15<sup>th</sup> IEEE International Conference on Software Testing, Verification and Validation (ICST 2022)*, Virtual Event, April 2022. (26% acceptance rate)
- C89. Mahmoud Hammad, Ibrahim Abueisa, and Sam Malek. “Tool-Assisted Componentization of Java Applications.” In *proceedings of the 19<sup>th</sup> IEEE International Conference on Software Architecture (ICSA 2022)*, Honolulu, Hawaii, March 2022. (20% acceptance rate)
- C88. Faraz YazdaniBanafsheDaragh and Sam Malek. “Deep GUI: Black-box GUI Input Generation with Deep Learning.” In *proceedings of the IEEE/ACM Automated Software Engineering Conference (ASE 2021)*, Melbourne, Australia, November 2021. (27% acceptance rate)
- C87. Forough Mehralian, Navid Salehnamadi, and Sam Malek. “Data-Driven Accessibility Repair Revisited: On the Effectiveness of Generating Labels for Icons in Android Apps.” In *proceedings*

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### 5.3 BOOK CHAPTERS

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- B6. Naeem Esfahani, and Sam Malek. "Uncertainty in Self-Adaptive Software Systems." In *Software Engineering for Self-Adaptive Systems 2*, Editors R. de Lemos, H. Giese, H. Müller, and M. Shaw. Lecture Notes in Computer Science Hot Topics, Springer, 2013.
- B5. Danny Weyns, Bradley Schmerl, Vincenzo Grassi, Sam Malek, Raffaella Mirandola, Christian Prehofer, Jochen Wuttke, Jesper Andersson, Holger Giese, and Karl Goschka. "On Patterns for Decentralized Control in Self-Adaptive Systems." In *Software Engineering for Self-Adaptive Systems 2*, Editors R. de Lemos, H. Giese, H. Müller, and M. Shaw. Lecture Notes in Computer Science Hot Topics, Springer, 2012.
- B4. Rogerio de Lemos, Holger Giese, Hausi Muller, Mary Shaw, Jesper Andersson, Luciano Baresi, Basil Becker, Nelly Bencomo, Yuriy Brun, Bojan Cikic, Ron Desmarais, Schahram Dustdar, Gregor Engels, Kurt Geihs, Karl M. Goeschka, Alessandra Gorla, Vincenzo Grassi, Paola Inverardi, Gabor Karsai, Jeff Kramer, Marin Litoiu, Antonia Lopes, Jeff Magee, Sam Malek, Serge Mankovskii, Raffaella Mirandola, John Mylopoulos, Oscar Nierstrasz, Mauro Pezze, Christian Prehofer, Wilhelm Schafer, Wilhelm Schlichting, Bradley Schmerl, Dennis B. Smith, Joao P. Sousa, Gabriel Tamura, Ladan Tahvildari, Norha M. Villegas, Thomas Vogel, Danny Weyns, Kenny Wong, Jochen Wuttke. "Software Engineering for Self-Adaptive Systems: A second Research Roadmap." In *Software Engineering for Self-Adaptive Systems 2*, Editors R. de Lemos, H. Giese, H. Müller, and M. Shaw. Lecture Notes in Computer Science Hot Topics, Springer, 2012.

- B3. Jesper Andersson, Rogerio de Lemos, Sam Malek, and Danny Weyns. “Modeling Dimensions of Self-Adaptive Software Systems.” In *Software Engineering for Self-Adaptive Systems*, Editors B. H. C. Cheng, R. de Lemos, H. Giese, P. Inverardi, and J. Magee, Lecture Notes in Computer Science Hot Topics, Springer, 2009.
- B2. Betty H. C. Cheng, Rogério de Lemos, Holger Giese, Paola Inverardi, Jeff Magee, Jesper Andersson, Basil Becker, Nelly Bencomo, Yuriy Brun, Bojan Cukic, Giovanna Di Marzo Serugendo, Schahram Dustdar, Anthony Finkelstein, Cristina Gacek, Kurt Geihs, Vincenzo Grassi, Gabor Karsai, Holger M. Kienle, Jeff Kramer, Marin Litoiu, Sam Malek, Raffaella Mirandola, Hausi A. Müller, Sooyong Park, Mary Shaw, Matthias Tichy, Massimo Tivoli, Danny Weyns, Jon Whittle. “Software Engineering for Self-Adaptive Systems: A Research Roadmap.” In *Software Engineering for Self-Adaptive Systems*, Editors B. H. C. Cheng, R. de Lemos, H. Giese, P. Inverardi, and J. Magee, Lecture Notes in Computer Science, Springer, 2009.
- B1. Sam Malek, Nels Beckman, Marija Mikic-Rakic, and Nenad Medvidovic. “A Framework for Ensuring and Improving Dependability in Highly Distributed Systems.” In *Architecting Dependable Systems III*, Editors R. de Lemos, C. Gacek, and A. Romanowski, Springer Verlag, October 2005.

## 5.4 EDITED BOOKS AND JOURNALS

- E2. Danny Weyns, Sam Malek, Jesper Andersson, and Bradley Schmerl. “Introduction to the Special Issue on the State of the Art in Engineering Self-Adaptive Software Systems.” *Journal of Systems and Software (JSS)*, Vol. 85, No. 12, pages 2675-2677, December 2012.
- E1. Danny Weyns, Sam Malek, Rogerio de Lemos, and Jesper Andersson, eds. “Self-Organizing Architectures.” *Lecture Notes in Computer Science (LNCS)*, Springer Verlag, Vol. 6090, 300 pages, September 2009. ISBN: 978-3-642-14411-0

## 5.5 DISSERTATION

- Sam Malek. “A User-Centric Approach for Improving a Distributed Software System’s Deployment Architecture.” PhD thesis. Computer Science Department, University of Southern California, 2007.

# 6 TEACHING

## 6.1 UNIVERSITY OF CALIFORNIA, IRVINE

- **INF 117 – Projects in Software System Design**  
Terms: Fall 2020, Fall 2021, Fall 2022, Fall 2024  
Upper-division undergraduate course for several majors within ICS
- **INF 124 / CompSci 137 – Internet Applications Engineering**  
Terms: Spring 2016, Spring 2017, Spring 2018, Spring 2019, Spring 2021, Spring 2022  
Upper-division undergraduate course for several majors within ICS
- **SWE 221 – Software Architecture**  
Terms: Fall 2016, Fall 2017, Fall 2018, Fall 2019, Fall 2022, Fall 2023, Spring 2025  
Graduate-level core course for Software Engineering M.S. and Ph.D. students

- **SWE 264P – Distributed Software Architecture**  
Terms: Winter 2020, Winter 2021, Winter 2022, Winter 2023, Winter 2024, Winter 2025, Winter 2026  
Graduate-level core course for Software Engineering MSWE student
- **INF 291S – Literature Survey in Software Engineering**  
Terms: Fall 2017, Spring 2018, Fall 2018, Spring 2019, Fall 2019, Spring 2020  
Graduate-level seminar course for Software Engineering M.S. and Ph.D. students
- **SWE 295 – Mobile Software Engineering**  
Terms: Winter 2023  
Graduate-level elective course for Software Engineering M.S. and Ph.D. students
- **SWE 295 – Software Accessibility**  
Terms: Fall 2024  
Graduate-level elective course for Software Engineering M.S. and Ph.D. students

## 6.2 GEORGE MASON UNIVERSITY

- **SWE 699 / CS 795 / IT 821 – Software Architecture Research Issues**  
Terms taught: Spring 2010  
Graduate-level elective course for M.S. and Ph.D. level students
- **SWE 699 / CS 795 / IT 821 – Service-Oriented Architecture**  
Terms taught: Spring 2009, Fall 2011  
Graduate-level elective course for M.S. and Ph.D. level students
- **SWE 622 – Distributed Software Engineering**  
Terms taught: Fall 2007, Spring 2008, Fall 2008, Fall 2009, Spring 2010, Spring 2011, Fall 2011, Spring 2012, Fall 2012, Spring 2013, Fall 2013, Spring 2014  
Graduate-level core course for the M.S. degree in Software Engineering
- **SWE 443 – Software Architectures**  
Terms taught: Spring 2013  
Upper-division undergraduate course for BS CS and BS ACS majors

## 6.3 UNIVERSITY OF SOUTHERN CALIFORNIA

- **CS 589 – Software Engineering for Embedded Systems**  
Teaching Assistant, Fall 2003; Guest Lecturer, Fall 2004-2006
- **CS 377 – Introduction to Software Engineering**  
Guest Lecturer, Fall 2006

## 7 SUPERVISED STUDENTS AND RESEARCHERS

### 7.1 POSTDOCTORAL ASSOCIATES

#### ALUMNI

- Joshua Garcia  
July 2014 – June 2018  
First employment: Assistant Professor, University of California Irvine
- Hamid Bagheri  
September 2013 – August 2016  
First employment: Assistant Professor, University of Nebraska Lincoln
- Yonghee Shin  
August 2012 – May 2013  
First employment: Folio Investing

### 7.2 DOCTORAL DISSERTATION COMMITTEE CHAIR

#### CURRENT

- Syed Fatiul Huq  
Status: passed advancement in Summer 2024
- Ziyao He  
Status: passed advancement in Summer 2025
- Moumita Asad  
Status: started in Fall 2023
- Congyu Luo  
Status: started in Fall 2023
- Yirui He  
Status: passed advancement in Fall 2025

#### ALUMNI

- Forough Mehralian  
Graduation date: July 2024  
Dissertation title: Automated Techniques for Improving the Accessibility of Android Applications for Screen Reader Users  
First employment: Apple Inc
- Abdulaziz Alshayban  
Graduation date: March 2023  
Dissertation title: Automated Detection and Repair of Text Accessibility Issues  
First employment: Assistant Professor, King Saud University
- Navid Salehnamadi  
Graduation date: December 2022  
Dissertation title: Automated Assistive-Service Driven Accessibility Testing for Mobile Applications  
First employment: Senior Machine Learning Engineer, Tesla
- Negar Ghorbani  
Graduation date: August 2022

Dissertation title: Validation and Verification of Modular Constructs in Software Applications

First employment: Research Scientist, Meta

- Jun-Wei Lin  
Graduation date: August 2021  
Dissertation title: Advancing Automated Software Testing Through Test Reuse  
First employment: Software Engineer, MGM Resort International
- Reyhaneh Jabbarvand  
Graduation date: June 2020  
Dissertation title: Advancing Energy Testing of Android Applications  
First employment: Assistant Professor, University of Illinois Urbana-Champaign
- Mahmoud Hammad  
Graduation date: August 2018  
Dissertation title: Self-Protection of Android Systems from Inter-Component Communication Attacks  
First employment: Assistant Professor, Jordan University of Science and Technology
- Alireza Sadeghi  
Graduation date: December 2017  
Dissertation title: Efficient Permission-Aware Analysis of Android Apps  
First employment: Google Inc.
- Nariman Mirzaei  
Graduation date: August 2016  
Dissertation title: Automated Input Generation Techniques for Testing Android Applications  
First employment: Videology
- Ehsan Kouroshfar  
Graduation date: May 2016  
Dissertation title: An Empirical Study of the Interplay Between Architecture and Software Quality Using Evolutionary History of Software  
First employment: Appian Corporation
- Eric Yuan  
Graduation date: May 2016  
Dissertation title: Architecture-Based Self-Protecting Software Systems  
First employment: Aerospace Corporation
- Riyadh Mahmood  
Graduation date: May 2015  
Dissertation title: An Evolutionary Approach for System Testing of Android Applications  
First employment: Harris Corporation
- Naeem Esfahani  
Graduation date: August 2014  
Dissertation title: Management of Uncertainty in Self-Adaptive Software  
First employment: Google Inc.
- Ahmed Elkhodary  
Graduation date: December 2011  
Dissertation title: A Learning-Based Approach for Engineering Feature-Oriented Self-Adaptive Software Systems  
First employment: U.S. Securities and Exchange Commission

### 7.3 MASTERS DISSERTATION COMMITTEE CHAIR

#### CURRENT

- Rafed Muhammad Yasir
- Abdul Kalam Syed

#### ALUMNI

- Rafed Muhammad Yasir  
Graduation date: July 2025  
Dissertation title: Impact of Mislabelled Issues on Information Retrieval-based Bug Localization
- Shubhi Jain  
Graduation date: June 2025  
Dissertation title: Automated Detection of Web Application Navigation Barriers for Screen Reader Users
- Ziyao He  
Graduation date: June 2023  
Dissertation title: Enhancing Manual Accessibility Testing in Mobile Apps through Synergistic Integration of Assistive Technology and Record-and-Replay Techniques
- Pooja Naresh Bhatia  
Graduation date: June 2023  
Dissertation title: A Historical Review of Web Accessibility Using Wave
- Faraz Yazdani  
Graduation date: August 2020  
Dissertation title: Deep-GUI: Towards Platform-Independent UI Input Generation with Deep Reinforcement Learning
- Deshan A. Cooray  
Graduation date: August 2010  
Dissertation title: Resisting Reliability Degradation through Proactive Reconfiguration  
First employment: Verisign Inc.

### 7.4 DOCTORAL ADVANCEMENT AND DISSERTATION COMMITTEE MEMBER

- |                    |                            |     |            |
|--------------------|----------------------------|-----|------------|
| • Shenshen Han     | Advisor: Kylie Peppler     | UCI | 2025       |
| • Hang Du          | Advisor: James Jones       | UCI | 2025       |
| • Md Rakib Hossain | Advisor: Cristina Lopes    | UCI | 2024       |
| • Jiawei Li        | Advisor: Iftekhar Ahmed    | UCI | 2023       |
| • Yuqi Huai        | Advisor: Joshua Garcia     | UCI | 2022       |
| • Yasaman Razeghi  | Advisor: Sameer Singh      | UCI | 2022       |
| • Andrew Truelove  | Advisor: Iftekhar Ahmed    | UCI | 2021       |
| • Jiri Gesi        | Advisor: Iftekhar Ahmed    | UCI | 2021, 2023 |
| • Arda Unal        | Advisor: Joshua Garcia     | UCI | 2021, 2022 |
| • Zhihao Yao       | Advisor: Ardalan Amir Sani | UCI | 2020       |

|                               |                            |              |            |
|-------------------------------|----------------------------|--------------|------------|
| • Farnaz Behrang              | Advisor: Alessandro Orso   | Georgia Tech | 2020       |
| • Farima Farmahinifarahani    | Advisor: Cristina Lopes    | UCI          | 2019, 2022 |
| • Sumaya Almanee              | Advisor: Joshua Garcia     | UCI          | 2019, 2022 |
| • Seyed Mohammad Seyed Talebi | Advisor: Ardalan Amir Sani | UCI          | 2019       |
| • Yingtong Liu                | Advisor: Ardalan Amir Sani | UCI          | 2019       |
| • Julian Lettner              | Advisor: Michael Franz     | UCI          | 2018       |
| • Vaibhav Saini               | Advisor: Cristina Lopes    | UCI          | 2018       |
| • Di Yang                     | Advisor: Cristina Lopes    | UCI          | 2019       |
| • Rohan Achar                 | Advisor: Cristina Lopes    | UCI          | 2019, 2020 |
| • Yang Feng                   | Advisor: James Jones       | UCI          | 2019       |
| • Alexios Voulimeneas         | Advisor: Michael Franz     | UCI          | 2018       |
| • Gabriel Moreno              | Advisor: David Garlan      | CMU          | 2017       |
| • Hsin-Chung Chen             | Advisor: Pai Chou          | UCI          | 2016       |
| • Jing Guan                   | Advisor: Jeff Offutt       | GMU          | 2015       |
| • John D. McDowall            | Advisor: Larry Kerschberg  | GMU          | 2014       |
| • Quyen L. Nguyen             | Advisor: Arun Sood         | GMU          | 2014       |
| • Nan Li                      | Advisor: Jeff Offutt       | GMU          | 2014       |
| • Ahmed Abu Jbara             | Advisor: Alexander Levis   | GMU          | 2013       |
| • Antti Evesti                | Advisor: Jukka Riekkii     | U. of Oulu   | 2013       |
| • Sander van der Burg         | Advisor: Eelco Visser      | Delft U.     | 2013       |
| • Zhaohui Wang                | Advisor: Angelos Stavrou   | GMU          | 2012       |
| • Julie Street, 2011          | Advisor: Hassan Gomaa      | GMU          | 2011       |
| • Mohammad Abu-Matar          | Advisor: Hassan Gomaa      | GMU          | 2011       |

## 7.5 MASTERS DISSERTATION COMMITTEE MEMBER

|                         |                             |     |      |
|-------------------------|-----------------------------|-----|------|
| • Leyu Lyu              | Advisor: Andre van der Hoek | UCI | 2024 |
| • Yongbo Chen           | Advisor: Joshua Garcia      | UCI | 2024 |
| • Changnam Hong         | Advisor: Joshua Garcia      | UCI | 2024 |
| • Anmol Deshpande       | Advisor: Andre van der Hoek | UCI | 2024 |
| • Canyang Shi           | Advisor: Joshua Garcia      | UCI | 2022 |
| • Aaron Matthews        | Advisor: Joshua Garcia      | UCI | 2021 |
| • Xiaochen Yu           | Advisor: Cristina Lopes     | UCI | 2021 |
| • Shrijith Venkatramana | Advisor: Cristina Lopes     | UCI | 2021 |
| • Thomas Kwak           | Advisor: Andre van der Hoek | UCI | 2017 |
| • Andrea Renika Souza   | Advisor: Cristina Lopes     | UCI | 2016 |
| • Xiang Shen            | Advisor: Joao Sousa         | GMU | 2013 |
| • Muhammad Faraz Rafi   | Advisor: Alexander Levis    | GMU | 2010 |

• Koji Hashimoto

Advisor: Hassan Gomaa

GMU

2010

## 8 FORMAL PRESENTATIONS

- P63. *Invited talk — Beyond Functional Bugs: How AI Can Help Us Test the Non-Functional Properties that Matter*, Future Advanced Testing Technology Workshop, Paris, France, September 2025.
- P62. *Recall: Automated Generation of Accessibility Test Reports from Recorded User Transcripts*, 47<sup>th</sup> IEEE/ACM International Conference on Software Engineering (ICSE 2025), Ottawa, Canada, April 2025.
- P61. *Invited talk — Emerging Software Testing Techniques for More Accessible Software*, 34<sup>th</sup> ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2025), Inclusive Software Session, Trondheim, Norway, June 2025.
- P60. *MaIly: A Mutation Framework for Web Accessibility Testing*, 33<sup>rd</sup> ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2024), Vienna, Austria, September 2024.
- P59. *Keynote — Beyond “alt text”: Emerging Software Engineering Techniques for More Accessible Software*, 17<sup>th</sup> IEEE International Conference on Software Testing, Verification, and Validation (ICST 2024), Toronto, Canada, May 2024.
- P58. *Invited talk — Emerging Software Engineering Techniques for Stemming Software Accessibility Issues*, Monash University, Software Systems and Cybersecurity Seminars, June 2023.
- P57. *Invited talk — Software Analysis and Testing Techniques for Mobile Applications*, Nippon Telegraph and Telephone, April 2022.
- P56. *Invited talk — Test of Time Award: FUSION: a Framework for Engineering Self-Tuning Self-Adaptive Software Systems*, 27<sup>th</sup> ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE), Sacramento, CA, November 2020.
- P55. *Invited talk — The Threat in Your Pocket: Trends, Challenges, and Solutions in Mobile Application Security*, ACM OC Chapter, Irvine, CA, May 2020.
- P54. *Invited talk — Mining Architectural Information to Stem Technical Debt*, Google, Venice, CA, June 2019.
- P53. *Invited talk — Mobile Application Security*. CPRI-ISR IoT Security Symposium, Irvine, CA, May 2019.
- P52. *Invited talk — Testing and Analysis Techniques for Improving the Quality of Android Apps*. Google, Mountain View, CA, March 2019.
- P51. *Keynote — The Threat in Your Pocket: Trends, Challenges, and Solutions in Mobile Application Security*. 25<sup>th</sup> Australasian Software Engineering Conference (ASWEC) and Australasian Software Week (ASW), November 2018.
- P50. *Advancing Energy Testing of Android Apps*. Futurewei Academia Test Forum. Dallas, TX, September 2018.
- P49. *Missteps in Framework Design: Consequences and Solutions*. Institute for Software Research Forum, UC Irvine, June 2018.
- P48. *Mining Mobile App Markets for Prioritization of Security Assessment Effort*. International Workshop on App Market Analytics (WAMA 2017), Paderborn, Germany, September 2017.

- P47. *Tools for Automated Detection and Assessment of Security Vulnerabilities in Mobile Applications*. Department of Homeland Security's Cyber Security Division R&D Showcase and Technical Workshop, Washington DC, July 2017.
- P46. *Keynote — Android Security from a Software Architectural Perspective*. IEEE International Conference on Software Architecture (ICSA 2017), Gothenburg, Sweden, April 2017.
- P45. *Energy-Aware Test-Suite Minimization for Android Apps*. International Symposium on Software Testing and Analysis (ISSTA 2016), Saarbrücken, Germany, July 2016.
- P44. *Mobile App Security: Detection and Family Identification of the Malice in your Pocket*. Institute for Software Research Forum, UC Irvine, May 2016.
- P43. *Detection and Family Identification of Android Malware*. Department of Homeland Security's Cyber Security Division R&D Showcase and Technical Workshop, Washington, DC, February 2016.
- P42. *SIG-Droid: Automated System Input Generation for Android Applications*. 26<sup>th</sup> IEEE International Symposium on Software Reliability Engineering (ISSRE 2015), Gaithersburg, MD, November 2015.
- P41. *Detection and Family Identification of Android Malware*. NII Shonan Meeting – Mobile App Store Analytics, Kanagawa, Japan, October 2015.
- P40. *Automated Detection of Android Inter-Application Vulnerabilities*. DHS SWAMP/SQA PI meeting, Atlanta, May 2015.
- P39. *A Tool for Automated Detection of Inter-Application Security Vulnerabilities in Android*. National Security Agency, College Park, Maryland, March 2015.
- P38. *Automated Analysis and Testing of Mobile Software*. University of California Irvine. Computer Science Department. March 2015.
- P37. *Automated Analysis and Testing of Mobile Software*. University of Southern California. Computer Science Department. February 2015.
- P36. *Automated Analysis and Testing of Mobile Software*. College of William and Mary. Computer Science Department. February 2015.
- P35. *Automated Analysis and Testing of Mobile Software*. George Mason University. Computer Science Department. February 2015.
- P34. *Invited Talk — Automated Detection and Mitigation of Inter-Application Security Vulnerabilities in Android*. 2<sup>nd</sup> International Workshop on Software Development Lifecycle for Mobile. Hong Kong, China, November 2014.
- P33. *Automated Mining of Software Component Interactions for Self-Adaptation*. 9<sup>th</sup> International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS 2014). Hyderabad, India, June 2014.
- P32. *Keynote — Toward the Making of Software that Learns to Manage Itself*. 27<sup>th</sup> Brazilian Symposium on Software Engineering (SBES 2013), Brasilia, Brazil, October 2013.
- P31. *Invited Speaker — Automated Security Testing of Mobile Applications*. FedMobileCamp hosted by NSA/InnoVision, Reston, VA, August 2013.
- P30. *Invited Talk — A Framework for Improving a Distributed Software System's Deployment Architecture*. Delft University of Technology, Delft, Netherlands, June 2013.
- P29. *Keynote — The Secret Sauce for Succeeding in your PhD Research and Beyond*. 35<sup>th</sup> International Conference on Software Engineering (ICSE 2013), Doctoral Symposium track, San Francisco, CA, May 2013.

- P28. *Automated Security Testing and Analysis of Smartphone Applications*. National Security Agency, George Mason University, Fairfax, VA, August 2012
- P27. *Automated Security Testing of Android Applications for the Military App Store*. DARPA Computer Science Study Panel, Arlington, VA, April 2012
- P26. *Invited Talk — Guided Exploration of the Architectural Solution Space in the Face of Uncertainty*. Lockheed Martin Architects Workshop, Littleton, Colorado, August 2011
- P25. *Taming Uncertainty in Self-Adaptive Software*. 8th joint meeting of the European Software Engineering Conference and ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE 2011), Szeged, Hungary, September 2011
- P24. *Invited Talk — Engineering Self-Adaptive Software Systems*. Virginia Polytechnic Institute and State University, Falls Church, VA, February 2011
- P23. *Invited Talk — Engineering Self-Adaptive Software Systems*. Sharif University, Tehran, Iran, December 2010
- P22. *FUSION: A Framework for Engineering Self-Tuning Self-Adaptive Software Systems*. 18<sup>th</sup> ACM SIGSOFT International Symposium on the Foundations of Software Engineering (FSE 2010), Santa Fe, NM, November 2010
- P21. *Reliability Degradation through Proactive Reconfiguration*. 25<sup>th</sup> IEEE/ACM International Conference on Automated Software Engineering (ASE 2010), Antwerp, Belgium, September 2010
- P20. *Utilizing Architectural Styles to Enhance Adaptation Support in Middleware Platforms*. 4<sup>th</sup> European Conference on Software Architectures (ECSA 2010), Copenhagen, Denmark, August 2010
- P19. *Context-Driven Optimization of Mobile Service-Oriented Systems for Improving their Resilience*. IEEE International Workshop on Engineering Mobile Service-Oriented Systems (EMSOS 2010), Miami, FL, July 2010
- P18. *Social Computing Networks: A New Paradigm for Engineering Pervasive Software Systems*. 32<sup>nd</sup> International Conference on Software Engineering (ICSE 2010), New Ideas and Emerging Results Track, Cape Town, South Africa, May 2010
- P17. *Self-Architecting Software Systems (SASSY) from QoS-Annotated Activity Models*. International Workshop on Principles of Engineering Service Oriented Systems (PESOS 2009), Vancouver, Canada, May 2009
- P16. *Component-Level Energy Consumption Estimation for Distributed Java-Based Software Systems*. International Symposium on Component Based Software Engineering (CBSE 2008), Karlsruhe, Germany, October 2008
- P15. *Dealing with the Crosscutting Structure of Software Architectural Styles*. IEEE International Computer Software and Applications Conference (COMPSAC), Turku, Finland, July 2008
- P14. *Architecture-Driven Software Mobility in Support of QoS Requirements*. International Workshop on Software Architectures and Mobility (SAM), Leipzig, Germany, May 2008
- P13. *Effective Realization of Software Architectural Styles with Aspects*. Working IEEE/IFIP Conference on Software Architecture (WICSA 2008), Vancouver, BC, Canada, February 2008
- P12. *A Framework for Estimating the Impact of a Distributed Software System's Architectural Style on its Energy Consumption*. Working IEEE/IFIP Conference on Software Architecture (WICSA 2008), Vancouver, BC, Canada, February 2008
- P11. *Architecture-Driven Software Mobility in Support of QoS Requirements*. Dagstuhl Seminar 08031 on Software Engineering for Self-Adaptive Systems, Saarbrücken, Germany, January 2008

- P10. *Reconceptualizing a Family of Heterogeneous Embedded Systems via Explicit Architectural Support*. International Conference on Software Engineering (ICSE 2007), Minneapolis, Minnesota, May 2007
- P9. *A User-Centric Framework for Improving a Distributed Software System's Deployment Architecture*. Doctoral track of the Symposium on Foundations of Software Engineering (FSE 2006), Portland, Oregon, November 2006
- P8. *Tailoring an Architectural Middleware Platform to a Heterogeneous Embedded Environment*. International Workshop on Software Engineering and Middleware (SEM 2006), Portland, Oregon, November 2006
- P7. *A Decentralized Redeployment Algorithm for Improving the Availability of Distributed Systems*. International Conference on Component Deployment (CD 2005), Grenoble, France, November 2005
- P6. *Improving Availability in Large, Distributed, Component-Based Systems via Redeployment*. International Conference on Component Deployment (CD 2005), Grenoble, France, November 2005
- P5. *A User-Centric Approach for Improving a Distributed Software System's Deployment Architecture*. USC Center for Software Engineering Annual Research Review, Los Angeles, California, March 2005
- P4. *An Extensible Framework for Autonomic Analysis and Improvement of Distributed Deployment Architectures*. ACM SIGSOFT Workshop on Self-Managed Systems (WOSS 2004), Newport Beach, California, October 2004
- P3. *A Tailorable Environment for Assessing the Quality of Deployment Architectures in Highly Distributed Settings*. Second International Conference on Component Deployment (CD 2004), Edinburgh, Scotland, May 2004
- P2. *Improving Availability of Distributed Event-Based Systems via Run-Time Monitoring and Analysis*. Workshop on Architecting Dependable Systems (WADS 2004) held in conjunction with the International Conference on Software Engineering (ICSE 2004), Edinburgh, Scotland, May 2004
- P1. *Improving System Availability in Distributed Environments*. USC Center for Software Engineering Annual Research Review, Los Angeles, CA, March 2004

## 9 PROFESSIONAL SERVICE

### 9.1 EDITORIAL BOARDS AND STEERING COMMITTEES

- E7. Deputy Editor-in-Chief, Springer Journal of Automated Software Engineering (February 2024 – present)
- E6. Associate Editor, ACM Transactions on Software Engineering and Methodology (March 2018 – March 2024)
- E5. Associate Editor, ACM Transactions on Autonomous and Adaptive Systems (Nov 2017 – present)
- E4. Associate Editor, Springer Computing Journal (February 2011 – February 2024)
- E3. Member, Steering Committee, IEEE International Conference on Software Architecture (April 2019 – May 2022)

- E2. Member, Steering Committee, International Symposium on Software Engineering for Adaptive and Self-Managing Systems (June 2015 – May 2019)
- E1. Associate Editor, IEEE Transactions on Software Engineering (February 2014 – February 2018)

## 9.2 CONFERENCE AND WORKSHOP ORGANIZATION

- O36. Area Track Chair, 49<sup>th</sup> International Conference on Software Engineering (ICSE 2027), Dublin, Ireland, May 2027.
- O35. Co-Organizer, 1<sup>st</sup> International Workshop on User Interface and Experience for Software Engineering (UISE 2026), Rio De Janeiro, Brazil, April 2026.
- O34. Co-Organizer, 8<sup>th</sup> International Workshop on Advances in Mobile App Analysis (A-Mobile 2024), Seoul, South Korea, November 2025.
- O33. Co-Organizer, 7<sup>th</sup> International Workshop on Advances in Mobile App Analysis (A-Mobile 2024), Sacramento, CA, September 2024.
- O32. Co-Organizer, 6<sup>th</sup> International Workshop on Advances in Mobile App Analysis (A-Mobile 2023), Kirchberg, Luxembourg, September 2023
- O31. Workshop Co-Chair, International Conference on Software Engineering (ICSE 2023), Melbourne, Australia, May 2023
- O30. Co-Organizer, 5<sup>th</sup> International Workshop on Advances in Mobile App Analysis (A-Mobile 2022), Ann Arbor, Michigan, October 2022
- O29. Sponsorship Co-Chair, International Conference on Software Engineering (ICSE 2022), Pittsburgh, PA, May 2022
- O28. Co-Organizer, 4<sup>th</sup> International Workshop on Advances in Mobile App Analysis (A-Mobile 2021), Melbourne, Australia, November 2021
- O27. Co-Organizer, 3<sup>rd</sup> International Workshop on Advances in Mobile App Analysis (A-Mobile 2020), Melbourne, Australia, September 2020
- O26. Technical Briefings Co-Chair, 42<sup>nd</sup> International Conference on Software Engineering (ICSE 2020), Seoul, South Korea, May 2020
- O25. Program Co-Chair, IEEE International Conference on Software Architecture (ICSA 2020), Salvador, Brazil, March 2020
- O24. Co-Organizer, 2<sup>nd</sup> International Workshop on Advances in Mobile App Analysis (A-Mobile 2019), San Diego, CA, November 2019
- O23. Co-Organizer, 2<sup>nd</sup> International Workshop on Establishing a Community-Wide Infrastructure for Architecture-Based Software Engineering (ECASE 2019), Montreal, Canada, May 2019
- O22. Co-Organizer, International Workshop on Advances in Mobile App Analysis (A-Mobile 2018), Montpellier, France, September 2018
- O21. Program Co-Chair, 5<sup>th</sup> IEEE/ACM International Conference on Mobile Software Engineering and Systems (MobileSoft 2018), Visions Track, Gothenburg, Sweden, May 2018
- O20. Co-Organizer, NSF Sponsored Workshop on Infrastructures and Instruments for Software Architecture (REINFORCE), Urbana-Champaign, Illinois, October 2017

- O19. Program Co-Chair, 11<sup>th</sup> IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2017), Tucson, Arizona, September 2017
- O18. Awards Chair, 39th International Conference on Software Engineering (ICSE 2016), Buenos Aires, Argentina, May 2017
- O17. Program Co-Chair, International Workshop on Establishing the Community-Wide Infrastructure for Architecture-Based Software Engineering (ECASE 2017), Buenos Aires, Argentina, May 2017
- O16. Program Chair, 11th International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS 2016), Austin, Texas, May 2016
- O15. Tutorial Co-Chair, 10th Joint Meeting of European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE 2015), Bergamo, Italy, August 2015
- O14. Proceedings Chair, 22nd International Symposium on the Foundations of Software Engineering (FSE 2014), Hong Kong, China, November 2014
- O13. Tutorial Chair, 11th Working IEEE/IFIP Conference on Software Architecture (WICSA 2014), Sydney, Australia, April 2014
- O12. Program Chair, 4th ACM SIGSOFT International Symposium on Architecting Critical Systems (ISARCS 2013), Vancouver, Canada, June 2013
- O11. Internet Chair, 35th International Conference on Software Engineering (ICSE 2013), San Francisco, California, May 2013
- O10. Publicity Chair, 6th IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2012), Lyon, France, September 2012
- O9. Workshop Chair, Joint 10th Working IEEE/IFIP Conference on Software Architecture (WICSA 2012) and 6th European Conference on Software Architecture (ECSA 2012), Helsinki, Finland, August 2012
- O8. Publicity Chair, 5th International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2011), Ann Arbor, Michigan, October 3-7 2011
- O7. Posters Chair, 33rd International Conference on Software Engineering (ICSE 2011), Honolulu, Hawaii, May 21-28, 2011
- O6. Co-editor, special issue of the Journal of Systems and Software on “State of the Art in Self-Adaptive Software Systems”, tentative publication date of December 2011
- O5. North America Regional Editor, International Journal of Software Architecture, 2010-2014
- O4. Co-Organizer, ICAC International Workshop on Self-Organizing Architectures (SOAR 2010), Cambridge, UK, June 7, 2010
- O3. Co-editor, “Self-Organizing Architectures”, Lecture Notes in Computer Science, Springer Verlag, vol. 6090, 300 pages, September 2009, ISBN: 978-3-642-14411-0
- O2. Co-Organizer, WICSA/ECSA International Workshop on Self-Organizing Architectures (SOAR 2009), Cambridge, UK, Sep 14, 2009
- O1. GMU Software Engineering Seminar Series, 2007- 2015  
<http://cs.gmu.edu/~smalek/seminar.html>

### 9.3 PROGRAM COMMITTEE AND PANEL MEMBERSHIP

- S129. Program Committee Member, 1<sup>st</sup> International Workshop on Code Translation, Transformation, and Modernization (ReCode 2026), Rio De Janeiro, Brazil, April 2026.
- S128. Program Committee Member, 23<sup>rd</sup> IEEE International Conference on Software Architecture (ICSA 2026), Netherlands, Amsterdam, June 2026.
- S127. Program Committee Member, 40<sup>th</sup> IEEE/ACM International Conference on Automated Software Engineering (ASE 2025), Seoul, South Korea, November 2025.
- S126. Program Committee Member, ACM International Conference on the Foundations of Software Engineering (FSE 2025), Trondheim, Norway, June 2025.
- S125. Program Committee Member, 22<sup>nd</sup> IEEE International Conference on Software Architecture (ICSA 2025), Odense, Denmark, March 2025.
- S124. Program Committee Member, 9<sup>th</sup> ACM/IEEE International Conference on Automated Software Engineering (ASE 2024), Sacramento, CA, November 2024.
- S123. Program Committee Member, 21<sup>st</sup> IEEE International Conference on Software Architecture (ICSA 2024), Hyderabad, India, June 2024.
- S122. Program Committee Member, 46<sup>th</sup> International Conference on Software Engineering (ICSE 2024), Lisbon, Portugal, April 2024.
- S121. Program Committee Member, 22<sup>nd</sup> ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE 2023), San Francisco, CA, November 2023.
- S120. Program Committee Member, 38<sup>th</sup> IEEE/ACM International Conference on Automated Software Engineering (ASE 2023), Kirchberg, Luxembourg, September 2023.
- S119. Program Committee Member, 10<sup>th</sup> International Conference on Mobile Software Engineering and Systems (MobileSoft 2023), Melbourne, Australia, May 2023
- S118. Program Committee Member, 20<sup>th</sup> IEEE International Conference on Software Architecture (ICSA 2023), L'aquila, Italy, March 2023.
- S117. Program Committee Member, 21<sup>st</sup> ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE 2022), Singapore, November 2022
- S116. Panelist, National Science Foundation, Computing and Communication Foundations, November 2022.
- S115. Program Committee Member, 37<sup>th</sup> IEEE/ACM International Conference on Automated Software Engineering (ASE 2022), Ann Arbor, Michigan, October 2022
- S114. Program Committee Member, 44<sup>th</sup> International Conference on Software Engineering, Doctoral Symposium (ICSE-DS 2022), Pittsburgh, PA, May 2022
- S113. Program Committee Member, 17<sup>th</sup> International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS 2022), Pittsburgh, PA, May 2022
- S112. Program Committee Member, 19<sup>th</sup> IEEE International Conference on Software Architecture (ICSA 2022), Honolulu, Hawaii, March 2022

- S111. Program Committee Member, ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE 2021), Athens, Greece, August 2021
- S110. Program Committee Member, International Conference on Software Engineering Journal First track (ICSE-JF 2021), , Madrid, Spain, May 2021
- S109. Program Committee Member, 8<sup>th</sup> IEEE/ACM International Conference on Mobile Software Engineering and Systems (MOBILESOFT 2021), Madrid, Spain, May 2021
- S108. Panelist, National Science Foundation, May 2021
- S107. Program Committee Member, 4th International Workshop on User Interface Test Automation and Testing Techniques for Event-Based Software (INTUITESTBEDS 2021), Porto de Galinha, Brazil, April 2021
- S106. Program Committee Member, 18<sup>th</sup> IEEE International Conference on Software Architecture (ICSA 2021), Stuttgart, Germany, March 2021
- S105. Program Committee Member, Language and Tools for Next Generation Testing Workshop (LANGETI 2020), Sacramento, CA, November 2020
- S104. Program Committee Member, 11<sup>th</sup> International Workshop on Automated Software Testing (A-Test 2020), Sacramento, CA, November 2020
- S103. Program Committee Member, 15<sup>th</sup> European Conference on Software Architecture (ECSA 2020), L'Aquila, Italy, September 2020
- S102. Editor-in-Chief ACM Transactions on Autonomous and Adaptive Systems Search Committee Member, September 2020
- S101. Program Committee Member, 3<sup>rd</sup> International Conference on Science of Cyber Security (SciSec 2020), Shanghai, China, August 2020
- S100. Program Committee Member, 42<sup>nd</sup> ACM/IEEE International Conference on Software Engineering (ICSE 2020), Seoul, South Korea, May 2020
- S99. Program Committee Member, 3<sup>rd</sup> International Workshop on User Interface Test Automation and Testing Techniques for Event-Based Software (INTUITESTBEDS 2020), Porto, Portugal, March 2020
- S98. Program Committee Member, 2<sup>nd</sup> International Workshop on Software Security from Design to Deployment (SEAD 2019), San Diego, CA, November 2019
- S97. Program Committee Member, 14<sup>th</sup> European Conference on Software Architecture (ECSA 2019), Paris, France, September 2019
- S96. Program Committee Member, 10<sup>th</sup> International Workshop on Automated Software Testing (A-Test 2019), Tallinn, Estonia, August 2019
- S95. Program Committee Member, 2<sup>nd</sup> International Conference on Science of Cyber Security (SciSec 2019), Nanjing, China, August 2019
- S94. Program Committee Member, 41<sup>st</sup> ACM/IEEE International Conference on Software Engineering (ICSE 2019), Montreal, Canada, May 2019
- S93. Program Committee Member, 6<sup>th</sup> IEEE/ACM International Conference on Mobile Software Engineering and Systems (MOBILESOFT 2019), Montreal, Canada, May 2019
- S92. Program Committee Member, 14<sup>th</sup> Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS 2019), Doctoral Track, Montreal, Canada, May 2019

- S91. Program Committee Member, 1<sup>st</sup> International Workshop on Self-Protecting Systems (SPS 2019), Umea, Sweden, April 2019
- S90. Program Committee Member, 2<sup>nd</sup> International Workshop on User Interface Test Automation and Testing Techniques for Event-Based Software (INTUITESTBEDS 2019), Xi'an, China, April 2019
- S89. Program Committee Member, IEEE International Conference on Software Architecture (ICSA 2019), Hamburg, Germany, March 2019.
- S88. Program Committee Member, 26<sup>th</sup> ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE 2018), Lake Buena Vista, Florida, November 2018
- S87. Program Committee Member, 1<sup>st</sup> International Workshop on Architectural Knowledge for Self-Adaptive Systems (AKSAS 2018), Madrid, Spain, September 2018
- S86. Program Committee Member, 12<sup>th</sup> Workshop on Distributed Software Development, Software Ecosystems and Systems-of-Systems (WDES 2018), Madrid, Spain, September 2018
- S85. Program Committee Member, 12<sup>th</sup> IEEE International Conference on Adaptive and Self-Organizing Systems (SASO 2018), Trento, Italy, September 2018
- S84. Program Committee Member, 12<sup>th</sup> European Conference on Software Architecture (ECSA 2018), Madrid, Spain, September 2018
- S83. Program Committee Member, 12<sup>th</sup> Workshop on Distributed Software Development, Software Ecosystems and Systems-of-Systems (WDES 2018), Madrid, Spain, September 2018
- S82. Program Committee Member, 1<sup>st</sup> International Workshop on Architecture Knowledge for Self-Adaptive Systems (AKSAS 2018), Madrid, Spain, September 2018
- S81. Program Committee Member, 4<sup>th</sup> International Workshop on User-Interface Test Automation and 8<sup>th</sup> International Workshop on Testing Techniques for Event-based Software (INTUITESTBEDS 2018), Amsterdam, Netherlands, July 2018
- S80. Program Committee Member, 40<sup>th</sup> International Conference on Software Engineering (ICSE 2018), Demonstrations Track, Gothenburg, Sweden, May 2018
- S79. Program Committee Member, 40<sup>th</sup> International Conference on Software Engineering (ICSE 2018), Software Engineering in Society Track, Gothenburg, Sweden, May 2018
- S78. Program Committee Member, 5<sup>th</sup> IEEE/ACM International Conference on Mobile Software Engineering and Systems (MOBILESOFT 2018), Gothenburg, Sweden, May 2018
- S77. Program Committee Member, 13<sup>th</sup> International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS 2018), Gothenburg, Sweden, May 2018
- S76. Program Committee Member, 1<sup>st</sup> International Workshop on Security Awareness from Design to Deployment (SEAD 2018), Gothenburg, Sweden, May 2018
- S75. Program Committee Member, IEEE International Conference on Software Architecture (ICSA 2018), Seattle, USA, April 2018
- S74. Program Committee Member, 11<sup>th</sup> European Conference on Software Architecture (ECSA 2017), Canterbury, UK, September 2017
- S73. Program Committee Member, 2<sup>nd</sup> Workshop on Engineering Collective Adaptive Systems (eCAS 2017), Tucson, Arizona, September 2017

- S72. Search Committee Member, Editor in Chief Search Committee for the ACM Transactions on Autonomous and Adaptive Systems, January 2017-June 2017
- S71. Program Committee Member, 4<sup>th</sup> IEEE/ACM International Conference on Mobile Software Engineering and Systems (MOBILESOFT 2017), Buenos Aires, Argentina, May 2017
- S70. Program Committee Member, 39<sup>th</sup> International Conference on Software Engineering (ICSE 2017), Buenos Aires, Argentina, May 2017
- S69. Program Committee Member, Joint 5<sup>th</sup> International Workshop on Software Engineering for Systems-of-Systems and 11<sup>th</sup> Workshop on Distributed Software Development, Software Ecosystems and Systems-of-Systems (SESOS/WDES 2017), Buenos Aires, Argentina, May 2017
- S68. Program Committee Member, 12<sup>th</sup> International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS 2017), Buenos Aires, Argentina, May 2017
- S67. Program Committee Member, International Conference on Software Architecture (ICSA 2017), Gothenburg, Sweden, April 2017
- S66. Program Committee Member, International Workshop on App Market Analytics (WAMA 2016), Seattle, WA, November 2016
- S65. NSF Panel Member, Computing and Communication Foundations, Arlington, VA, September 2016
- S64. Program Committee Member, 10<sup>th</sup> International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2016), Augsburg, Germany, September 2016
- S63. Program Committee Member, 10<sup>th</sup> European Conference on Software Architecture (ECSA 2016), Istanbul, Turkey, September 2016
- S62. Program Committee Member, 13<sup>th</sup> IEEE International Conference on Autonomic Computing (ICAC 2016), Wurzburg, Germany, July 2016
- S61. Program Committee Member, 38<sup>th</sup> International Conference on Software Engineering (ICSE 2016), Workshop Proposals, Austin, Texas, May 2016
- S60. Program Committee Member, IEEE/ACM International Conference on Mobile Software Engineering and Systems (MOBILESoft 2016), Doctoral Symposium, Austin, Texas, May 2016
- S59. Program Committee Member, International Workshop on Bringing Architecture Design Thinking into Developers' Daily Activities (BRIDGE 2016), Austin, Texas, May 2016
- S58. Program Committee Member, 4<sup>th</sup> International Workshop on Software Engineering for System-of-Systems (SESoS 2016), Austin, Texas, May 2016
- S57. Program Committee Member, Symposium and Bootcamp on the Science of Security (HotSoS 2016), Pittsburgh, PA, April 2016
- S56. Program Committee Member, 13<sup>th</sup> Working IEEE/IFIP Conference on Software Architecture (WICSA 2016) and 10<sup>th</sup> Federated Conference Series on Component-Based Software Engineering and Software Architecture (CompArch 2016), Venice, Italy, April 2016
- S55. Program Committee Member, 3<sup>rd</sup> International Workshop on Software Development Lifecycle for Mobile (DeMobile 2015), Bergamo, Italy, August 2015
- S54. Program Committee Member, 9<sup>th</sup> European Conference on Software Architecture (ECSA 2015), Dubrovnik, Croatia, September 2015
- S53. Program Committee Member, 9<sup>th</sup> IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2015), Cambridge, MA, September 2015

- S52. Program Committee Member, 19th International Software Product Line Conference (SPLC 2015): New Directions in Systems and Software Product Line Engineering, Nashville, TN, July 2015
- S51. Program Committee Member, Symposium and Bootcamp on the Science of Security (HotSoS 2015), Urbana-Champaign, IL, April 2015
- S50. Program Committee Member, 37th International Conference on Software Engineering (ICSE 2015), Florence, Italy, May 2015
- S49. NSF Panel Member, Computing and Communication Foundations, Arlington, VA, May 2015.
- S48. Program Committee Member, 12th Working IEEE/IFIP Conference on Software Architecture (WICSA 2015), Montreal, Canada, May 2015
- S47. Program Committee Member, 10th International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS 2015), Florence, Italy, May 2015
- S46. Program Committee Member, 9th International Workshop on Models at Runtime (MRT 2014), Valencia, Spain, September 2014
- S45. Program Committee Member, 5th Testing Techniques and Experimentation Benchmarks for Event-Driven Software (TESTBEDS 2014), Vasteras, Sweden, September 2014
- S44. Program Committee Member, 8th European Conference on Software Architecture (ECSA 2014), Vienna, Austria, August 2014
- S43. Program Committee Member, IEEE 2nd International Workshop on Engineering Mobile Service Oriented Systems (EMSOS 2014), Anchorage, AL, June 2014
- S42. Program Committee Member, 4th International Workshop on the Twin Peaks of Requirements and Architecture (TwinPeaks 2014), Hyderabad, India, June 2014
- S41. Program Committee Member, 2nd International Workshop on the Engineering of Mobile-Enabled Systems (MOBS 2014), Hyderabad, India, June 2014
- S40. Program Committee Member, 36th International Conference on Software Engineering (ICSE 2014), Hyderabad, India, June 2014
- S39. Program committee Member, 9th International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS 2014), Hyderabad, India, June 2014
- S38. Program Committee Member, 11th Working IEEE/IFIP Conference on Software Architecture (WICSA 2014), Sydney, Australia, April 2014
- S37. Program Committee Member, Workshop on Architecting Mobile-Enabled Systems (AMeS 2014), Sydney, Australia, April 2014
- S36. Program Committee Member, Coordination Models, Languages and Applications track, 29th ACM Symposium on Applied Computing (SAC 2014), Gyeongju, Korea, March 2014
- S35. NSF Panel Member, Secure and Trustworthy Computing, Arlington, VA, March 2014
- S34. Panelist, American Association for the Advancement of Science (AAAS), Maine Technology Institute Development Loan Program, August 2013
- S33. Program Committee Member, 7th IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2013), Philadelphia, USA, September 2013
- S32. Program Committee Member, International Workshop on Software Engineering for Systems-of-Systems (SESoS 2013), Montpellier, France, July 2013

- S31. Program Committee Member, 7th European Conference on Software Architecture (ECSA 2013), Montpellier, France, July 2013
- S30. Program Committee Member, 3rd International Workshop on the Twin Peaks of Requirements and Architecture (TwinPeaks 2013), Rio de Janeiro, Brazil, July 2013
- S29. Program Committee Member, International Workshop on the Engineering of Mobile-Enabled Systems (MOBS 2013), San Francisco, CA, May 2013
- S28. Program Committee Member, 4th International Workshop on Software Engineering for Sensor Network Applications (SESENA 2013), San Francisco, CA, May 2013
- S27. Program Committee Member, 2nd International Workshop on the Twin Peaks of Requirements and Architecture (TwinPeaks 2013), San Francisco, CA, May 2013
- S26. NSF Panel Member, Computing and Communication Foundations, Arlington, VA, January 2013
- S25. Program Committee Member, Coordination Models, Languages and Applications track, 28th ACM Symposium on Applied Computing (SAC 2013), Coimbra, Portugal, January 2013
- S24. Program Committee Member, 1st International Workshop on the Twin Peaks of Requirements and Architecture (TwinPeaks 2012), Chicago, Illinois, September 2012
- S23. Program Committee Member, 1st International Workshop on Adaptive Service Ecosystems: Nature and Socially Inspired Solutions (ASENSIS 2012), Lyon, France, September 2012
- S22. Program Committee Member, 20th International Symposium on the Foundations of Software Engineering (FSE 2012), New Ideas and Emerging Results Track, Research Triangle Park, North Carolina, November 2012
- S21. Program Committee Member, 6th IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2012), Lyon, France, September 2012
- S20. Program Committee Member, Joint 10th Working IEEE/IFIP Conference on Software Architecture (WICSA 2012) and 6th European Conference on Software Architecture (ECSA 2012), Helsinki, Finland, August 2012
- S19. Program Committee Member, Workshop on Architectures and Platforms for Knowledge Discovery from Data, Helsinki, Finland, August 2012
- S18. Program Committee Member, 15th International ACM SIGSOFT Symposium on Component Based Software Engineering (CBSE 2012), Bertinoro, Italy, June 2012
- S17. Program Committee Member, 2nd Workshop on Developing Tools as Plug-ins (TOPI 2012), Zurich, Switzerland, June 2012
- S16. Program Committee Member, 34th International Conference on Software Engineering (ICSE 2012), New Ideas and Emerging Results Track, Zurich, Switzerland, June 2012
- S15. Program Committee Member, 5th International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2011), Ann Arbor, Michigan, October 3-7 2011
- S14. Program Committee Member, 25th Brazilian Symposium on Software Engineering (SBES), São Paulo, Brazil, September 26-30 2011
- S13. NSF Panel Member, Computer Networks and Systems core, Arlington, VA, March 2011
- S12. Program Committee Member, 5th European Conference on Software Architecture (ECSA 2010), Essen, Germany, September 13-16 2011

- S11. Program Committee Member, 33rd International Conference on Software Engineering (ICSE 2011), ACM Student Research Competition, Honolulu, Hawaii, May 21-28 2011
- S10. Program Committee Member, 1st International Workshop on Engineering Mobile Service Oriented Systems (EMSOS), Miami, Florida, July 5 2010
- S9. Program Committee Member, 4th European Conference on Software Architecture (ECSA 2010), Copenhagen, Denmark, August 23-26, 2010
- S8. Program Committee Member, 33rd International Conference on Software Engineering (ICSE 2011), Technical/Research Track, Honolulu, Hawaii, May 21-28, 2011
- S7. Program Committee Member, 3rd IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2009), San Francisco, CA, September 14-18, 2009
- S6. NSF Panel Member, Cyber Physical Systems, Arlington, VA, May 2009
- S5. Program Committee Member, International Workshop on Software Architectures and Mobility (SAM 2009), Vancouver, Canada, May 2009
- S4. Program Committee Member, Special Session on Software Architecture for Pervasive Systems (SAPS), 34th Euromicro Conference in Parma, Italy, September 3-5, 2008
- S3. Program Committee Member, International Conference on Software Engineering Research and Practice (SERP'06), Las Vegas, Nevada, June 2006
- S2. Program Committee Member, ISR Graduate Student Research Symposium, Irvine, California, June 2005
- S1. Program Committee Member, 39<sup>th</sup> Hawaiian International Conference on System Sciences, Kauai, Hawaii, January 2006

#### 9.4 REFEREE AND REVIEWER SERVICE

- R22. Journal of Computer Security, 2014
- R21. Elsevier Journal of Pervasive and Mobile Computing, 2014
- R20. Journal of Computer Science and Technology, 2012
- R19. ACM Transactions on Autonomous and Adaptive Systems, 2010, 2013, 2014, 2015, 2018, 2019, 2023
- R18. International Journal of Software and Systems Modeling, 2010
- R17. Journal of Empirical Software Engineering, 2010
- R16. IEEE Computer, 2009
- R15. Journal of Systems and Software, 2009, 2010, 2011, 2012
- R14. ACM Transactions on Software Engineering and Methodology, 2008, 2011, 2012, 2013, 2017
- R13. European Journal of Information Systems, 2008
- R12. Enterprise Information Systems, 2008
- R11. ACM Computing Surveys, 2007, 2008, 2009
- R10. International Software Technology Journal, 2007, 2010, 2016
- R9. IEEE Transactions on Software Engineering, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014

- R8. IET Software, 2007, 2008, 2009
- R7. IEEE Software, 2006, 2007, 2008, 2018
- R6. International Working Conference on Software Architecture, outside reviewer, 2007
- R5. International Working Conference on Component Deployment, outside reviewer, 2005
- R4. International Workshop on Software Engineering and Middleware, outside reviewer, 2005
- R3. International Symposium on Component-based Software Engineering, outside reviewer, 2004 - 2006
- R2. Twin Workshops on Architecting Dependable Systems (WADS), outside reviewer, May 2004
- R1. ACM SISGSOFT Workshop on Self-Managed Systems (WOSS), outside reviewer, October 2004

## 10 UNIVERSITY SERVICE

- U23. Software Engineering Hiring Committee, Informatics Department, 2023-2024
- U22. Computing and Networking Policy Committee, Informatics Department, 2023-2025.
- U21. Director, Graduate Assistance in Areas of National Need Fellowship, UCI, 2021-2025
- U20. Bren Chair Hiring Committee, Informatics Department, UCI, 2022-2025
- U19. MSWE Steering/Admissions Committee, School of Information and Computer Sciences, 2021-2025
- U18. Distinctions and Awards Committee, School of Information and Computer Sciences, 2021-2025
- U17. Member, Lecturer Review Board, School of Information and Computer Sciences, UCI, 2020-2021
- U15. Health Informatics Recruitment Committee, 2019-2020
- U14. Member, Executive Committee, School of Information and Computer Sciences, UCI 2018 – 2019
- U13. Software Engineering Steering Committee, School of Information and Computer Sciences, UCI 2018 – 2019 (Chair), 2019-2020 (Chair), 2024-2025
- U12. Chair, Cybersecurity Recruitment Committee, School of Information and Computer Sciences, UCI 2017-2018
- U11. Member, Software Engineering Recruitment Committee, Informatics Department, UCI 2017-2018
- U10. Software Engineering Admissions Committee, Informatics Department, UCI 2017 – 2018 (Chair), 2022-2023 (Chair), 2023-2024 (Chair), 2024-2025
- U9. Member, Software Engineering Steering Committee, School of Information and Computer Sciences, UCI 2017 – 2018
- U8. Member, Executive Committee, School of Information and Computer Sciences, UCI 2017 – 2018

- U7. Chair, Software Engineering Steering Committee, School of Information and Computer Sciences, UCI  
2015 – 2017, 2019-2020
- U6. Member, Graduate Admissions and Recruitment Day Committee, Informatics Department, UCI  
2015 – 2017
- U5. Member, Development and Fundraising Committee, Informatics Department, UCI  
2015 – 2017
- U4. Member, Faculty Recruitment, Computer Science Department, GMU  
2013, 2015
- U3. Member, PhD Admission, Computer Science Department, GMU  
2012 – 2015
- U2. Chair, Software Engineering Seminar Series, Computer Science Department, GMU  
2008 – 2015
- U1. Member, MS-SWE Admissions & Policy, Computer Science Department, GMU  
2007 – 2015

## 11 PROFESSIONAL ASSOCIATIONS

- Association for Computing Machinery (ACM)
- ACM Special Interest Group on Software Engineering (SIGSOFT)
- Institute of Electrical and Electronics Engineers (IEEE)

## 12 PATENTS AND PATENT APPLICATIONS

- Application number: 61782323  
Title: Runtime Learning System for Enabling Consistent and Timely Runtime Component Adaptation  
Filing date: March 14, 2013  
Inventors: Kyle R. Canavera, Naeem Esfahani, and Sam Malek
- Application number: 63178708  
Title: Automated Assistive-Technology Driven Accessibility Testing Environments  
Filing date: April 23, 2021  
Inventors: Navid Salehnamadi and Sam Malek

## 13 LITIGATION CONSULTING

- L104. Skysong Innovations, LLC v. CrowdStrike, Inc and CrowdStrike Holdings, Inc**  
Retaining Party: CrowdStrike, Inc  
Venue: Western District of Texas  
Case No.: 7:25-cv-00040  
Counsel: Morrison Foerster  
Nature of Suit: Intellectual Property – Patent  
June 2025 – present

- L103. Wizards of OBS, LLC v. ByteDance Ltd. et al.**  
Retaining party: Wizards of OBS, LLC  
Venue: Central District of California  
Case No.: 5:2025cv00636  
Counsel: MGL LLP  
Nature of Suit: Intellectual Property – Copyright  
July 2026 – present
- L102. VL Collective IP LLC v. Microsoft Corp.**  
Retaining Party: VL Collective IP LLC  
Venue: Eastern District of Texas  
Case No.: 2:26-cv-00346-JRG  
Counsel: Alberti Lim & Tonkovich LLP  
Nature of Suit: Intellectual Property – Patent  
June 2026 – present
- L101. Polaris Powered Technologies, LLC v. Apple Inc.**  
Retaining Party: Polaris Powered Technologies, LLC  
Venue: Western District of Texas, Austin Division  
Case No.: 1:25-cv-01821  
Counsel: Kramer LLP  
Nature of Suit: Intellectual Property – Patent  
April 2026 – present
- L100. Skybell Technologies, Inc. v. Alarm.com, Inc.**  
Retaining Party: Alarm.com, Inc.  
Venue: Eastern District of Virginia, Alexandria Division  
Case No.: 1:25-cv-01105-RDA-WBP  
Counsel: Cravath, Swaine & Moore LLP  
Nature of Suit: Intellectual Property – Trade Secret and Copyright  
Deposition testimony on August 7, 2026  
April 2026 – present
- L99. Amadeus North America, Inc, Amadeus IT Group, SA v. Optym, Inc. f/k/a Innovative Scheduling, LLC, Ravindra K. Ahuja, Pranav Gupta, and Renzo Vaccari**  
Retaining Party: Amadeus North America, Inc, Amadeus IT Group, SA  
Venue: Business Court of Texas First Division  
Case No.: 26-BC01B-0004  
Counsel: Troutman Pepper Locke  
Nature of Suit: Intellectual Property – Trade Secret  
March 2026 – present
- L98. Microsoft Corporation v. Qomplx LLC**  
Retaining Party: Qomplx LLC  
Venue: USPTO Patent Trial and Appeal Board  
Case No.: IPR2026-00184; IPR2026-00183  
Counsel: Irell & Manella LLP  
Nature of Suit: Intellectual Property – Patent  
March 2026 – present
- L97. Ex Parte Reexamination Request**  
Retaining Party: Walmart Inc.  
Venue: U.S. Patent and Trademark Office  
Counsel: Jackson Walker LLP

- Nature of Suit: Intellectual Property – Patent  
March 2026 – present
- L96. QPrivacy USA LLC v. Cisco Systems, Inc.**  
Retaining Party: QPrivacy USA LLC  
Venue: Eastern District of Texas, Marshall Division  
Case No.: 2:24-cv-855-RWS-RSP  
Counsel: Cherian Harkins Dunham LLP  
Nature of suit: Intellectual Property – Patent  
Deposition testimony on July 27, 2026  
February 2026 – present
- L95. Walmart, Inc. v. Q Technologies, Inc., Marcus Allen Thomas**  
Retaining Party: Walmart Inc.  
Venue: USPTO Patent Trial and Appeal Board  
Counsel: Alavi & Anaipakos PLLC  
Nature of Suit: Intellectual Property – Patent  
February 2026 – present
- L94. OnePass Data Technology LLC v. Verizon Communications Inc. and Cellco Partnership d/b/a Verizon Wireless; AT&T Mobility LLC and AT&T Services, Inc.**  
Retaining Party: OnePass Data Technology  
Venue: District of Delaware  
Case No.: 25-cv-01112-JCG; 25-cv-01111-JCG  
Counsel: Ellenoff Grossman & Schole LLP  
Nature of Suit: Intellectual Property – Patent  
February 2026 – present
- L93. Ex Parte Reexamination Request**  
Retaining Party: Walmart Apollo, LLC  
Venue: U.S. Patent and Trademark Office  
Counsel: Fitch, Even, Tabin & Flanner LLP  
Nature of Suit: Intellectual Property – Patent  
November 2025 – present
- L92. Security First Innovations, LLC v. International Business Machines Corporation**  
Retaining Party: Security First Innovations  
Venue: Eastern District of Virginia, Alexandria Division; USPTO  
Case No.: 1:25-cv-00514; IPR2025-01201; IPR2025-01200  
Counsel: Sullivan & Cromwell LLP  
Nature of Suit: Intellectual Property – Patent  
September 2025 – present
- L91. VinLogx LLC v. Accu-Trade LLC**  
Retaining Party: VinLogx LLC  
Venue: Court of Chancery of the State of Delaware  
Case No.: 2024-1236-MTZ  
Counsel: Gordon Rees Scully Mansukhani, LLP  
Nature of Suit: Intellectual Property – Trade Secret  
Deposition testimony on July 21, 2026  
September 2025 – present
- L90. System Soft Technologies LLC v. Resource Acquisition & Management Services Inc.**  
Retaining Party: Resource Acquisition & Management Services Inc.

- Venue: Circuit Court of the Thirteenth Judicial Circuit, Hillsborough County, Florida  
Case No.: 24-CA-010290  
Counsel: Rocke, McLean & Sbar, P.A.  
Nature of Suit: Breach of Contract  
August 2025 – November 2025
- L89. Sholem Weisner v. Google LLC and Shmuel Nemanov**  
Retaining Party: Sholem Weisner  
Venue: Southern District of New York  
Case No.: 23-civ-8186 (AKH); 20-civ-2862 (AKH)  
Counsel: Valhalla Legal, PLLC  
Nature of Suit: Intellectual Property – Patent  
August 2025 – August 2025
- L88. WAPP Tech Limited Partnership and WAPP Tech Corp. v. Apple Inc., Capital One, N.A., Capital One Services, LLC, Frost Bank, and Cullen/Frost Bankers**  
Retaining Party: Wapp Tech Limited Partnership and WAPP Tech Corp.  
Venue: Eastern District of Texas  
Case No.: 4:25-cv-00230  
Counsel: Heim, Payne, & Chorush, LLP  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on March 9, 2026  
June 2025 – present
- L87. FlexShopper, Inc. v. Upbound Group, Inc., Acima Holdings, LLC (d/b/a Acima Leasing), and Acima Digital, LLC (d/b/a Acima Leasing)**  
Retaining Party: Upbound Group, Inc., Acima Holdings, LLC, and Acima Digital, LLC  
Venue: Eastern District of Texas  
Case No.: 2:24-CV-00795-JRG (Lead); 2:24-CV-00794-JRG (Member)  
Counsel: Sullivan & Cromwell LLP  
Nature of Suit: Intellectual Property – Patent  
May 2025 – Dec 2025
- L86. VirtaMove, Corp. v. International Business Machines Corp**  
Retaining Party: VirtaMove, Corp.  
Venue: Eastern District of Texas, Western District of Texas  
Case No.: 2:24-cv-64 (E.D. Tex.)  
Counsel: Russ, August & Kabat  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on July 18, 2025  
April 2025 – August 2025
- L85. Warner Records, Inc., et al. v. Altice USA, Inc., et al.**  
Retaining Party: Warner Music Group, Sony Music and Entertainment, Sony Music Publishing  
Venue: Eastern District of Texas  
Case No.: 2:23-cv-576-JRG-RSP  
Counsel: Oppenheim & Zebrak, LLP  
Nature of Suit: Intellectual Property – Copyright  
Deposition testimony on June 3, 2025  
January 2025 – March 2026
- L84. Quartz Auto Technologies, LLC v. Lyft, Inc.**  
Retaining Party: Quartz Auto Technologies, LLC  
Venue: Western District of Texas

- Case No.: 1-20-CV-00719-ADA  
Counsel: Irell & Manella LLP  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on July 22, 2025  
Trial testimony on February 27, 2026, and March 2, 2026  
January 2025 – March 2026
- L83. Dr. Edwin A. Hernandez, et al. v. Stingray Group Inc., et al.**  
Retaining Party: Stingray Group Inc.  
Venue: Southern District of Florida  
Case No.: 1:24-cv-21226-RAR  
Counsel: Alavi & Anaipakos PLLC  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on October 13, 2025  
January 2025 – present
- L82. Proxense, LLC v. Apple, Inc.**  
Retaining Party: Proxense, LLC.  
Venue: Western District of Texas  
Case No.: 6:24-cv-00143  
Counsel: Susman Godfrey LLP; Hecht Partners LLP  
Nature of Suit: Intellectual Property – Patent  
January 2025 – July 2025
- L81. OpenAI, Inc. v. Open Artificial Intelligence, et al.**  
Retaining Party: Open Artificial Intelligence, et al.  
Venue: Northern District of California  
Case No.: 23-cv-03918-YGR  
Counsel: Willenken LLP  
Nature of Suit: Intellectual Property – Trademark  
Deposition testimony on March 12, 2025  
January 2025 – July 2025
- L80. Trama et al. v. RELX PLC et al.**  
Retaining Party: Trama et al. on behalf of class  
Venue: Central District of California  
Case No.: 2:24-cv-03174-DSF-E  
Counsel: Susman Godfrey LLP  
Nature of Suit: Class Action  
November 2024 – April 2025
- L79. IN RE GEICO Customer Data Breach Litigation**  
Retaining party: GEICO  
Venue: Eastern District of New York  
Case No.: 1:21-cv-02210-KAM-SJB  
Counsel: Rivkin Radler  
Nature of Suit: Class Action  
Deposition testimony on January 16, 2026  
October 2024 – present
- L78. Keyless Licensing, LLC v. Samsung Electronics America, Inc. et al.**  
Retaining party: Keyless Licensing, LLC  
Venue: Eastern District of Texas, Marshall Division  
Case No.: 2:24-cv-00464-JRG

- Counsel: Kramer Alberti Lim & Tonkovich LLP  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on March 20, 2026  
October 2024 – present
- L77. Entri LLC v. GoDaddy.com LLC**  
Retaining party: Entri LLC  
Venue: Eastern District of Virginia, Alexandria Division  
Case No.: 1:24-cv-0069-AJT-WEF  
Counsel: McGuireWoods LLP  
Nature of Suit: Antitrust; Breach of Contract; Computer Fraud and Abuse  
Deposition testimony on February 7, 2025  
September 2024 – February 2025
- L76. Roku Inc v. VideoLabs Inc**  
Retaining party: VideoLabs Inc.  
Venue: USPTO Patent Trial and Appeal Board  
Case No.: IPR2024-01023; IPR2024-01024; IPR2024-01025; IPR2024-01026  
Counsel: Bunsow De Morry LLP  
Nature of Suit: Intellectual Property – Patent  
August 2024 – December 2024
- L75. RightQuestion, LLC v. Verizon Business Network Services LLC et al.; AT&T Corporation, et al.**  
Retaining party: Right Question, LLC  
Venue: Eastern District of Texas, Marshall Division  
Case No.: 2:24-cv-00091-JRG; 2:24-cv-00094-JRG  
Counsel: Kramer Alberti Lim & Tonkovich LLP  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on July 7-8, 2025  
June 2024 – August 2025
- L74. People v. David Hott**  
Retaining party: People  
Venue: Superior Court of California, County of San Diego  
Case No.: SCD291916  
Counsel: San Diego County District Attorney  
Nature of Suit: Criminal  
May 2024 – July 2024
- L73. Hyper Hippo Entertainment Ltd. v. Redcell Games General Partnership et al.**  
Retaining party: Hyper Hippo Entertainment Ltd.  
Venue: Supreme Court of British Columbia, Vancouver Registry  
Case No.: S217364  
Counsel: Lawson Lundell LLP  
Nature of Suit: Intellectual Property – Trade Secret  
May 2024 – present
- L72. 303 Software, Inc. v. Find Solace, Inc.**  
Retaining party: Find Solace, Inc.  
Venue: District Court of Colorado, Denver  
Case No.: 2023CV30245  
Counsel: Jason Kelly PLLC

- Nature of Suit: Breach of Contract, Fraud  
April 2024 – September 2024
- L71. Visa Inc. v. Cortex MCP, Inc.**  
Retaining party: Cortex MCP, Inc.  
Venue: USPTO Patent Trial and Appeal Board  
Case No.: IPR2024-00486  
Counsel: Armond Wilson LLP  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on December 12, 2024  
March 2024 – present
- L70. WAPP Tech Limited Partnership and WAPP Tech Corp v. JP Morgan Chase Bank, N.A.**  
Retaining party: WAPP Tech Limited Partnership, et al.  
Venue: Eastern District of Texas, Sherman Division  
Case No.: 4:23-cv-1137  
Counsel: Heim, Payne & Chorush, LLP  
Nature of Suit: Intellectual Property – Patent  
January 2024 – December 2024
- L69. BMG Rights Management (US), LLC, UMG Recordings, Inc, Capital Records, LLC, Concord Music Group, Inc., and Concord Bicycle Assets, LLC v. Altice USA, Inc, and CSC Holdings, LLC**  
Retaining party: BMG Rights Management (US), LLC, et al.  
Venue: Eastern District of Texas, Marshall Division  
Case No.: 2:22-CV-471-JRG  
Counsel: Steptoe LLP  
Nature of Suit: Intellectual Property – Copyright  
January 2024 – June 2024
- L68. Immersion Corporation v. Valve Corporation**  
Retaining party: Valve Corporation  
Venue: Western District of Washington  
Case No.: 2:23-CV-00712  
Counsel: Kwun Bhansali Lazarus LLP  
Nature of Suit: Intellectual Property – Patent  
December 2023 – present
- L67. Metarail, Inc. v. Google LLC**  
Retaining party: Metarail, Inc  
Venue: District of Delaware  
Case No.: 23-1116-GBW  
Counsel: Bunsow De Mory LLP  
Nature of Suit: Intellectual Property – Patent  
December 2023 – present
- L66. David Irvin et al. v. Cabeela's LLC and BPS Direct LLC**  
Retaining party: David Irvin et al.  
Venue: Eastern District of Pennsylvania  
Case No.: 2:23-CV-04008  
Counsel: Bursor & Fisher, P.A.  
Nature of Suit: Class Action  
December 2023 – January 2024

- L65. Benjamin Strusowski et al. v. The Nemours Foundation**  
Retaining party: Strusowski  
Venue: Eastern District of Pennsylvania  
Case No.: 2:23-CV-00537  
Counsel: Bursor & Fisher, P.A.  
Nature of Suit: Class Action  
December 2023 – March 2024
- L64. Anonymous Media Research Holdings, LLC v. Samsung Electronics Co., Ltd., Samsung Electronics America, Inc.**  
Retaining party: Anonymous Media Research Holdings, LLC  
Venue: Eastern District of Texas, Marshall Division  
Case No.: 2:23-CV-439  
Counsel: Ahmad, Zavitsanos & Mensing, PLLC  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on May 23, 2025  
Trial testimony on September 23, 2025  
November 2023 – September 2025
- L63. Anonymous Media Research Holdings, LLC v. Roku, Inc.**  
Retaining party: Anonymous Media Research Holdings, LLC  
Venue: Western District of Texas, Austin Division  
Case No.: 1:23-cv-01143  
Counsel: Ahmad, Zavitsanos & Mensing, PLLC  
Nature of Suit: Intellectual Property – Patent  
November 2023 – present
- L62. Kytch, Inc. v. Jonathan Tyler Gamble, TFGGroup, LLC, and Taylor Commercial Foodservice, LLC DBA Taylor Company**  
Retaining party: Kytch, Inc.  
Venue: Superior Court of the State of California, The County of Alameda  
Case No.: RG21099155  
Counsel: Meier Watkins Phillips Pusch LLP; Irell & Manella  
Nature of Suit: Intellectual Property – Trade Secret  
September 2023 – March 2024
- L61. Emerging Automotive LLC v. Kia Corporation et al.; Toyota Motor North America Inc. et al.**  
Retaining party: Emerging Automotive LLC  
Venue: Eastern District of Texas, Marshall Division; USPTO Patent Trial and Appeal Board  
Case No.: 2:23-CV-00437; IPR2024-01167; IPR2024-00785; IPR2024-00981; IPR2024-01167; 2:23-CV-00434; IPR2024-01167; IPR2024-00785; IPR2024-00786; IPR2024-00814; IPR2024-00981; IPR2024-01167  
Counsel: Bunsow De Morry LLP  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on March 31, 2025; April 2, 2025; April 7, 2025; April 11, 2025; June 25, 2025; August 13, 2026  
September 2023 – present
- L60. Beijing Meishe Network Technology Co., Ltd. v. TikTok Inc., TikTok Pte. Ltd., ByteDance Ltd. and ByteDance Inc.**  
Retaining party: Beijing Meishe Network Technology Co. Ltd.  
Venue: Western District of Texas, Waco Division

Case No.: 6:21-CV-00504-ADA-DTG  
Counsel: Cherian LLP  
Nature of Suit: Intellectual Property – Trade Secret  
Deposition testimony on June 30, 2025  
September 2023 – September 2025

**L59. Grey Wall Software LLC and Veoci Inc. v. Aerosimple LLC, Visweswara Rao Viswanadha a/k/a Visweswara Viswanadha Rao a/k/a Vishu Rao**

Retaining Party: Aerosimple LLC and Vishu Rao  
Venue: District of Connecticut  
Case No.: 3:22-cv-00203-VLB  
Counsel: Halloran & Sage LLP  
Nature of Suit: Intellectual Property – Trade Secret  
June 2023 – present

**L58. RoadSync, Inc. v. Relay Payments, Inc. Spener Barkoff, and James Ryan Droege**

Retaining party: RoadSync, Inc.  
Venue: Northern District of Georgia, Atlanta Division  
Case No.: 1:21-cv-03420-MLB  
Counsel: Councill, Gunnemann & Chally, LLC  
Nature of Suit: Intellectual Property – Trade Secret  
Deposition testimony on February 16, 2024  
June 2023 – present

**L57. Todd Wooten et al. v. Ron Donaire, Jeff Pescatello, John Williams, and Delplaya Media; Delplaya Media Inc. v. Todd Wooten, Maureen Wooten, and VRTCAL Markets**

Retaining party: Todd Wooten  
Venue: Superior Court of the State of California, County of Santa Barbara  
Case No.: 22CV01147  
Counsel: Foley Bezek Behle & Curtis, LLP  
Nature of Suit: Intellectual Property – Trade Secret  
June 2023 – March 2024

**L56. Attentive Mobile, Inc. v. 317 Labs, Inc. d/b/a Emotive; Stodge Inc. d/b/a Postscript**

Retaining party: Attentive Mobile, Inc.  
Venue: District of Delaware  
Case No.: 1:22-cv-01163-CJB; 1:23-cv-087-CJB  
Counsel: King and Spalding  
Nature of Suit: Intellectual Property – Patent  
May 2023 – July 2024

**L55. Teresa E. Mendez Villegas, et al. v. Duarte Nursery, Inc.**

Retaining party: Duarte Nursery, Inc.  
Venue: Superior Court of California, County of Stanislaus  
Case No.: 2014212  
Counsel: Brunn and Flynn  
Nature of Suit: Class Action  
April 2023 – July 2023

**L54. Alarm.com v. Vivint, Inc.**

Retaining Party: Alarm.com  
Venue: Eastern District of Texas; and American Arbitration Association  
Case No.: 2:23-cv-00004-JRG-RSP; AAA No. 01-22-0004-5525  
Counsel: Cravath, Swaine & Moore LLP

- Nature of Suit: Intellectual Property – Patent  
March 2023 – January 2024
- L53. Matter of Position Mobile Ltd SEZC**  
Retaining Party: Technology Investment Consortium, LLC  
Venue: Grand Court of the Cayman Islands  
Case No.: FSD 79 OF 2022 (DDJ)  
Counsel: Dinner Martin Attorneys t/a Dentons  
Nature of Suit: Breach of Contract; Intellectual Property – Trade Secret  
Trial testimony on November 3, 2025  
February 2023 – November 2025
- L52. Vector Flow, Inc. v. HID Global Corp.**  
Retaining Party: HID Global Corp.  
Venue: USPTO Patent Trial and Appeal Board  
Case No.: IPR2023-00353  
Counsel: Morgan, Lewis & Bockius LLP  
Nature of Suit: Intellectual Property – Patent  
February 2023 – July 2023
- L51. Wildseed Mobile LLC v. Google LLC et al.**  
Retaining party: Wildseed Mobile LLC  
Venue: Norther District of California; USPTO Patent Trial and Appeal Board  
Case No.: 3:22-cv-04928  
Inter Partes Review No.: IPR2023-00247; IPR2023-00248  
Counsel: Kramer Day Alberti Lim Tonkovich & Belloli LLP  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on October 31, 2023, and November 2, 2023  
January 2023 – April 2024
- L50. Datanet LLC v. Dropbox Inc.**  
Retaining party: Datanet LLC  
Venue: Western District of Texas  
Case No.: 6:22-cv-01142-OLG  
Counsel: Messner Reeves LLP  
Nature of Suit: Intellectual Property – Patent  
December 2022 – present
- L49. Datanet LLC v. Microsoft Corporation**  
Retaining party: Datanet LLC  
Venue: Western District of Washington  
Case No.: 2:22-cv-01545-TL  
Counsel: Messner Reeves LLP  
Nature of Suit: Intellectual Property – Patent  
December 2022 – present
- L48. Austin Recht et al. v. TikTok Inc. (f/k/a Musical.ly, Inc.); ByteDance Inc.; Beijing Douyin Information Service Co. Ltd. a/k/a ByteDance Technology Co. Ltd.; and Douyin Ltd. a/k/a ByteDance Ltd.**  
Retaining party: Austin Recht et al.  
Venue: Central District of California  
Case No.: 2:22-cv-8613  
Counsel: Baron and Budd, P.C.

- Nature of Suit: Class Action  
December 2022 – November 2025
- L47. The Receivership Estate of AudienceScience Inc. et al v. Google LLC et al.**  
Retaining party: The Receivership Estate of AudienceScience et al  
Venue: Northern District of California  
Case No.: 5:22-cv-04756-EJD  
Counsel: Kramer Day Alberti Lim Tonkovich & Belloli LLP  
Nature of Suit: Intellectual Property – Patent  
October 2022 – May 2024
- L46. Dairy, LLC v. Milk Moovement, Inc.**  
Retaining party: Dairy, LLC  
Venue: Eastern District of California  
Case No.: 2:21-cv-02233-WBS-AC  
Counsel: Willkie Farr & Gallagher LLP  
Nature of Suit: Intellectual Property – Trade Secret  
October 2022 – January 2024
- L45. Webroot Inc. and Open Text Inc. v. Forcepoint LLC; AO Kaspersky Lab; Crowdstrike Inc. and Crowdstrike Holdings Inc.; Sophos Ltd; and Trend Micro Inc.**  
Retaining party: Webroot, Inc. and Open Text, Inc.  
Venue: Western District of Texas, Waco Division; USPTO Patent Trial and Appeal Board  
Case No.: 22-cv- 00342, 22-cv-00243; No. 22-cv-00241; 22-cv-00240; 22-cv-00239  
Counsel: King & Spalding; Sprinkle IP Law Group  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on December 1, 2022  
October 2022 – March 2024
- L44. Ascension Data & Analytics LLC v. Pairprep, Inc. et al.**  
Retaining party: Pairprep, Inc.  
Venue: American Arbitration Association  
Case No.: 01-20-0019-3241  
Counsel: Kwun Bhansali Lazarus LLP  
Nature of Suit: Intellectual Property – Trade Secret  
Deposition testimony on October 27, 2022  
Arbitration testimony on December 7, 2022  
July 2022 – December 2022
- L43. GoTV Streaming LLC v. Netflix**  
Retaining party: GoTV Streaming LLC  
Venue: Central District of California  
Case No.: 2-22-CV-07556  
Counsel: Alavi & Anaipakos PLLC  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on July 6, 2023  
Trial testimony on October 18, 2023  
June 2022 – October 2023
- L42. Broadband iTV, Inc. v. Comcast Corporation; Comcast Cable Communications, LLC; NBCUniversal Media, LLC; Charter Communications, Inc., Charter Communications Operating, LLC, Charter Communications Holding Company, LLC; Spectrum Management Holding Company, LLC; Altice USA, Inc.; CSC Holding, LLC; Cablevision Systems Corp**

- Retaining party: Broadband iTV  
Venue: International Trade Commission  
Case No.: 337-TA-1315  
Counsel: Kramer Day Alberti Lim Tonkovich & Belloli LLP  
Nature of Suit: Intellectual Property – Patent  
June 2022 – October 2022
- L41. Palmetto Solar, LLC v. Dvinci Energy, Inc. and Walid Halty**  
Retaining party: Dvinci Energy, Inc. and Walid Halty  
Venue: Court of Chancery of the State of Delaware  
Case No.: Confidential Filing  
Counsel: Ray and Counsel, P.C.; The Williams Law Firm, P.A.  
Nature of Suit: Intellectual Property – Trade Secret  
April 2022 – May 2022
- L40. Daedalus Blue, LLC v. Microsoft Corporation**  
Retaining party: Daedalus Blue, LLC  
Venue: Western District of Texas, Waco Division  
Case No.: 6:20-CV-01152-ADA  
Counsel: Bunsow De Mory LLP  
Nature of Suit: Intellectual Property – Patent  
January 2022 – October 2022
- L39. Morton v. Henry County 911 Emergency Communications, Harris Systems USA, et al.**  
Retaining party: Harris Systems USA  
Venue: Circuit Court of Henry County, Missouri  
Case No.: 19CA-CC00256  
Counsel: Patton & Ryan LLC  
Nature of Suit: Personal Injury  
Deposition testimony on October 21, 2021  
October 2021 – November 2021
- L38. Wapp Tech Limited Partnership and Wapp Tech Corp. v. Bank of America, N.A.; and Wells Fargo Bank, N.A.**  
Retaining party: Wapp Tech Limited Partnership and Wapp Tech Corp  
Venue: Eastern District of Texas, Sherman Division  
Case No.: 4:21-cv-00670-ALM; 4:21-cv-00671-ALM  
Counsel: Heim Payne & Chorush, LLP; Ahmad, Zavitsanos & Mensing PC  
Nature of Suit: Intellectual Property – Patent  
August 2021 – November 2022
- L37. Daedalus Blue, LLC v. MicroStrategy Incorporated**  
Retaining party: Daedalus Blue, LLC  
Venue: Eastern District of Virginia, Norfolk Division  
Case No.: 20-cv-00551-RCY-RJK  
Counsel: Bunsow De Mory LLP  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on September 1 and 2, 2022  
July 2021 – January 2024
- L36. Scorpcast, LLC dba HaulStars v. MG Freesites Ltd**  
Retaining party: Scorpcast, LLC dba HaulStars  
Venue: Eastern District of Texas, Marshall Division  
Case No.: 2:20-CV-00193-JRG-RSP

Counsel: Williams Simons & Landis PLLC  
Nature of Suit: Intellectual Property – Patent  
April 2021 – August 2021

**L35. Express Mobile Inc. vs. Slack Technologies Inc.; Salesforce.com Inc.; Facebook Inc.; and eBay Inc.**

Retaining party: Express Mobile Inc.  
Venue: Western District of Texas, Waco Division; USPTO Patent Trial and Appeal Board  
Case No.: 3:21-cv-02001-RS; 3:20-cv-08461-WHO; 6:20-cv-00803-ADA; 6:20-cv-802-ADA  
Inter Partes Review No: IPR2021-01224, IPR2021-01226  
Counsel: Feinberg Day Kramer Alberti Lim Tonkovich & Belloli LLP  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on April 26, 2022  
April 2021 – November 2022

**L34. AudioEye Inc. v. Accessibe Ltd.**

Retaining party: AudioEye  
Venue: Western District of Texas, Waco Division; USPTO Patent Trial and Appeal Board  
Case No.: 6:20-cv-00997-ADA  
Inter Partes Review No: IPR2021-00797  
Counsel: Knobbe Martens  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on April 26, 2022  
March 2021 – September 2022

**L33. United Services Automobile Association v. PNC Bank N.A.**

Retaining party: United Services Automobile Association  
Venue: Eastern District of Texas, Marshal Division; USPTO Patent Trial and Appeal Board  
Case No.: 2:20-CV-00319-JRG  
Inter Partes Review No: IPR2021-01248, IPR2021-01163  
Counsel: Irell & Manella LLP  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on January 13, 2022 and March 18, 2022  
Trial testimony on September 15, 2022  
March 2021 – September 2022

**L32. Global eTicket Exchange Ltd. v. Ticketmaster L.L.C., and Live Nation Worldwide, Inc.**

Retaining party: Global eTicket Exchange  
Venue: Western District of Texas, Waco Division  
Case No.: 6:21-cv-00399  
Counsel: Leichtman Law PLLC  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on January 26, 2023 and February 2, 2023  
Trial testimony on May 2, 2023  
February 2021 – May 2023

**L31. HEALTHeSTATE LLC v. The United States, ASM Research**

Retaining party: The United States  
Venue: The United States Court of Federal Claims  
Case No.: 18-034  
Counsel: United States Department of Justice  
Nature of Suit: Intellectual Property – Copyright  
February 2021 – January 2022

- L30. RE FormsNet LLC v. Glide Labs Inc.**  
Retaining party: Glide Labs Inc.  
Venue: Superior Court of the State of California, County of San Francisco  
Case No.: CGC-21-588988  
Counsel: Kecker, Van Nest & Peters LLP  
Nature of Suit: Intellectual Property – Trade Secret  
January 2021 – February 2021
- L29. Monode Marking Products, Inc. V. Columbia Marking Tools, Inc.**  
Retaining party: Monode Marking Products  
Venue: Northern District of Ohio, Eastern Division  
Case No.: 1:18-cv-16  
Counsel: McDonald Hopkins  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on February 22, 2021  
January 2021 – June 2021
- L28. HOV Services Inc. v. ASG Technologies Group Inc.**  
Retaining party: HOV Services Inc.  
Venue: Southern District of New York  
Case No.: 1:18-cv-09780-PKC  
Counsel: Tarter Krinsky & Drogin LLP  
Nature of Suit: Breach of Contract, Software License, and Copyright  
Deposition testimony on July 30, 2021  
October 2020 – January 2024
- L27. Wapp Tech Limited Partnership and Wapp Tech Corp v. Seattle Spinco, Inc., et al.  
Wapp Tech Limited Partnership and Wapp Tech Corp v. Wells Fargo  
Wapp Tech Limited Partnership and Wapp Tech Corp v. Bank of America**  
Retaining party: Wapp Tech Limited Partnership and Wapp Tech Corp  
Venue: Eastern District of Texas, Sherman Division  
Case No.: 4:18-cv-00469-ALM; 4:18-cv-00501-ALM; 4:18-cv-00519-ALM  
Counsel: Feinberg Day Kramer Alberti Lim Tonkovich & Belloli LLP  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on January 5, 2021 and February 19, 2021  
Trial testimony on March 2, 2021 and March 5, 2021  
October 2020 – March 2021
- L26. The Hertz Corporation v. Accenture LLP**  
Retaining party: Accenture LLP  
Venue: Southern District of New York  
Case No.: 1:19-cv-03508-WHP  
Counsel: Wiggin and Dana LLP  
Nature of Suit: Breach of Contract  
March 2020 – May 2020
- L25. Ameranth v. Pizza Hut, Inc., et al.**  
Retaining party: Ameranth  
Venue: Southern District of California  
Case No.: 3:11-cv-01810 DMS (WVG)  
Counsel: Caldarelli Hejmanowski Page & Leer LLP, Fabiano Law Firm, P.C., Osborne Law LLC, and Watts Law Offices  
Nature of Suit: Intellectual Property – Patent

- Deposition testimony on April 23, 2018, April 25, 2018, May 14, 2018, May 21, 2018, June 29, 2018, August 31, 2018, September 4, 2018, September 11, 2018, and September 17, 2018  
January 2018 – October 2019
- L24. IPA Technologies, Inc. v. ZTE (USA), Inc.**  
Retaining party: ZTE  
Venue: Southern District of California  
Case No.: 17-cv-01858-BAS-JLB  
Counsel: Brinks Gilson & Lione  
Nature of Suit: Intellectual Property – Patent  
December 2017 – March 2018
- L23. Financial Information Technologies Inc. v. IControl Systems, USA, LLC**  
Retaining party: IControl Systems  
Venue: Middle District of Florida, Tampa Division  
Case No.: 8:17-cv-190-T-23MAP  
Counsel: Rocke McLean Sbar  
Nature of Suit: Intellectual Property – Trade Secret  
Deposition testimony on January 18, 2018  
Trial testimony on February 28, 2020  
September 2017 – March 2020
- L22. Ford Motor Company v. Versata Software, Inc., F/K/A Trilogy Software, Inc.**  
Retaining party: Versata Software, Inc., F/K/A Trilogy Software, Inc.  
Venue: Eastern District of Michigan, Southern Division  
Case No.: 15-10628-MFL-EAS (consolidated with 15-11624-MFL-EAS)  
Counsel: Winston and Strawn LLP; Ahmad, Zavitsanos, Anaipakos, Alavi, and Mensing P.C.  
Nature of Suit: Intellectual Property – Patent and Trade Secret  
Deposition testimony on December 20 and 21, 2017, and Nov 9, 2018  
Trial testimony on October 12, 13, and 14, 2022  
February 2017 – October 2022
- L21. Financial Information Technologies Inc. v. Mark Lopez**  
Retaining party: Mark Lopez  
Venue: Middle District of Florida, Tampa Division  
Case No.: 8:15-cv-02784-JSM-AEP  
Counsel: Rocke McLean Sbar  
Nature of Suit: Intellectual Property – Trade Secret  
Deposition testimony on March 18, 2017  
January 2017 – September 2017
- L20. Alexander Yershov v. Gannett Satellite Information Network, Inc. d/b/a USA Today**  
Retaining party: Gannett Satellite Information Network  
Venue: District of Massachusetts  
Case No.: 1:14-cv-13112  
Counsel: ZwillGen PLLC  
Nature of Suit: Class Action  
January 2017 – March 2017
- L19. Chrome Systems Inc. v. Internet Brands Inc., Autodata Solutions Inc., et al.**  
Retaining party: Chrome Systems Inc.  
Venue: Judicial Arbitration and Mediation Services, Inc.  
Case No.: 1340012931  
Counsel: Wachtell, Lipton, Rosen & Katz

- Nature of Suit: Intellectual Property – Software License  
Deposition testimony on September 7, 2016  
Arbitration testimony on September 16, 2016  
June 2016 – October 2016
- L18. TiVo Inc. v. Samsung Electronics Co., Ltd., et al.**  
Retaining party: TiVo Inc.  
Venue: Eastern District of Texas  
Case No.: 2:15-cv-1503  
Counsel: Irell & Manella LLP  
Nature of Suit: Intellectual Property – Patent  
April 2016 – December 2016
- L17. Lenovo Adware Litigation**  
Retaining party: Lenovo  
Venue: Northern District of California, San Jose Division  
Case No.: 5:15-md-02624-RMW  
Counsel: K&L Gates  
Nature of Suit: Class Action  
April 2016 – July 2018
- L16. Ericsson Inc., et al. v TCL Communication Technology Holdings, LTD, et al.**  
Retaining party: TCL  
Venue: Eastern District of Texas; USPTO Patent Trial and Appeal Board  
Case No.: 2:15-cv-11  
Inter Partes Review No: IPR2015-01605  
Counsel: Sheppard Mullin Richter & Hampton LLP; Morgan, Lewis, and Bockius LLP  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on February 1, 2016; April 14, 2016; August 29, 2016; October 6, 2017  
Trial testimony on December 6, 2017  
March 2015 – December 2017
- L15. STAR CO Ranger Digital, LLC v. Microsoft Corporation, et al.**  
Retaining party: Microsoft Corporation  
Venue: Eastern District of Texas, Marshall Division  
Case No.: 2:14-cv-00793  
Counsel: Klarquist Sparkman, LLP  
Nature of Suit: Intellectual Property – Patent  
March 2015 – May 2015
- L14. YYZ, LLC v. Hewlett-Packard Company**  
Retaining party: Hewlett-Packard Company  
Venue: District of Delaware  
Case No.: 1:13-cv-00136-SLR  
Counsel: Kenyon and Kenyon  
Nature of Suit: Intellectual Property – Patent  
December 2014 – February 2015
- L13. Data Engine Technologies LLC v. International Business Machines Corporation**  
Retaining party: Data Engine Technologies  
Venue: Eastern District of Texas, Tyler Division  
Case No.: 6:13-cv-00858-LED  
Counsel: Ahmad, Zavitsanos, Anaipakos, Alavi, and Mensing P.C.  
Nature of Suit: Intellectual Property – Patent

- Deposition testimony on November 23 and 24, 2015  
February 2014 – December 2015
- L12. Rockstar Consortium US LP and Netstar Technologies LLC v Google Inc.**  
Retaining party: Google Inc.  
Venue: Eastern District of Texas, Marshall Division  
Case No.: 2:13-cv-00893-JRG-RSP  
Counsel: Quinn Emanuel Urquhart & Sullivan LLP  
Nature of Suit: Intellectual Property – Patent  
October 2014 – February 2015
- L11. Optimum Content Protection LLC v. Microsoft Corporation**  
Retaining party: Optimum Content Protection  
Venue: Eastern District of Texas, Tyler Division  
Case No.: 6:13-cv-00741-KNM  
Counsel: Ahmad, Zavitsanos, Anaipakos, Alavi, and Mensing P.C.  
Nature of Suit: Intellectual Property – Patent  
November 2014 – December 2014
- L10. Alarm.com Inc. v. iControl Networks Inc.**  
Retaining party: Alarm.com Inc.  
Venue: USPTO Patent Trial and Appeal Board  
Patent Interference No: 106,001 (HHB)  
Counsel: Fish and Richardson P.C.  
Nature of Suit: Intellectual Property – Patent  
June 2014 – October 2014
- L9. Thought Inc. v. Oracle Corporation**  
Retaining party: Thought Inc.  
Venue: USPTO Patent Trial and Appeal Board  
Inter Partes Review No: IPR2014-00117, IPR2014-00118, IPR2014-00119  
Counsel: Sughrue Mion PLLC  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on August 25 and 26, 2014  
May 2014 – October 2014
- L8. Steve Morsa v. Facebook, Inc.**  
Retaining party: Steve Morsa  
Venue: Federal District Court, Central District of California  
Case No.: 14-00161-JLS-JPR  
Counsel: Bragalone Conroy PC  
Nature of Suit: Intellectual Property – Patent  
April 2014 – December 2014
- L7. United States of America v Alexander Rousseau**  
Retaining party: United States of America  
Venue: Southern District of Florida  
Case No.: 14-20243-KMM(s)  
Counsel: U.S. Department of Justice  
Nature of Suit: Criminal  
Trial testimony on July 15, 2014  
June 2014 – July 2014

- L6. Clori Isaac v. Geo. Mijilem & Company Inc. DBA SVM L.P., ConocoPhillips, et al.**  
Retaining party: Clori Isaac  
Venue: Superior Court of California, County of Los Angeles  
Case No.: BC477305  
Counsel: Selman Breitman LLP  
Nature of Suit: Class Action  
April 2014 – June 2014
- L5. Miant, LLC, et al. v. Kevin Lasser, et al.**  
Retaining party: Miant LLC.  
Venue: State of Michigan, Oakland County Circuit Court  
Case No.: 2013-133695-CK  
Counsel: Mantese, Honigman, Rossman & Williamson, P.C.  
Nature of Suit: Intellectual Property  
April 2014 – June 2014
- L4. Motorola Mobility Inc. v. Apple Inc.**  
Retaining party: Motorola Mobility Inc.  
Venue: U.S. District Court for the Southern District of Florida  
Case No.: 1:12-cv-20271-RNS  
Counsel: Quinn Emanuel Urquhart & Sullivan LLP  
Nature of Suit: Intellectual Property – Patent  
December 2013 – May 2014
- L3. iControl Networks Inc. v. Alarm.com Inc., et al.**  
Retaining party: Alarm.com Inc.  
Venue: U.S. District Court for the Eastern District of Virginia  
Case No.: 13-834 (LMB/IDD) (E.D. Va.)  
Counsel: Cravath, Swaine & Moore LLP  
Nature of Suit: Intellectual Property – Patent  
Deposition testimony on December 13, 2013  
September 2013 – December 2013
- L2. United States ex rel. Hooper v. Lockheed Martin Corporation**  
Retaining party: United States ex rel. Hooper  
Venue: U.S. District Court for the Central District of California  
Case No.: 2:08-cv-00561BRO(PJWx)  
Counsel: The Cullen Law Firm PLLC  
Nature of Suit: False Claims Act  
August 2013 – January 2014
- L1. Lotchinbek Samatov, Jakhongir Samatov, and SSD Software Solutions v. AirShowBuzz**  
Retaining party: Lotchinbek Samatov, Jakhongir Samatov, and SSD Software Solutions  
Venue: Superior Court of California for the County of Los Angeles Central District  
Case No.: BC488092  
Counsel: Michelman & Robinson LLP  
Nature of Suit: Breach of Contract  
June 2013 – August 2013