UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TIKTOK INC.,
Petitioner,

v.

NTECH PROPERTIES, INC.,
Patent Owner.

Case IPR2024-01342
U.S. Patent No. 8,886,753

DECLARATION OF MICHAEL T. GOODRICH, Ph.D. IN SUPPORT OF PATENT OWNER'S PRELIMINARY RESPONSE

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I. INTRODUCTION

1. I, Dr. Michael Goodrich, have been retained as an expert witness for NTECH Properties, Inc., the Patent Owner in this response to a "inter partes review" petition. I have personal knowledge of the facts stated in this Declaration and can testify competently to those facts. The petition was initiated by TikTok Inc. and its related entities concerning U.S. Patent No. 8,886,753, which I will refer to as the '753 Patent. I have been retained as a technical expert in connection with this IPR petition. In my testimony, I will refer to NTECH Properties, Inc. as "NTECH" or the "Patent Owner." I will refer to TikTok Inc. as "TikTok" or the "Petitioner."

2. I am being compensated for my work in this matter. My compensation does not depend on the outcome of this proceeding.

3. I have been asked to provide my technical opinions relating to the '753 Patent in relation to arguments raised by TikTok in its Petition.

4. My opinion is based on a person having ordinary skill in the art (which I understand is sometimes abbreviated "POSITA") at the time of the earliest claimed priority date, which I understand to be roughly between 2006 and 2007. '753 Patent at 1. My opinion does not change with a later priority date.

5. In the preparation of this declaration, I have reviewed the '753 Patent, associated file history, the petition, Petitioner's exhibits, and Patent Owner's exhibits filed in this proceeding.

II. QUALIFICATIONS

6. I summarize some of the relevant information regarding my CV (Appendix A) as follows. I received a Bachelor of Arts degree in Mathematics and Computer Science from Calvin University, in Grand Rapids, Michigan, in 1983, a Master of Science (M.S.) degree in Computer Science from Purdue University, in West Lafayette, Indiana, in 1985, and a Ph.D. in Computer Science from Purdue University in 1987.

7. I am a Distinguished Professor in the Department of Computer Science at the University of California, Irvine, where I have been a faculty member since 2001. The Distinguished Professor title is a campus-level distinction and is reserved for faculty who have achieved the highest levels of scholarship over the course of their careers. I was a professor in the Department of Computer Science at Johns Hopkins University from 1987-2001.

8. I have authored or coauthored over 350 publications, including several widely adopted books, such as Data Structures and Algorithms in Java, Data Structures and Algorithms in C++, Data Structures and Algorithms in Python, Introduction to Computer Security, and Algorithm Design and Applications. My publications include contributions to data structures and algorithms, information visualization, networking, graph algorithms, computational geometry, distributed and parallel algorithms, cloud security, information security and privacy, and

algorithm engineering. Also, several of my textbooks include entire chapters on software engineering, and several of my publications are on algorithm engineering. Altogether, my publications have, according to Google Scholar, been cited over 18,000 times. My research has been supported by grants from the Defense Advanced Research Projects Agency ("DARPA"), the National Security Agency ("NSA"), the Office of Naval Research ("ONR"), the Army Research Office ("ARO"), and the National Science Foundation ("NSF").

9. In addition, I have consulting experience in matters involving algorithms, cryptography, machine learning, digital rights management, computer security, mobile devices (including power management), networking, software, video streaming, and storage technologies.

10. I am a Fellow of the American Association for the Advancement of Science ("AAAS"), a Fellow of the Institute of Electrical and Electronics Engineers ("IEEE"), and a Fellow of the Association for Computing Machinery ("ACM"), as well as being named as a Foreign Member of the Royal Danish Academy of Sciences and Letters. I am also a recipient of a Fulbright Scholarship (for senior specialist service to University of Aarhus, Denmark). In addition, I am a recipient of the IEEE Computer Society Technical Achievement Award ("for outstanding contributions to the design of parallel and distributed algorithms for fundamental combinatorial and

geometric problems") and the Pond Award for Excellence in Undergraduate Teaching. Also, I am an ACM Distinguished Scientist.

11. I have extensive experience studying technologies involved with distributed video streaming. For instance, in my journal article J-56, my coauthors and I study methods for partitioning data into push and pull regions so as to optimize communication costs between a server and several clients. I have also published numerous research articles on topics in cloud computing and storage, distributed algorithms, and network visualization. Using the indexing scheme of my CV, examples of such publications include P-3, P-4, P-5, P-6, P-8, P-10, Ch-9, Ch-10, J-7, J-26, J-36, J-38, J-61, J-69, J-73, J-76, J-77, J-78, J-82, J-84, C-41, C-46, C-47, C-53, C-60, C-69, C-79, C-85, C-90, C-91, C-92, C-94, C-102, C-105, C-106, C-112, C-119, C-123, C-134, C-154, C-156, C-159, C-165, C-167, C-168, C-169, C-171, C-172, C-182, C-196, C-200, C-203, C-228, C-230, and C-243. Further, I have published research articles on topics in audio and video creation, encoding, and distribution, as well as authoring research videos, including publications P-9, J-65, J-66, J-68, C-38, C-54, C-74, and C-124. I also have published research articles on technologies for streaming data, including publications J-56 (mentioned above), J-58, J-72, C-98, C-121, and C-179.

12. I am a co-inventor on several U.S. patents, including U.S. Patent No. 7,257,711, "Efficient Authenticated Dictionaries with Skip Lists and Commutative

Hashing," which discloses secure distributed data authentication schemes. I am also co-inventor of U.S. Patent No. 7,299,219, "High Refresh-Rate Retrieval of Freshly Published Content using Distributed Crawling," which discloses a technology for quickly retrieving website data that can change frequently, so as to be stored in a search engine. I am also co-inventor of U.S. No. Patent 8,681,145, "Attribute Transfer Between Computer Models Including Identifying Isomorphic Regions in Polygonal Meshes," which teaches how to map one mesh-based computer model to another. In addition, I am co-inventor of U.S. Patent No. 9,152,716, "Techniques for Verifying Search Results Over a Distributed Collection," which discloses a system for searching the Internet so as to produce verifiable search results that can be produced by a search engine.

13. I have taught courses at Johns Hopkins University, Brown University, and University of California, Irvine, at both the undergraduate and graduate levels. Topics of my courses have included computer security, algorithms, data structures, information visualization, computer graphics, networking, algorithm engineering, computational geometry, and parallel processing. In addition, I have mentored twenty-six (26) PhD students over the years, who have written their PhD theses on topics in algorithms, data structures, information visualizations, networking, parallel processing, and computer security and privacy.

14. I have served as an editor on several technical journals, including Computational Geometry: Theory and Applications, Journal of Computer & System Sciences, Journal of Graph Algorithms and Applications, Int. Journal of Computational Geometry & Applications, and Information Processing Letters. I have also served on many program committees (PCs) for top conferences and workshops in Computer Science, including serving as PC chair in several instances. Examples include ACM Symposium on Computational Geometry ("SoCG"), ACM Symposium on Theory of Computing ("STOC"), Workshop/Symposium on Algorithms and Data Structures ("WADS"), Algorithm Engineering and Experimentation ("ALENEX"), which I cofounded with Dr. Catherine McGeoch in 1999), IEEE Symposium on Foundations of Computer Science ("FOCS"), ACM-SIAM Symposium on Discrete Algorithms (SODA), International Symposium on Graph Drawing ("GD"), International Colloquium on Automata, Languages, and Programming ("ICALP"), ACM Conference on Computer and Communications Security ("CCS"), European Symposium on Algorithms ("ESA"), IEEE International Parallel and Distributed Processing Symposium ("IPDPS"), ACM Symposium on Parallel Algorithms and Architectures ("SPAA"), ACM Symposium on Advances in Geographic Information Systems ("GIS"), IEEE Symposium on Security and Privacy ("S&P"), IEEE International Conference on Big Data, IEEE International Conference on Data Engineering ("ICDE"), and International

Symposium on Algorithms and Computation ("ISAAC"), and DAGS Conference on Electronic Publishing and the Information Superhighway.

III. APPLICABLE STANDARDS AND CONTROLLING PRINCIPLES

A. Person of Ordinary Skill in the Art

15. I understand that the "person of ordinary skill in the art" ("POSITA") is a hypothetical person who is presumed to be familiar with the relevant scientific field and its literature at the time of the invention. This hypothetical person is also a person of ordinary creativity capable of understanding the scientific principles applicable to the pertinent field.

16. I understand that the level of ordinary skill in the art may be determined by reference to certain factors, including (1) the type of problems encountered in the art, (2) prior art solutions to those problems, (3) the rapidity with which innovations are made, (4) the sophistication of the technology, and (5) the educational level of active workers in the field. I further understand that in a given case, every factor may not be present, and one or more factors may predominate.

17. In my opinion, the POSITA in 2006 to 2007 is a person would have had a bachelor's degree in computer science, computer engineering, or an equivalent, or two years of professional experience in the field of distributed computing. More education can supplement for less professional experience, and vice versa. I note that my definition of a POSITA is similar to that of Dr. Almeroth. Ex. 1002 at ¶¶ 49-50.

My opinions in this declaration would not change were I to adopt the definition of a POSITA offered by Dr. Almeroth.

18. Based on the above definition, I had such education and knowledge as of the 2006 to 2007 potential priority date of the ’753 Patent. Further, I have been teaching undergraduate and graduate computer science students for over 35 years. Thus, I believe that I am qualified to opine on the subject matter in the ’753 Patent, and what a person of ordinary skill in the art would have known as of 2006 to 2007.

19. Throughout this declaration, to avoid having to repeat myself, when I opine about one of a skilled artisan or a “POSITA” (person of ordinary skill in art) I do so with respect to the above definition, and what that person would have known or understood as of 2006 to 2007.

IV. THE ’753 PATENT

20. U.S. Patent No. 8,886,753 (“’753 Patent”), “Method and System for Providing Media Programming,” to Dwight Marcus, was filed March 23, 2012, and issued November 11, 2014. It is a continuation of U.S. Patent Application No. 12/138,925, now U.S. Patent No. 8,145,704. The ’753 Patent discloses a method and system for generating media programming to a client and from a publisher based on a signal including a selection of one of the media streams and providing an output signal including data indicative of the selection and of user data. ’753 Patent at Abstract, Claim 1. It illustrates a preferred embodiment in Figure 1. The ’753 Patent

discloses an embodiment where the aggregator 100 provides information relating to each user to publisher 110. Based on the selected feed (originally from the user) and the user information, the publisher 110 provides individual feeds to a user 120 or user 130, such that the feeds are responsive at least in part to the user information in addition to feed selection. The feeds may include media elements selected and concatenated by the publisher. *Id.* at 2:48-65.

V. ALLEGED PRIOR ART

1. Whitehead

21. U.S. Patent No. 8,555,318 ("Whitehead"), "Customized Media on Demand," to Steven D. Whitehead, was filed on December 6, 2006 and issued October 8, 2013.

22. Whitehead discloses a system delivering customized media to a customer premise 101 from various backend servers, such as mixing server 130. Whitehead at Fig. 1 (excerpted below), 2:1-30.

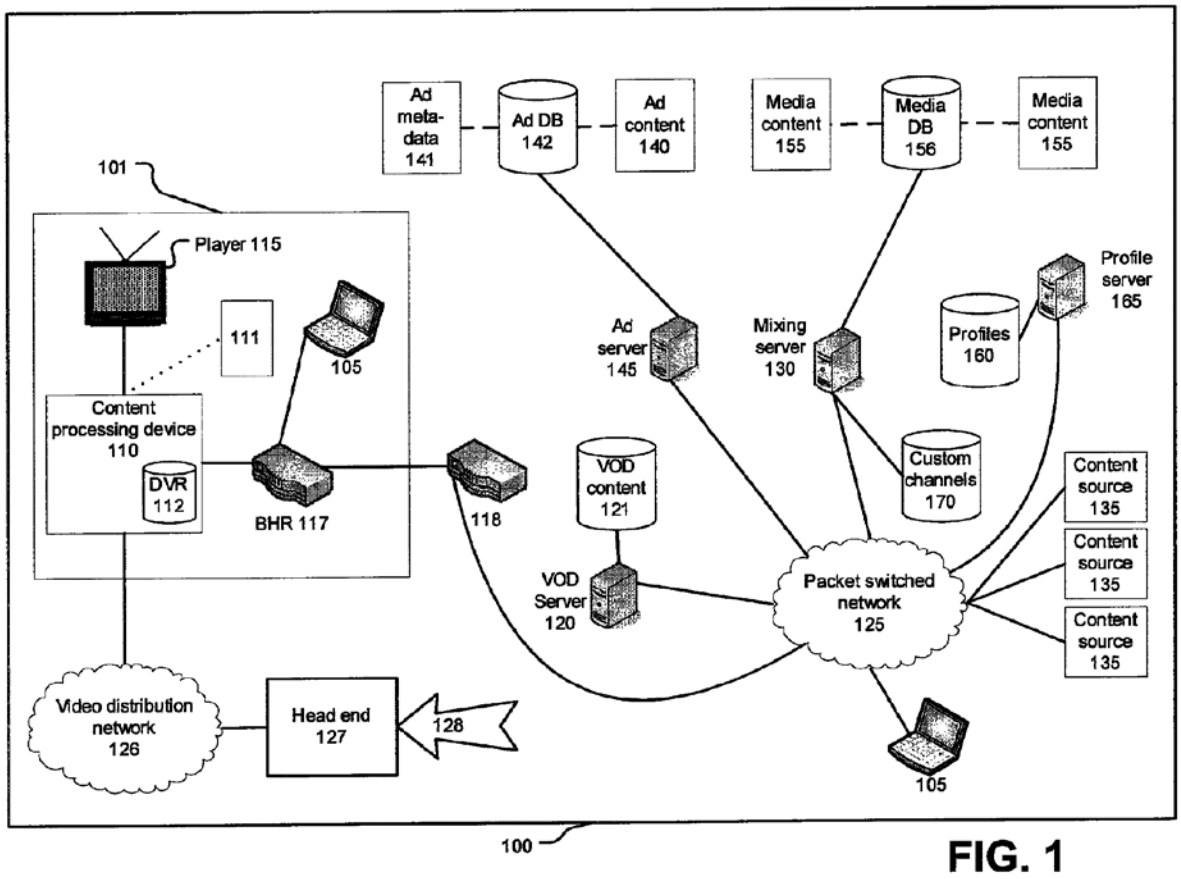


FIG. 1

Whitehead at Fig. 1.

2. Marcus ’904

23. Marcus ’904 is U.S. Patent Application Publication No. US 2006/0015904, “Method and Apparatus for Creation, Distribution, Assembly, and Verification of Media,” to Dwight Marcus, which was filed June 16, 2005, and published January 19, 2006.

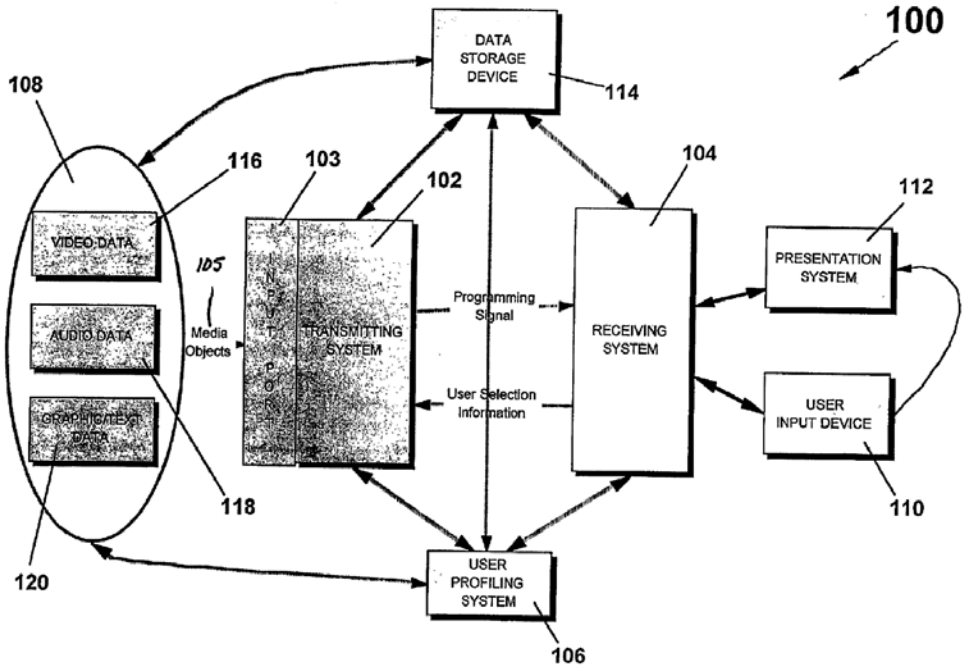
24. Marcus ’904 discloses a method and apparatus for “creation, distribution, assembly and verification of media,” including a system where “media

is transmitted to a receiver where the receiver assembles the media into programming." Marcus '904 at Abstract.

3. Cristofalo

25. Cristofalo is U.S. Patent Application Publication No. US2002/0152117, "System and Method for Targeting Object Oriented Audio and Video Content to Users," to Mike Cristofalo and Frank Paul Deo, which was filed April 12, 2001 and published October 17, 2002.

26. Cristofalo discloses a system and process for targeting programing, such as advertising, to users based on user profiling information. Cristofalo at Abstract. Cristofalo illustrates its system in its Figure 1:



Cristofalo at Fig. 1.

27. Cristofalo discloses that the receiving system 104 is "preferably configured to support the reception, selection, and composition of media object based content into audio, video, and audio-video presentations" to a presentation system 112, such as, e.g., a television receiver, home theater system, audio system, computer workstation, laptop computer, personal data assistant, set top box, in-home communication system, wireless communication system, web tablet, virtual reality system, web phone, printer, heads-up display, gaming console, tactile or sensory perceptible signal generator, or combinations of such devices. Cristofalo at ¶¶ [0024], [0027].

VI. WHITEHEAD (EX. 1003)

A. Petitioner's Mapping Shows Whitehead Does Not Disclose "collecting by the publisher from the aggregator client information, wherein said client information comprises user information"

28. I have reviewed Petitioner's arguments regarding Whitehead. When read in the context of the claim language, Petitioner's own mapping shows that Whitehead cannot disclose the claim limitation. Pet at 20-23. Indeed, Petitioner admits that the profile server 165 with the profiles 160 is the required user information that it would either be a separate server in the backend or combined with the purported publisher, mixing server 130. Pet at 20-23. In either instance, the claim language cannot be disclosed by Whitehead because the claim language

requires that the publisher collects the user information from the aggregator, while in Petitioner's own mapping, user information (profiles 160) come from the publisher itself or profile server 165, but not from the purported content processing device 110. Pet at 20.

29. While Petitioner admits that the profiles 160 are the user information, Petitioner appears to incorrectly imply that the profiles 160 are in content processing device 110. Pet at 20. Petitioner's implication is incorrect because 1) Petitioner already admitted it is not true and 2) Petitioner is apparently intentionally misreading Whitehead.

30. Petitioner already admitted that profiles 160 are not located in content processing device 110 in IPR2024-01340. Indeed, Petitioner stated in IPR2024-1340 that profiles 160 are not in content processing device 110, but it would be obvious to combine them.[1] Ex. 2013 (IPR2024-01340 Petition) at 19. Here, Petitioner makes no argument for combining them. Since Petitioner is not arguing it would be obvious to modify Whitehead and already admits it is not disclosed in

[1] I explain why a POSITA would not combine them in my declaration in IPR2024-01340.

Whitehead, Petitioner's own mapping of Whitehead to the claim language shows that it is not disclosed.

31. Moreover, as discussed and shown throughout Whitehead, the profile server 165 contains profiles 160. Whitehead at Fig. 3, 5:56-57, 6:35-37, 7:3-5, 10:4-67, 11:18-28, 19:16-17. At no point do the profiles 160 come from content processing device 110, nor does Petitioner cite any portion of Whitehead that states otherwise. Petitioner appears to intentionally misread Whitehead to state "Whitehead's content processing device 110 can be 'used to create, modify, and/or delete profiles 160.'" Pet at 20 (quoting a portion of Whitehead at 6:35-46, but excluding the context). However, this sentence in the Petition is missing context. A POSITA would have read that sentence in the context of the paragraph including the immediately preceding sentence which talks about the fact a computer 105 can ***login*** to the profile server 165 to create a profile 160 that is stored on the profile server 165. Whitehead at 6:35-37; *see also* Whitehead at 10:6-67 (explaining that the user logins to profile server to provide information for the profile 160 that is stored on profile server 165), Fig. 3 at step 305 (noting that the user logins to profile server 165). Whitehead then alternately notes that content processing device 110 or the provider of the profile server 165 can also do the same. Whitehead at 6:37-46. Thus, a POSITA would understand accordingly that in each instance the profile 160 is only located on profile server 165.

32. Petitioner also notes that username, user interest, playback capabilities[2], user feedback, and viewing histories are part of profile 160. Pet. at 20-21. Again, using Petitioner's own mapping, those are all information stored on profile server 165, which Petitioner readily admits. Pet. at 21 ("Whitehead's profile server 165 then transmits that profile [] to mixing server 130.").

B. There is No Motivation to Modify Whitehead

33. Petitioner also proposes to modifying Whitehead's profile server 165 and merging it with the mixing server 130. Pet at 22-23. As discussed above, this proposed combination does not resolve the issues of Petitioner's own mapping. Regardless, Petitioner's proposed modification is based purely on apparent hindsight because it is not how Whitehead is design to operate. The proposed changes substantially and fundamentally the operation of Whitehead.

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[2] "Playback capabilities" is not a term in Whitehead, nor defined by Petitioner. To extent that Petitioner is referring to the "playback mode," a POSITA would understand that this an administrative option, not a user option, as whether a user can skip content such as advertisements or other clips would always be a preferred option for user.

34. Petitioner and Dr. Almeroth's declaration fails to properly analyze the proposed modification of Whitehead in the context of Whitehead, instead relying only on the '753 Patent claims as a guide to create a justification for the proposed changes. Dr. Almeroth's only proposed motivation to move the profile server 165 to the mixing server 130 is that would simply "eliminate the need for a separate profile server 165" which would "simplify[] processing and communications." Pet at 22-23; Ex. 1002 at ¶89. That is simply false, as I explain below.

35. Petitioner states that Whitehead already contemplates shifting system components. However, Petitioner apparently fails to recognize (and does not explain reasons to deviate from the teachings in Whitehead) that in each of the citations to combining components it relates to alternative options for a specific component, involve combining specific components that provide "similar" functionality, or unrelated citations. Whitehead at 2:52-59 (describing that media player could be TV, HDTV, or Window Media Player), 4:10-26 (explaining that the mixing server 130 can be combined with VOD server 120 because they have similar video streaming functionality), 6:35-46 (discussing various ways of accessing profiles 160 located on profile server 165), 15:16-22 (noting that the playback application may be executed at client 105, content processing device 110, or mixing server 130), 19:44-63 (explaining there are multiple options to create an overlay menu). Notably, none of the citations involve moving profile server 165 to mixing server 130.

Perhaps most importantly, none of these citations state that these two components perform similar functionality. Indeed, Dr. Almeroth and Petitioner's only citation in Whitehead that provides motivation to combine components is for the reason that they provide similar functionality. Whitehead at 4:10-26 (explaining the reasoning of combining the mixing server 130 with VOD server 120 as having similar functionality). Here, there is no dispute that the profile server 165 and mixing server 130 do not provide the same or similar functionality. In my opinion, a POSITA would therefore understand that Whitehead is teaching away from combining the profile server 165 and mixing server 130 because they do not perform the same or similar functionality.

36. Merging these two systems would introduce significant performance problems because one server (mixing server 130) is disclosed as providing streaming content and the other server (profile server 165) is disclosed as providing a graphical user interface (GUI) for collecting, updating, and storing information of multiple profiles in a database. Whitehead at 4:17-19 ("A basic purpose of the mixing server 130 is to assemble and deliver to content processing device 110 one or more custom media channels 170"), 9:44-48 (which also discloses mixing server 130 streaming content to content processing device 110), 9:64-10:1 (which also discloses mixing server 130 streaming content to content processing device 110), 14:23-26 ("Next, in step 440, mixing server 130 delivers e.g., isochronously streams or progressively

downloads, media content 155 and/or advertising content 140 to content processing device 110"), 17:27-55 (which discloses that mixing server can deliver content using Real Time Streaming Protocol (RTSP)). Further, Whitehead does not disclose the mixing server 130 as providing a GUI, but rather discloses users logging into mixing server 130. In contrast, Whitehead discloses that users login and access the profile server 165 through a webpage or some other GUI. Whitehead at 10:6-67, 15:23-41. Thus, a POSITA would understand that unlike the servers 120 and 130, which stream content, the profile server 165 is not disclosed as being able to stream content and instead is disclosed as providing a GUI for using its database for creating, accessing, and/or updating user profiles. *Id.* For example, a POSITA would understand that a server used for streaming video needs to have large amounts of memory (since video files tend to be large) and high input/output (I/O) bandwidth, whereas a webserver used for general database operations through a GUI does not need as much memory or I/O performance, e.g., since a POSITA would understand that profile records that store user preferences (such as topics of interest) are not as large. Whitehead at 7:3-18, 10:46-67, 13:62-14:4. For example, a study of Internet workloads from 2001 concluded the following:

> The increasing availability of continuous-media data is provoking a significant change in Internet workloads. For example, video from news, sports, and entertainment sites, and audio from Internet broadcast radio, telephony, and peer-to-peer networks, are becoming commonplace. Compared with traditional Web workloads, multimedia objects can require significantly more storage and transmission bandwidth.

Ex. 2011 at 1 (Maureen Chesire, Alec Wolman, Geoffrey M. Voelker, and Henry M. Levy, "Measurement and Analysis of a Streaming Media Workload," 3rd USENIX Symposium on Internet Technologies and Systems (USITS 01) (2001).

37. For reference, around the time of the filing of the parent application of the '753 Patent, Amazon Web Services (AWS) was charging 2 to 4 times more for virtual servers with larger memories and high I/O performance than servers with moderate memories and/or I/O performance. Ex. 2012 (Amazon EC2 Instance Types, October 22, 2008). Accordingly, a POSITA would not be motivated to add to the memory and I/O burdens of a streaming server, like the mixing server 130, by merging it with a traditional database/web server, like the profile server 165, because doing so would increase the costs of the entire system, require adding previously unneeded GUI functionality to the mixing server 130, and degrade performance by eliminating the load balancing that was already built into the Whitehead system by

separating the streaming servers (like servers 120 and 130) from its GUI/database/web servers (like profile server 165).

VII. CRISTOFALO (EX. 1004) IN VIEW OF MARCUS '904 (EX. 1005)

A. Cristofalo (Ex. 1004) In View of Marcus '904 (Ex. 1005) Does Not Disclose "collecting by the publisher from the aggregator client information, wherein said client information comprises user information"

38. Petitioner identifies "information on programs selected by the user and content to receive" as the user information contained within the presumably client information (user profiles). Pet at 45. I disagree with this analysis because the current feed selection is related to a different claim element, namely "acquiring by a publisher from the aggregator the feed selection." If the current feed selection is the same as client information containing user information, as Petitioner contends, then the claim element "collecting by the publisher from the aggregator client information, wherein said client information comprises user information" would be superfluous and would not be needed. For example, a POSITA would understand that the step of "acquiring by a publisher from the aggregator the feed selection" implies that the publisher has received (and, hence, collected) the feed selection, in which case there would be no reason for the publisher to collect it again. Moreover, for the same reasons, even if the temporal ordering of steps in claim 1 is not as given in the claim, then one of the steps of "acquiring" or "collecting" would still be

superfluous. Further, a POSITA would understand the ’753 Patent to be teaching, based on both the language of the claims and the teachings in the specification, that a content feed selection is not the same as user information. See, e.g., ’753 Patent at Figs. 7 and 8, and at 2:1-7, 2:55-65, 6:22-33.

39. I also disagree that co-locating Cristofalo’s user profiling system 106 with transmission system 102 would do anything to address the deficiencies in Petitioner’s analysis because the user selection of the current feed being the same as user information would still render the claim element superfluous, for at least the same reasons I give above. Further, Dr. Almeroth opines that in such an alleged combination of the transmitting system 102 and user profiling system 106, “user profile information would include programs selected by the user and content received.” Ex. 1002 at ¶ 137. A POSITA would find this too to be superfluous, of course, since the transmitting system 102 already receives indications of the programs selected by the user and it has previously sent (hence, can already know about) content received by the user; hence, a POSITA would recognize that there is no need for the transmitting system 102 to again receive alleged user information comprising programs selected by the user and content received by the user. Cristofalo at ¶¶ [0021], [0027], [0046] (e.g., “Preferably the user’s choice of programming is communicated to the transmitting side (i.e., to the media object creators 108 and the transmitting system 102) by the receiving system 104.”).

I declare that all statements made herein on my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were 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.

Executed on December 15, 2024, in Irvine, California.

Michael T. Goodrich, Ph.D

APPENDIX A

CURRICULUM VITAE
Michael T. Goodrich

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CITIZENSHIP: U.S.A.

EDUCATION

Ph.D.	1987	*Efficient Parallel Techniques for Computational Geometry* Computer Science, Purdue Univ. (M.J. Atallah, advisor)
M.S.	1985	Computer Science, Purdue Univ.
B.A.	1983	Mathematics and Computer Science, Calvin Univ.

PROFESSIONAL EXPERIENCE

July '19 to present	Distinguished Professor, Dept. of Computer Science Univ. of California, Irvine
March '10 to present	Technical Director, Center for Algorithms and Theory of Computation Univ. of California, Irvine
April '07 to June '19	Chancellor's Professor, Dept. of Computer Science Univ. of California, Irvine
July '12 to June '13	Chair, Dept. of Computer Science Univ. of California, Irvine
October '06 to June '12	Assoc. Dean for Faculty Dev., Bren School of Info. and Comp. Sci. Univ. of California, Irvine
July '01 to March '07	Professor, Dept. of Computer Science Univ. of California, Irvine
Fall '00	Visiting Professor of Computer Science Brown Univ.
July '96 to June '02	Professor of Computer Science (on leave, from July '01) Johns Hopkins Univ.
July '92 to June '96	Associate Professor of Computer Science Johns Hopkins Univ.
Spring '94	Visiting Associate Professor of Computer Science Univ. of Illinois, Urbana-Champaign
July '87 to June '92	Assistant Professor of Computer Science Johns Hopkins Univ.
Aug. '83 to June '87	Teaching Assistant, Research Assistant Purdue Univ.
Summer '83	Summer intern Argonne National Laboratory

RESEARCH INTERESTS

Algorithm and data structure design
Networking and parallel and distributed computing
Computer security and information assurance and privacy
Machine learning and computer vision
Databases and high-performance data management
Information visualization and graph drawing
Computational geometry and computer graphics

Patent Owner, NTECH Properties, Inc. - Ex. 2001, p. 26

PRIZES, HONORS, AND AWARDS

- *Compere Loveless Fellowship in Computer Sciences*, Purdue Univ., 1985
- *Research Initiation Award*, National Science Foundation, 1988
- *Oraculum Award for Excellence in Teaching*, Johns Hopkins, 1993, 1994, 1995
- *ACM Recognition of Service Award*, 1996
- *Robert B. Pond, Sr. Award for Excellence in Undergraduate Teaching*, Johns Hopkins, 1998
- *Elected Senior Member*, the Institute of Electrical and Electronics Engineers (IEEE), 1999
- *Spirit of Technology Transition Award*, DARPA Dynamic Coalitions Program, 2002
- *Brown Univ. Award for Technological Innovation* (with R. Tamassia, N. Triandopoulos, D. Yao, and D. Ellis), 2006
- *ACM Distinguished Scientist*, 2006
- *2006 IEEE Computer Society Technical Achievement Award*, "for outstanding contributions to the design of parallel and distributed algorithms for fundamental combinatorial and geometric problems"
- *Fulbright Scholar*, 2007, for senior specialist service to University of Aarhus, Denmark
- *Fellow of the San Diego Supercomputer Center*, 2007
- *Fellow of the American Association for the Advancement of Science (AAAS)*, "for distinguished contributions to parallel and distributed algorithms for combinatorial and geometric problems, and excellence in teaching, academic and professional service, and textbook writing," 2007
- *Named as Chancellor's Professor*, for "demonstrated unusual academic merit and whose continued promise for scholarly achievement is unusually high," Univ. of California, Irvine, 2007
- *Fellow of the Institute of Electrical and Electronics Engineers (IEEE)*, "for contributions to parallel and distributed algorithms for combinatorial and geometric problems," 2009
- *Fellow of the ACM*, "for contributions to data structures and algorithms for combinatorial and geometric problems," 2009
- *ICS Dean's Award for Research*, "for contributions in the area of parallel and distributed algorithms," 2014
- *Chancellor's Award for Excellence in Fostering Undergraduate Research*, Univ. of California, Irvine, 2016
- *Faculty Mentor of the Month*, Undergraduate Research Opportunities Program (UROP), Univ. of California, Irvine, April 2016
- *Elected as a foreign member*, Royal Danish Academy of Sciences and Letters, April 2018
- *Named as Distinguished Professor*, for achieving "the highest levels of scholarship" over the course of a career and having "earned national and international level distinctions and honors of the highest level," Univ. of California, Irvine, 2019
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- Total citations: over 18,000
- H-index (top H publications with at least H citations): 73

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C-215. G. Barequet, M. De, and M.T. Goodrich, "Computing Convex-Straight-Skeleton Voronoi Diagrams for Segments and Convex Polygons," *24th International Computing and Combinatorics Conference* (COCOON), 130–142, 2018. (Proceedings version of J-91.)

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C-217. D. Eppstein, M.T. Goodrich, J. Jorgensen, and M.R. Torres, "Geometric Fingerprint Recognition via Oriented Point-Set Pattern Matching," *30th Canadian Conference on*

Computational Geometry (CCCG), 1–16, 2018.

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C-243. M.T. Goodrich, R. Kitagawa, and V. Srindhar, "Dynamic Accountable Storage: An Efficient Protocol for Real-time Cloud Storage Auditing," *Int. Symp. on Algorithmic Aspects of Cloud Computing* (ALGOCLOUD), 2024.

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N-1. H. Masum, "Review of *Data Structures and Algorithms in Java* (2nd ed)," *ACM SIGACT News*, **32**(1), 3–5, 2001.

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PROFESSIONAL SERVICE

Guest Editor:

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Journal of Computer & System Sciences, **52**(1), 1996
Computational Geometry: Theory and Applications, **12(1–2)**, 1999.
Algorithmica, **33**(3), 2002.

Editorial Board Membership:

Computational Geometry: Theory and Applications, 2006–2015
Journal of Computer & System Sciences, 1994–2011
Journal of Graph Algorithms and Applications, 1996–2011
Int. Journal of Computational Geometry & Applications, 1993–2010
Information Processing Letters, 1995–1997

Journal Advisory Board Membership:

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Int. Journal of Computational Geometry & Applications, 2010–
Journal of Graph Algorithms and Applications, 2011–

Program Committee Service:

7th ACM Symp. on Computational Geometry (SoCG), 1991
1991 Workshop on Algorithms and Data Structures (WADS)
8th ACM Symp. on Computational Geometry (SoCG), 1992
25th ACM Symp. on Theory of Computing (STOC), 1993
Chair, 26th ACM Symp. on Theory of Computing (STOC), 1994
11th ACM Symp. on Computational Geometry (SoCG), 1995
DAGS '95 Conf. on Electronic Publishing and the Information Superhighway
1996 SIAM Discrete Mathematics Conference
1997 Workshop on Algorithms and Data Structures (WADS)
Int. Symp. on Graph Drawing (GD), 1997
1999 Workshop on Algorithms and Data Structures (WADS)
Co-chair, Workshop on Algorithm Engineering and Experimentation (ALENEX), 1999
Int. Symp. on Graph Drawing (GD), 2000
2000 Workshop on Algorithm Engineering (WAE)
41st IEEE Symp. on Foundations of Computer Science (FOCS), 2000
2001 Workshop on Algorithms and Data Structures (WADS)
Int. Symp. on Graph Drawing (GD), 2001
Workshop on Algorithm Engineering and Experimentation (ALENEX), 2002
18th ACM Symp. on Computational Geometry (SoCG), 2002
13th ACM-SIAM Symp. on Discrete Algorithms (SODA), 2002
Co-Chair, Graph Drawing 2002
Int. Symp. on Graph Drawing (GD), 2003
16th ACM-SIAM Symp. on Discrete Algorithms (SODA), 2005
32nd Int. Colloq. on Automata, Languages and Programming (ICALP), 2005
12th Int. Computing and Combinatorics Conference (COCOON), 2006
13th ACM Conf. on Computer and Communication Security (CCS), 2006
15th European Symp. on Algorithms (ESA), 2007
5th Int. Conference on Applied Cryptography and Network Security (ACNS), 2007
21st IEEE Int. Parallel & Distributed Processing Symp. (IPDPS), 2007
19th ACM Symp. on Parallelism in Algorithms and Architectures (SPAA), 2007
5th Workshop on Algorithms and Models for the Web-Graph (WAW), 2007
7th Int. Workshop on Experimental Algorithms (WEA), 2008
Second Int. Frontiers of Algorithmics Workshop (FAW), 2008
16th ACM SIGSPATIAL Int. Symp. on Adv. in Geographic Information Systems (GIS), 2008
17th ACM SIGSPATIAL Int. Symp. on Adv. in Geographic Information Systems (GIS), 2009
31st IEEE Symp. on Security and Privacy (S&P), 2010
18th Int. Symp. on Graph Drawing (GD), 2010
2011 Workshop on Analytic Algorithmics and Combinatorics (ANALCO)
8th Workshop on Algorithms and Models for the Web Graph (WAW), 2011
19th Int. Symp. on Graph Drawing (GD), 2011
24th ACM Symp. on Parallelism in Algorithms and Architectures (SPAA), 2012
20th European Symp. on Algorithms (ESA), 2012
2013 IEEE Int. Conf. on Big Data (BigData), 2013
30th IEEE Int. Conf. on Data Engineering (ICDE), 2014
21st ACM Conf. on Computer and Communication Security (CCS), 2014
Symp. on Algorithms and Data Structures (WADS), 2015
ACM Cloud Computing Security Workshop (CCSW), 2015
Int. Symp. on Graph Drawing (GD), 2015

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co-chair, 2016 Workshop on Algorithm Engineering and Experiments (ALENEX)
2016 Workshop on Massive Data Algorithmics (MASSIVE)
2016 Int. Symp. on Algorithms and Computation (ISAAC)
29th ACM Symp. on Parallelism in Algorithms and Architectures (SPAA), 2017
25th ACM SIGSPATIAL Int. Conf. on Adv. in Geographic Information Systems (GIS), 2017
26th European Symp. on Algorithms (ESA), 2018
26th ACM SIGSPATIAL Int. Conf. on Adv. in Geographic Information Systems (GIS), 2018
2nd SIAM Symp. on Simplicity in Algorithms (SOSA), 2019
ACM SIGSPATIAL Int. Workshop on Spatial Gems, 2019
2021 SIAM Symp. on Applied Computational & Discrete Algorithms (ACDA)
2023 SIAM Symp. on Algorithm Engineering and Experimentation (ALENEX)
35th ACM Symp. on Parallelism in Algorithms and Architectures (SPAA), 2023
7th SIAM Symp. on Simplicity in Algorithms (SOSA), 2024

Conference/Workshop Committee Service:

Conference chair, 12th ACM Symp. on Computational Geometry, 1996
Organizer, 1st CGC Workshop on Computational Geometry, 1996
Co-chair, 1999 Dagstuhl Workshop on Computational Geometry, 1999
Conference chair, Graph Drawing, 2002
Co-organizer, Hawaiian Workshop on Parallel Algorithms, 2017, 2019
Member, Symp. on Theory of Computing (STOC) Test of Time Award Committee, 2024

Steering Committee and Executive Committee Service:

Member at large, ACM SIG on Algorithms & Comp. Theory (SIGACT) Exec. Comm., 1993–97
Member, Exec. comm. for 1996 Federated Computing Research Conference (FCRC)
co-Founder and member, Steering Comm. for Workshop on Algorithm Engineering and Experimentation (ALENEX), 1999–2017 (chair, 2014–16)
co-Chair, Steering Comm. for ACM Symp. on Computational Geometry, 1999–2001
Member, Steering Comm. for Graph Drawing Conference, 2000–03, 2014–16
Conference Chair, ACM SIG on Algorithms & Comp. Theory (SIGACT), 2005–09

Center and Institute Affiliations:

Algorithms, Combinatorics and Optimization Center, UCI
Center for Algorithms and Theory of Computation, UCI
Center for Embedded and Cyber-physical Systems, UCI
Center for Machine Learning and Intelligent Systems, UCI
The Institute for Virtual Environments and Computer Games (IVECG), UCI
Secure Computing & Networking Center, UCI

Postdoctoral Fellows:

1. Timothy Chan, Johns Hopkins, 1996. (Now at Univ. of Illinois)
2. Gill Barequet, Johns Hopkins, 1996-98. (Now at Technion)
3. Pawel Gajer, Johns Hopkins, 2000. (Now at Univ. of Maryland)
4. Amitabh Chaudhary, UC-Irvine, 2002-2004. (Now at U. Chicago)
5. Amitabha Bagchi, UC-Irvine, 2002-2004. (Now at IIT-Dehli)
6. Martin Nöllenburg, UC-Irvine, 2010, mentored jointly with David Eppstein. (Now at TU Wien)
7. Maarten Löffler, UC-Irvine, 2010-2011, mentored jointly with David Eppstein. (Now at Utrecht University)
8. Md. Jawaherul Alam, UC-Irvine, 2015-16. (Now at Amazon)
9. Giordano Da Lozzo, UC-Irvine, 2016-2017, mentored jointly with David Eppstein. (Now at "Roma Tre" University)

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Ph.D. Students:

1. Mujtaba Ghouse, "Randomized Parallel Computational Geometry in Theory and Practice," Johns Hopkins Univ., May 1993.
2. Paul Tanenbaum, "On Geometric Representations of Partially Ordered Sets," Johns Hopkins Univ., May 1995 (co-advised with Edward Scheinerman).
3. Mark Orletsky, "Practical Methods for Geometric Searching Problems with Experimental Validation," Johns Hopkins Univ., May 1996.
4. Kumar Ramaiyer, "Geometric Data Structures and Applications," Johns Hopkins Univ., Aug. 1996.
5. Christian Duncan, "Balanced Aspect Ratio Trees," Johns Hopkins Univ., Aug. 1999.
6. Christopher Wagner, "Graph Visualization and Network Routing," Johns Hopkins Univ., Oct. 1999 (co-advised with Prof. Lenore Cowen).
7. Stephen Kobourov, "Algorithms for Drawing Large Graphs," Johns Hopkins Univ., May 2000.
8. Amitabha Bagchi, "Efficient Strategies for Topics in Internet Algorithmics," Johns Hopkins Univ., Oct. 2002.
9. Amitabh Chaudhary, "Applied Spatial Data Structures for Large Data Sets," Johns Hopkins Univ., Oct. 2002.
10. Breno De Medeiros, "New Cryptographic Primitives with Applications to Information Privacy and Corporate Confidentiality," Johns Hopkins Univ., May 2004 (co-advised with Giuseppe Ateniese).
11. "Jeremy" Yu Meng, "Confluent Graph Drawing," UC-Irvine, June 2006.
12. Jonathan Zheng Sun, "Algorithms for Hierarchical Structures, with Applications to Security and Geometry," UC-Irvine, Aug. 2006.
13. Nodari Sitchinava, "Parallel External Memory Model—A Parallel Model for Multi-core Architectures," UC-Irvine, Sep. 2009.
14. Darren Strash, "Algorithms for Sparse Geometric Graphs and Social Networks," UC-Irvine, May 2011 (co-advised with with David Eppstein).
15. Lowell Trott, "Geometric Algorithms for Social Network Analysis," UC-Irvine, May 2013.
16. Joseph Simons, "New Dynamics in Geometric Data Structures," UC-Irvine, May 2014.
17. Pawel Pszona, "Practical Algorithms for Sparse Graphs," UC-Irvine, May 2014.
18. William E. Devanny, "An Assortment of Sorts: Three Modern Variations on the Classic Sorting Problem," UC-Irvine, July 2017 (co-advised with David Eppstein).
19. Siddharth Gupta, "Topological Algorithms for Geographic and Geometric Graphs," UC-Irvine, Aug. 2018 (co-advised with with David Eppstein).
20. Timothy Johnson, "Graph Drawing Representations and Metrics with Applications," UC-Irvine, Aug. 2018.
21. Juan Besa, "Optimization Problems in Directed Graph Visualization," UC-Irvine, Aug. 2019.
22. Nil Mamano Grande, "New Applications of the Nearest-Neighbor Chain Algorithm," UC-Irvine, Sep. 2019 (co-advised with David Eppstein).
23. Pedro Matias, "Exact Learning of Sequences from Queries and Trackers," UC-Irvine, May 2021
24. Martha Osegueda, "Constructing, Counting and Matching Combinatorial and Geometric Shapes," UC-Irvine, May 2022
25. Ramtin Afshar, "Exact Learning of Graphs Using Queries," UC-Irvine, Feb. 2023
26. Evrim Ozel, "Efficient Algorithms for Road Networks and Noisy Sorting: an Experimental and Theoretical Perspective," UC-Irvine, May 2024

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Ph.D. Committee Service:

John Augustine	UC-Irvine	Advancement to candidacy, September 2003
Nikos Triandopoulos	Brown U.	Thesis prelim., February 2004
Einar Mykletun	UC-Irvine	Advancement to candidacy, March 2004
Kartic Subr	UC-Irvine	Advancement to candidacy, September 2004
S. Joshua Swamidass	UC-Irvine	Advancement to candidacy, April 2005
Jeong Hyun Yi	UC-Irvine	Thesis defense, August, 2005
Nodari Sitchinava	UC-Irvine	Advancement to candidacy, chair, December 2005
John Augustine	UC-Irvine	Thesis defense, July 2006
Maithili Narasimha	UC-Irvine	Thesis defense, August, 2006
Josiah Carlson	UC-Irvine	Advancement to candidacy, August 2006
Xiaomin Liu	UC-Irvine	Advancement to candidacy, September 2006
Gabor Madl	UC-Irvine	Advancement to candidacy, September 2006
Nikos Triandopoulos	Brown U.	Thesis defense, September 2006
Rabia Nuray-Turan	UC-Irvine	Advancement to candidacy, May 2007
S. Joshua Swamidass	UC-Irvine	Thesis defense, June 2007
Michael Sirivianos	UC-Irvine	Advancement to candidacy, June 2007
Kevin Wortman	UC-Irvine	Advancement to candidacy, August 2007
Di Ma	UC-Irvine	Advancement to candidacy, December 2007
Josiah Carlson	UC-Irvine	Thesis defense, December 2007
Michael Nelson	UC-Irvine	Advancement to candidacy, chair, March 2008
Minas Gjoka	UC-Irvine	Advancement to candidacy, June 2008
Sara Javanmardi	UC-Irvine	Advancement to candidacy, June 2008
Ali Zandi	UC-Irvine	Advancement to candidacy, September 2008
Jihye Kim	UC-Irvine	Thesis defense, September 2008
Darren Strash	UC-Irvine	Advancement to candidacy, December 2008
Kevin Wortman	UC-Irvine	Topic defense, January 2009
Nodari Sitchinava	UC-Irvine	Topic defense, chair, June 2009
Fabio Soldo	UC-Irvine	Advancement to candidacy, July 2009
Emil De Cristofaro	UC-Irvine	Advancement to candidacy, July 2009
Di Ma	UC-Irvine	Thesis defense, August 2009
Yanbin Lu	UC-Irvine	Advancement to candidacy, December 2009
Anh Le	UC-Irvine	Advancement to candidacy, April 2010
Lowell Trott	UC-Irvine	Advancement to candidacy, June 2010
Xiaomin Liu	UC-Irvine	Thesis defense, August 2010
Josh Olsen	UC-Irvine	Advancement to candidacy, September 2010
Yasser Altowim	UC-Irvine	Advancement to candidacy, December 2010
Angela Wong	UC-Irvine	Advancement to candidacy, May 2011
Joshua Hill	UC-Irvine	Advancement to candidacy, September 2011
Alex Abatzoglou	UC-Irvine	Advancement to candidacy, September 2011
Michael Wolfe	UC-Irvine	Masters Thesis defense, October 2011
Olya Ohrimenko	Brown Univ.	PhD Thesis proposal, October 2011
Yanbin Lu	UC-Irvine	PhD Thesis defense, November 2011
Chun Meng	UC-Irvine	Advancement to candidacy, December 2011
Abinesh Ramakrishnan	UC-Irvine	Advancement to candidacy, March 2012
Pegah Sattari	UC-Irvine	PhD Thesis defense, April 2012
Michael Bannister	UC-Irvine	PhD Thesis defense, May 2015

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Yingyi Bu	UC-Irvine	PhD Thesis defense, August 2015
Jenny Lam	UC-Irvine	PhD Thesis defense, November 2015
Timothy Johnson	UC-Irvine	Advancement to candidacy, chair, June 2016
Jiayu Xu	UC-Irvine	Advancement to candidacy, November 2016
Sky Faber	UC-Irvine	PhD Thesis defense, November 2016
Juan Jose Besa Vial	UC-Irvine	Advancement to candidacy, chair, March 2017
William Devanny	UC-Irvine	PhD Thesis defense, co-chair, July 2017
Ingo van Duijn	Aarhus Univ.	PhD Thesis defense, September 2017
Siddharth Gupta	UC-Irvine	Advancement to candidacy, January 2018
Boyang Wei	UC-Irvine	PhD Thesis defense, August 2018
Timothy Johnson	UC-Irvine	PhD Thesis defense, chair, August 2018
Siddharth Gupta	UC-Irvine	PhD Thesis defense, August 2018
Pedro Matias	UC-Irvine	Advancement to candidacy, chair, May 2019
Juan Jose Besa Vial	UC-Irvine	PhD Thesis defense, chair, August 2019
Sameera Chayyur	UC-Irvine	Advancement to candidacy, September 2019
Nil Mamano Grande	UC-Irvine	PhD Thesis defense, co-chair, September 2019
Yihan Sun	CMU	PhD Thesis defense, October 2019
Martha Osegueda	UC-Irvine	Advancement to candidacy, chair, June 2020
Tatiana Bradley	UC-Irvine	PhD Thesis defense, December 2020
Julius Ceasar Aguma	UC-Irvine	Advancement to candidacy, December 2020
Ramtin Afshar	UC-Irvine	Advancement to candidacy, chair, March 2021
Pedro Matias	UC-Irvine	PhD Thesis defense, chair, May 2021
Elham Havvaei	UC-Irvine	PhD Thesis defense, May 2021
Daniel Frishberg	UC-Irvine	Advancement to candidacy, May 2021
Hadi Khodabandeh	UC-Irvine	Advancement to candidacy, July 2021
Sameera Ghayyur	UC-Irvine	PhD topic defense, February 2022
Evrim Ozel	UC-Irvine	Advancement to candidacy, chair, May 2022
Rohith Gangam	UC-Irvine	Advancement to candidacy, May 2022
Martha Osegueda	UC-Irvine	PhD Thesis defense, chair, May 2022
Yanqi Gu	UC-Irvine	Advancement to candidacy, June 2022
Sameera Ghayyur	UC-Irvine	PhD Thesis defense, August 2022
Rasmus K. Petersen	Aarhus Univ.	PhD Thesis defense, Sept. 2022
Zihan Yu	UC-Irvine	Advancement to candidacy, Nov. 2022
Ramtin Afshar	UC-Irvine	PhD Thesis defense, chair, Feb. 2023
Shanshan Han	UC-Irvine	Advancement to candidacy, Feb. 2023
Zhanhang (Marco) Liang	UC-Irvine	Advancement to candidacy, Mar. 2023
Shion Fukuzawa	UC-Irvine	Advancement to candidacy, co-chair, Mar. 2023
Ryuto Kitagawa	UC-Irvine	Advancement to candidacy, chair, May 2024
Ofek Gila	UC-Irvine	Advancement to candidacy, chair, May 2024
Po-Chu Hsu	UC-Irvine	Advancement to candidacy, May 2024
Yanqi Gu	UC-Irvine	PhD Thesis defense, May 2024
Evrim Ozel	UC-Irvine	PhD Thesis defense, chair, May 2024
Hadi Khodabandeh	UC-Irvine	PhD Thesis defense, June 2024
Alfred (Songyu) Liu	UC-Irvine	Advancement to candidacy, chair, Nov. 2024
Parnian Shahkar	UC-Irvine	Advancement to candidacy, Nov. 2024
Stelios Stavroukakis	UC-Irvine	Advancement to candidacy, Nov. 2024

University Service:

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Ph.D. Requirements Committee, Dept. of Computer Science, chair: 1987–89
Graduate Admissions Committee, Dept. of Computer Science, 1991–1993 (chair: 1992)
Faculty Recruiting Committee, Dept. of Computer Science, 1993,95,96 (chair: 1996)
Steering Committee, Whiting School of Engineering, 1990–93 (chair, 1993)
Johns Hopkins Homewood Academic Computing Oversight Committee, 1990–93
Curriculum Committee, Whiting School of Engineering, 1994–96
Strategic Planning Committee, Whiting School of Engineering, 1999–00
Graduate Policy Committee, UCI Dept. of Information & Computer Science (ICS), 2001–02
Faculty Search Committee in Cryptography, UCI Dept. of ICS, 2001–03
School of Info. and Computer Science Executive Committee, 2002–04
UCI Committee on Educational Policy (CEP), 2002–03, 2004–06
UCI Change of Major Criteria Committee, 2002–03
UCI CEP Policy Subcommittee, 2002–2003
Distinguished Faculty Search Committee, Bren School of ICS, 2004–11 (chair, 2007–08)
Equity Advisor, Bren School of ICS, 2005–09
Dean's Advisory Council, Bren School of ICS, 2007–13
Associate Dean for Faculty Development, Bren School of ICS, 2006–12
Chair, Department of Computer Science, Bren School of ICS, 2012–13
Master of Computer Science Development Committee, Bren School of ICS, 2013–16
Stragic Planning Committee, Dept. of Computer Science, Bren School of ICS, 2015–16
Executive Committee, Bren School of ICS, 2017–18
UC-Irvine Senate Committee on Scholarly Honors & Awards, 2017–20
UC-Irvine Special Research Program Review Committee for CalIT2, 2018–19
UC-Irvine Year of Scholarly Values Advisory Committee, 2024–
Master of Computer Science Steering/Admissions Comm., Bren School of ICS, 2016–22, 2024–

Courses Taught and Developed:

Advanced Parallel Computing (developed and taught at Johns Hopkins)
Cyber-Puzzlers (designed and taught at UCI)
Computer Literacy (taught at Purdue, developed at Johns Hopkins)
Computer Programming for Scientists and Engineers (taught at Purdue)
Computer Security Algorithms (developed and taught at UCI)
Computational Models (revised and taught at Johns Hopkins)
Computational Geometry (revised and taught at Johns Hopkins and UCI)
Compiler Theory and Design (revised and taught at Johns Hopkins)
Computer Graphics (taught at Johns Hopkins)
Cyber-Fraud Detection and Prevention (designed and taught at UCI)
Data Structures (revised and taught at Johns Hopkins and UCI)
Graph Algorithms (revised and taught at UCI)
Formal Languages and Automata Theory (revised and taught at UCI)
Fundamentals of Algorithms with Applications (revised and taught at UCI)
Introduction to Algorithms (developed and taught at Johns Hopkins and UCI)
Internet Algorithmics (developed and taught at Johns Hopkins, Brown, and UCI)
Design and Analysis of Algorithms (revised and taught at Johns Hopkins and UCI)
Parallel Algorithms (developed and taught at Johns Hopkins and Univ. of Illinois)
Project in Algorithms and Data Structures (revised and taught at UCI)
Text Processing and Pattern Matching (developed and taught at UCI)

Consulting:

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The National Science Foundation, proposal panel member, 1990–
Army Research Laboratory, Fort Belvior, 1995
Battelle Research Triangle, Columbus Division, 1996
AT&T, 1998
Univ. of Miami, 1999
Algomagic Technologies, Inc., 2000–2005
Brown University, 2000–2007
Purdue University, 2002
APAC Security, Inc., 2005
Walt Disney Animation Studios, 2009
Technical expert and expert witness, 2012–
3M, 2015

GRANTS AND CONTRACTS

1. PI, "Research Initiation Award: Parallel and Sequential Computational Geometry," National Science Foundation (NSF Grant CCR-8810568), $32,914, 1988–90.
2. co-PI, "Paradigms for Parallel Algorithm Design," NSF and DARPA (as NSF Grant CCR-8908092), $523,837, 1989–93 (with S.R. Kosaraju (PI), S. Kasif, and G. Sullivan).
3. PI, "Parallel Computation and Computational Geometry," NSF (Grant CCR-9003299), $67,436, 1990–93.
4. co-PI, "A Facility for Experimental Validation," NSF (Grant CDA-9015667), $1,476,147, 1991–96 (with G. Masson (PI), J. Johnstone, S. Kasif, S.R. Kosaraju, S. Salzberg, S. Smith, G. Sullivan, L. Wolff, and A. Zwarico).
5. PI, "Parallel Network Algorithms for Cell Suppression," The Bureau of the Census (JSA 91-23), $14,998 1991–92.
6. PI, "A Geometric Framework for the Exploration & Analysis of Astrophysical Data," NSF (Grant IRI-9116843), $535,553, 1991–96 (with S. Salzberg and H. Ford (from Physics and Astronomy Dept.)).
7. PI, "Research Experiences for Undergraduates supplement to IRI-9116843," NSF, $4,000, 1993–94 (with S. Salzberg and H. Ford).
8. PI, "Constructing, Maintaining, and Searching Geometric Structures," NSF (Grant CCR-9300079), $134,976, 1993–96.
9. co-PI, "Robust and Applicable Geometric Computing," Army Research Office (ARO MURI Grant DAAH04-96-1-0013), $4,500,000, 1996–2000 (with F. Preparata (PI, Brown U.), R. Tamassia (Brown U.), S. Rao Kosaraju, J. Vitter (Duke U.), and P. Agarwal (Duke U.)). Subaward size: $1,466,640.
10. PI, "Application-Motivated Geometric Algorithm Design," NSF (Grant CCR-9625289), $107,389, 1996-98.
11. co-PI, "vBNS Connectivity for the Johns Hopkins University," NSF, $350,000, 1997–99 (with T.O. Poehler (PI), D.J. Binko, J.G. Neal, and A.S. Szalay).
12. co-PI, "Product Donation, Technology for Education Program," Intel Corporation, $480,071, 1997–2001 (with T.O. Poehler (PI), J.H. Anderson, A.S. Szalay, and M. Robbins).
13. co-PI, "A Networked Computing Environment for the Manipulation & Visualization of Geometric Data" (Research Infrastructure), NSF, $1,638,785, 1997–2003 (with L.B. Wolff (PI), Y. Amir, S.R. Kosaraju, S. Kumar, R. Tamassia (Brown U.), R.H. Taylor, and D. Yarowsky).
14. PI, "Geometric Algorithm Design and Implementation," NSF, Grant CCR-9732300, $224,982, 1998–2002.

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15. PI, "Certification Management Infrastructure – Certificate Revocation," $52,023, 1998, NSA LUCITE grant.
16. PI, "Software Engineering Data Loading, Analysis, and Reporting," $41,614, 1998, NSA LUCITE grant.
17. PI, "Establishing a LUCITE Collaboration Environment," $10,018, 1998, NSA LUCITE grant.
18. PI, "In Support of a Secure Multilingual Collabortive Computing Environment," $51,471, 1999-2000, NSA LUCITE grant.
19. PI, "Accessing Large Distributed Archives in Astronomy and Particle Physics," $199,981. subcontract to UCI from Johns Hopkins Univ. on NSF Grant PHY-9980044 (total budget, $2,500,000), 1999–2004.
20. PI, "Efficient and Scalable Infrastructure Support for Dynamic Coalitions," $1,495,000, DARPA Grant F30602-00-2-0509, 2000-2003 (with Robert Cohen and Roberto Tamassia), including $227,893 subaward to UCI (with Gene Tsudik).
21. PI, "Graph Visualization and Geometric Algorithm Design," $400,000, NSF Grant CCR-0098068, 2001-2004 (with Roberto Tamssia).
22. PI, "Collaborative Research: Teaching Data Structures to the Millennium Generation," $125,00, NSF Grant DUE-0231467, 2003–2005.
23. PI, "Collaborative Research: An Algorithmic Approach to Cyber-Security," $100,000, NSF Grant CCR-0311720, 2003–2006.
24. PI, "The OptIPuter," $900,000, subcontract from UCSD on NSF ITR grant CCR-0225642 (total budget, $13.5 million), 2002–2007 (with Padhraic Smyth and Kane Kim).
25. PI, "ITR: Algorithms for the Technology of Trust," $300,000, NSF Grant CCR-0312760, 2003–2009.
26. co-PI, "SDCI Data New: Trust Management for Open Collaborative Information Repositories: The CalSWIM Cyberinfrastructure," NSF grant OCI-0724806, $1,103,590, 2007–2012.
27. co-PI, "Support for Machine Learning Techniques for Cyber-Fraud Detection," Experian Corporation, $200,000 gift, 2008.
28. PI, "IPS: Collaborative Research: Privacy Management, Measurement, and Visualization in Distributed Environments," NSF Grant IIS-0713046, $224,851, 2007–2009.
29. PI, "Collaborative Research: Algorithms for Graphs on Surfaces," $400,000, NSF Grant CCR-0830403, 2008–2011.
30. PI, "ROA Supplement: IPS: Collaborative Research: Privacy Management, Measurement, and Visualization in Distributed Environments," NSF Grant IIS-0847968, $25,000, 2008–2009.
31. co-investigator, "Scalable Methods for the Analysis of Network-Based Data," Office of Naval Research: Multidisciplinary University Research Initiative (MURI) Award, number N00014-08-1-1015, $529,152, 2008–2014.
32. PI, "EAGER: Usable Location Privacy for Mobile Devices," NSF Grant 0953071, $300,000, 2009–2011.
33. PI, "TC:Large:Collaborative Research: Towards Trustworthy Interactions in the Cloud," NSF Grant 1011840, $500,000, 2010-2015.
34. PI, "TWC: Medium: Collaborative: Privacy-Preserving Distributed Storage and Computation," NSF Grant 1228639, $390,738, 2012-2018.
35. PI, "Support for Research on Geometric Motion Planning," 3M Corporation, $40,000 gift, 2014.
36. PI, "A4V: Automated Analysis of Algorithm Attack Vulnerabilities," subcontract 10036982-UCI from University of Utah for DARPA agreement no. AFRL FA8750-15-2-0092, $980,000,

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2015–2019.

37. PI, "TWC: Small: Collaborative: Practical Security Protocols via Advanced Data Structures," NSF Grant 1526631, $166,638, 2015–2018.
38. PI, "NSF-BSF: AF: Small: Geometric Realizations and Evolving Data," NSF Grant 1815073, $474,392, 2018–2022.
39. PI, "Collaborative Research: AF: Medium: Algorithms for Geometric Graphs," NSF Grant 2212129, $799,800, 2022–2026.

SELECTED INVITED TALKS (RECENT YEARS ONLY)

- "Probabilistic Packet Marking for Large-Scale IP Traceback," Purdue Univ., 2003
- "Algorithms for Data Authentication," Harvey Mudd College, 2003
- "Efficient Tree-Based Revocation in Groups of Low-State Devices," Univ. of Arizona, 2004
- "Leap-Frog Packet Linking and Diverse Key Distributions for Improved Integrity in Network Broadcasts," Southern California Security and Cryptography Workshop, 2005
- "Is Your Business Privacy Protected?," NEXT Connections, 2005
- "Distributed Peer-to-peer Data Structures," Harvard Univ., 2006
- "Balancing Life with an Academic Research Career," Grace Hopper Conference, 2006
- "Computer Security in the Large," Univ. Texas, San Antonio, 2006
- "Inspirations in Parallelism and Computational Geometry," Brown Univ., 2006
- "Efficiency and Security Issues for Distributed Data Structures," Computer Science Distinguished Lecture Series, Johns Hopkins Univ., 2006
- "Efficiency and Security Issues for Distributed Data Structures," UCLA, 2006
- "Efficiency and Security Issues for Distributed Data Structures," Edison Distinguished Lecturer Series, Univ. of Notre Dame, 2006
- "Efficiency and Security Issues for Distributed Data Structures," Computer Science Distinguished Lecturer Series, Texas A & M Univ., 2006
- "Algorithms for Secure Computing and Searching with Applications to Medical Informatics," Purdue Univ., 2006
- "Blood on the Computer: How Algorithms for Testing Blood Samples can be Used for DNA Sequencing, Wireless Broadcasting, and Network Security," Univ. of Southern California, 2007
- "Blood on the Computer: How Algorithms for Testing Blood Samples can be Used for DNA Sequencing, Wireless Broadcasting, and Network Security," Univ. California, San Diego, 2007
- "Blood on the Computer: How Algorithms for Testing Blood Samples can be Used for DNA Sequencing, Wireless Broadcasting, and Network Security," Univ. Minnesota, 2007
- "Blood on the Database: How Algorithms for Testing Blood Samples can be Used for Database Integrity," Invited Keynote, 21st Annual IFIP WG 11.3 Working Conference on Data and Applications Security (DBSec), 2007
- "Space-Efficient Straggler Identification," ALCOM Seminar, Univ. of Aarhus, 2007
- "Blood on the Computer: How Algorithms for Testing Blood Samples can be used in Modern Applications," ALCOM Seminar, Univ. of Aarhus, 2007
- "Studying Road Networks Through an Algorithmic Lens," ALCOM Seminar, Univ. of Aarhus, 2008
- "Studying Geometric Graph Properties of Road Networks Through an Algorithmic Lens," Int. Workshop on Computing: from Theory to Practice, 2009

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- "Randomized Shellsort: A Simple Oblivious Sorting Algorithm," Distinguished Lecture Series, Department of Computer Science, Brown University, 2009
- "Simulating Parallel Algorithms in the MapReduce Framework with Applications to Parallel Computational Geometry," MASSIVE 2010
- "Data Cloning Attacks for Nearest-Neighbor Searching based on Retroactive Data Structures," Department of Computer Science, UCSB, 2011
- "Turning Privacy Leaks into Floods: Surreptitious Discovery of Social Network Friendships and Other Sensitve Binary Attribute Vectors," Department of Computer Science Distinguished Lecturer Series, Univ. of Illinois, Chicago, 2011
- "Turning Privacy Leaks into Floods: Surreptitious Discovery of Social Network Friendships and Other Sensitve Binary Attribute Vectors," Department of Computer Science, Purdue Univ., 2011
- "Spin-the-bottle Sort and Annealing Sort: Oblivious Sorting via Round-robin Random Comparisons," Department of Computer Science, Brown Univ., 2012
- "Using Data-Oblivious Algorithms for Private Cloud Storage Access," Qatar University, 2013
- "Using Data-Oblivious Algorithms for Private Cloud Storage Access," Department of Computer Science and Engineering Distinguished Speaker Series, University of Buffalo, 2013
- "Force-Directed Graph Drawing Using Social Gravity and Scaling," invited talk, ICERM Workshop on Stochastic Graph Models, Providence, RI, 2014
- "Invertible Bloom Lookup Tables and Their Applications in Large-Scale Data Analysis," invited key-note speaker, Algorithms for Big Data, Frankfurt, Germany, 2014
- "Invertible Bloom Lookup Tables and Their Applications in Large-Scale Data Analysis," Brown University, Providence, RI, 2014
- "Studying Road Networks Through an Algorithmic Lens," Bold Aspirations Visitor and Lecture, University of Kansas, 2015
- "Learning Character Strings via Mastermind Queries, with Case Studies," Invited Lecture, Workshop on Pattern Matching, Data Structures and Compression, Bar-Ilan University, Tel Aviv, Israel, 2016
- "Invertible Bloom Lookup Tables and Their Applications in Data Analysis," University of Hawaii, 2016
- "Invertible Bloom Lookup Tables," Purdue University, 2016
- "Combinatorial Pair Testing: Distinguishing Workers from Slackers," Calvin Univ., 2016
- "Invertible Bloom Lookup Tables," University of California, Riverside, 2016
- "2-3 Cuckoo Filters for Faster Triangle Listing and Set Intersection," Technion, Israel Institute of Technology, Haifa, Israel, 2017
- "2-3 Cuckoo Filters for Faster Triangle Listing and Set Intersection," University of Arizona, 2017
- "Parallel Computational Geometry," First Hawaii Workshop on Parallel Algorithms and Data Structures, University of Hawaii, 2017
- "Fighting Gerrymandering with Algorithmic Fairness," Calvin University, 2019
- "Fighting Gerrymandering with Algorithmic Fairness," Carnegie Mellon University, 2019
- "Sorting Evolving Data in Parallel," Second Hawaii Workshop on Parallel Algorithms and Data Structures, University of Hawaii, 2019
- "Dealing with Big Data via External Memory Algorithms and Data Structures," Aarhus University, Denmark, 2021
- "Dealing with Big Data via External Memory Algorithms and Data Structures," Royal Danish

Academy of Sciences and Letters, 2021

- "Augmenting Networks for Greedy Routing," Dept. of Electrical and Computer Engineering, Distinguished Lecturer Series, Iowa State University, Dec. 2023.
- "Augmenting Networks for Greedy Routing," Dept. of Computer Science, University of California, Riverside, June 2024.
- "String Algorithms," Dept. of Computer Science, University of Hawaii, Dec. 2024.

Patent Owner, NTECH Properties, Inc. - Ex. 2001, p. 63

TECHNICAL EXPERT CONSULTING SUMMARY
(LAST FIVE YEARS)

Michael T. Goodrich, PhD

Dept. of Computer Science
Bren School of Info. & Computer Sciences
University of California, Irvine
Irvine, CA 92697-3435

http://www.ics.uci.edu/~goodrich/
E-mail: mike.t.goodrich (at) gmail.com

TECHNICAL EXPERT CONSULTING

The following is a listing of prior and current expert consulting since 2019, where I have testified as an expert, but it may not include confidential information, as per written agreements.

1. Apr. 2016 to Sep. 2024, Technical expert and deponent, retained through Kramer Levin LLP on behalf of Acceleration Bay LLC, in IPR proceedings and patent litigation, Acceleration Bay LLC v. Activision Bizzard, Inc., Electronic Arts Inc., Take-Two Interactive Software, Inc., Rockstar Games, Inc., and 2K Sports, Inc. Civil Actions No. 1:16-cv-00453-RGA, No. 1:16-cv-00454-RGA, No. 1:16-cv-00455-RGA (D. Del.), IPR2015-01951, IPR2015-01953, IPR2015-01964, IPR2015-01970, IPR2015-01972, IPR2015-01996, IPR2016-00724, and IPR2016-00747 (PTAB).

2. May 2016 to Apr. 2023, Technical expert and deponent, retained through Kramer Levin LLP (transferred to Fish & Richardson) on behalf of Finjan, Inc., in PTO proceedings and patent litigations, Finjan, Inc. v. Blue Coat, Finjan, Inc. v. ESET, LLC, Finjan, Inc. v. Juniper Networks, Inc., Finjan, Inc. v. Cisco Systems, Inc., Finjan, Inc. v. Qualys, Inc., Finjan, Inc. v. Rapid7, Inc., and Finjan, Inc. v. SonicWall, Inc., IPR2015-01974, IPR2015-01979, IPR2016-00478, IPR2016-00159 (PTAB), 5:15-cv-03295-BLF-PSG (N.D. Cal.), 3:17-cv-05659-WHA (N.D. Cal.), 3:17-cv-0183-CAB-BGS (S.D. Cal.), 17-cv-0072-BLF-SVK (N.D. Cal.), 4:18-cv-07229-YGR (N.D. Cal.), 1:18cv-01519-MN (Del.), and 5:17-cv-04467-BLF (N.D. Cal.).

3. Jan. 2017 to Jan. 2021, Technical expert and deponent, retained by Fitzpatrick, Cella, Harper & Scinto, Venable LLP, on behalf of Koninklijke Philips N.V. and U.S. Philips Corp., in patent litigation, Philips v. Acer Inc., ASUSTeK Computer, Double Power Tech., HTC, Southern Telecom, Visual Land, Zowee Marketing Co., Ltd., Shenzen Zowee Technology Co., Ltd., YiFang USA, Inc. d/b/a EFun, Inc., and Intervenor/Counterclaim Defendant Microsoft Corporation. Civil Actions No. 15-1125-GMS, No. 15-1126-GMS, No. 15-1127-GMS, No. 15-1128-GMS, No. 15-1130-GMS, No. 15-1131-GMS, No. 15-1170-GMS (D. Del.), and 4:18-cv-01885-HSG (N.D. Cal., Oakland Div.).

4. Jun. 2018 to present, Technical expert, declarant, deponent, and testifying trial expert witness, retained through Kramer Levin LLP on behalf of Centripetal Networks, Inc., in IPRs

and patent litigation, Centripetal Networks, Inc. v. Keysight Technologies, Inc., Ixia, and Cisco. Civil Actions No. 2:17-cv-00383/HCM-LRL and 2:18-cv-00094-HCM-LRL (E.D. Virginia), 2:22-cv-00002 (E.D. Virginia), IPR2018-01386, IPR2018-01443, IPR2018-01444, IPR2018-01512, IPR2018-01513, IPR2022-01525, IPR2023-00445, IPR2023-00446, IPR2023-00448 (PTAB), and Inv. No. 337-TA-1314 (ITC).

5. Feb. 2019 to present, Technical expert, declarant, deponent, and testifying trial expert witness, retained through Reichman Jorgensen LLP on behalf of Kove IO, Inc., in patent litigation, Kove IO, Inc. v. Amazon Web Services, Inc., Civil Action No. 1:18-cv-08175 (N.D. Illinois, Eastern Div.).

6. Apr. 2019 to Sep. 2020, Technical expert, declarant, and deponent, retained by McKool Smith on behalf of SEVEN Networks LLC in patent litigation, SEVEN Networks LLC v. Apple, Inc. Civil Action No. 2:19-cv-115 (E.D. Texas).

7. Jun. 2019 to Jun. 2023, Technical expert, declarant, and deponent, retained through Kramer Levin LLP on behalf of CUPP Cybersecurity LLC, in patent litigation, CUPP Cybersecurity LLC, et al., v. Trend Micro, Inc. IPR2021-00813, IPR2021-01236, IPR2021-01237 (PTAB), Civil Action no. 3:18-cv-01251-M, 3:20-cv-03206-M (N.D. Texas).

8. Jul. 2020 to Feb. 2021, Technical expert and declarant, retained through Goodwin Procter LLP on behalf of MobileIron, Inc., in patent litigation, MobileIron, Inc. v. BlackBerry Corp. IPR2020-01741 (PTAB).

9. Aug. 2020 to present, Technical expert and declarant, retained through Thompson & Knight LLP (now Holland & Knight) on behalf of Broadcom Corp., in patent litigation, Broadcom Corp. and Avago Technologies International Sales PTE. Limited v. Netflix, Inc. Civil actions no. 8:20-cv-529 (C.D. Cal.), 3:20-cv-04677-JD (N.D. Cal.).

10. Nov. 2020 to Dec. 2021, Technical expert and deponent, retained through Kramer Levin LLP on behalf of Midwest Athletics and Sports Alliance LLC (MASA), in patent litigation, Midwest Athletics and Sports Alliance LLC v. RICOH USA, Inc., and Midwest Athletics and Sports Alliance LLC v. Xerox Corp. Civil Action Nos. 19-CV-00514 (E.D. Penn.) and 6:19-CV-06036-EAW-JFW (W.D. New York).

11. Mar. 2021 to Feb. 2024, Technical expert, declarant, and deponent, retained through Nix Patterson LLP on behalf of Ikorongo Technology LLC, in patent litigation, Ikorongo v. Samsung, LG, Lyft, Uber, and Bumble Trading, Civil Action Nos. 6:20-cv-00256-ADA, 6:20-cv-00257-ADA, 6:20-cv-00258-ADA, 6:20-cv-00259-ADA, 6:20-cv-00843-ADA (W.D. Texas, Waco), and IPR2021-00204 (PTAB).

12. May 2021 to Aug. 2024, Technical expert, declarant, and deponent, retained by McKool Smith on behalf of SEVEN Networks LLC in patent litigation, SEVEN Networks, LLC v. Motorola Mobility LLC. Civil Action Nos. 2:21-cv-88 (E.D. Texas) and 3:21-cv-1036 (N.D. Texas).

13. Aug. 2021 to present, Technical expert, declarant, and deponent, retained through Holland & Knight LLP on behalf of CA, Inc., in patent litigation, CA, Inc. and Avago Technologies International Sales PTE. Limited v. Netflix, Inc. Civil action no. 2:21-cv-00080-JRG-RSP (E.D. Texas).

14. Aug. 2021 to present, Technical expert, declarant, deponent, and testifying trial expert witness, retained through Kramer Levin LLP on behalf of Centripetal Networks, Inc., in patent litigation and IPRs, Centripetal Networks, Inc. v. Palo Alto Networks, Inc. Civil Action No. 2:21-cv-00137 (E.D. Virginia, Norfolk Div.), IPR2021-01149, IPR2021-01150, IPR2021-01152, IPR2021-01157, IPR2022-00182 (PTAB).

15. Jul. 2022 to May 2024, Technical expert, deponant, and declarant, retained through McKool Smith on behalf of the State of Texas, in litigation State of Texas v. Meta Platforms, Inc., Cause No. 22-0121.

16. Aug. 2022 to present, Technical expert and declarant, retained through Stamoulis & Weinblatt LLC on behalf of Ameranth, Inc., in a patent-related matter.

17. Sep. 2022 to present, Technical expert, deponent, and declarant, retained through Reichman Jorgensen Lehman & Feldberg LLP on behalf of VideoLabs, Inc., in patent-related matters, VideoLabs v. Netflix, and Starz Entertainment, LLC, et al. v. VL Collective IP, LLC and VideoLabs, Inc., Civil Action No. 21-cv-1448-JLH (D. Del.), IPR2022-01086, IPR2023-00628, IPR2023-00630, IPR2023-00891.

18. Nov. 2022 to Jun. 2023, Technical expert and declarant, retained through McKool Smith on behalf of American Airlines, Inc., in a patent-related litigation, R2 Solutions LLC v. American Airlines, Inc., Civil Action No.4:22-cv-00353 (E.D. Tex.).

19. Feb. 2023 to Nov. 2023, Technical expert and declarant, retained through Kirkland and Ellis LLP on behalf of Forcepoint LLC in a patent-related litigation, Webroot, Inc. et al. v. Forcepoint LLC, Case No. 6:22-cv-00341-ADA (W.D. Tex.).

20. Feb. 2023 to Dec. 2023, Technical expert and declarant, retained through Holland & Knight LLP on behalf of MDSave Shared Services, Inc., in a patent-related litigation.

21. Aug. 2023 to Sep. 2024, Technical expert, declarant, and deponent, retained though Kramer Levin LLP on behalf of Acceleration Bay LLC in patent-related litigation, Acceleration Bay LLC v. Amazon Web Services, Inc., Case No. 1:22-cv-904 (D. Del.).

22. Feb. 2024 to May 2024, Technical expert and declarant, retained through McKool Smith on behalf of AlphaSense, Inc., in patent litigation, AlphaSense, Oy and AlphaSense, Inc. v. Tegus, Inc. and Bamsec, LLC, Case No. cv-23-1030-MN (D. Del.).

23. May 2024 to present, Technical expert and declarant, retained through Reichman Jorgensen Lehman & Feldberg LLP on behalf of Kove IO, Inc., in patent litigation, Kove IO, Inc. v. Google, LLC, No. 1:23-cv-04244 (N.D. Ill.).

24. July 2024 to present, Technical expert, declarant, and deponent, retained through McKool Smith on behalf of Carbyne Biometrics, LLC, in patent litigation, Apple, Inc., Petitioner v. Carbyne Biometrics, LLC, Patent Owner in Case: (1) IPR2024-00329, U.S. Patent No. 9,972,010; (2) IPR2024-00330, U.S. Patent No. 10,713,656; (3) IPR2024-00331, U.S. Patent No. 11,526,886; (4) IPR2024-00332, U.S. Patent No. 10,929,512; (5) IPR2024-00333, U.S. Patent No. 11,475,105; (6) IPR2024-00334, U.S. Patent No. 11,514,138; and (7) IPR2024-00507, U.S. Patent No. 11,475,105.

25. October 2024 to present, Technical expert, retained through Kramer Levin LLP on behalf of Cyandia, Inc., in patent litigation Cyandia, Inc. v. SAP America, Inc., and SAP SE, Case No. 2:22-cv-00096-JRG.

26. November 2024 to present, Technical expert and declarant, Kramer Levin LLP on behalf of NTECH Properties, Inc. in patent litigation NTECH Properties, Inc. in v. ByteDance LTD., ByteDance PTE. LTD, TikTok PTE. LTD., and TikTok Inc., Case No. 2:24-cv-00130-JRG and IPR2024-01340, IPR2024-01341, IPR2024-01342, and IPR2024-01343.