EXHIBIT 1003

Declaration of Immanuel Freedman

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent of Jacobs *et al.*	§	REQUEST FOR *EX PARTE* REEXAMINATION
U.S. Patent 10,021,380	§	Attorney Docket No.: VDP380
Filed: Feb. 28, 2018	§	Customer No.: 165774
Issued: July 10, 2018	§	
Title: FASTER STATE TRANSITIONING FOR CONTINUOUS ADJUSTABLE 3DEEPS FILTER SPECTACLES USING MULTI-LAYERED VARIABLE TINT MATERIALS	§	

DECLARATION OF DR. IMMANUEL FREEDMAN

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I, Immanuel Freedman, hereby declare under penalty of perjury:

I. INTRODUCTION

1. I have been retained as a technical expert witness by counsel for Unified Patents, LLC, ("Unified" or "Requester") and asked to review and provide my opinion on the patentability of claims 1-10 ("Challenged Claims") of U.S. 10,021,380 ("the '380 Patent," Ex. 1001). This declaration accompanies the Request for Reexamination of the '380 Patent ("Request").

2. I am being compensated at my standard rate. My compensation is not contingent on the outcome of this proceeding or the content of my opinions.

3. I have reviewed, had input into, and endorse the discussions in Sections I.A.1-3, I.B.-I.E, II.A-B, and II.C-D. These sections include the review of the '380 Patent and its prosecution history; the scope of the claims; Kasagi's, Yamada's, Miyazaki's, and Compton's prior art's disclosure of the claims; the statements throughout those sections of the Request regarding a person of ordinary skill in the art ("POSITA")'s knowledge and understanding; and the accompanying claim charts attached the Request as Appendices A-B and D.

4. In addition to endorsing the Request (and accompanying claim charts), this declaration is a statement of my opinions on issues related to the patentability of the Challenged Claims.

5. My complete qualifications and professional experiences are described in my *curriculum vitae*, a copy of which has been submitted as Ex. 1004. The following is a summary of my relevant qualifications and professional experience.

II. QUALIFICATIONS

A. Overview

6. I have over 30 years of industry experience, including a substantial portion of which was spent working with satellite telemetry, digital television set-top boxes, graphical user interfaces, security and authentication processes, and standards for 5G telephony test data, I have summarized in this section my educational background, career history, and other qualifications relevant to this matter. As set forth in my curriculum vitae:

7. I earned a Bachelor of Science degree in Physics from the University of Durham, England, in 1979. I obtained a Doctorate in Physics from the University of Durham, England, in

1986. Between obtaining my undergraduate and doctoral degree, I developed a microcomputer system for detecting coalmine fires and heatings as a scientist for the National Coal Board and worked as a software engineer for Laser-Scan Ltd. in Cambridge, England.

8. After obtaining my Doctorate, I served as a Research Assistant at University College London from September 1986 to June 1987, where I developed digital image processing algorithms to improve image and stereo-matching quality for a digital terrain modeling system, including software and algorithms for affine transformation, edge filtering, kriging interpolation, and image stereo-matching with sub-pixel acuity. I continued my work with digital image processing as a Research Associate at the University of Maryland, from June 1987 to September 1988. During my time at the University of Maryland, I designed algorithms for filtering, segmenting, clustering, and path planning based on digital images organized by quad-tree data structures.

9. From September 1988 to June 1994, I worked as a Senior Systems Engineer for the Hughes STX Corporation. As part of my work, I developed methods for comparison of sky maps from the Cosmic Background Explorer (COBE) mission with sky maps from other missions based on scientific data stored in a spatially-referenced database using a quad-tree data structure. In this role, I led the Systems Engineering and end-to-end development of a novel system for compressing imaging and ancillary data that combined scientific modeling with statistical data compression. I was also charged with designing and developing evaluation tools to ensure user-transparent, system-wide compression of a 380-GB dynamic database at an image quality acceptable to end-user scientists. In public recognition of my work, I received National Aeronautics and Space Administration Group Achievement Awards in 1990 and 1992.

10. After June 1994, I began a six-month stint as a contract Software Engineer for the Federal National Mortgage Association in Washington D.C., for which I developed a graphical user interface to monitor and validate loan servicer input for a Loss Mitigation Project. I then served as an Independent Consultant to Optivision, Inc. for the next six months, where I researched and developed rate control algorithms and software based on the MPEG-2 Test Model 5 for the OPTIVideo^{TM} MPEG-2 video encoder, as well as adaptive quantization algorithms based on the then-JPEG-3 draft standard. In this role, I researched and developed algorithms to improve the quality of gray scale image compression for the medical imaging DICOM Standard by providing

a lossless hybrid algorithm encoding image residuals with a diagonal Golomb code based an Enhanced Universal Trellis Coded Quantization algorithm.

11. Between December 1995 and March 1996, I served as a Senior Staff Engineer for General Instrument Inc. and contract Firmware Engineer for Comstream Inc., and Armor Safe Technologies Inc. At Comstream, I worked on integrating an MPEG-2 set top box with OpenTV interactive television middleware programmed in the Microtec C language ported to a Motorola 68340 processor under the pSOS operating system.

12. From January 1996-97, I was the sole proprietor of Anugraha, where I researched and developed algorithms and processes to compress fine art photography at an image quality acceptable to artists based on the JPEG imaging standard implemented with image pre-processing and adaptive quantization. For the next year or so, I worked as an engineering contractor or consultant for various companies, working primarily on image processing systems and digital interactive television set-top boxes.

13. In October 1998, I began a six-month engagement with Rockwell Collins Inc., where I worked as a Lead Systems Engineer tasked with harmonizing requirements for an MPEG-2 in-flight entertainment system. I then worked for Sun Microsystems Inc. as a contract Software Engineer until November 1999. During my time at Sun Microsystems Inc., I developed a Distributed Component Object Model (DCOM) software interface between a TV control graphical user interface and a Microsoft broadcast application programming interface (API) with the goal of improving the visual quality of interactive TV displays derived from UDP/IP datagrams synchronized with MPEG-2 audio/video packet data.

14. For the next 22 months, from January 2000 to October 2002, I worked as the Chief Systems Engineer for Media Logic Systems Ltd. During my time at Media Logic Systems, I designed and developed a live interactive television system (iSeeTV) in which customers communicate with human sales agents in video-enabled call centers. To create this system, I researched and developed tools and encoder systems to improve image quality at prescribed latency and bit rate for distributing live video and audio streams encoded via low latency methods. To perform the above, I was required to understand and implement video codec systems employing the MPEG-2 Simple Profile at Main Level (CATV), MPEG-4 Visual Profile with background sprite coding, and the H.263+ Standard (now known as H.264).

15. Since November 2002, I have been an engineering contractor, and more recently an independent consultant in mathematical modeling, for several companies, such as Cyra Technologies Inc. and Amgen Inc. I also served as a senior research fellow at Merck & Co., Inc., a manager at GlaxoSmithKline Inc., a director at Daiichi Sankyo, Inc., a senior director at Praxis Precision Medicines, and currently serve as a director at Takeda Pharmaceuticals. During this time, I have developed mathematical models and simulations related to various systems, signals, and images. Specifically, I have focused on analyzing, processing, storing, and deriving information from biomedical imaging and other data. Using the information derived from these data, I have created a variety of models related to biology and the effects of drugs on the human body. In recognition of my work, I have received GlaxoSmithKline R&D Recognition Awards in 2012, 2013, and 2016, a Daiichi Sankyo recognition award in 2021, and Takeda recognition awards in 2022, 2023, and 2024.

16. In addition to my over thirty years of relevant industry experience, I have authored many publications relating to imaging and video processing systems. In 2003, I authored a chapter titled "Video Compression" for the Internet Encyclopedia. In 2004 I authored the chapter titled "Video" for the Berkshire Encyclopedia of Human-Computer Interaction. And in 2007 I authored a chapter titled "Video Compression" for the Handbook of Computer Networks.

17. I am also a Senior Member of the Institute of Electrical and Electronics Engineers ("IEEE") and currently chair the Philadelphia Chapter of the Communications & Information Theory Societies. I am a former Chair of the American Association of Pharmaceutical Scientists Pharmaco-Imaging Community and former Chair of the Predictive Modeling Community. I have also served as the 2019 Vice Chair of the IEEE P2673 Intelligence Augmentation for Medical Imaging Standards Working Group, currently chair the Data Models Sub-Group of the IEEE P2795 Shared Analytics for Secured and Unsecured Networks Standards Working Group, and recently served as Secretary for the IEEE Dynamic Spectrum Access Standards Machine Learning Study Group. I also have been registered to practice as a patent agent for the United States Patent and Trademark Office since 2002 (Reg. No. 51,704).

18. From 2017, I have also volunteered, first as a Research Scholar and currently as a Voluntary Researcher with the State University of New York at Buffalo. In this role, I have provided mentorship for a doctoral candidate in areas relating to computer modeling and estimation.

19. In view of the above and my curriculum vitae, I received a doctorate in physics and several years of work experience on technologies including wireless image and video processing systems prior to the earliest priority date of the '444 Patent. Thus, as of the earliest possible priority date of the '444 Patent (i.e., January 23, 2001), I was at least a person of ordinary skill in the art of the '444 Patent (Section IV.B, *infra*), and I had direct personal knowledge of the technologies involved in the '444 Patent.

20. As part of my work in forming my opinions in connection with this proceeding, I have reviewed the materials shown below, which I believe those in the field would reasonably rely upon in forming opinions regarding the subject matter of this proceeding.

LIST OF CONSIDERED EXHIBITS

Ex. 1001	U.S. Patent 10,021,380 (the "'380 Patent")
Ex. 1002	Prosecution History of U.S. Patent Application 15/907,614
Ex. 1015	Order Granting Request for *Ex Parte* Reexamination of U.S. Patent 9,699,444, Reexamination Control No. 90/015,245, July 26, 2023
Ex. 1018	U.S. Patent 5,351,082 to Kasagi ("Kasagi")
Ex. 1019	Yamada, Yuichiro, Advanced Method for Improvement of Obscure Video Image, Proceedings IEEE 33rd Annual 1999 Int'l Carnahan Conference on Security Tech. (Cat. No.99CH36303), Madrid, Spain, 1999, pp. 440-445 *electronic copy available at* https://ieeexplore.ieee.org/document/797952 ("Yamada")
Ex. 1020	U.S. Patent 7,030,902 to Jacobs ("Jacobs")
Ex. 1021	U.S. Publication 2009/0184916 to Miyazaki et al. ("Miyazaki")
Ex. 1022	U.S. Publication 2002/0054241 to Compton ("Compton")
Ex. 1023	Infringement Chart for Complaint in *VDPP v. Roku, Inc.*, 5:24-cv-05303, Dkt. 1-2 (N.D.Cal., Aug. 16, 2024)
Ex. 1024	Infringement Chart for Complaint in *VDPP v. TP-Link Sys. Inc.*, 8:24-cv-01663, Dkt. 1-2, (C.D.Cal., Jul. 31, 2024)
Ex. 1025	Infringement Chart for Complaint in *VDPP, LLC v. Casio Am. Inc.*, 2:24-cv-08333 (D.N.J., Aug. 7, 2024)

III. SUMMARY OF MY OPINION

21. In my opinion, claims 10-10 of the '380 Patent are unpatentable. My opinions are based on my expertise in the technology of the '380 Patent at the time the application was filed, as well as my review of the '380 Patent and the prior art discussed in the Request.

22. I reviewed and contributed to the Request's (with claim charts) explanation as to why these claims are unpatentable. The Request's explanation as to why these claims are unpatentable reflects my understanding, which are also detailed in the accompanying claim charts, and I adopt the Request, with its Appendices A-B and D, herein.

A. Instructions and Legal Framework

23. I am not an attorney. My analysis and opinions are based on my expertise in this technical field, as well as the instructions I have been given by counsel for the legal standards relating to patentability.

24. The materials I have reviewed in connection with my analysis include the '380 Patent, its file history, the exhibits identified in the Request, and the exhibits identified here.

25. I understand that unpatentability in this proceeding must be proven by a preponderance of the evidence, and this is the standard I have used throughout my declaration. Further, I understand that each patent claim is considered separately for purposes of unpatentability.

26. I believe that a POSITA at the time of the alleged invention would have had at least a bachelor's degree in electrical engineering, computer science (or a related field such as physics) and at least two years of relevant industry experience in video processing and methods for displaying video signals, or the equivalent thereof, and my analysis relies on that understanding. I am qualified as a person of ordinary skill in the art of the '380 Patent as of its earliest possible priority date (January 23, 2001) because I had Bachelor and Doctoral degrees with over seven years of experience with video processing systems, especially, developing software and middleware for improving the visual quality of video content displayed on TVs as I described above in paragraphs 11-14.

27. I understand that a patent claim is unpatentable as "anticipated" if each and every feature of the claim is found in a single prior art reference.

28. I understand that a patent claim is unpatentable as "obvious" if, in view of a prior art reference or a combination of prior art references, it would have been obvious to a POSITA at the time of the invention, taking into account:

a. the scope and content of the prior art;

b. the differences between the prior art and the claim under construction; and

c. the level of ordinary skill in the art.

29. I am informed that legal principles regarding unpatentability of a claim due to obviousness have been addressed by the U.S. Supreme Court. I am informed that, while not absolute, the principles relating to a "motivation," "suggestion," or "teaching" in the prior art to combine references are useful in analyzing whether an invention is obvious. I am informed that the suggestion or motivation may be either explicit or implicit and may come from knowledge generally available to a POSITA, from the nature of the problem to be solved, or from a combination of these factors. The test for an implicit motivation, suggestion, or teaching is what the combined teachings, knowledge of a POSITA, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art. The problem examined is not the specific problem solved by the invention, but the general problem that confronted the inventor before the invention was made.

30. I am further informed that the U.S. Supreme Court has clarified that additional principles may also be applied in such an analysis. Some of those principles are set forth below.

31. As I understand it, it is no longer always required to present evidence of an explicit teaching, suggestion, or motivation to combine prior art references for purposes of determining whether an invention is obvious. Prior art can be combined based on an express teaching, suggestion, or motivation from the prior art itself, or from a reasoned explanation of an expert or other witness.

32. A patent claim composed of several elements, however, is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. In order to prove obviousness, it must be shown that the improvement is not more than the predictable use of prior-art elements according to their established functions. To determine whether there was an apparent reason to combine the known elements in the way a patent claims, it will often be necessary to look to interrelated teachings of multiple pieces of prior art, to the effects of demands known to the design community or present in the marketplace, and to the background knowledge

possessed by a POSITA. Also, in determining obviousness, one must be aware of the distortion caused by hindsight bias and be cautious of arguments relying upon hindsight reasoning. An obviousness argument cannot be sustained by mere conclusory statements. Instead, it must be some articulated reasoning with some rational underpinnings to support the legal conclusion of obviousness.

33. In an obviousness analysis, it is my understanding that there are "secondary considerations" that should be analyzed if they apply. I am told that these considerations include (a) whether the prior art teaches away from the claimed invention, (b) whether there was a long felt but unresolved need for the claimed invention, (c) whether others tried but failed to make the claimed invention, (d) skepticism of experts, (e) whether the claimed invention was commercially successful, (f) whether the claimed invention was praised by others, and (g) whether the claimed invention was copied by others.

34. I am informed that in performing an obviousness analysis, it is necessary to understand the scope of the claims. I have also been informed the first step in an unpatentability analysis, therefore, involves construing the claims. Second, the construed claim language is then compared to the disclosures of the prior art. For purposes of this proceeding, I have applied the claim constructions set forth in the claim construction section of the Request that this declaration accompanies when analyzing the prior art and the claims.

B. Effective Filing Dates and Prior Art Patents and Printed Publications

35. I am informed that I am to consider January 23, 2001 to be the priority date for the '380 Patent for SNQs 1-4, the earliest possible priority date for the '380 Patent. I am also informed that for SNQs 5-6, the Requester is arguing that the effective filing date for the '380 Patent is later in time (e.g., August 22, 2017 or May 2, 2014). I express no opinion on whether the claims of the '380 Patent warrant any of the priority dates listed here.

36. As part of my analysis, I have considered the scope and content of the prior art and any potential differences between the claimed subject matter and the prior art. For SNQs 1-4, I conducted my analysis as of the earliest claimed priority date, January 23, 2001. I do not opine on SNQ 5. But for SNQ 6, I conducted my analysis and considered the references as of their relevant time frames (e.g., August 22, 2017 or May 2, 2014) and the knowledge a POSITA would possess at that time.

37. I rely upon the following references, all of which I understand are prior art to all claims of the '380 Patent based on the priority dates used for their respective SNQs as described above. That is, Kasagi and Yamada are prior art as of the earliest possible priority dates, and Miyazaki and Compton are prior art based on the asserted priority dates of either August 22, 2017 or May 2, 2014.

a. U.S. Patent 5,351,082 to Kasagi ("Kasagi"), Ex. 1018

b. Yamada, Yuichiro, Advanced Method for Improvement of Obscure Video Image, Proceedings IEEE 33rd Annual 1999 Int'l Carnahan Conference on Security Tech. (Cat. No.99CH36303), Madrid, Spain, 1999, pp. 440-445 ("Yamada"), Ex. 1019

c. U.S. Publication 2009/0184916 to Miyazaki et al. ("Miyazaki"), Ex. 1021

d. U.S. Publication 2002/0054241 to Compton ("Compton"), Ex. 1022

38. The chart below summarizes my conclusions of unpatentability regarding the '380 Patent. These conclusions are supported by the claim charts provided in Appendices A, B, and D

Ground	Conclusions	Challenged Claims	Claim Chart
1	Anticipated by Kasagi	1, 6	Appendix A
2	Rendered obvious by Kasagi	1, 6	Appendix A
3	Anticipated by Yamada	1, 6	Appendix B
4	Rendered obvious by Yamada	1, 6	Appendix B
6	Rendered obvious by Miyazaki in view of Compton	1-10	Appendix D

IV. THE '380 PATENT[1]

A. Summary of the '380 Patent

39. As noted above, I have reviewed and had input into the Request, including, for example, the overview of the '380 Patent, the review of the file history, the characterizations of the grounds and the prior art used, and the claim charts attached as Appendices A-B and D of the Request. I agree with the statements made therein, and adopt herein by reference.

[1] Unless otherwise specified, all **bold** and underline emphases and color annotations below have been added. Text in *italics* is used to signify claim language and/or add emphasis.

B. The Level of Ordinary Skill in the Art

40. I understand that the factors considered in determining the ordinary level of skill in a field of art include the level of education and experience of persons working in the field; the types of problems encountered in the field; and the sophistication of the technology at the time of the purported invention, which I understand is January 23, 2001 for SNQs 1-4, and either August 22, 2017 or May 2, 2014 for SNQ 6. I understand that a POSITA is not a specific real individual, but is rather a hypothetical individual having the qualities reflected by the factors above. I understand that a POSITA would also have knowledge of the teachings of the prior art, including the art cited below.

41. It is my opinion that a POSITA for the '380 Patent would have had at least a bachelor's degree in electrical engineering, computer science (or a related field such as physics) and at least two years of relevant industry experience in video processing and methods for displaying video signals, or the equivalent thereof in the 2001 (or 2014 or 2017) timeframe. This description is approximate, and a higher level of education or specific skill might make up for less experience, and vice-versa. A POSITA is presumed to have knowledge of all relevant prior art, and therefore would have been familiar with each of the references cited in this declaration and the full range of teachings they contain.

42. As I explained above in paragraph 26, my level of skill in the art was at least that of a POSITA before the time of the '380 Patent. I am qualified to provide opinions concerning what a POSITA would have known and understood at that time, and my analysis and conclusions in this declaration are from the perspective of a POSITA prior to January 23, 2001 (and well before either August 22, 2017 or May 2, 2014 for SNQ 6). Furthermore, I have taught, worked with, and supervised persons whom I would consider to be persons of ordinary skill in the art in accordance with the description given above. Finally, I note that, for SNQ 6, the level of ordinary skill in the art would only have increased in the interim between January 2001 and August 2017 or May 2014, and so a POSITA as of August 2017 or May 2014 would have had the same (or better) understanding and ability to implement the claims based on the art presented herein.

V. CLAIM CONSTRUCTION

43. As I noted in paragraph 34, it is my understanding that in order to properly evaluate the '380 Patent, the terms of the claims must first be interpreted. Next, the construed claim language is then compared to the disclosures of the prior art.

44. Based upon my review of the intrinsic record and my experience video processing methods and displaying video signals in the 2001 timeframe, it is my opinion that express constructions are not necessary. However, I understand and have reviewed the understandings presented in the Request about certain meanings of the claim terms, and provide my comments on these below.

45. For the purposes of this proceeding, I have applied the understandings set forth in the claim construction section of the Request (supported by my comments below) that this declaration accompanies when analyzing the prior art and the claims.

A. *expanding the [first/second] image frame*

46. Claims 1 and 6 recite, in part, *expanding the [first/second] image frame* (claim 1) or *expand the [first/second] image frame* (claim 6).

47. Based on the plain language of the phrase, *expanding* an *image frame* refers to enlarging the image frame itself, not a "resolution conversion [that] increases…the amount of detail an image holds but does not expand/shrink the image frame itself." I note that the examiner had the same understanding in the *ex parte* reexamination of the allegedly related U.S. Patent 9,699,444 (Reexamination Control No. 90/015,245). Ex. 1015, 17.

48. As explained in the review of the patent in the Request, the '380 Patent's specification does not define the term *expanding* [an] *image frame*, but does disclose, discloses expanding[2] an entire *image frame* one time, explaining that the Eternalism effect can be created using two pictures (A and B) and a bridging frame (C), noting that "picture B might be only a

[2] The disclosure of "**expand** or otherwise manipulate matching **elements"** of image frames, where in "[o]ne or both pictures…**parts** may be removed or inserted, lifted or reshaped or/and relocated" (Ex. 1001, 57:5-19 (emphasis added)) does not provide support for the expansion of an *image frame* as a whole. Other recitations of the term "expand" or "expanding" are not pertinent to the claims, such as explaining how a 3Deeps' control unit was "expanded to include control of the sunglasses" in one embodiment (Ex. 1001, 37:42-48), discussing how moving a camera will cause the camera's field of view to expand or contract (Ex. 1001, 67:29-31, 68:9-15, 85:26-29), and noting that some animals can change color by expanding chromatophore cells (Ex. 1001, 69:45-51).

slight modification, a shifting or size reduction or **expansion** or tilting, etc. **of picture A**." Ex. 1001, 55:9-13 (emphasis added). That is, the Eternalism effect can be seen by simply cycling between A (original image), B (expanded original image), and C (bridge frame). This is consistent with the understanding that *expanding the…image frame* refers to enlarging the entire image, and with the slightly enlarged entire image, the Eternalism effect can be created.

49. I would also note that the '380 Patent's disclosure of "**expand** or otherwise manipulate matching **elements"** of image frames, where in "[o]ne or both pictures…**parts** may be removed or inserted, lifted or reshaped or/and relocated" (Ex. 1001, 57:5-19 (emphasis added)) does not provide support for the expansion of an *image frame* as a whole. Other recitations of the term "expand" or "expanding" are not pertinent to the claims, such as explaining how a 3Deeps' control unit was "expanded to include control of the sunglasses" in one embodiment (Ex. 1001, 37:42-48), discussing how moving a camera will cause the camera's field of view to expand or contract (Ex. 1001, 67:29-31, 68:9-15, 85:26-29), and noting that some animals can change color by expanding chromatophore cells (Ex. 1001, 69:45-51).

50. Thus, given the plain language of the claims in light of the disclosure, it is my opinion that this phrase refers to the enlarging or expanding of the image frame itself.

B. *bridge frame*

51. I note that the independent claims 1 and 6 do not recite this term. Only the dependent claims 2-5 and 7-10 of the '380 Patent recite a *bridge frame*."

52. It is my opinion that *bridge frame* encompasses "[1] a solid black or other solid-colored picture, [2] a strongly contrasting image-picture readily distinguished from the two or more pictures, or [3] a timed unlit-screen pause" that serves as a connection from one frame to another.

53. Although the '380 Patent does not define the term *bridge frame*, the specification discloses the following with regard to a "bridging interval" or "bridge-picture":

> Specifically, two or more image pictures are repetitively presented together with **a bridging interval (a bridging picture) which is preferably a solid black or other solid-colored picture, but may also be a strongly contrasting image-picture readily distinguished from the two or more pictures that are substantially similar**. In electronic media, **the bridge-picture may simply be a timed unlit-screen pause** between serial re-appearances of the two or more similar image pictures.

Ex. 1001, 8:59-67 (emphasis added).

54. Given this disclosure, a POSITA would have understood the term *bridge frame* to include at least "[1] a solid black or other solid-colored picture, [2] a strongly contrasting image-picture readily distinguished from the two or more pictures, or [3] a timed unlit-screen pause."

55. Additionally, the examiner's interpretation in the *ex parte* reexamination of the allegedly related U.S. Patent 9,699,444 (Reexamination Control No. 90/015,245) found that a *bridge frame* needed to serve as "a bridge to another frame" (Ex. 1015, 17), which the definition I present here recites it as a connection from one frame to another to avoid a self-referential scope. I see this phrase as consistent with the plain meaning of the word *bridge*.

VI. CHALLENGED CLAIMS ARE UNPATENTABLE

56. It is my opinion that claims 1-10 of the '380 Patent are unpatentable because they are obvious to a POSITA as of the earliest possible priority date for SNQs 1-4 and as of the later priority dates for SNQ 6. The Request sets forth my reasons for this opinion. Below I elaborate on certain points raised in the discussion of the Request.

VII. SNQS 1-2 – KASAGII

57. It is my opinion that the Kasagi discloses or renders obvious claims 1 and 6 of the '380 Patent. In addition to the opinions expressed in this declaration, I have reviewed, had input into, and endorse the discussions in the Request (including Appendix A) regarding these SNQs 1-2.

58. I have been asked to assume that Kasagi (Ex. 1018) is prior art. I have done so.

A. Overview of Kasagi

59. An overview of Kasagi is provided in the Request, which I have reviewed and with which I agree.

60. As stated in the Request, Kasagi is analogous art to the '380 Patent: Kasagi is from the same "field of motion pictures" and methods for generating modified video, with teachings pertinent to a problem the '380 Patent was trying to solve such as how to "create[] a zooming in or out effect" or how to "shrink and expand or otherwise manipulate" images to produce visual effects for the viewer and how to provide a satisfactory visual experience for viewers when using "Video Format Converters…such as up-converters…to reformat movies for showing in different venues" (*see* Ex. 1018, 1:10-23, 35:61-36:7).

B. Claims 1 and 6

61. As I noted above, I have reviewed and had input into the Request, including, for example, Appendix A, which demonstrate the disclosures mapping Kasagi to claims 1 and 6. It is my opinion that Kasagi discloses each element of claims 1 and 6 to a POSITA (SNQ 1) in at least two ways: (1) with its disclosure of Zooming with Superimposing and (2) with its disclosures of TV-System Conversion. It is also my opinion that, to the extent more is needed, Kasagi together with the knowledge of a POSITA, disclose or at least suggest each of claims 1 and 6 (SNQ 2).

62. I provide the following additional comments in support of the statements in the Request, addressing the two embodiments Kasagi discloses that teach, or at least suggest, the claims.

1. Zooming with Superimposing: Motivations for Combining Disclosures in Examples that use A/D Converters and CCDs

63. I agree with the analysis in the Request explaining that the teachings within Kasagi apply to both A/D converter and CCD based systems. As explained in the Request, the examples Kasagi discloses often switch between devices that rely on A/D converters for their digital signals and those that rely on CCDs. And the Request relies on the disclosure of expanding the image as described in Figures 10A-10C, which detail portions of the system of Figure 9, which has an A/D converter. And the Request relies on the disclosure of the "Addition of Superimposing Means" which includes an example of a CCD-based device.

64. It is my opinion that the concepts described in the context of CCD-based devices are applicable to A/D converter-based devices. Indeed, even Kasagi acknowledges that a CCD system can substitute for an A/D-based one when describing Figure 17. Kasagi explains that "FIG. 17 illustrates an electronic zooming system having a CCD-signal converting device…[in a] TV system which is similar to the system illustrated in FIG. 9." Ex. 1018, 22:40-47. Many of "[t]he same components as those shown in FIG. 9 are designated at the same numerals" in Figure 17. Ex. 1018, 22:45-47. Where the CCD and A/D-based systems differ is in the component that performs the disclosed functions, not in the functions themselves. That is, in the CCD-based system, "CCD-signal converting device 51 performs the functions of the A/D converter 6, the switch circuit 7, the frame memory 8, and the D/A converter 11, and the operation control circuit 31," which were "all described above" in relation to Figures 9 and 10A-C. Ex. 1018, 22:53-59. Notably, Kasagi

explicitly notes that the "functions of…the frame memory 8"—which include the expansion of image frames—is also performed in CCD-based systems in the "CCD-signal converting device 51" component. Thus, a POSITA would have understood that the teachings of superimposing would apply to the A/D converter systems, including those relied upon in Request.

65. Nevertheless, it is my opinion that it would have at least been obvious to apply the superimposing teachings to the A/D converter-based systems relied upon in the Request for the disclosure of expanding image frames. A POSITA would have been motivated to apply superimposing to the expanded frames at least because Kasagi itself notes that "[i]t is often demanded that an enlarged…image be superimposed on another larger image."

66. Moreover, it would be the use of a known technique (superimposing) to improve similar devices (Kasagi's device as disclosed in Figures 9 and 10A-C) in the same way (resulting in the combination of images that had been expanded).

67. A POSITA would have had a reasonable expectation of success at least because the disclosures are found within Kasagi itself, Kasagi itself recognizes the overlap and similarities between A/D-based and CCD-based devices, and the concept of superimposing or combining images would have been well-known to a POSITA—so much so that, as Kasagi recognizes, it was "often demanded."

68. This is particularly true when recognizing the request is not proposing the bodily incorporation of one embodiment into another. A POSITA would have merely been motivated to the concept of superimposing one image with another be applied to an A/D-based system, which merely uses an A/D converter to obtain digitized data that can then be manipulated to provide superimposing effects (as opposed to using a CCD to obtain digital data).

2. Zooming with Superimposing: Motivations for Combining Zooming with Superimposing

69. I agree with the analysis in the Request regarding the motivations to combine zooming with superimposing. Kasagi discloses the order of steps contemplated by the '380 Patent's claims by explicitly stating that after images are processed to expand them, the "addition of superimposing means" may be included, and then explaining how images are combined after it has been enlarged. Ex. 1018, 34:63-35:3 (emphasis added). Moreover, Kasagi discloses that the expanding of images is done to "video signals" which are "sequentially written to the frame

memory 8," where they are "converted, frame by frame." Ex. 1018, 7:55-63. And then Kasagi explains that "a signal converting device" may also have "superimposing means." Ex. 1018, 35:9-16.

70. Accordingly, a POSITA would have understood Kasagi to be operating on video, i.e., a sequence of image frames. Thus, the disclosure for superimposing images onto each other would have applied to the disclosed processing of sequential images of the video. That is, because Kasagi discloses processing sequences of images and also superimposing images onto one another, a POSITA would have immediately envisioned the "addition of superimposing means" to also include the superimposing of one image in a sequence with another image in that same sequence.

71. Kasagi's example after describing that superimposing means can be added to its video processing, however, is the concept of "picture-in-picture (PIP)" combinations. Ex. 1018, 35:12-13. PIP methods typically combine images from one video with images from a separate video. Kasagi further notes that "[t]he PIP method is totally equivalent to a method of superimposing one image on another," indicating that Kasagi's disclosure was intended to apply to the other methods of superimposing images. Ex. 1018, 35:13-14. But since Kasagi only provides the single PIP example, I make the following additional comments.

72. The plain language of Kasagi discloses broadly the concept of superimposing any of enlarged frames with other enlarged frames, which would encompass the combination of sequential frames within the same video (as well as Kasagi's example of combining separate videos for a PIP effect). Indeed, Kasagi notes that the "PIP method is totally equivalent" to other methods of "superimposing." Ex. 1018, 35:13-14. The '380 Patent itself also describes combination of image frames A and B to obtain A/B as "blending." *See, e.g.,* Ex. 1001, 9:21-37. The '380 Patent broadly defines "blending" as including "any manner which allows for both pictures to be merged in the same picture frame," and specifically notes that "blending…can also be called superimposing" and "can be done in a conventional manner using conventional equipment." Ex. 1001, 9:58-63. Thus, the '380 Patent recognizes its methods as covering the known technique of "superimposing," and Kasagi discloses "superimposing." Merely because Kasagi provides an example of PIP does not detract from Kasagi's use of the term "superimposing" would cause a POSITA to immediately envision the breadth of blending techniques that term encompasses, including the combination of sequential frames.

73. Nevertheless, to the extent more is needed, it would have at least been obvious to employ the superimposing effect to combine sequential images at least because Kasagi provides an example of doing so in the very next section of its disclosure. That is, Kasagi immediately follows the "Addition of Superimposing Means" disclosure with the application of its invention to TV-System Conversion, which contemplates combining frames to, for example, convert video at 24 frames per second to video at 30 frames per second. Ex. 1018, 35: 58-36:6. In that disclosure, the video obtained is represented by a five-frame sequence of frames G1-G5 provided within a 0.2 second period, and those frames are combined to provide a six-frame sequence, M1-M6, to be displayed within that same 0.2 second period. Ex. 1018, 35:56-38:19.

74. Accordingly, to the extent "forming a composite image" did not immediately cause a POSITA to envision the combination of two sequential images, Kasagi's explicit disclosure of combining sequential images would have suggested it.

75. Additionally, there are only a finite number of combinations that could result in the superimposing of one image with another: (1) the combination of two unrelated images; (2) the combination of two images from the same video but not sequential, and (3) the combination of two sequential images from the same video. It would have been obvious to try any of these combinations to achieve various effects. But, as Kasagi recognizes, it would have been particularly beneficial to try the third option because this would allow the conversion of TV signals from one system to be played on another system.

76. Finally, a POSITA would have had a reasonable expectation of success because Kasagi provides an example of combining frames in its TV Conversion section, Kasagi recognizes that PIP combination is "totally equivalent to a method of superimposing one image on another," and the combination of images was well known.

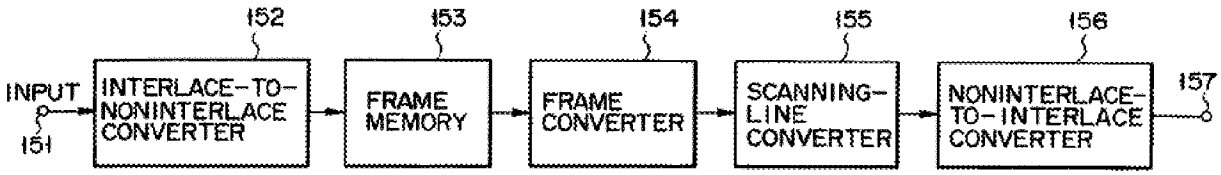
3. TV-System Conversion: Motivations for Order of Kasagi's Steps

77. I agree with the analysis in the Request regarding the motivation to provide Kasagi's steps in the order that reads on the claims.

78. Although Kasagi's Zooming with Superimposing embodiment explicitly states that superimposing is accomplished with the "addition of superimposing means," when discussing the TV-System Conversion embodiment, the one example Kasagi describes provides the modular

steps with the combination of image frames occurring before the frames are expanded. Because Kasagi only provides one example in its TV-System Conversion embodiment, I present the following explanation of how a POSITA would understand Kasagi.

79. In particular, Kasagi's disclosed embodiments are presented as modular steps. The method disclosed in Figure 39A contemplates first converting interlaced video signals into non-interlaced frames and storing them in a frame memory for the needed tv-system conversion (steps 152-153), then combining the frames in a frame converter to obtain the needed number of frames (step 154), then expanding (or reducing) the frames in a scanning line converter to obtain the needed frame size (step 155), and finally converting the frames (which are now in the needed size and number) to an interlaced signal for output to the viewer. Ex. 1018, Fig. 39, 36:35-56.



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80. It would have been obvious to switch steps 154 and 155, to first expand the images and then combine them, for a number of reasons. First, it would have been obvious to try the finite number of identified predictable solutions for addressing the TV-system conversion issue: (1) combine the two images first and then expand (or reduce) the image frame or (2) expand (or reduce) the image frame first and then combine the two images. Kasagi provides an example of the first, but a POSITA would have immediately envisioned the other option.

81. Indeed, Kasagi itself discloses expanding images first and then applying an additional step of superimposing the two images together in the immediately preceding section. That is, Kasagi discloses the "addition of superimposing means" because "[i]t is often demanded that an enlarged…image be superimposed on another larger image," providing the order that first an image is enlarged and then the superimposing process is added. Ex. 1018, 34:62-35:3.

82. A POSITA would have been motivated to select the second option because it would have likely produced a better result. By extrapolating each original image data separately to obtain a larger image first, and then combining that data from the two larger images, one would have obtained a clearer or more accurate combined image. This is because any estimations or aberrations

that would occur when combining the image frames would be exaggerated if combined image is enlarged after combining. A better result can be achieved by enlarging each image frame separately, obtaining the best version of each zoomed in image individually before combining the two images and introducing estimations of what the combined image would look like in the final step.

83. A POSITA would have had a reasonable expectation of success in first enlarging the images and then combining them at least because Kasagi provides an example of doing so (Ex. 1018, 34:62-35:3), and the operations were modular, and it was well within a POSITA's ability to perform either step in either order.

VIII. SNQS 3-4 – YAMADA

84. It is my opinion that the Yamada discloses or renders obvious claims 1 and 6 of the '380 Patent. In addition to the opinions expressed in this declaration, I have reviewed, had input into, and endorse the discussions in the Request (including Appendix B) regarding these SNQs 3-4.

85. I have been asked to assume that Yamada (Ex. 1019) is prior art. I have done so.

A. Overview of Yamada

86. An overview of Yamada is provided in the Request, which I have reviewed and with which I agree.

87. As stated in the Request, Yamada is analogous art to the '380 Patent: Yamada is from the same "field of motion pictures" and methods for generating modified video, with teachings pertinent to a problem the '380 Patent was trying to solve, such as how to "create[] a zooming in or out effect" or how to "shrink and expand or otherwise manipulate" images to produce visual effects for the viewer and also the problem the inventors recognized with the "degree of darkening"[3] that made images harder to see. Ex. 1019, 10c1, 12c1-c2, 13c1.

B. Claims 1 and 6

88. As I noted above, I have reviewed and had input into the Request, including, for example, Appendix B, which demonstrate the disclosures mapping Yamada to claims 1 and 6. It

[3] The '380 Patent contemplates letting a user control the degree of darkening of spectacles worn by the user; Yamada recognized that combining images could also be used to lighten up or make clearer images that were too dark.

is my opinion that Yamada anticipates each of claims 1 and 6 (SNQ 3). It is also my opinion that, to the extent more is needed, Yamada together with the knowledge of a POSITA, disclose or at least suggest each of claims 1 and 6 (SNQ 4).

1. How Yamada's Example Discloses *Combining the Modified First and Second Image Frames to Generate a Modified Combined Image Frame*

89. I agree with the analysis in the Request that at least Yamada's disclosure of "General Darkness Correction and General Picture Enlargement" where by "sequential images" were enlarged to identify "a vehicle passing in the shade of a tree" (Ex. 1019, 13c1) along with Yamada's explanation that combining "several images" is "effective [for] an image which is very dark" (Ex. 1019, 13c1) teaches a POSITA that the vehicle "in the shade of a tree" was identified by combining the "sequential" enlarged images.

90. Nevertheless, to the extent more is required, Yamada at least renders obvious the use of combining the enlarged images in order to see portions of the image darkened by the "shade of a tree" at least because Yamada suggests that combining the images by "registrating several images and averaging" the values can accomplish the stated goal of providing image data where an image is dark or lacking RGB information. I note that image registration is a term of art that refers to the process of transforming different sets of data (e.g., data from multiple photographs) into compatible formats so that the data can be compared or integrated (e.g., including averaging the pixel data, as Yamada suggests).

91. Additionally, both of Yamada's examples in Figures 6 and 7 contemplate the combination of two images to obtain an improved combined image, further suggesting that such a superimposing of the enlarged images would provide the stated result of identifying a vehicle even "in the shade of a tree." Indeed, this example is provided under the heading "General Darkness Correction and General Picture Enlargement" (Ex. 1019, 13c1 (emphasis added)) and is followed by the explanation of how to correct dark images by combining them (Ex. 1019, 13c1), further suggesting to a POSITA that the enlarged images were combined to achieve the stated result.

92. Additionally, it would have been obvious to try combining the images at least because there were only a finite number of options Yamada discloses that could provide "General Darkness Correction" to identify a vehicle "in the shade of a tree": (1) using the "device to check

and modify analog images" that "can correct the dark image whose the video signal is weak" (Ex. 1019, 11c1), and (2) registration of images to superimpose (combine) them (Ex. 1019, 13c1).

93. Even in these two options, the second one (combining the images) is most likely to obtain the stated result of analyzing "sequential images" to identify a vehicle "passing in the shade of a tree." A POSITA would have understood that those sequential images likely contained different visible portions of the vehicle, and so generally lightening each image would not necessarily improve visibility of the vehicle under option 1. Essentially, the shade caused each frame to contain missing pieces of the image, and by combining the sequential images showing the vehicle with different illuminations as it passed, a complete picture of the vehicle could be obtained. Moreover, a POSITA would have been motivated to employ the second option because it is a technique of the image processing device that can be applied to all video, whereas the first option is only a generalized lightening technique for pre-processing "analogue images."

94. A POSITA would have had a reasonable expectation of success in applying the combination technique at least because Yamada itself describes doing so, and Yamada describes how its image processing device can "process [images] with several methods," which allows the system to "superimpose [images]." *See, e.g.,* Ex. 1019, 13c1, 11c1-c2, 12c1).

2. Motivations for Displaying

95. I agree with the analysis in the Request (as detailed in Appendix B) that Yamada discloses displaying the modified combined image frame in at least two ways: via the "PC" or by using a "digital video printer."

96. Nevertheless, to the extent more is required, Yamada at least renders obvious the display of images on the "PC." A POSITA would have been motivated by the common and known techniques of providing visual feedback on a display when modifying images to do so using a display of the disclosed PC to improve the user friendliness of the system. That is, it would take what most users would find an unacceptably long amount of time and it would be an unnecessarily complicated process if the only way a user could see the results of the PC's modifications was to wait for the image to be physically printed (to the extent the print itself does not qualify as *displaying*). Providing a display, even as a "print preview" option, would reduce the time needed to wait for a physical image to be printed, and it may obviate the need to print the images altogether (e.g., if a user does not want or need the image, it does not need to be printed—it can be further

manipulated and viewed on screen until the desired image is obtained for printing), improving the system of Yamada in the same way all PC's with displays improved the user experience.

97. Displaying the images on a display of the PC would have also represented combining prior art elements (i.e., the known use of displaying images on a PC display device instead of or in addition to physically printing images with the disclosed PC of Yamada) according to methods a POSITA would have known (i.e., how to display an image, for example, even as a "print preview" before printing), to yield the predictable result of displaying the image.

98. Moreover, Yamada would immediately suggest to a POSITA that a display of the PC was used because the sheer volume of analysis makes the concept of printing out each image highly unlikely. Because Yamada discloses that the system can "collect 512 images" to allow human users to analyze a high volume of images (Ex. 1019, 12c1), it suggests that the images were visible via a display of the PC, not physically printed out. *See also* Ex. 1019, 14c2 (by "extracting and putting in order the frames of every 250ms," the human users were able to analyze the images processed by the PC, which is unlikely to have been accomplished using printed images). Indeed, because Yamada highlights that the "processing can be done in real-time," it suggests using a PC display for the processed images—waiting for each image to physically print out would defeat the purpose of building a system fast enough to process in "real-time."

IX. SNQ 6 – MIYAZAKI IN VIEW OF COMPTON

99. It is my opinion that Miyazaki in view of Compton discloses, or at least suggests each of claims 1-10 of the '380 Patent. In addition to the opinions expressed in this declaration, I have reviewed, had input into, and endorse the discussions in the Request (including Appendix D) regarding this SNQ.

100. I have been asked to assume that Miyazaki (Ex. 1021) and Compton (Ex. 1022) are prior art. I have done so.

A. Overview of Miyazaki

101. An overview of Miyazaki is provided in the Request, which I have reviewed and with which I agree.

102. As stated in the Request, Miyazaki is analogous art to the '380 Patent: Miyazaki is from the same "field of motion pictures" and methods for generating modified video, with teachings pertinent to a problem the '380 Patent was trying to solve, such as such as how to "shrink

and expand or otherwise manipulate" images to produce visual effects for the viewer. Ex. 1021, [0003], [0021], [0420].

B. Overview of Compton

103. An overview of Compton is provided in the Request, which I have reviewed and with which I agree.

104. As stated in the Request, Compton is analogous art to the '380 Patent: Compton is from the same "field of motion pictures" and methods for generating modified video, with teachings pertinent to a problem the '380 Patent was trying to solve, such as how to provide a satisfactory visual experience for viewers when using "Video Format Converters…such as up-converters…to reformat movies for showing in different venues." Ex. 1022, [0003], [0034]..

C. Claims 1-10

105. As I noted above, I have reviewed and had input into the Request, including, for example, Appendix D, which demonstrate the disclosures mapping Miyazaki and Compton to claims 1-10. It is my opinion that Miyazaki in view of Compton disclose, or at least suggest, each of claims 1-10 (SNQ 6).

1. Motivations for Enlarging Frames Before Interpolation

106. I agree with the analysis in the Request on this issue. As noted in the Request, Miyazaki recognized the known need to change the format of a video from one system to another. But Miyazaki focused only on the frame rate conversion portion of that reformatting (and the bridge frame insertion required to address "hold" issues when presenting such high rate video on a typical screen). Miyazaki did not directly address the issues with the different frame sizes that various systems present.

107. Indeed, Miyazaki explicitly contemplated conversions to the 120 Hz motion-compensated high performance televisions only from a video signal originating in an NTSC system. Ex. 1021, [0004]. The NTSC system is also known as the CCIR-M system, i.e., the 525-scanning line system that was discussed in Kasagi. Ex. 1018, 36:9-15. A POSITA would have understood (as evidenced by Kasagi), that in order to apply the interpolation technique more broadly to provide video to countries that use the CCIR-G system, the image frames would need to first be expanded to 625 scanning lines. Ex. 1018, 36:9-15.

108. Accordingly, a POSITA would have been motivated by the known need in Miyazaki for providing video with interpolated frames for high performance televisions, the disclosed method of how to apply interpolation to NTSC/CCIR-M/525-line frames, and the known fact that other countries would need 625-line frames to add Compton's teachings of how to change the shape, i.e., expand the image frames, to the correct image size so that when the frames are put through Miyazaki's interpolation methods (or even the known prior art interpolation methods), frames of the correct frame rate and correct frame size would have been supplied to those viewers.

109. Additionally, the market forces of supplying video for high performance televisions in the CCIR-G TV-system market would have prompted a POSITA to apply Compton to Miyazaki to obtain the frames of the correct size for the CCIR-G market for processing through Miyazaki's interpolation methods, resulting in the predicable variation of video suited for the high performance televisions in the CCIR-G market.

110. Moreover, a POSITA would have had a reasonable expectation of success because the expansion of video image frames was well-known, as evidenced by Compton's acknowledgement that "there is often a requirement to change the shape of images." Ex. 1022, [0002]. Indeed, Compton describes the "linear stretch" of a frame as a "simple" task. Ex. 1022, [0034].

111. Finally, to the extent there is an issue raised regarding the order of the proposed combination, a POSITA would have at least found it obvious to try the expansion of the image frames before subjecting them to interpolation as there were only a finite number of ways to make the combination: (1) combine images first and then expand the image frame or (2) expand the image frame first and then combine the two images. A POSITA would have been motivated to employ the second option at least because it would be simpler (i.e., require less processing) to expand the relatively few original two images than it would be to expand each of the six images after interpolation. That is, with the first option, six images (frames A, B, and the four interpolated images) would each need to go through an expansion process. But, with the second option, only the two original images (A and B) would need to be expanded, and from those expanded images, the four other interpolated images would automatically be the correct size.

2. Motivations for Solid or Non-Solid Frames as *Bridge Frames* Instead of Miyazaki's "Black Display"

112. I agree with the analysis in the Request on this issue. As noted in the Request, Miyazaki's "black display" areas are accomplished by turning the backlight of the display (or portions of the display) on and off. As explained in the claim construction section of the Request for "bridge frame" (Request at Section I.C.2), the '380 Patent explicitly contemplates that "the bridge-picture may simple be a timed unlit-screen pause." Ex. 1001, 8:59-67. Thus, a POSITA would understand Miyazaki's "black display" areas meet the definition of bridge frame, which encompasses "[1] a solid black or other solid-colored picture, [2] a strongly contrasting image-picture readily distinguished from the two or more pictures, or [3] a timed unlit-screen pause" that serves as a connection from one frame to another.

113. Nevertheless, to the extent more is needed, a POSITA would have found it obvious to insert a "picture" for Miyazaki's an unlit-screen pause at least because this represents the simple substitution of one known element (a picture bridge frame) for another (the unlit-screen pause bridge frame) to obtain the predicable result of having pictures displayed as the bridge frame instead of having the screen go dark. Moreover, because the equivalency of a picture bridge frame and an unlit-screen pause bridge frame was known (Ex. 1001:59-67 (applicant's own confirmation that they were equivalent as further evidence corroborating his recollection)), this modification would also represent applying the known technique of inserting picture bridge frames to the known methods that Miyazaki discloses to yield the predictable result of having pictures displayed as the bridge frame instead of having the screen go dark.

114. A POSITA would have had a reasonable expectation of success in using a picture bridge frame instead of an unlit-screen pause bridge frame at least because the equivalency of the two and the use of each was well known to a POSITA.

3. Motivations for Displaying the *Modified Combined Image Frames* and the *Bridge Frames* (claims 3-5)

115. I agree with the analysis in the Request on this issue. As noted in the Request, claim 1 recites *displaying the modified combined image frame,* claims 2 and 3 recites further *displaying the bridge frame,* and claim 4 recites further *displaying the blended modified combined image*

frame (with claim 5 depending from claim 4). Similar recitations are in the corresponding claims 6 and 8-10.

116. Miyazaki discloses *displaying the combined image frame* (i.e., the interpolated frames between A and B, *see, e.g.,* Fig. 3B, 4, 10A-10B), *displaying the bridge frame* (the insertion of a black area that encompasses the entire frame, *see, e.g.,* Fig. 49), and *displaying the blended modified combined image frame* (the combination of interpolated frames with a black area that does not encompass the entire frame, *see, e.g.,* Fig. 50, second vertical period).

117. Miyazaki provides further examples of displaying a combination of the bridge frame with the original frame (*see, e.g.,* Fig. 50, first vertical period), and use of a combination of bridge frames where some frames may be combined with non-solid bridge frames and others may be replaced with solid bridge frames (*see, e.g.,* Fig. 51, first and second vertical periods). Miyazaki also provides numerous examples of different types of non-solid bridge frames and different patterns of bridge frames to display. *See, e.g.,* Figs. 52-55. And Miyazaki broadly notes that notes that "both of the black insertion ratio and luminance of the black display area may be varied." Ex. 1021, [0047].

118. Thus, it is my opinion that a POSITA would have understood that Miyazaki's broad disclosure encompasses a pattern of inserting bridge frames that result in the display of a series of frames that include (1) the modified combined image frame, (2) the bridge frame, and (3) the blended modified combined image frame.

119. Nevertheless, to the extent more is required, a POSITA would have found it obvious to provide this particular series of image frames at least because it would have been obvious to try. That is, Miyazaki discloses that only five types of frames can be displayed: (1) an original frame, (2) an interpolated frame, (3) a solid bridge frame, (4) a blended original frame and non-solid bridge frame, and (5) a blended interpolated frame and non-solid bridge frame. *See, e.g.,* Figures 3B, 4, 10A-10B, Figs 49, 50. Since the order of the frames does not matter (e.g., claim 4 does not require the interpolated frame to be displayed in the first position, only that three frames be displayed), and presuming that repetition is allowed (e.g., as Miyazaki contemplates several sets of three frames with repeated frame types), the calculation[4] for obtaining a combination of three frames from five frame options is: ((3+5-1)!)/ (3!(5-1)!) = 7!/(3!4!) = 5040/6x24 = 35.

[4] The website https://www.mathsisfun.com/combinatorics/combinations-permutations.html provides a simplified explanation of how to calculate various permutations and combinations,

120. Thus, there are only a finite set of options—35 to be exact—that are identifiable, predictable ways to present three frames of the five frame types that Miyazaki discloses. And because Miyazaki discloses how to present each of the frames, there is a reasonable expectation of success in presenting any one of the 35 options of the series of three frames.

121. A POSITA would have been motivated to display a series of frames that included (1) the modified combined image frame, (2) the solid bridge frame, and (3) the blended modified combined image frame because these are each frames that Miyazaki discloses as providing benefits to the viewing experience so providing each in a video would bring those benefits to bear on that video-watching experience. Displaying the modified combined image frame is beneficial to include in a video—particularly the high frame rate 120 Hz signal proposed by Miyazaki—because it smooths motion and reduces judder. Ex. 1021, [0008]. Displaying the solid bridge frame because it is the most efficient way to address the hold issue that certain screens have—by inserting a solid black area, the display is essential re-set and the pixels are not inappropriately "holding" the color and creating blur. Ex. 1021, [0444] ("an entire frame is lighted on or off, so that the hold improvement effect increases"). But because using a solid black frame can cause a visible flicker effect, a POSITA may not want to use a solid frame each time, and can opt for combining a non-solid bridge frame with another frame, e.g., another interpolated frame. Ex. 1021, [0444] (discussing changing the "black insertion ratio" to be less than an entire "frame unit" so that the "flicker is less-visible"). Thus, Miyazaki itself provides the motivation for displaying each of these types of frames.

122. Considering the claims are open to the display of other frames (*method comprising* (claim 1), *apparatus comprising* (claim 6)), these three frames do not even need to be displayed in series next to each other—they merely need to be displayed somewhere in a series of multiple frames— making it even more likely that a POSITA would display each one of these frame types somewhere in the video to obtain the benefits disclosed by Miyazaki. To obtain the benefits of each of the frame types Miyazaki discloses, within a series of many frames, the main image frames (the original and interpolated frames) would be shown, but to address the hold issue, both solid and non-solid bridge frames would be used to obtain the benefits of both. A POSITA would optimize the use solid bridge frames to efficiently clear the pixels as often as possible, but would

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and it includes the exact example of selecting a combination of 3 items from 5 options, allowing for repetition in the options.

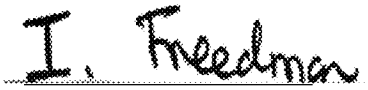
also use non-solid bridge frames to reduce the chances that a user would notice the flicker effect that can be noted when using solid bridge frames. And for many of the non-solid bridge frames, they would be blended with the interpolated frame. The result would be that, over the course of a film, multiple interpolated (combined) frames, solid bridge frame, and non-solid bridge frames blended with interpolated frames would be displayed.

X. CONCLUSION

123. I hereby declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct, and that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I understand that willful false statements are punishable by fine or imprisonment or both. *See* 18 U.S.C. § 1001.

Dated: December 18, 2024

Respectfully Submitted,



Dr. Immanuel Freedman