

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

3SHAPE A/S and 3SHAPE INC.
Petitioners

v.

MEDIT CORPORATION
Patent Owner

Case No. IPR2024-01260
Patent 7,912,257

**DECLARATION OF ELI SABER IN SUPPORT OF
PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 7,912,257**

3SHAPE EXHIBIT 1004
3Shape v. Medit

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	BACKGROUND AND QUALIFICATIONS	2
III.	INFORMATION CONSIDERED	8
IV.	RELEVANT LEGAL STANDARDS	8
	A. Claim Interpretation	8
	B. Perspective of One of Ordinary Skill in the Art.....	9
	C. Anticipation	9
	D. Obviousness.....	10
V.	SUMMARY OF OPINIONS.....	13
VI.	IDENTIFICATION OF CHALLENGES TO THE CLAIMS	13
VII.	LEVEL OF ORDINARY SKILL IN THE ART	13
VIII.	TECHNICAL BACKGROUND	14
	A. The '257 Patent	14
	B. The '257 Patent Examination History.....	16
	C. Overview of the Prior Art.....	18
	1. Kopelman (EX1006).....	18
	a) Kopelman is Supported by its Provisional Application	20
	2. Quadling (EX1007).....	22
IX.	CLAIM CONSTRUCTION	22

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

X.	CLAIMS 1, 3-11, 13-18, AND 20-22 WOULD HAVE BEEN OBVIOUS OVER KOPELMAN (GROUND 1).	23
A.	Claim 1 (Preamble): A method comprising:	23
1.	[1.1]: acquiring two dimensional data from one or more intraoral structures of a dental patient at a video rate;	26
2.	[1.2]: reconstructing a digital surface representation of the one or more intraoral structures;	31
3.	[1.3]: displaying the digital surface representation at the video rate;	34
4.	[1.4]: acquiring additional two-dimensional data from the one or more intraoral structures in a subsequent frame of data at the video rate;	35
5.	[1.5]: reconstructing a subsequent digital surface representation from the additional two-dimensional data at the video rate	37
6.	[1.6]: combining the digital surface representation and the subsequent digital surface representation at the video rate to provide a three-dimensional representation of the one or more intraoral structures;	38
7.	[1.7]: providing a visual display of the three-dimensional representation at the video rate in real time; and	40
8.	[1.8]: providing a visualization within the visual display, the visualization updated at the video rate to identify regions of inaccurate scan data within the three- dimensional representation.	41
B.	Claim 3: The method of claim 1 wherein the one or more intraoral structures include at least one tooth.	46
C.	Claim 4: The method of claim 1 wherein the one or more intraoral structures include at least one tooth surface prepared for a dental prosthetic.	47

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

D.	Claim 5: The method of claim 1 wherein the one or more intraoral structures include at least one area of soft tissue.....	47
E.	Claim 6 (Preamble): The method of claim 1 further comprising:	48
1.	[6.1] generating user feedback concerning the one or more intraoral structures; and	48
2.	[6.2] providing a visual display of the user feedback at the video rate.	49
F.	Claim 7: The method of claim 6 wherein generating user feedback includes highlighting at least one area in the three-dimensional representation requiring user attention.	49
G.	Claim 8: The method of claim 1 wherein the video rate includes a rate of at least eight frames per second.	50
H.	Claim 9: The method of claim 1 wherein the video rate includes a rate of at least twenty frames per second.	51
I.	Claim 10: The method of claim 1 wherein the video rate includes a rate of between twenty-four and thirty frames per second.	51
J.	Claim 11 (Preamble): A computer program product embodied on a non-transitory computer readable medium that, when executing on one or more computing devices, performs the steps of:.....	52
1.	[11.1]: acquiring two dimensional data from one or more intraoral structures of a dental patient at a video rate;.....	52
2.	[11.2]: reconstructing a digital surface representation of the one or more intraoral structures;	52
3.	[11.3]: displaying the digital Surface representation at the video rate;.....	53

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

4.	[11.4]: acquiring additional two-dimensional data from the one or more intraoral structures in a subsequent frame of data at the video rate;	53
5.	[11.5]: reconstructing a subsequent digital surface representation from the additional two-dimensional data at the video rate	53
6.	[11.6]: combining the digital surface representation and the subsequent digital surface representation at the video rate to provide a three-dimensional representation of the one or more intraoral structures;	54
7.	[11.7]: providing a visual display of the three-dimensional representation at the video rate in real time; and	54
8.	[11.8] providing a visualization within the visual display, the visualization updated at the video rate to identify regions of inaccurate scan data within the three-dimensional representation.	54
K.	Claim 13: The computer program product of claim 11 wherein the one or more intraoral structures include at least one tooth.	55
L.	Claim 14: The computer program product of claim 11 wherein the one or more intraoral structures include at least one tooth surface prepared for a dental prosthetic.	55
M.	Claim 15: The computer program product of claim 11 wherein the one or more intraoral structures include at least one area of soft tissue.	55
N.	Claim 16: The computer program product of claim 11 further comprising code for performing the steps of generating user feedback concerning the one or more intraoral structures; and providing a visual display of the user feedback at the video rate.	55

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

- O. Claim 17: The computer program product of claim 16 wherein generating user feedback includes highlighting at least one area in the three-dimensional representation requiring user attention.....56
- P. Claim 18 (Preamble): A system comprising: 56
1. [18.1]: a scanner for acquiring a sequence of image sets from one or more intraoral structures of a dental patient at a video rate; and 56
2. [18.2]: a processor configured to: 57
- a) [18.2.1]: receive one of the sequence of image sets,.....57
- b) [18.2.2] convert the one of the sequence of image sets into a three-dimensional surface representation of the one or more intraoral structures, ...58
- c) [18.2.3] combine the three-dimensional surface representation with one or more prior three-dimensional surface representations from one or more prior ones of the sequence of image sets to provide a three-dimensional model of the one or more intraoral structures, and 58
- d) [18.2.4] generate a visual display signal of the three-dimensional model at the video rate in real time, ...59
- e) [18.2.5] generate a visualization within the visual display signal, the visualization updated at the video rate to identify regions of inaccurate scan data within the three-dimensional representation;.....59
3. [18.3] and a display for displaying the visual display signal. 60
- Q. Claim 20: The system of claim 18 wherein the one or more intraoral structures include at least one of a tooth surface

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

prepared for a dental prosthetic, an area of soft tissue, and a tooth. 60

- R. Claim 21: The system of claim 18 wherein the processor generates user feedback concerning the one or more intraoral structures and includes the user feedback in the visual display signal at the video rate.....61
- S. Claim 22: The system of claim 21 wherein the user feedback includes highlighting at least one area in the three-dimensional Representation requiring user attention. 61
- XI. CLAIMS 1, 3-11, 13-18, AND 20-22 WOULD HAVE BEEN OBVIOUS OVER KOPELMAN IN VIEW OF QUADLING (GROUND 2). 61
- A. Claim 1 (Preamble): A method comprising: 61
1. [1.1]: acquiring two dimensional data from one or more intraoral structures of a dental patient at a video rate; 62
2. [1.2]: reconstructing a digital surface representation of the one or more intraoral structures; 65
3. [1.3]: displaying the digital surface representation at the video rate;.....66
4. [1.4]: acquiring additional two-dimensional data from the one or more intraoral structures in a subsequent frame of data at the video rate; 67
5. [1.5]: reconstructing a subsequent digital surface representation from the additional two-dimensional data at the video rate 69
6. [1.6]: combining the digital surface representation and the subsequent digital surface representation at the video rate to provide a three-dimensional representation of the one or more intraoral structures; 70
7. [1.7]: providing a visual display of the three-dimensional representation at the video rate in real time; and 72

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

8.	[1.8]: providing a visualization within the visual display, the visualization updated at the video rate to identify regions of inaccurate scan data within the three-dimensional representation.	74
B.	Claim 3: The method of claim 1 wherein the one or more intraoral structures include at least one tooth.....	74
C.	Claim 4: The method of claim 1 wherein the one or more intraoral structures include at least one tooth surface prepared for a dental prosthetic.	74
D.	Claim 5: The method of claim 1 wherein the one or more intraoral structures include at least one area of soft tissue.....	75
E.	Claim 6 (Preamble): The method of claim 1 further comprising:	75
1.	[6.1] generating user feedback concerning the one or more intraoral structures; and	75
2.	[6.2] providing a visual display of the user feedback at the video rate.	75
F.	Claim 7: The method of claim 6 wherein generating user feedback includes highlighting at least one area in the three-dimensional representation requiring user attention.	76
G.	Claim 8: The method of claim 1 wherein the video rate includes a rate of at least eight frames per second.	77
H.	Claim 9: The method of claim 1 wherein the video rate includes a rate of at least twenty frames per second.	77
I.	Claim 10: The method of claim 1 wherein the video rate includes a rate of between twenty-four and thirty frames per second.	78
J.	Claim 11 (Preamble): A computer program product embodied on a non-transitory computer readable medium that, when executing on one or more computing devices, performs the steps of:.....	78

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

1. [11.1]: acquiring two dimensional data from one or more intraoral structures of a dental patient at a video rate; 78
2. [11.2]: reconstructing a digital surface representation of the one or more intraoral structures; 79
3. [11.3]: displaying the digital Surface representation at the video rate;.....79
4. [11.4]: acquiring additional two-dimensional data from the one or more intraoral structures in a subsequent frame of data at the video rate; 79
5. [11.5]: reconstructing a subsequent digital surface representation from the additional two-dimensional data at the video rate 79
6. [11.6]: combining the digital surface representation and the subsequent digital surface representation at the video rate to provide a three-dimensional representation of the one or more intraoral structures; 80
7. [11.7]: providing a visual display of the three-dimensional representation at the video rate in real time; and 80
8. [11.8] providing a visualization within the visual display, the visualization updated at the video rate to identify regions of inaccurate scan data within the three-dimensional representation. 80
- K. Claim 13: The computer program product of claim 11 wherein the one or more intraoral structures include at least one tooth. 80
- L. Claim 14: The computer program product of claim 11 wherein the one or more intraoral structures include at least one tooth surface prepared for a dental prosthetic. 81

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

- M. Claim 15: The computer program product of claim 11 wherein the one or more intraoral structures include at least one area of soft tissue.....81
- N. Claim 16: The computer program product of claim 11 further comprising code for performing the steps of generating user feedback concerning the one or more intraoral structures; and providing a visual display of the user feedback at the video rate. 81
- O. Claim 17: The computer program product of claim 16 wherein generating user feedback includes highlighting at least one area in the three-dimensional representation requiring user attention.....81
- P. Claim 18 (Preamble): A system comprising: 82
1. [18.1]: a scanner for acquiring a sequence of image sets from one or more intraoral structures of a dental patient at a video rate; and 82
2. [18.2]: a processor configured to: 83
- a) [18.2.1]: receive one of the sequence of image sets,.....83
- b) [18.2.2] convert the one of the sequence of image sets into a three-dimensional surface representation of the one or more intraoral structures, ...84
- c) [18.2.3] combine the three-dimensional surface representation with one or more prior three-dimensional surface representations from one or more prior ones of the sequence of image sets to provide a three-dimensional model of the one or more intraoral structures, and 84
- d) [18.2.4] generate a visual display signal of the three-dimensional model at the video rate in real time, ...85
- e) [18.2.5] generate a visualization within the visual display signal, the visualization updated at the

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

	video rate to identify regions of inaccurate scan data within the three-dimensional representation;.....	85
3.	[18.3] and a display for displaying the visual display signal.	86
Q.	Claim 20: The system of claim 18 wherein the one or more intraoral structures include at least one of a tooth surface prepared for a dental prosthetic, an area of soft tissue, and a tooth. 86	
R.	Claim 21: The system of claim 18 wherein the processor generates user feedback concerning the one or more intraoral structures and includes the user feedback in the visual display signal at the video rate.....	86
S.	Claim 22: The system of claim 21 wherein the user feedback includes highlighting at least one area in the three-dimensional Representation requiring user attention.	86
T.	Explanation of Why Claims 1, 3-11, 13-18, and 20-22 Would Have Been Obvious.....	87
1.	Difference between the claimed invention and the prior art.....	87
2.	A POSITA would have had motivation to combine the disclosures of Kopelman and Quadling.	87
3.	A POSITA would have had a reasonable expectation of success based on the disclosures of Kopelman and Quadling and knowledge generally available in the art.....	90
XII.	ANY PURPORTED SECONDARY CONSIDERATIONS EVIDENCE DOES NOT OVERCOME THE STRONG EVIDENCE OF THE OBVIOUSNESS OF THE CLAIMS.....	91
XIII.	CONCLUSION.....	92
APPENDIX A		

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

EXHIBIT	DESCRIPTION
1001	U.S. Patent No. 7,912,257, issued on March 22, 2011 to E. Paley <i>et al.</i> (“the ’257 Patent”)
1002	File History of U.S. Patent Application No. 11/469,870, filed on September 3, 2006
1003	U.S. Provisional Application No. 60/761,078, filed on January 20, 2006
1005	<i>Curriculum Vitae</i> of Eli Saber
1006	U.S. Patent Publication No. 2006/0115793 (“Kopelman”)
1007	U.S. Patent Publication No. 2004/0254476 (“Quadling”)
1008	U.S. Provisional Application Serial No. 60/630,572 (“the ’572 Provisional”)
1009	U.S. Patent Publication No. 2002/0055800 (“Nikolskiy”)
1010	U.S. Patent No. 6,687,393 (“Skinner”)
1011	U.S. Patent No. 4,846,684 (“Oestreich”)
1012	PCT International Publication No. WO 00/08415, published on February 17, 2000
1015	Claim Construction Order for U.S. Patent Nos. 7,912,257; 9,191,648; 9,245,374; 9,262,864 filed on May 31, 2024 in <i>Medit Corporation v. 3Shape A/S</i> , Civ. Action No. 6:23-cv-00658 (WDTX)
1016	Comparison of U.S. Provisional Application Serial No. 60/630,572 (“the ’572 Provisional”) to U.S. Patent Publication No. 2006/0115793 (“Kopelman”)

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

EXHIBIT	DESCRIPTION
1017	Multiple View Geometry in computer vision, Richard Hartley and Andrew Zisserman, Second Edition (2003), Introduction pp. 1-21.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

I, Eli Saber, hereby state as follows:

I. INTRODUCTION

1. I have been retained by Buchanan Ingersoll & Rooney (“Counsel”) on behalf of 3SHAPE A/S (“Petitioner”) as an independent expert consultant in this *inter partes* review (“IPR”) proceeding before the United States Patent and Trademark Office (“PTO”).

2. I have been asked by Counsel to provide opinions regarding Claims 1, 3-11, 13-18, and 20-22 of U.S. Patent No. 7,912,257 (“the ’257 Patent”). My opinions and the bases for my opinions are set forth below.

3. I am being compensated at my ordinary and customary consulting rate for my work, which is \$500 per hour. My compensation is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other financial interest in this proceeding.

4. This report is based on information currently available to me. I reserve the right to continue my investigation and analysis, which may include a review of documents and information not listed above. I also reserve the right to expand or otherwise modify my opinions and conclusions as my investigation and study

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

continues, and to supplement my opinions and conclusions in response to any additional information that becomes available to me.

II. BACKGROUND AND QUALIFICATIONS

5. All my opinions stated in this declaration are based on my own personal knowledge and professional judgment. In forming my opinions, I have relied on my knowledge and experience in designing, developing, researching, and teaching the technology referenced in this declaration.

6. I am over 18 years of age and, if I am called upon to do so, I would be competent to testify as to the matters set forth herein. I understand that a copy of my current curriculum vitae, which details my education and professional and academic experience, is being submitted as EX1005. The following provides a brief overview of some of my experience that is relevant to the matters set forth in this declaration.

7. I am a Professor in the Department of Electrical and Microelectronic Engineering (EME) and the Chester F. Carlson Center for Imaging Science at the Rochester Institute of Technology (RIT) in Rochester, New York. I also serve as the Director of the Image, Video and Computer Vision Laboratory. I joined RIT's full-time faculty in 2004. I have over thirty-four (34) years of industry and academic experience, thirty (30) of which are in the fields of Computer Vision, Digital Image/Video Processing, Pattern Recognition, and Machine Learning.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

8. I received a Ph.D. in Electrical Engineering from the University of Rochester in 1996. My concentration was in Signal/Image/Video Processing, Pattern Recognition, and Computer Vision. I received a Master of Science Degree in Electrical Engineering from the University of Rochester in 1992 in the same concentration as listed above, and I received a Bachelor of Science Degree in Electrical and Computer Engineering, Summa Cum Laude, from the State University of New York at Buffalo in 1988.

9. Before becoming a full-time professor, I worked for Xerox Corporation for 16 years, from 1988 to 2004. During my years at Xerox, I was responsible for delivering color management, image processing innovations, architectures, and algorithms; xerographic sub-systems for a variety of color products; and control systems for toner production facilities. One of several roles I held at Xerox was Advanced Development Scientist and Manager. In that capacity, I established the Advanced Design Laboratory—an Imaging/Xerographics lab—and provided technical and managerial leadership for the Electrical, Imaging and Xerographics Department. In another role, as Product Development Scientist and Manager, I led the research and development of image quality metrics for various product platforms. I also led the Image Science, Analysis, and Evaluation area, with 12 to 15 direct reports and a budget of approximately \$2 million.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

10. From 1997 until 2004, I was an adjunct faculty member at the Electrical Engineering Department of the Rochester Institute of Technology and at the Electrical & Computer Engineering Department of the University of Rochester. I was responsible for teaching undergraduate and graduate coursework such as Digital Signal Processing, Digital Image Processing, Digital Video Processing, Pattern Recognition, Detection and Estimation Theory and Communication Systems; and performing research in multimedia applications, pattern recognition, image understanding and color engineering.

11. Since joining RIT full time, I have been responsible for teaching several undergraduate and graduate courses in Digital Signal Processing, Digital Image Processing, Digital Video Processing, Pattern Recognition, Advanced Neural Networks and Deep Learning, Engineering Analysis, Random Signal & Noise, Advanced Engineering Mathematics, Matrix Methods, Communications, Modern Control Theory, and Linear Systems.

12. I proposed, developed and introduced the Digital Video Processing and the Advanced Neural Network and Deep Learning courses; and reestablished the Pattern Recognition course at the Electrical Engineering Department at RIT. These graduate courses were instrumental in providing MS/PhD students with the proper

foundation and knowledge in all aspects of the subject areas in order to perform in-depth research in the field and continue to advance the state of the art.

13. The Digital Video Processing course is designed to provide a thorough and comprehensive coverage of the field. Topics covered include the mathematical representation of digital video including motion and time-varying image formation models, spatio-temporal sampling/reconstruction, sampling structure conversions, motion estimation using optical flow, block-based, pel-recursive, Bayesian and point correspondence type methodologies, segmentation, motion tracking, filtering, restoration, super-resolution and image/video compression.

14. The Pattern Recognition course, on the other hand, covers pertinent concepts in Bayes decision theory, linear and nonlinear classifiers, artificial neural networks, feature selection/generation/extraction and various types of clustering algorithms and techniques.

15. The “Advanced Neural Networks and Deep Learning: Theory, Mathematics and Algorithms” course is intended to provide an in-depth comprehensive study of the theory, mathematics and algorithms for advanced neural networks and their usage in deep learning. It is primarily targeted for upper graduate students that are planning to pursue advanced studies/research in the field. The course begins with an in-depth study of the mathematical methodologies for neural

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

networks and optimization (zero-, first- and second-order) techniques. It then progresses to provide a thorough study of shallow and deep neural networks architectures and algorithms, activation functions, regression, two- and multi-class classification, unsupervised learning, feature engineering/selection, backpropagation along with applications to a variety of engineering problems.

16. I am currently working to develop a follow-on course (part 2) to the Advanced Neural Networks and Deep Learning course described above. This course is intended to cover convolutional and recurrent style neural networks, principles of feature engineering, kernel methods, tree-based learners, attention mechanisms/transformers, reinforcement learning and generative adversarial networks. This course is being targeted to debut in Fall 2025.

17. My current research focuses on machine learning for object tracking/remote sensing applications; image/video processing for multimedia, military & biomedical applications; and computer vision and three-dimensional scene reconstruction. As a principal investigator (PI) or co-principal investigator, I have acquired almost \$6 million in research funding since joining RIT and have managed multiple government grants from the Department of Defense as well as several corporate grants from Hewlett-Packard, Lenel, and Data Physics. I am currently managing (as PI) a multiyear government grant from the Department of

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

Defense titled “Target Detection/Tracking and Activity Recognition from Multimodal Data.” In this project, we propose to develop operational target detection/tracking techniques and activity recognition/understanding methods that can leverage multimodal data in a fusion framework using deep learning algorithms while providing accurate and near real-time performance.

18. In 2012, I was awarded the Prestigious Trustees Scholarship, the highest award at RIT with regard to research recognition.

19. I am the author or co-author of thirty-eight (38) peer-reviewed journal publications.

20. I have also authored or co-authored 102 conference and workshop publications and a book entitled Advanced Linear Algebra for Engineers with MATLAB, published by CRC Press in February 2009, and am a named inventor on multiple U.S. and foreign patents.

21. I am a senior member of the Institute of Electrical and Electronic Engineers and a member of the IEEE Signal Processing Society, the Electrical Engineering Honor Society, Eta Kappa Nu.

22. A detailed record of my professional qualifications, including a list of publications, awards, and professional activities, is set forth in my curriculum vitae and is attached to this report as Appendix A.

III. INFORMATION CONSIDERED

23. In preparing this declaration, I have reviewed the '257 Patent, its prosecution history, and the exhibits and documents referenced herein. In addition, my opinions are further based on my education, training, experience, and knowledge in the relevant field.

IV. RELEVANT LEGAL STANDARDS

24. I am not an attorney and offer no legal opinions. For the purposes of this Declaration, I have been informed about certain aspects of the law that are relevant to my analysis, as summarized below.

A. Claim Interpretation

25. I have been informed that during an *inter partes* review proceeding, claims are to be construed in light of the specification as would be read by a person of ordinary skill in the relevant art at the time the application was filed. I have been informed that claim terms are given their ordinary and customary meaning as would be understood by a person of ordinary skill in the relevant art in the context of the entire disclosure. A claim term, however, will not receive its ordinary meaning if the patentee acted as his own lexicographer and clearly set forth a definition of the claim term in the specification. In that case, the claim term will receive the definition set forth in the patent.

B. Perspective of One of Ordinary Skill in the Art

26. I have been informed that a patent is to be understood from the perspective of a hypothetical “person of ordinary skill in the art” (“POSITA”). Such an individual is considered to possess normal skills and knowledge in a particular technical field (as opposed to being a genius). I have been informed that in considering what the claims of a patent require, what was known prior to that patent, what a prior art reference discloses, and whether an invention is obvious or not, one must use the perspective of such a POSITA.

C. Anticipation

27. I have been informed that a claim is not patentable if it is anticipated. I have been informed that anticipation of a claim requires that every element of a claim is disclosed expressly or inherently in a prior art reference, arranged as in the claim, when considered from the perspective of a person of ordinary skill in the relevant art. I have been informed that when the structure recited in a reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent. I have been informed that extrinsic evidence may be used to explain but not expand the meaning of terms and phrases used in the reference relied upon as anticipatory of the claimed subject matter.

D. Obviousness

28. I have been informed that a patent claim is obvious under 35 U.S.C. §103, and therefore invalid, if the claimed subject matter, as a whole, would have been obvious to a POSITA as of the priority date of the patent based on one or more prior art references and/or the knowledge of a POSITA.

29. I have been informed that an obviousness analysis must consider (1) the scope and content of the prior art, (2) the differences between the claims and the prior art, (3) the level of ordinary skill in the pertinent art, and (4) secondary considerations, if any, of non-obviousness (such as unexpected results, commercial success, long-felt but unmet need, failure of others, copying by others, and skepticism of experts).

30. I have been informed that a prior art reference may be combined with other references to disclose each element of the invention under 35 U.S.C. §103. I have been informed that a reference may also be combined with the knowledge of a POSITA, and that this knowledge may be used to combine multiple references. I have been informed that a POSITA is presumed to know the relevant prior art. I have been informed that the obviousness analysis may take into account the inferences and creative steps that a POSITA would employ.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

31. In determining whether a prior art reference would have been combined with other prior art or other information known to a POSITA, I have been informed that the following principles may be considered:

- whether the references to be combined involve non-analogous art;
- whether the references to be combined are in different fields of endeavor than the alleged invention in the patent;
- whether the references to be combined are reasonably pertinent to the problems to which the inventions of the patent are directed;
- whether the combination is of familiar elements according to known methods that yields predictable results;
- whether a combination involves the substitution of one known element for another that yields predictable results;
- whether the combination involves the use of a known technique to improve similar items or methods in the same way that yields predictable results;
- whether the combination involves the application of a known technique to a prior art reference that is ready for improvement, to yield predictable results;

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

- whether the combination is “obvious to try”;
- whether the combination involves the known work in one field of endeavor prompting variations of it for use in either the same field or a different one based on design incentives or other market forces, where the variations are predictable to a POSITA;
- whether there is some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill in the art to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention;
- whether the combination requires modifications that render the prior art unsatisfactory for its intended use;
- whether the combination requires modifications that change the principle of operation of the reference;
- whether the combination is reasonably expected to be a success; and
- whether the combination possesses the requisite degree of predictability at the time the invention was made.

32. I have been informed that in determining whether a combination of prior art references renders a claim obvious, it is helpful to consider whether there is

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

some teaching, suggestion, or motivation to combine the references and a reasonable expectation of success in doing so. I have been informed, however, that a teaching, suggestion, or motivation to combine is not required.

V. SUMMARY OF OPINIONS

33. It is my opinion that Claims 1, 3-11, 13-18, 20-22 of the '257 Patent are unpatentable under 35 U.S.C. §103 at least under the grounds discussed below.

VI. IDENTIFICATION OF CHALLENGES TO THE CLAIMS

34. The '257 Patent contains 22 claims. I have been asked to opine on the validity of Claims 1, 3-11, 13-18, and 20-22. Grounds 1 and 2, which are discussed below in greater detail, are as follows:

Ground	References	Basis	Claims Challenged
1	U.S. Patent Publication 2006/0115793 ("Kopelman") (EX1006)	§103	1, 3-11, 13-18, 20-22
2	Kopelman in view of U.S. Patent Publication No. 2004/0254476 ("Quadling") (EX1007)	§103	1, 3-11, 13-18, 20-22

VII. LEVEL OF ORDINARY SKILL IN THE ART

35. I have been informed that a POSITA is presumed to be aware of all pertinent art, thinks along conventional wisdom in the art, and is a person of ordinary creativity.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

36. I believe that a POSITA would have at least (1) a bachelor's degree in electrical engineering, computer engineering, computer science, or an equivalent field, as well as at least two to three years of industry or research experience with computer vision/graphics making use of three-dimensional virtual models; or (2) a master's degree in electrical engineering, computer engineering, computer science, or an equivalent field with a focus in making use of three-dimensional virtual models in the area of computer vision/graphics.

VIII. TECHNICAL BACKGROUND

A. The '257 Patent

37. I understand that the '257 Patent issued from U.S. Patent Application No. 11/469,870 filed Sep. 3, 2006, which claims priority to U.S. Provisional Application No. 60/761,078, filed on January 20, 2006 (EX1003). The '257 Patent relates to a system and method providing real time display of three-dimensional dental data acquired intraorally from a dental patient. EX1001, Abstract.

38. An example rendering of scanned dental data is provided by Figure 5:

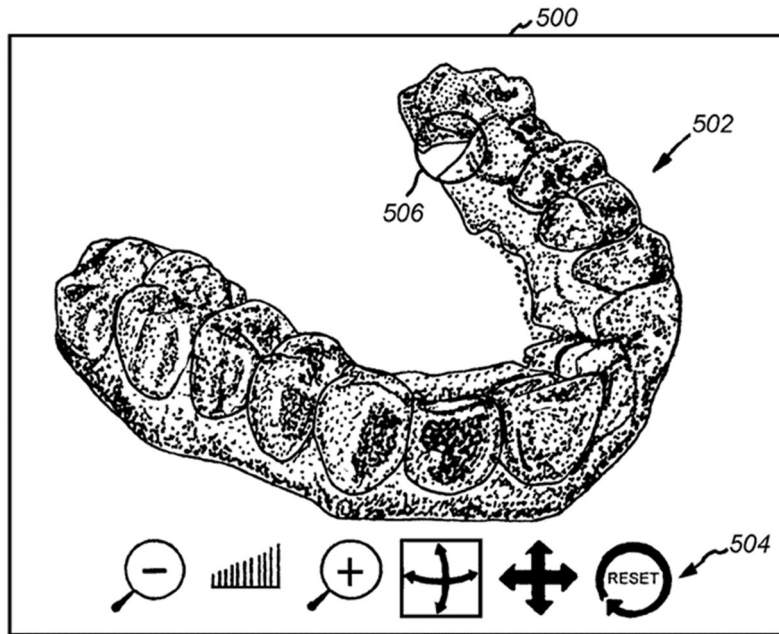


Fig. 5

39. The '257 Patent explains that at least one problem with the prior art is that “[u]nrecoverable errors or gaps in incremental data cannot be identified and fixed without initiating a new scan, possibly a full scan to completely replace the defective results.” EX1001, 1:42-45.

40. The '257 Patent explains that “[t]here remains a need for real time visual feedback systems to support continuous three-dimensional scanning.” EX1001, 1:57-58.

41. The independent claims of the '257 Patent require an inaccurate scan data visualization feature.

42. An embodiment of that feature is identified as region 506 in Figure 5 (reproduced above), and is explained in the '257 Patent as:

“In the window, gross errors in a digital model, such as a region 506 of omitted or missing scan data, may be intrinsically identified by the absence of visible point data. Other errors such as excessive variability of surface data may be intrinsically identified by fuzziness or excessive random texture. Visualization of scan quality may also, or instead, be augmented by explicit indicators, such as coloring, shading, surface texturing, or any of the other visual cues described above, which may visually identify regions of incomplete scan data, inaccurate scan data, insufficient scan detail (such as where a restoration will be affixed) and the like.” EX1001, 13:34-44.

B. The '257 Patent Examination History

43. A single office action issued rejecting Claims 1-3 and 5-7, 11-13, and 15-17, 18-19, 21-22 ¹ as anticipated by U.S. Pat. Pub. No. 2002/0055800 (“Nikolskiy”) (EX1009), Claims 8-10 as obvious over Nikolskiy in view of U.S. Pat. No. 6,687,393 (“Skinner”) (EX1010), and 4, 14, and 20 as obvious over Nikolskiy in view of U.S. Pat. No. 4,846,684 (“Oestreich”) (EX1011). EX1002, 215-227.

¹ The issued claim numbering is the same as that during prosecution.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

Applicant conducted an Examiner Interview and subsequently filed an Amendment and Reply. EX1002, at 182-194. In that Amendment and Reply, Applicant amended the claims and submitted arguments directed to the incremental nature of the claimed scanning technique. *See e.g.*, EX1002, p. 192.

44. Applicant characterized Nikolskiy as primarily directed to post-processing techniques, with “only cursory descriptions of techniques used to acquire initial three-dimensional tooth models.” *See e.g.*, EX1002 at p. 192 (citing Nikolskiy, ¶[0020] (“Fig. 11 is a simplified block diagram of a data processing system 300 that may be used to develop orthodontic treatment plans...”)).

45. The amendments and accompanying arguments focused on incremental scanning did not directly result in allowance. Instead, the Examiner issued a Notice of Allowance that was premised on an Examiner’s Amendment of independent Claims 1 and 11 to recite “providing a visualization within the visual display, the visualization updated at the video rate to identify ***regions of inaccurate scan data*** within the three-dimensional representation.” *See* EX1002, pp. 164-166 (emphasis added). Additionally, a second Notice of Allowance issued also amending independent Claim 18 to include the same visualization feature that lead to the first Notice of Allowance. *See* EX1002, pp. 11-20. That Notice specifically stated “claim 1 is considered allowable ... [due to its recitation]” of the inaccurate scan data

visualization feature noted above and that “Claim 11 and Claim 18 are considered allowable for similar reasons.” EX1002, pp. 11-20.

46. The prior art discussed in this Declaration explicitly discloses the inaccurate scan data visualization feature that was absent from the prior art applied by the Examiner.

C. Overview of the Prior Art

47. I have been informed that Kopelman and Quadling both qualify as prior art to the '257 Patent. EX1017 provides some background on three-dimensional computer modeling.

1. Kopelman (EX1006)

48. Kopelman discloses “a system and method for providing feedback information that facilitates and that may provide guidance for prosthodontic procedures in the intra oral cavity, i.e., procedures involving the installation and definition of dental prostheses.” EX1006, ¶[0002] (EX1008, 1:6-9). In Kopelman, “[f]irst, a 3D numerical model [i.e. a virtual model] of the target zone in the intra oral cavity is provided” and then it is “manipulated so as to extract particular data that may be useful in a particular procedure.” EX1006, Abstract. Exactly like the '257 Patent, Kopelman recognizes there may be deficiencies with respect to its

3D model/virtual model acquisition, which could result in the need for a complete rescan:

“However, if the model is deficient or undefined in certain areas, or if the preparation is not optimal for receiving the prosthesis, the dental technician has a more difficult job ahead than otherwise, and may result in less than optimal design for the prosthesis. **In some circumstances, the model is rejected and the dental practitioner must re-scan the dental site**, or must rework the preparation, so that a suitable prosthesis may be produced.” EX1006, ¶[0005] (emphasis added) (EX1008, 2:1-6).

49. Like the '257 Patent, Kopelman solves this problem through an inaccurate scan data visualization feature:

“Thus, in step 13' the processor 52 determines whether data is missing, or whether the **accuracy** of the data of the numerical entity is **insufficient**.

In step 14', feedback data is generated to alert the user as to how to correct for the insufficiency of definition.... This information may be provided by display 54, for example by providing a graphical image of the entity, with the deficient areas marked hereon, and then arrows or markers with respect thereto showing the desired position of the

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

scanner 31.” EX1006, ¶¶[0167]-[0168] (emphasis added)
(EX1008, 35:23-36:2).

a) Kopelman is Supported by its Provisional Application

50. Kopelman claims priority to U.S. Provisional Application Serial No. 60/630,572 (“the ’572 Provisional”) (EX1008). It is my opinion that the ’572 Provisional provides written description support for all elements of at least one independent claim of Kopelman. The ’572 Provisional is nearly verbatim in the relevant respects when compared to Kopelman. *See* EX1016.

51. The following chart shows that the ’572 Provisional (EX1008) discloses every limitation of at least claim 1 of Kopelman (EX1006):

Kopelman (EX1006), Claim 1	Support from ’572 Provisional (EX1008)
1. A method for providing feedback data useful in at least one prosthodontic procedure associated with the intra oral cavity, comprising:	“1. A method for providing feedback data useful in at least one prosthodontic procedure associated with the intra oral cavity, comprising:” p. 39 (identical) <i>See also</i> Figure 12.
(a) providing at least one numerical entity representative of the three-dimensional surface geometry of at least part of the intra-oral cavity;	“(a) providing at least one numerical entity representative of the three-dimensional surface geometry of at least part of the intra-oral cavity;” p. 39 (identical) <i>See also</i> Figure 12, Step 11’.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

(b) manipulating said entity to provide desired data of a type useful in at least a first said procedure;	“(b) manipulating said entity to provide desired data of a type useful in at least a first said procedure;” p. 39 (identical) <i>See also</i> Figure 12, Step 12’.
(c) determining at least one relationship between said desired data and said first procedure; and	“(c) determining at least one relationship between said desired data and said first procedure; and” p. 39 (identical) <i>See also</i> Figure 12, Step 13’.
(d) generating feedback data representative of said at least one relationship.	“(d) generating feedback data representative of said at least one relationship.” p. 39 (identical) <i>See also</i> Figure 12, Step 14’.

52. Parallel citations are also provided in the Grounds below to the ’572 Provisional² for each Kopelman citation, confirming written description support for the same material from Kopelman. The ’572 Provisional is also incorporated by reference into Kopelman, and which I am informed by counsel means that it forms part of Kopelman’s disclosure. EX1006, ¶[0001]. I am informed by counsel that the

² The parallel citations are provided directly next to each paragraph number for the Kopelman patent publication EX1006 in parentheses with page and line numbers to EX1008.

relationship between the '572 Provisional and Kopelman is relevant for Kopelman's prior art date.

2. Quadling (EX1007)

53. Quadling discloses a known three-dimensional scanner, specifically designed to scan dentition. *See* EX1007, Abstract (“A intra-oral laser digitizer system provides a three-dimensional visual image of a real-world object such as a dental item through a laser digitization.”). Quadling explains that its scanner acquires a sequence of images that are stored in memory and from which a three-dimensional model is created with a processor. EX1007, ¶[0012] (“Multiple images of the object may be recorded and processed by the computer to produce a 3D map of the object.”); *see also* Figure 1 and ¶[0067] (illustrating and discussing Quadling's computer and image processor). Quadling's images include video images acquired using a video camera as its image sensor. EX1007, ¶[0059].

IX. CLAIM CONSTRUCTION

54. For purposes of my analysis in this IPR proceeding, I have been informed that terms that appear in the claims of the '257 Patent should be interpreted according to their plain and ordinary meaning under the *Phillips* standard. This is reflected in the Claim Construction Order from the District Court proceeding included as Exhibit 1015. In determining the ordinary and customary meaning, I

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

have been informed that the words of a claim are first given their plain meaning that those words would have had to a POSITA at the time of the alleged invention. I also have been informed that the claims, specification, and file history may be used to better construe a claim insofar as the plain meaning of the claims cannot be understood. I have been informed that even treatises and dictionaries may be used under limited circumstances to determine the meaning attributed by a POSITA to a claim term at the time of filing.

55. I have reviewed the '257 Patent and its prosecution history as well as additional documents and have used a plain-meaning understanding for each claim term.

X. CLAIMS 1, 3-11, 13-18, AND 20-22 WOULD HAVE BEEN OBVIOUS OVER KOPELMAN (GROUND 1).

56. In my opinion, Claims 1, 3-11, 13-18, and 20-22 are unpatentable over Kopelman. The following sections explain where each element of these claims is found in this prior art.

A. Claim 1 (Preamble): A method comprising:

57. Kopelman renders obvious a method that includes the steps (among others) of acquiring two dimensional data from intraoral structures at a video rate [1.1], reconstructing a digital surface representation of those intraoral structures [1.2] and displaying them at the video rate [1.3], acquiring additional two

dimensional data from the intraoral structures [1.4], reconstructing a subsequent digital surface representation [1.5], combining the two digital surface representations to provide a three-dimensional representation of the intraoral structures [1.6] and providing a visual display of that new three-dimensional representation [1.7], and providing a visualization to identify regions of inaccurate scan data within the three-dimensional representation [1.8].

58. As Kopelman succinctly explains (annotated in green for the evaluation and blue for the visual feedback):

- “(a) providing at least one numerical entity representative of the three-dimensional surface geometry of at least part of the intra-oral cavity;
- (b) manipulating said entity to provide desired data of a type useful in at least a first said procedure;
- (c) determining at least one relationship between said desired data and said first procedure; and
- (d) generating feedback data representative of said at least one relationship.

Typically, in the said prosthodontic procedure, dental material has been previously removed from said part of the intra-oral cavity by means of a second procedure.

Optionally, step (c) comprises testing an adequacy of said desired data for performing said first procedure according to at least one predetermined parameter,

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

and step (d) comprises generating feedback data representative of said adequacy.” EX1006, ¶¶[0051]-[0054] (emphasis added) (EX1008, 39:2-20 (Claims 1-4)).

59. As noted in the Second Notice of Allowance (EX1002, pp. 164-166), the inaccurate scan data visualization feature of the challenged independent claims was the reason for allowance. Here, the ’257 Patent explains its understanding of the claimed visualization of inaccurate scan data as:

“Visualization of scan quality may also, or instead, be augmented by explicit indicators, such as coloring, shading, surface texturing, or any of the other visual cues described above, which may visually identify regions of incomplete scan data, inaccurate scan data, insufficient scan detail (such as where a restoration will be affixed) and the like.” EX1001, 13:34-44.

60. Kopelman provides precisely the same inaccurate scan data visualization feature:

“Thus, in step 13’ the processor 52 determines whether data is missing, or whether the accuracy of the data of the numerical entity is insufficient.

In step 14’, feedback data is generated to alert the user as to how to correct for the insufficiency of definition.... This

information may be provided by display 54, for example by providing a graphical image of the entity, with the deficient areas marked hereon, and then arrows or markers with respect thereto showing the desired position of the scanner 31.” EX1006, ¶¶[0167]-[0168] (emphasis added) (EX1008, 35:23-36:2).

61. In my opinion, Kopelman discloses all of the requirements of the preamble of Claim 1.

1. [1.1]: acquiring two dimensional data from one or more intraoral structures of a dental patient at a video rate;

62. Element [1.1] is disclosed in Kopelman (EX1006).

63. Kopelman is directed to the evaluation of a “numerical entity” of intraoral structures, which is defined as a virtual model (i.e. a three-dimensional / digital surface representation):

“Feedback data useful in prosthodontic procedures associated with the intra oral cavity is provided. First, a 3D numerical model of the target zone in the intra oral cavity is provided, and this is manipulated so as to extract particular data that may be useful in a particular procedure, for example data relating to the finish line or to the shape and size of a preparation.” EX1006, Abstract (EX1008, 3:14-4:17).

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

The term ‘numerical entity’ is used herein synonymously with virtual model and other such terms, and relates to a virtual representation of a real object, typically a dentition or at least a part of intraoral cavity, or of a real model thereof, for example.” EX1006, ¶[0011] (EX1008, 3:10-13); *see also* ¶[0082] (discussing numerical entity and stating “the said numerical entity is typically at least ‘three-dimensional’”) (EX1008, 11:22-12:2).

64. Kopelman explains its three-dimensional / digital surface representation is acquired by a 3D scanner:

“Any suitable means may be used to provide the numerical entity. FIG. 2 illustrates the main elements of the system 50 according to the present invention, comprising a suitable scanner 31, a microprocessor or computer 52, and a display means 54. According to the invention, digitised three-dimensional (3D) information W (FIG. 3) of the patient's intra-oral cavity, or part thereof, is created by the system 50 using scanner 31. Preferably, the 3D digitized data of the intraoral cavity is obtained, including the dentition and associated anatomical structures of a patient.” EX1006, ¶[0083] (EX1008, 12:4-11).

65. Kopelman explains that confocal scanners are among those applicable to its disclosure, which a POSITA would have appreciated functions by acquiring

two dimensional data which is then used to generate a three-dimensional / digital surface representation:

“The scanning means 31 may include, for example, a hand-held scanner that is used by the practitioner or other user to acquire the 3D data. Advantageously, a probe for determining three dimensional structure by confocal focusing of an array of light beams may be used, for example as manufactured under the name of **PROSTHOCAD or as disclosed in WO 00/08415**, the contents of which are incorporated herein in their entirety.” EX1006, ¶[0083] (emphasis added) (EX1008, 12:11-16); ¶[0094] (“Thus, advantageously, such a scanner makes use of confocal imaging for providing an accurate three-dimensional representation of the target surface within the intra-oral cavity. Color values may then added to each data point of this data set by obtaining a two-dimensional color image of the target surface”) (EX1008, 15:12-15); *see also* WO 00/08415 (EX1012) (incorporated by reference in Kopelman at ¶[0083] (EX1008, 12:11-16)) at 3:3-22 (discussing general function of confocal 3D scanners).

66. Kopelman also explains that the display of its scanned “numerical entity” as a digital surface representation is in real time:

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

“According to the first and second aspects of the invention, the entity obtained by scanning via scanner 31 is displayed in real time via display 54, and when the scanning is complete and acceptable, feedback data is provided alerting the user to this fact.” EX1006, ¶[0173] (EX1008, 37:1-4); *see also* ¶[0081] (discussing real time display) (EX1008, 11:20-21); ¶[0160] (same) (EX1008, 33:12-13).

67. Concerning “video” and “video rate,” the ’257 Patent explains that its disclosure and claims cover a wide variety of images displayed in sequence (i.e. frames) as videos at a wide variety of rates. And, in particular that imaging equipment employs a rate adapted to the computation demands of the particular imaging technique employed:

‘It will also be understood that terms such as ‘video’ or ‘video rate’ imply a wide range of possible frame rates associated with such video. While most modern video formats employ a frame rate of 25 to 30 frames per second, early video employed frame rates as low as 8 frames per second, and movies of the early 1900's varied from 12 to 18 frames per second. **In addition, it is common for specialized imaging equipment to employ a rate adapted to the computational demands of particular imaging and rendering techniques**, and some video systems operate with frame rates anywhere from 4 frames

per second (for computationally extensive imaging systems) to 100 frames per second or higher (for high-speed video systems). **As used herein, the terms video rate and frame rate should be interpreted broadly.**

Notwithstanding this broad meaning, it is noted that useful and visually pleasing three-dimensional imaging systems have been constructed according to the foregoing with frame rates of at least ten frames per second, frame rates of at least twenty frames per second, and frame rates between 25 and 30 frames per second.” EX1001, 6:53-7:5 (emphasis added).

68. In my opinion, Kopelman does not explicitly disclose that its acquisition and real time display is in the form of “video” at a “video rate.”

69. It would have been obvious to a POSITA in view of Kopelman’s disclosure alone to implement Kopelman’s system such that the acquisition of two dimensional data while scanning target intraoral structures would have been acquired at a video rate, and that the display of Kopelman’s digital surface representation would be consistent with that data acquisition video rate in order to achieve Kopelman’s disclosed real time display so that the “real time” display would continue uninterrupted.

70. A POSITA would have recognized the selection of a consistent acquisition and display video rate was simply a matter of design choice. And,

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

selection of video rate that is consistent for both acquisition and display would have been one of a finite number of predictable solutions, and one known solution available to a POSITA at that time to achieve real-time acquisition and display. That is, if the rates themselves are selected to be consistent, a POSITA would have recognized less computation would have been necessary to coordinate the acquisition rate with Kopelman's display rate; as compared to inconsistent rates that would have required additional computation and processing to allow for an uninterrupted display of the acquired image data. The '257 patent itself recognizes that "it [was] common for specialized imaging equipment to employ a rate adapted to the *computational demands* of particular imaging and rendering techniques." EX1001, 6:53-7:5 (emphasis added).

71. Thus, Kopelman's disclosure meets the recited "video rate" in this feature as this step relates to that acquisition.

72. In my opinion, Kopelman discloses all of the requirements of Element [1.1].

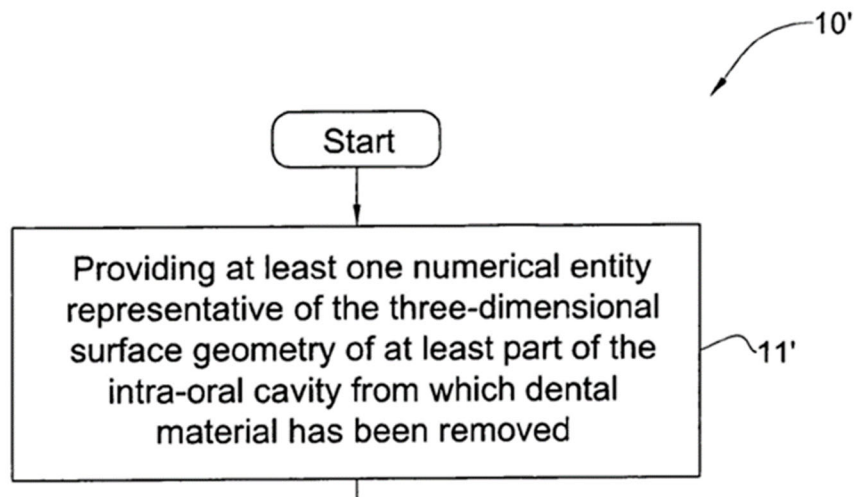
2. [1.2]: reconstructing a digital surface representation of the one or more intraoral structures;

73. Element [1.2] is disclosed in Kopelman (EX1006).

74. Kopelman explains that its process of intraoral structure scanning involves reconstructing a “numerical entity” as a digital surface representation of the scanned one or more intraoral structures:

“Thus in step 11’, scanner 32 of system 50 (FIG. 2) scans the area of interest of the intraoral cavity and a numerical entity corresponding to the surface scanned is created by processor 52 and optionally displayed by display 54.” EX1006, ¶[0162] (EX1008, 33:18-20); *see also* ¶[0083] (“According to the invention, digitised three-dimensional (3D) information W (FIG. 3) of the patient's intra-oral cavity, or part thereof, is created by the system 50 using scanner 31.”) (EX1008, 12:7-9).

75. Kopleman Figure 12 is shown below:



EX1006, Figure 12 (portion) (EX1008, Figure 12 at Sheet 8/8).

76. Kopleman discloses its digital surface representation may be obtained through multiple scans resulting in multiple “sub-entities” that are ultimately stitched together to form the overall digital surface representation of the target scanned intraoral structure(s):

“The numerical entity may be obtained in a single scan, or alternatively, the numerical entity is originally created by taking multiple scans of the target area, and stitching the numerical entities thus obtained together.” EX1006, ¶[0163] (EX1008, 33:28-30).

“When multiple scan [sic] are employed, then, in step 11’, the scanner 31 may be used for obtaining high resolution numerical sub-entities representative of the surface topography within the intra-oral cavity...Nevertheless, by identifying the overlap zone within the entities, the spatial relationship between the entities may be established, and the various entities stitched together or combined to form **a global numerical entity** that comprises the full geometry and color representation of the target zone.” EX1006, ¶[0164] (emphasis added) (EX1008, 34:5-19).

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

77. The multiple scan aspect of Kopelman's disclosure is more specifically relevant for Elements [1.4]-[1.7], and is introduced here to lay a foundation for Kopelman's multiple "sub-entities" scanning workflow.

78. In my opinion, Kopelman discloses all of the requirements of Element [1.2].

3. [1.3]: displaying the digital surface representation at the video rate;

79. Element [1.3] is disclosed in Kopelman (EX1006).

80. Kopelman explains that the display of its scanned "numerical entity" as a digital surface representation is displayed in real time:

"According to the first and second aspects of the invention, the entity obtained by scanning via scanner 31 is displayed in real time via display 54, and when the scanning is complete and acceptable, feedback data is provided alerting the user to this fact." EX1006, ¶[0173] (EX1008, 37:1-4); *See also* ¶[0081] (discussing real time display) (EX1008, 11:20-21); ¶[0160] (same) (EX1008, 33:12-13).

81. As noted above with respect to Element [1.1], Kopelman does not explicitly disclose that its acquisition and real time display is in the form of "video" at a "video rate."

82. In my opinion, it would have been obvious to a POSITA in view of Kopelman's disclosure alone to implement Kopelman's system to achieve its "numerical entity" real time display by displaying that "numerical entity" at a video rate consistent with the video rate of two-dimensional data acquisition during scanning, as also noted above with respect to Element [1.1].

83. Kopelman's disclosure relating to real time display is at the "video rate" recited in this feature because it would have been obvious to a POSITA to implement Kopelman's real time display to be coordinated through a common video rate with its two dimensional scanner data acquisition to achieve its disclosed function of "real time" display so that the "real time" display would be uninterrupted.

84. In my opinion, Kopelman discloses all of the requirements of Element [1.3].

4. [1.4]: acquiring additional two-dimensional data from the one or more intraoral structures in a subsequent frame of data at the video rate;

85. Element [1.4] is disclosed in Kopelman (EX1006).

86. As discussed above with respect to Element [1.2], Kopelman explains that its "numerical entity" acquisition may be obtained through multiple scans (which are stitched together):

"The numerical entity may be obtained in a single scan, or alternatively, the numerical entity is originally created by

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

taking multiple scans of the target area, and stitching the numerical entities thus obtained together.” EX1006, ¶[0163] (EX1008, 33:28-30).

“When multiple scan [sic] are employed, then, in step 11’, the scanner 31 may be used for obtaining high resolution numerical sub-entities representative of the surface topography within the intra-oral cavity.” EX1006, ¶[0164] (EX1008, 34:5-7).

87. As noted above with respect to Element [1.1], Kopelman does not explicitly disclose that its acquisition and real time display is in the form of “video” at a “video rate.”

88. In my opinion, it would have been obvious to a POSITA that as Kopelman’s overall multiple “sub-entity” scanning process proceeds, additional two dimensional data would be acquired at the same video rate as the data acquired for a preceding “sub-entit[y] representative of the surface topography within the intra-oral cavity” (*i.e.*, the portion scanned as discussed above with reference to Elements [1.1] and [1.2]). This is because any such scanner would be configured to scan at a constant video rate in this respect, and also to support the obvious implementation of a consistent video rate for Kopelman’s disclosed real time display of its

“numerical entity” as a digital surface representation (as discussed above with respect to Element [1.3]).

89. Kopelman’s subsequent two-dimensional data acquisition disclosure meets the “video rate” recited in this feature as this step relates to subsequent acquisition and the additional two-dimensional data would be acquired at the same video rate as the data acquired for a preceding “sub-entit[y].”

90. In my opinion, Kopelman discloses all of the requirements of Element [1.4].

5. [1.5]: reconstructing a subsequent digital surface representation from the additional two-dimensional data at the video rate

91. Element [1.5] is disclosed in Kopelman (EX1006).

92. In view of Kopelman’s disclosure of “numerical entity” acquisition through multiple “sub-entities”³, and its disclosure of real time display of the same⁴, it would have been obvious to a POSITA that the disclosed stitching process as

³ EX1006, ¶[0163] (EX1008, 33:28-30).

⁴ EX1006, ¶[0173] (EX1008, 37:1-4); *see also* ¶[0081] (discussing real time display) (EX1008, 11:20-21); ¶[0160] (same) (EX1008, 33:12-13).

between “sub-entities representative of the surface topography within the intra-oral cavity” would be at the same video rate as acquisition and previous display.

93. Kopelman’s disclosure relating to real time display and corresponding subsequent digital surface representation reconstruction meets the “video rate” recited in this feature because it would have been obvious to a POSITA to implement Kopelman’s real time display to be coordinated through a common video rate with its two-dimensional scanner data acquisition to achieve its disclosed function of “real time” display so that the “real time” display would be uninterrupted.

94. In my opinion, Kopelman discloses all of the requirements of Element [1.5].

6. [1.6]: combining the digital surface representation and the subsequent digital surface representation at the video rate to provide a three-dimensional representation of the one or more intraoral structures;

95. Element [1.6] is disclosed in Kopelman (EX1006).

96. Similarly in view of Kopelman’s disclosure of “numerical entity” acquisition through multiple “sub-entities”⁵, and its disclosure of real time display

⁵ EX1006, ¶[0163] (EX1008, 33:28-30).

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

of the same⁶, it would have been obvious to a POSITA that Kopelman's digital surface representation (from Element [1.2]) and subsequent digital surface representation (from Element [1.5]) are stitched together into a more complete "numerical entity" at the same video rate as acquisition and previous display. That more complete "numerical entity" as scanning progresses would be the claimed "three-dimensional representation of the one or more intraoral structures."

97. Kopelman's disclosure relating to real time display and corresponding stitching together of the digital surface representation (from Element [1.2]) and subsequent digital surface representation (from Element [1.5]) meets the "video rate" recited in this feature because it would have been obvious to a POSITA to implement Kopelman's real time display to be coordinated through a common video rate with its two-dimensional scanner data acquisition to achieve its disclosed function of "real time" display so that the "real time" display would be uninterrupted.

98. In my opinion, Kopelman discloses all of the requirements of Element [1.6].

⁶ EX1006, ¶[0173] (EX1008, 37:1-4); See also ¶[0081] (discussing real time display) (EX1008, 11:20-21); ¶[0160] (same) (EX1008, 33:12-13).

7. [1.7]: providing a visual display of the three-dimensional representation at the video rate in real time; and

99. Element [1.7] is disclosed in Kopelman (EX1006).

100. Likewise in view of Kopelman's disclosure of "numerical entity" acquisition through multiple "sub-entities"⁷, and its disclosure of real time display of the same⁸, it would have been obvious to a POSITA that the combined "numerical entity" as the claimed "three-dimensional representation of the one or more intraoral structures" would have been displayed at the video rate in real time – again, as Kopelman expressly discloses:

“According to the first and second aspects of the invention, the entity obtained by scanning via scanner 31 is displayed in real time via display 54, and when the scanning is complete and acceptable, feedback data is provided alerting the user to this fact.” EX1006, ¶[0173] (EX1008, 37:1-4); *see also* ¶[0081] (discussing real time display) (EX1008, 11:20-21); ¶[0160] (same) (EX1008, 33:12-13).

⁷ EX1006, ¶[0163] (EX1008, 33:28-30).

⁸ EX1006, ¶[0173] (EX1008, 37:1-4); *see also* ¶[0081] (discussing real time display) (EX1008, 11:20-21); ¶[0160] (same) (EX1008, 33:12-13).

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

101. Kopelman's disclosure relating to real time display meets the "video rate" recited in this feature because it would have been obvious to a POSITA to implement Kopelman's real time display to be coordinated through a common video rate with its two-dimensional scanner data acquisition to achieve its disclosed function of "real time" display so that the "real time" display would be uninterrupted.

102. In my opinion, Kopelman discloses all of the requirements of Element [1.7].

8. [1.8]: providing a visualization within the visual display, the visualization updated at the video rate to identify regions of inaccurate scan data within the three-dimensional representation.

103. Element [1.8] is disclosed in Kopelman (EX1006).

104. Kopelman discloses analyzing its scanned "numerical entity" as it is being scanned to identify areas of inaccurate scan data:

"Thus, in step 13' the processor 52 determines whether data is missing, or whether the accuracy of the data of the numerical entity is insufficient." EX1006, ¶[0167] (emphasis added) (EX1008, 35:22-24).

105. To support its scanning process, Kopelman's system then provides a visualization within the visual display updated at the video rate to identify regions of inaccurate scan data within its "numerical entity" as the claimed three-dimensional representation:

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

“In step 14’, feedback data is generated to alert the user as to how to correct for the insufficiency of definition.... This information may be provided by display 54, for example by providing a graphical image of the entity, with the deficient areas marked hereon, and then arrows or markers with respect thereto showing the desired position of the scanner 31.” EX1006, ¶[0168] (EX1008, 35:25-36:2).⁹

“In this context, an image of the numerical entity may be displayed in the display 54, with the finish line 84 and optionally also the shoulder 85 highlighted thereon. Then, the zones of the finish line that require further work may

⁹ See also EX1006, ¶[0038] (discussing incomplete definition and feedback concerning the same) (EX1008, 7:3-11); ¶[0163] (discussing analyzing scans for insufficient (*i.e.* inaccurate) data) (EX1008, 33:25-4); ¶[0165] (discussing analyzing scans for insufficient (*i.e.* inaccurate) data) (EX1008, 34:27-35:3); ¶[0166] (discussing analyzing scans for *quantitative* (*i.e.* inaccurate) level of data available) (EX1008, 35:4-9); ¶[0169] (discussing scans lacking definition and resolution of the same) (EX1008, 36:6-15). Concerning additional visualization disclosure in Kopelman see EX1006, ¶¶[0112]-[0116] (EX1008, 19:27-20:20); ¶[0127] (EX1008, 23:15-22).

be contrasted with respect to the finish line 84 and/or the shoulder 85, for example by coloring such zones in a different color to the rest of the image.” EX1006, ¶[0115] (EX1008, 20:9-13).

106. Kopelman explains the purpose of such a visualization of inaccurate scan data is to signal to a user that further scanning is required:

“Of course, it may be that more than one scan is required to make up for the missing data, and the processor provides the required feedback data to deal with each scan.” EX1006, ¶[0168] (EX1008, 36:2-5).

“Furthermore, the processor may be programmed to alert the user when the entity is sufficiently well defined for the purpose for which it is needed. In such a case, the feedback data is deigned to alert the user that the scan is complete, and may comprise a distinct visual or audio signal, similar but distinguishable from other audio/visual signals provided by display 54, as described herein, mutatis mutandis.” EX1006, ¶[0170] (EX1008, 36:16-21).¹⁰

¹⁰ See also EX1006, ¶¶[0171]-[0172] (discussing feedback to ensure adequacy of acquisition) (EX1008, 36:23-30); ¶[0044] (discussing advising a user to continue scanning until “definition is sufficient”) (EX1008, 44:12-14).

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

107. Kopelman's disclosure explains that all of this, including that the feedback, is provided in real time and a user is alerted when a scan is acceptable:

“Thus, in the second aspect of the invention, the feedback data may essentially be used to facilitate the acquisition of data that may be used to construct the numerical entity for subsequent use, for example according to the first aspect of the invention.

According to the first and second aspects of the invention, the entity obtained by scanning via scanner 31 is displayed **in real time via display 54**, and when the scanning is complete and acceptable, feedback data is provided alerting the user to this fact.” EX1006, ¶¶[0172]-[0173] (emphasis added) (EX1008, 36:27-37:4).

108. Including with reference to Figure 12 illustrating the process from acquisition through feedback generation:

“Preferably, steps 11' to 14' are carried out in a relatively short space of time, more preferably in **real time** or close thereto.” EX1006, ¶[0160] (emphasis added) (EX1008, 33:12-13).

109. Kopleman Figure 12 is shown below:

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

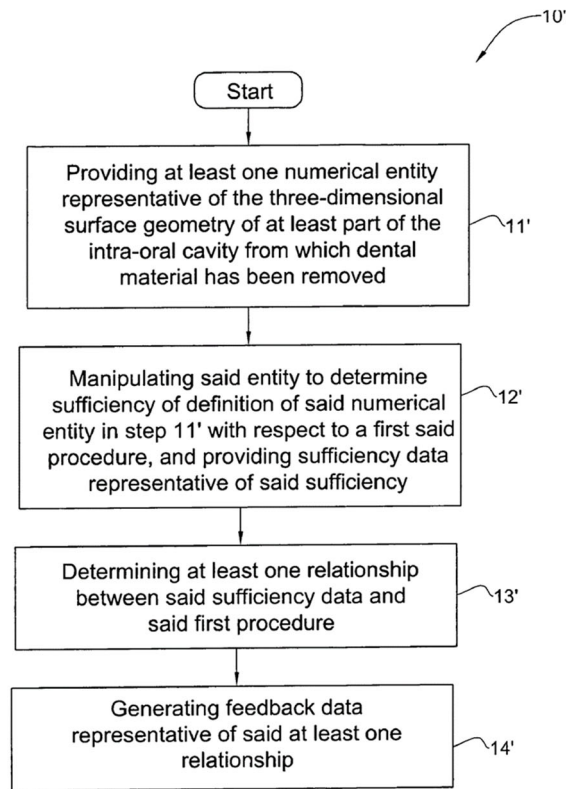


FIG. 12

EX1006, Figure 12 (portion) (EX1008, Figure 12 at Sheet 8/8).

110. It would have been obvious to a POSITA that Kopelman's inaccurate scan data visualization would be provided at the video rate of the real time display which meets the "video rate" recited in this feature because it would have been obvious to a POSITA to implement Kopelman's real time display to be coordinated through a common video rate with its two dimensional scanner data acquisition to

achieve its disclosed function of “real time” display so that the “real time” display would be uninterrupted.

111. Additionally, the foregoing disclosure from Kopelman concerning “inaccurate scan data” is consistent with the guidance from the Court in the Related Litigation which noted that “inaccurate scan data” “includes missing scan data, incomplete scan data, insufficient scan detail (such as where a restoration will be affixed) and the like.” *See* EX1015, p. 2.

112. In my opinion, Kopelman discloses all of the requirements of Element [1.8].

B. Claim 3: The method of claim 1 wherein the one or more intraoral structures include at least one tooth.

113. Kopelman discloses the additional limitations of Claim 3.

114. Kopelman’s scanned intraoral structures include at least one tooth associated with a prosthodontic procedure. *See* EX1006, ¶[0155] (“The FIG. 12 illustrates a method 10’ for providing feedback data useful in at least one prosthodontic procedure associated with the intra oral cavity, in accordance with a second aspect of the invention.”) (EX1008, 32:25-27); ¶[0010] (definition of prosthodontic procedure involving “prosthesis”) (EX1008, 3:5-9); ¶[0008] (definition of prosthesis involving “preparation”) (EX1008, 2:24-26); ¶[0009]

(definition of “preparation” meaning remaining portion of a tooth) (EX1008, 2:27-3:4).

115. In my opinion, Kopelman discloses the requirements of Claim 3.

C. Claim 4: The method of claim 1 wherein the one or more intraoral structures include at least one tooth surface prepared for a dental prosthetic.

116. Kopelman discloses the additional limitations of Claim 4.

117. *See* Claim 3, above. Kopelman’s scanned site preparations involve at least one tooth surface prepared for a dental prosthetic:

“While the term “preparation” typically refers to the stump (including the finish line and shoulder) that is left of the tooth that is to be replaced by the prosthesis—typically a crown—and on which the crown is to be mounted, the term herein also includes artificial stumps, pivots, cores and posts, or other devices that may be implanted in the intraoral cavity in such a position or in a position that is optimal for implanting the crown.” EX1006, ¶[0009] (EX1008, 2:27-3:4).

118. In my opinion, Kopelman discloses all of the requirements of Claim 4.

D. Claim 5: The method of claim 1 wherein the one or more intraoral structures include at least one area of soft tissue.

119. Kopelman discloses the additional limitations of Claim 5.

120. Kopelman discloses scanning soft tissues as part of its scanning process of one or more intraoral structures:

“Optionally, in step (a), said numerical entity further comprises color data of said part of the intra oral cavity, and step (b) comprises differentiating parts of said entity according to whether the said color associated therewith is correlated with soft tissues or hard tissues of the intra oral cavity.” EX1006, ¶[0047] (EX1008, 44:19-23); *see also* ¶[0025] (“surrounding dental tissues”) (EX1008, 5:1-3); ¶[0105] (color data for soft tissue) (EX1008, 18:26-19:11); ¶[0164] (same) (EX1008, 34:5-26); Claim 44 (same) (EX1008, 44:21-13).

121. In my opinion, Kopelman discloses all of the requirements of Claim 5.

E. Claim 6 (Preamble): The method of claim 1 further comprising:

122. Kopelman discloses the additional limitations of Claim 6.

1. [6.1] generating user feedback concerning the one or more intraoral structures; and

123. Kopelman discloses Element [6.1].

124. As discussed above with respect to Element [1.8], Kopelman generates user feedback concerning the scanning of one or more intraoral structures to identify regions of inaccurate scan data in its “numerical entity” as the claimed “three-dimensional representation.”

125. In my opinion, Kopelman discloses all of the requirements of Element [6.1].

2. [6.2] providing a visual display of the user feedback at the video rate.

126. Kopelman discloses Element [6.2].

127. As discussed above with respect to Element [1.8], it would have been obvious to a POSITA that Kopelman provides a visual display of its user feedback relating to inaccurate scan data in real time at the video rate in various forms, including “by providing a graphical image of the entity, with the deficient areas marked hereon, and then arrows or markers with respect thereto showing the desired position of the scanner 31.” EX1006, ¶[0168] (EX1008, 35:30-36:2).¹¹

128. In my opinion, Kopelman discloses all of the requirements of Element [6.2].

F. Claim 7: The method of claim 6 wherein generating user feedback includes highlighting at least one area in the three-dimensional representation requiring user attention.

129. Kopelman discloses the additional limitations of Claim 7.

130. As discussed directly above with respect to Element [1.8], Kopelman’s visual user feedback relating to inaccuracy includes “feedback data [that] is

¹¹ See also FN10 listing further visual feedback disclosure of Kopelman.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

generated to alert the user as to how to correct for the insufficiency of definition...[by] providing a graphical image of the entity, with the deficient areas marked hereon, and then arrows or markers with respect thereto showing the desired position of the scanner 31” (EX1006, ¶[0168] (EX1008, 35:25-36:2)) as “highlighting.” Kopelman also specifically uses the term “highlighting” with respect to its visual user feedback options: “In this context, an image of the numerical entity may be displayed in the display 54, with the finish line 84 and optionally also the shoulder 85 **highlighted** thereon. Then, the zones of the finish line that require further work may be contrasted with respect to the finish line 84 and/or the shoulder 85, for example by coloring such zones in a different color to the rest of the image.” EX1006, ¶[0115] (emphasis added) (EX1008, 20:9-13).

131. In my opinion, Kopelman discloses all of the requirements of Claim 7.

G. Claim 8: The method of claim 1 wherein the video rate includes a rate of at least eight frames per second.

132. Kopelman discloses the additional limitations of Claim 8.

133. It would have been obvious to a POSITA that Kopelman’s common acquisition and display video rate of its “numerical entity” would have been at a rate of ***at least*** eight frames per second (as a lower bound) to provide a useable visual interface.

134. A POSITA would have recognized this as a simple matter of design choice, dictated by visual aesthetics of the displaying frame rate as balanced by computation complexity of achieving such a frame rate.

135. The '257 Patent itself recognizes such video rates were known in the prior art and does not indicate selection of the video rate is a critical aspect of its alleged invention. *See* EX1001, 6:53-7:5.

136. In my opinion, Kopelman discloses all of the requirements of Claim 8.

H. Claim 9: The method of claim 1 wherein the video rate includes a rate of at least twenty frames per second.

137. Kopelman discloses the additional limitations of Claim 9.

138. *See* Claim 8, above. Selection of a video rate of at least twenty frames per second by a POSITA would have been a design choice driven by the factors noted above.

139. In my opinion, Kopelman discloses all of the requirements of Claim 9.

I. Claim 10: The method of claim 1 wherein the video rate includes a rate of between twenty-four and thirty frames per second.

140. Kopelman discloses the additional limitations of Claim 10.

141. *See* Claim 8, above. Selection of a video rate of between twenty-four and thirty frames per second by a POSITA would have been a design choice driven by the factors noted above.

142. In my opinion, Kopelman discloses all of the requirements of Claim 10.

J. Claim 11 (Preamble): A computer program product embodied on a non-transitory computer readable medium that, when executing on one or more computing devices, performs the steps of:

143. Kopelman discloses the preamble of Claim 11.

144. Kopelman's method is computer implemented, which a POSITA would have appreciated includes a non-transitory computer readable medium within computer 52 with instructions that when executed perform the method of Claim 11. *See* Figure 2 and associated disclosure at EX1006, ¶[0083] (EX1008, 12:4-16).

145. In my opinion, Kopelman discloses all of the requirements of the preamble of Claim 11.

1. [11.1]: acquiring two dimensional data from one or more intraoral structures of a dental patient at a video rate;

146. Kopelman discloses Element [11.1]. *See* Element [1.1] addressing identical method language.

147. In my opinion, Kopelman discloses all of the requirements of Element [11.1].

2. [11.2]: reconstructing a digital surface representation of the one or more intraoral structures;

148. Kopelman discloses Element [11.2]. *See* Element [1.2] addressing identical method language.

149. In my opinion, Kopelman discloses all of the requirements of Element [11.2].

3. [11.3]: displaying the digital Surface representation at the video rate;

150. Kopelman discloses Element [11.3]. *See* Element [1.3] addressing identical method language.

151. In my opinion, Kopelman discloses all of the requirements of Element [11.3].

4. [11.4]: acquiring additional two-dimensional data from the one or more intraoral structures in a subsequent frame of data at the video rate;

152. Kopelman discloses Element [11.4]. *See* Element [1.4] addressing identical method language.

153. In my opinion, Kopelman discloses all of the requirements of Element [11.4].

5. [11.5]: reconstructing a subsequent digital surface representation from the additional two-dimensional data at the video rate

154. Kopelman discloses Element [11.5]. *See* Element [1.5] addressing identical method language.

155. In my opinion, Kopelman discloses all of the requirements of Element [11.5].

6. [11.6]: combining the digital surface representation and the subsequent digital surface representation at the video rate to provide a three-dimensional representation of the one or more intraoral structures;

156. Kopelman discloses Element [11.6]. *See* Element [1.6] addressing identical method language.

157. In my opinion, Kopelman discloses all of the requirements of Element [11.6].

7. [11.7]: providing a visual display of the three-dimensional representation at the video rate in real time; and

158. Kopelman discloses Element [11.7]. *See* Element [1.7] addressing identical method language.

159. In my opinion, Kopelman discloses all of the requirements of Element [11.7].

8. [11.8] providing a visualization within the visual display, the visualization updated at the video rate to identify regions of inaccurate scan data within the three-dimensional representation.

160. Kopelman discloses Element [11.8]. *See* Element [1.8] addressing identical method language.

161. In my opinion, Kopelman discloses all of the requirements of Element [11.8].

K. Claim 13: The computer program product of claim 11 wherein the one or more intraoral structures include at least one tooth.

162. Kopelman discloses the additional limitations of Claim 13. *See* Claim 3 addressing identical method language.

163. In my opinion, Kopelman discloses all of the requirements of Claim 13.

L. Claim 14: The computer program product of claim 11 wherein the one or more intraoral structures include at least one tooth surface prepared for a dental prosthetic.

164. Kopelman discloses the additional limitations of Claim 14. *See* Claim 4 addressing identical method language.

165. In my opinion, Kopelman discloses all of the requirements of Claim 14.

M. Claim 15: The computer program product of claim 11 wherein the one or more intraoral structures include at least one area of soft tissue.

166. Kopelman discloses the additional limitations of Claim 15. *See* Claim 5 addressing identical method language.

167. In my opinion, Kopelman discloses all of the requirements of Claim 15.

N. Claim 16: The computer program product of claim 11 further comprising code for performing the steps of generating user feedback concerning the one or more intraoral structures; and providing a visual display of the user feedback at the video rate.

168. Kopelman discloses the additional limitations of Claim 16. *See* Claim 6 addressing identical method language.

169. In my opinion, Kopelman discloses all of the requirements of Claim 16.

O. Claim 17: The computer program product of claim 16 wherein generating user feedback includes highlighting at least one area in the three-dimensional representation requiring user attention.

170. Kopelman discloses the additional limitations of Claim 17. *See* Claim 7 addressing identical method language.

171. In my opinion, Kopelman discloses all of the requirements of Claim 17.

P. Claim 18 (Preamble): A system comprising:

172. Kopelman discloses the preamble of Claim 18.

173. Kopelman's method is disclosed in the context of a computer implemented system. *See* Figure 2 and associated disclosure at EX1006, ¶[0083] (EX1008, 12:4-16).

174. In my opinion, Kopelman discloses all of the requirements of the preamble of Claim 18.

1. [18.1]: a scanner for acquiring a sequence of image sets from one or more intraoral structures of a dental patient at a video rate; and

175. Kopelman discloses Element [18.1].

176. Kopelman's method and system includes a scanner 31. *See* Figure 2 and associated disclosure at EX1006, ¶[0083] (EX1008, 12:4-16).

177. Element [1.1]'s discussion above concerning the configuration and function of Kopelman's disclosed scanner is equally applicable to the nearly identical claim language of this element and is incorporated here.

178. In my opinion, Kopelman discloses all of the requirements of Element [18.1].

2. [18.2]: a processor configured to:

179. Kopelman discloses Element [18.2].

180. Kopelman's method and system is computer implemented, and its method is carried out and executed by the disclosed computer and a processor thereon. *See e.g.*, EX1006, ¶[0083] ("FIG. 2 illustrates the main elements of the system 50 according to the present invention, comprising a suitable scanner 31, a microprocessor or computer 52, and a display means 54.") (EX1008, 12:4-16).

181. In my opinion, Kopelman discloses all of the requirements of Element [18.2].

a) [18.2.1]: receive one of the sequence of image sets,

182. Kopelman's processor is configured to receive one of the sequence of image sets before creation of the "numerical entity" as a three-dimensional surface representation. EX1006, ¶[0162] ("Thus in step 11', scanner 32 [sic] of system 50 (FIG. 2) scans the area of interest of the intraoral cavity and a numerical entity corresponding to the surface scanned is created by processor 52 and optionally displayed by display 54.") (EX1008, 33:18-20).

183. This element is equivalent to Element [1.4] above, which refers to acquiring additional two dimensional data during Kopelman's multiple "sub-entity" scanning process and is incorporated here.

b) [18.2.2] convert the one of the sequence of image sets into a three-dimensional surface representation of the one or more intraoral structures,

184. Kopelman's processor is configured to convert the received one of the sequence of image sets into a "numerical entity" as a three-dimensional surface representation of the one or more intraoral structures that are being scanned.

185. This element is equivalent to Element [1.5] above, which refers to reconstructing a subsequent digital surface representation during Kopelman's multiple "sub-entity" scanning process and is incorporated here.

c) [18.2.3] combine the three-dimensional surface representation with one or more prior three-dimensional surface representations from one or more prior ones of the sequence of image sets to provide a three-dimensional model of the one or more intraoral structures, and

186. Kopelman's processor is configured to combine the three-dimensional surface representation (from element [18.2.2]) with one or more prior three-dimensional surface representations from one or more prior ones of the sequence of image sets to provide a three-dimensional model of the one or more intraoral structures.

187. This element is equivalent to Element [1.1] (*prior* acquisition of two dimensional data), Element [1.2] (reconstructing a *prior* digital surface representation), and Element [1.6] (combining digital surface representations together to form a more complete “numerical entity”) during Kopelman’s multiple “sub-entity” scanning process and are incorporated here.

d) [18.2.4] generate a visual display signal of the three-dimensional model at the video rate in real time,

188. Kopelman’s processor is configured to generate a visual display signal of the three-dimensional model at the video rate in real time.

189. This element is equivalent to Element [1.7] above, which refers to Kopelman’s real time display of its “numerical entity” as a three-dimensional model and is incorporated here.

e) [18.2.5] generate a visualization within the visual display signal, the visualization updated at the video rate to identify regions of inaccurate scan data within the three-dimensional representation;

190. Kopelman’s processor is configured to generate a visualization within the visual display signal, the visualization updated at the video rate to identify regions of inaccurate scan data within the three-dimensional representation.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

191. This element is equivalent to Element [1.8] above, which refers to Kopelman's real time display of its "numerical entity" as a three-dimensional model along with an inaccurate data visualization and is incorporated here.

192. In my opinion, Kopelman discloses all of the requirements of Elements [18.2.1-18.2.5].

3. [18.3] and a display for displaying the visual display signal.

193. Kopelman discloses Element [18.3].

194. Kopelman's system includes a display means 54. *See* Figure 2 and accompanying disclosure at EX1006, ¶[0083] (EX1008,12:4-16), and Claim 54 (EX1008, 46:8-9).

195. In my opinion, Kopelman discloses all of the requirements of Element [18.3].

Q. Claim 20: The system of claim 18 wherein the one or more intraoral structures include at least one of a tooth surface prepared for a dental prosthetic, an area of soft tissue, and a tooth.

196. Kopelman discloses the additional limitations of Claim 20. *See* Claims 3-5 addressing tooth surface (claim 4), soft tissue (claim 5), and tooth (claim 3), but in method form.

197. In my opinion, Kopelman discloses all of the requirements of Claim 20

R. Claim 21: The system of claim 18 wherein the processor generates user feedback concerning the one or more intraoral structures and includes the user feedback in the visual display signal at the video rate.

198. Kopelman discloses the additional limitations of Claim 21. *See* Claim 6 addressing similar language, but in method form.

199. In my opinion, Kopelman discloses all of the requirements of Claim 21.

S. Claim 22: The system of claim 21 wherein the user feedback includes highlighting at least one area in the three-dimensional Representation requiring user attention.

200. Kopelman discloses the additional limitations of Claim 22. *See* Claim 7 addressing similar language, but in method form.

201. In my opinion, Kopelman discloses all of the requirements of Claim 22.

XI. CLAIMS 1, 3-11, 13-18, AND 20-22 WOULD HAVE BEEN OBVIOUS OVER KOPELMAN IN VIEW OF QUADLING (GROUND 2).

202. The following sections explain where each element of Claims 1, 3-11, 13-18, and 20-22 are found in the prior art.

A. Claim 1 (Preamble): A method comprising:

203. As discussed above in Ground 1, Kopelman alone discloses or renders obvious all of the limitations of Claim 1, and particularly the inaccurate scan data visualization feature that lead to allowance of the '257 Patent claims.

204. However, as also recognized above in Ground 1, Kopelman does not provide an explicit discussion concerning acquisition of two dimensional data at *a*

video rate and corresponding reconstruction and display of three-dimensional models at that *video rate*. This Ground 2 is presented as an alternative to address those specific aspects of the claims in view of Quadling.

205. In my opinion, Kopelman in view of Quadling discloses all of the requirements of the preamble of Claim 1.

1. [1.1]: acquiring two dimensional data from one or more intraoral structures of a dental patient at a video rate;

206. As discussed above in Ground 1, Kopelman provides a disclosure of acquisition of two dimensional data of intraoral structures for digital surface representation reconstruction, and is incorporated here. And, beyond the scanner expressly discussed in Kopelman, the reference also indicates any scanner is suitable:

“Any suitable means may be used to provide the numerical entity. FIG. 2 illustrates the main elements of the system 50 according to the present invention, comprising a suitable scanner 31, a microprocessor or computer 52, and a display means 54. According to the invention, digitised three-dimensional (3D) information W (FIG. 3) of the patient's intra-oral cavity, or part thereof, is created by the system 50 using scanner 31. Preferably, the 3D digitized data of the intraoral cavity is obtained, including the dentition and associated anatomical structures of a patient.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

The scanning means 31 may include, for example, a hand-held scanner that is used by the practitioner or other user to acquire the 3D data.” EX1006, ¶[0083] (EX1008, 12:4-12).

“Alternatively, the 3D digitized data may be obtained in any other suitable manner, including other suitable intra oral scanning techniques, based on optical methods, direct contact or any other means, applied directly to the patient's dentition.” EX1006, ¶[0091] (EX1008, 14:14-17).

207. Quadling discloses such a scanner. *See* EX1007, Abstract (“A intra-oral laser digitizer system provides a three-dimensional visual image of a real-world object such as a dental item through a laser digitization.”).

208. Quadling explains that its scanner acquires a sequence of images that are stored in memory and from which a three-dimensional model is created with a processor. EX1007, ¶[0012] (“Multiple images of the object may be recorded and processed by the computer to produce a 3D map of the object.”); *see also* Figure 1 and ¶[0067] (illustrating and discussing Quadling’s computer and image processor).

209. Quadling’s plurality of images also include video images acquired using a video camera as its image sensor, which are acquired at a “video rate” by that video camera sensor:

“The image sensor 111 captures an image of the scanned surface of the object 108. The image sensor 111 may be a photo-sensitive or light sensitive device or electronic circuit capable of generating signal representative of intensity of a light detected. The image sensor 111 may include an array of photodetectors. The array of photodetectors may be a charge coupled device (“CCD”) or a CMOS imaging device, or other array of light sensitive sensors capable of generating an electronic signal representative of a detected intensity of the light. The image sensor 111 **may comprise a commercially available CCD or CMOS high resolution video camera** having imaging optics, with exposure, gain and shutter control, such as the Silicon Imaging USB Camera SI-1280F-U.” EX1007, ¶[0059] (emphasis added).

210. Also, and significant for further limitations, Quadling also discloses its acquisition, reconstruction, and display of three-dimensional surface representations of intraoral structures occurs in real time for the purpose of ensuring adequate capture. Just like Kopelman, Quadling states:

“Multiple images of the object may be recorded and processed by the computer to produce a 3D map of the object. The multiple images can be captured from multiple positions and orientations with respect to the object. The

individual images are merged to create an overall 3D map of the object. The images may be captured and processed **to provide a real time image of the surface of the object.** **The real time image may provide an instant feedback mechanism to an operator of the system. The digitizer system may include software that displays the overall 3D image captured in real time.** The software also may include feedback and identification provided to the operator of suggested viewpoints to complete the overall 3D image. The software also may identify crucial features in the scanned data set during a data acquisition process. These features include margins and neighboring dentition. This software also may display highlighted features or possible problem areas, as the operator captures additional viewpoints.” EX1007, ¶[0012] (emphasis added).

211. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [1.1].

2. [1.2]: reconstructing a digital surface representation of the one or more intraoral structures;

212. See Ground 1, Element [1.2], concerning Kopelman’s “numerical entity” reconstruction, and also Kopelman’s incremental “sub-entity” based scanning approach and stitching method. Quadling’s scanner, similar to the scanner used with Kopelman, uses an incremental scanning approach; and a POSITA would have

appreciated Quadling’s scanner disclosure is directly applicable to Kopelman’s incremental “sub-entity” scanning approach. *See e.g.*, EX1007, ¶[0012] (quoted directly above).

213. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [1.2].

3. [1.3]: displaying the digital surface representation at the video rate;

214. Kopelman explains that the display of its scanned “numerical entity” as a digital surface representation is displayed in real time. *See* EX1006, ¶[0173] (EX1008, 37:1-4); *see also* ¶[0081] (discussing real time display) (EX1008, 11:20-21); ¶[0160] (same) (EX1008, 33:12-13). Same with Quadling. *See* ¶[0012]. As noted above with respect to Elements [1.2] and [1.3] in Ground 1, it would have been obvious to a POSITA to implement Kopelman’s real time display to be coordinated through a common video rate with its two dimensional scanner data acquisition to achieve its disclosed function of “real time” display so that the “real time” display would be uninterrupted.

215. As noted above with respect to Element [1.1], Quadling discloses its two-dimensional data acquisition is with a video camera as its image sensor at a video rate.

216. As such, Quadling as the scanner used with Kopelman’s disclosure directly facilitates a POSITA’s obvious implementation of Kopelman to achieve its real time display through a common video rate with its two dimensional scanner data acquisition. This is so because Quadling is expressly capturing video by way of its video sensor at a video rate, and in order to achieve Kopelman’s disclosed “real time” display, it would have been obvious to a POSITA to specially choose a corresponding display video rate that was coordinated with the acquisition video rate so the system was useable, and the “real time” display would continue uninterrupted.

217. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [1.3].

4. [1.4]: acquiring additional two-dimensional data from the one or more intraoral structures in a subsequent frame of data at the video rate;

218. As discussed above with respect to Element [1.2] (in this Ground), Kopelman explains that its “numerical entity” acquisition may be obtained through multiple scans (which are stitched together). *See* EX1006, ¶[0164] (EX1008, 34:5-7).

219. Quadling – as the scanner used with Kopelman’s disclosure – uses the same incremental scanning approach, while also using a video camera as its image sensor. *See* EX1007, ¶[0012], ¶[0059].

220. As such, a POSITA would have appreciated that as Kopelman's overall multiple "sub-entity" scanning process (using Quadling's scanner) would have proceeded to acquire additional two-dimensional data at the same video rate as the data acquired for a preceding "sub-entit[y] representative of the surface topography within the intra-oral cavity" (*i.e.*, the portion scanned as discussed above with reference to Elements [1.1] and [1.2]). This is because any such scanner would be configured to scan at a constant video rate in this respect, and also to support the obvious implementation of a consistent video rate for Kopelman's disclosed real time display of its "numerical entity" as a digital surface representation.

221. Kopelman's subsequent two dimensional data acquisition disclosure (using Qualding as its scanner) meets the "video rate" recited in this feature as this step relates to acquisition and the additional two dimensional data would be acquired at the same video rate as the data acquired for a preceding "sub-entit[y]."

222. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [1.4].

5. [1.5]: reconstructing a subsequent digital surface representation from the additional two-dimensional data at the video rate

223. In view of Kopelman’s disclosure of “numerical entity” acquisition through multiple “sub-entities”¹², its disclosure of real time display of the same¹³, and Quadling’s disclosure of the same incremental scanning with real time display using a video camera as its video sensor¹⁴, a POSITA would have appreciated that Kopelman’s disclosed stitching process as between “sub-entities representative of the surface topography within the intra-oral cavity” would be at the same video rate as acquisition and previous display when using Quadling’s disclosed scanner for its system.

224. Kopelman’s disclosure relating to real time display and corresponding subsequent digital surface representation reconstruction – when used with Quadling’s scanning disclosure – meets the “video rate” recited in this feature. This is so because Quadling is expressly capturing video by way of its video sensor at a

¹² EX1006, ¶[0163] (EX1008, 33:28-30).

¹³ EX1006, ¶[0173] (EX1008, 37:1-4); *see also* ¶[0081] (discussing real time display) (EX1008, 11:20-21); ¶[0160] (same) (EX1008, 33:12-13).

¹⁴ EX1007, ¶[0012]; ¶[0059].

video rate, and in order to achieve Kopelman’s disclosed “real time” display, it would have been obvious to a POSITA to specifically choose a corresponding display video rate (for a reconstructed subsequent digital surface representation) that was coordinated with the acquisition video rate so the system was useable, and the “real time” display would continue uninterrupted.

225. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [1.5].

6. [1.6]: combining the digital surface representation and the subsequent digital surface representation at the video rate to provide a three-dimensional representation of the one or more intraoral structures;

226. Similarly in view of Kopelman’s disclosure of “numerical entity” acquisition through multiple “sub-entities”¹⁵, its disclosure of real time display of the same¹⁶, and Quadling’s disclosure of the same incremental scanning with real time display using a video camera as its video sensor¹⁷, a POSITA would have appreciated that Kopelman’s digital surface representation (from Element [1.2]) and

¹⁵ EX1006, ¶[0163] (EX1008, 33:28-30).

¹⁶ EX1006, ¶[0173] (EX1008, 37:1-4); *See also* ¶[0081] (discussing real time display) (EX1008, 11:20-21); ¶[0160] (same) (EX1008, 33:12-13).

¹⁷ EX1007, ¶[0012]; ¶[0059].

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

subsequent digital surface representation (from Element [1.5]) are stitched together into a more complete “numerical entity” at the same video rate as acquisition and previous display. That more complete “numerical entity” as scanning progresses would be the claimed “three-dimensional representation of the one or more intraoral structures.”

227. Thus, Kopelman’s disclosure relating to real time display and corresponding stitching together of the digital surface representation (from Element [1.2]) and subsequent digital surface representation (from Element [1.5]) – when used with Quadling’s scanning disclosure – meets the “video rate” recited in this feature. This is so because Quadling is expressly capturing video by way of its video sensor at a video rate, and in order to achieve Kopelman’s disclosed “real time” display, it would have been obvious to a POSITA to specifically choose a corresponding display video rate (for a combined digital surface representation) that was coordinated with the acquisition video rate so the system was useable, and the “real time” display would continue uninterrupted.

228. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [1.6].

7. [1.7]: providing a visual display of the three-dimensional representation at the video rate in real time; and

229. Likewise in view of Kopelman’s disclosure of “numerical entity” acquisition through multiple “sub-entities”¹⁸, its disclosure of real time display of the same¹⁹, along with Quadling’s disclosure of the same incremental scanning with real time display using a video camera as its video sensor²⁰, Kopelman’s combined “numerical entity” as the claimed “three-dimensional representation of the one or more intraoral structures” would have been displayed at the video rate in real time – again, as both Kopelman and Quadling expressly disclose:

“According to the first and second aspects of the invention, the entity obtained by scanning via scanner 31 is displayed in real time via display 54, and when the scanning is complete and acceptable, feedback data is provided alerting the user to this fact.” EX1006, ¶[0173] (EX1008, 37:1-4); *see also* ¶[0081] (discussing real time display) (EX1008, 11:20-21); ¶[0160] (same) (EX1008, 33:12-13).

¹⁸ EX1006, ¶[0163] (EX1008, 33:28-30).

¹⁹ EX1006, ¶[0173] (EX1008, 37:1-4); *See also* ¶[0081] (discussing real time display) (EX1008, 11:20-21); ¶[0160] (same) (EX1008, 33:12-13).

²⁰ EX1007, ¶[0012]; ¶[0059].

“The images may be captured and processed to provide a **real time** image of the surface of the object. The real time image may provide an instant feedback mechanism to an operator of the system. The digitizer system may include software that displays the overall 3D image captured in **real time**.” EX1007, ¶[0012] (emphasis added).

230. Thus, Kopelman’s disclosure relating to real time display – when used with Quadling’s scanning disclosure which expressly relies on a video camera as its image sensor – meets the “video rate” recited in this feature. This is so because Quadling is expressly capturing video by way of its video sensor at a video rate, and in order to achieve Kopelman’s disclosed “real time” display, it would have been obvious to a POSITA to specifically choose a corresponding display video rate (for a combined digital surface representation) that was coordinated with the acquisition video rate so the system was useable, and the “real time” display would continue uninterrupted.

231. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [1.7].

8. [1.8]: providing a visualization within the visual display, the visualization updated at the video rate to identify regions of inaccurate scan data within the three-dimensional representation.

232. The discussion concerning Kopelman's real time inaccurate scan data visualization disclosure from Element [1.8] in Ground 1 above is equally applicable and is incorporated here.

233. A POSITA would have appreciated that the use of Quadling's scanner would confirm that such visualization would be at the video rate of the display of the digital surface representation as separately discussed extensively above.

234. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [1.8].

B. Claim 3: The method of claim 1 wherein the one or more intraoral structures include at least one tooth.

235. *See* Ground 1, Claim 3 for Kopelman's disclosure.

236. In my opinion, Kopelman in view of Quadling discloses the requirements of Claim 3.

C. Claim 4: The method of claim 1 wherein the one or more intraoral structures include at least one tooth surface prepared for a dental prosthetic.

237. *See* Ground 1, Claim 4 for Kopelman's disclosure.

238. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Claim 4.

D. Claim 5: The method of claim 1 wherein the one or more intraoral structures include at least one area of soft tissue.

239. See Ground 1, Claim 5 for Kopelman's disclosure.

240. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Claim 5.

E. Claim 6 (Preamble): The method of claim 1 further comprising:

1. [6.1] generating user feedback concerning the one or more intraoral structures; and

241. As discussed above with respect to Element [1.8] Ground 1, Kopelman generates user feedback concerning the scanning of one or more intraoral structures to identify regions of inaccurate scan data in its "numerical entity" as the claimed "three-dimensional representation."

242. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [6.1].

2. [6.2] providing a visual display of the user feedback at the video rate.

243. As discussed above with respect to Element [1.8] in Ground 1, Kopelman provides a visual display of user feedback relating to inaccurate scan data in real time at the video rate in various forms, including "by providing a graphical image of the entity, with the deficient areas marked hereon, and then arrows or

markers with respect thereto showing the desired position of the scanner 31.”

EX1006, ¶[0168] (EX1008, 35:30-36:2).²¹

244. A POSITA would have appreciated that the use of Quadling’s scanner would confirm that such visual display would be at the video rate of the display of the digital surface representation as separately discussed extensively above.

245. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [6.2].

F. Claim 7: The method of claim 6 wherein generating user feedback includes highlighting at least one area in the three-dimensional representation requiring user attention.

246. As discussed directly above with respect to Element [1.8] in Ground 1, Kopelman’s visual user feedback relating to inaccuracy includes “feedback data [that] is generated to alert the user as to how to correct for the insufficiency of definition...[by] providing a graphical image of the entity, with the deficient areas marked hereon, and then arrows or markers with respect thereto showing the desired position of the scanner 31” (EX1006, ¶[0168] (EX1008, 35:25-36:2)) as “highlighting.” Kopelman also specifically uses the term “highlighting” with respect to its visual user feedback options: “In this context, an image of the numerical entity

²¹ See also FN10 listing further visual feedback disclosure of Kopelman.

may be displayed in the display 54, with the finish line 84 and optionally also the shoulder 85 **highlighted** thereon. Then, the zones of the finish line that require further work may be contrasted with respect to the finish line 84 and/or the shoulder 85, for example by coloring such zones in a different color to the rest of the image.” EX1006, ¶[0115] (emphasis added) (EX1008, 20:9-13).

247. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Claim 7.

G. Claim 8: The method of claim 1 wherein the video rate includes a rate of at least eight frames per second.

248. *See* Claim 8, Ground 1 above concerning obviousness of a POSITA’s frame selection and disclosure of Kopelman.

249. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Claim 8.

H. Claim 9: The method of claim 1 wherein the video rate includes a rate of at least twenty frames per second.

250. *See* Claim 9, Ground 1 above concerning obviousness of a POSITA’s frame selection and disclosure of Kopelman.

251. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Claim 9.

I. Claim 10: The method of claim 1 wherein the video rate includes a rate of between twenty-four and thirty frames per second.

252. See Claim 10, Ground 1 above concerning obviousness of a POSITA's frame selection and disclosure of Kopelman.

253. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Claim 10.

J. Claim 11 (Preamble): A computer program product embodied on a non-transitory computer readable medium that, when executing on one or more computing devices, performs the steps of:

254. Kopelman's method is computer implemented, which a POSITA would have appreciated includes a non-transitory computer readable medium within computer 52 with instructions that when executed perform the method of Claim 11. See Figure 2 and associated disclosure at EX1006, ¶[0083] (EX1008, 12:4-16).

255. In my opinion, Kopelman in view of Quadling discloses all of the requirements of the preamble of Claim 11.

1. [11.1]: acquiring two dimensional data from one or more intraoral structures of a dental patient at a video rate;

256. See Element [1.1] addressing identical method language.

257. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [11.1].

2. [11.2]: reconstructing a digital surface representation of the one or more intraoral structures;

258. *See* Element [1.2] addressing identical method language.

259. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [11.2].

3. [11.3]: displaying the digital Surface representation at the video rate;

260. *See* Element [1.3] addressing identical method language.

261. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [11.3].

4. [11.4]: acquiring additional two-dimensional data from the one or more intraoral structures in a subsequent frame of data at the video rate;

262. *See* Element [1.4] addressing identical method language.

263. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [11.4].

5. [11.5]: reconstructing a subsequent digital surface representation from the additional two-dimensional data at the video rate

264. *See* Element [1.5] addressing identical method language.

265. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [11.5].

6. [11.6]: combining the digital surface representation and the subsequent digital surface representation at the video rate to provide a three-dimensional representation of the one or more intraoral structures;

266. *See* Element [1.6] addressing identical method language.

267. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [11.6].

7. [11.7]: providing a visual display of the three-dimensional representation at the video rate in real time; and

268. *See* Element [1.7] addressing identical method language.

269. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [11.7].

8. [11.8] providing a visualization within the visual display, the visualization updated at the video rate to identify regions of inaccurate scan data within the three-dimensional representation.

270. *See* Element [1.8] addressing identical method language.

271. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [11.8].

K. Claim 13: The computer program product of claim 11 wherein the one or more intraoral structures include at least one tooth.

272. *See* Claim 3 addressing identical method language.

273. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Claim 13.

L. Claim 14: The computer program product of claim 11 wherein the one or more intraoral structures include at least one tooth surface prepared for a dental prosthetic.

274. See Claim 4 addressing identical method language.

275. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Claim 14.

M. Claim 15: The computer program product of claim 11 wherein the one or more intraoral structures include at least one area of soft tissue.

276. See Claim 5 addressing identical method language.

277. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Claim 15.

N. Claim 16: The computer program product of claim 11 further comprising code for performing the steps of generating user feedback concerning the one or more intraoral structures; and providing a visual display of the user feedback at the video rate.

278. See Claim 6 addressing identical method language.

279. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Claim 16.

O. Claim 17: The computer program product of claim 16 wherein generating user feedback includes highlighting at least one area in the three-dimensional representation requiring user attention.

280. See Claim 7 addressing identical method language.

281. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Claim 17.

P. Claim 18 (Preamble): A system comprising:

282. Kopelman's method is disclosed in the context of a computer implemented system. *See* Figure 2 and associated disclosure at EX1006, ¶[0083] (12:4-16).

283. In my opinion, Kopelman in view of Quadling discloses all of the requirements of the preamble of Claim 18.

1. [18.1]: a scanner for acquiring a sequence of image sets from one or more intraoral structures of a dental patient at a video rate; and

284. Kopelman's method and system includes a scanner 31. *See* Figure 2 and associated disclosure at EX1006, ¶[0083] (EX1008, 12:4-16).

285. Element [1.1]'s discussion above concerning the configuration and function of Quadling's scanner as used with Kopelman's disclosure is equally applicable to the nearly identical claim language of this element and is incorporated here.

286. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [18.1].

2. [18.2]: a processor configured to:

287. Kopelman's method and system is computer implemented, and its method is carried out and executed by the disclosed computer and a processor thereon. *See e.g.*, EX1006, ¶[0083] ("FIG. 2 illustrates the main elements of the system 50 according to the present invention, comprising a suitable scanner 31, a microprocessor or computer 52, and a display means 54.") (EX1008, 12:4-16).

288. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [18.2].

a) [18.2.1]: receive one of the sequence of image sets,

289. Kopelman's processor is configured to receive one of the sequence of image sets before creation of the "numerical entity" as a three-dimensional surface representation. EX1006, ¶[0162] ("Thus in step 11', scanner 32 [sic] of system 50 (FIG. 2) scans the area of interest of the intraoral cavity and a numerical entity corresponding to the surface scanned is created by processor 52 and optionally displayed by display 54.") (EX1008, 33:18-20).

290. This element is equivalent to Element [1.4] above, which refers to acquiring additional two-dimensional data during Kopelman's multiple "sub-entity" scanning process and is incorporated here.

- b) **[18.2.2] convert the one of the sequence of image sets into a three-dimensional surface representation of the one or more intraoral structures,**

291. Kopelman's processor is configured to convert the received one of the sequence of image sets into a "numerical entity" as a three-dimensional surface representation of the one or more intraoral structures that are being scanned.

292. This element is equivalent to Element [1.5] above, which refers to reconstructing a subsequent digital surface representation during Kopelman's multiple "sub-entity" scanning process and is incorporated here.

- c) **[18.2.3] combine the three-dimensional surface representation with one or more prior three-dimensional surface representations from one or more prior ones of the sequence of image sets to provide a three-dimensional model of the one or more intraoral structures, and**

293. Kopelman's processor is configured to combine the three-dimensional surface representation (from element [18.2.2]) with one or more prior three-dimensional surface representations from one or more prior ones of the sequence of image sets to provide a three-dimensional model of the one or more intraoral structures.

294. This element is equivalent to Element [1.1] (*prior* acquisition of two dimensional data), Element [1.2] (reconstructing a *prior* digital surface representation), and Element [1.6] (combining digital surface representations

together to form a more complete “numerical entity”) during Kopelman’s multiple “sub-entity” scanning process and are incorporated here.

d) [18.2.4] generate a visual display signal of the three-dimensional model at the video rate in real time,

295. Kopelman’s processor is configured to generate a visual display signal of the three-dimensional model at the video rate in real time.

296. This element is equivalent to Element [1.7] above, which refers to Kopelman’s real time display of its “numerical entity” as a three-dimensional model and is incorporated here.

e) [18.2.5] generate a visualization within the visual display signal, the visualization updated at the video rate to identify regions of inaccurate scan data within the three-dimensional representation;

297. Kopelman’s processor is configured to generate a visualization within the visual display signal, the visualization updated at the video rate to identify regions of inaccurate scan data within the three-dimensional representation.

298. This element is equivalent to Element [1.8] above, which refers to Kopelman’s real time display of its “numerical entity” as a three-dimensional model along with an inaccurate data visualization and is incorporated here.

299. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Elements [18.2.1-18.2.5].

3. [18.3] and a display for displaying the visual display signal.

300. Kopelman's system includes a display means 54. *See* Figure 2 and accompanying disclosure at EX1006, ¶[0083] (EX1008, 12:4-16), and EX1006, Claim 54 (EX1008, 46:8-9).

301. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Element [18.3].

Q. Claim 20: The system of claim 18 wherein the one or more intraoral structures include at least one of a tooth surface prepared for a dental prosthetic, an area of soft tissue, and a tooth.

302. *See* Claims 3-5 addressing tooth surface (claim 4), soft tissue (claim 5), and tooth (claim 3), but in method form.

303. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Claim 20

R. Claim 21: The system of claim 18 wherein the processor generates user feedback concerning the one or more intraoral structures and includes the user feedback in the visual display signal at the video rate.

304. *See* Claim 6 addressing identical language, but in method form.

305. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Claim 21.

S. Claim 22: The system of claim 21 wherein the user feedback includes highlighting at least one area in the three-dimensional Representation requiring user attention.

306. *See* Claim 7 addressing identical language, but in method form.

307. In my opinion, Kopelman in view of Quadling discloses all of the requirements of Claim 22.

T. Explanation of Why Claims 1, 3-11, 13-18, and 20-22 Would Have Been Obvious

308. Claims 1, 3-11, 13-18, and 20-22 would have been obvious over Kopelman in view of Quadling

1. Difference between the claimed invention and the prior art.

309. As discussed in Section X, Kopelman discloses all the features of the method and systems of Claims 1, 3-11, 13-18, and 20-22 with the exception an explicit discussion concerning acquisition of two-dimensional data at *a video rate* and corresponding reconstruction and display of three-dimensional models at that *video rate*. This Ground 2 is presented as an alternative to address those specific aspects of the claims in view of Quadling, which is in the same field as Kopelman.

2. A POSITA would have had motivation to combine the disclosures of Kopelman and Quadling.

310. A POSITA would have had express motivation to combine the system of Kopelman with Quadling's known three-dimensional scanner, specifically designed to scan dentition. *See* EX1007, Abstract ("A intra-oral laser digitizer system provides a three-dimensional visual image of a real-world object such as a dental item through a laser digitization.").

311. Beyond the scanner expressly discussed in Kopelman, the reference also indicates any scanner is suitable:

“Any suitable means may be used to provide the numerical entity. FIG. 2 illustrates the main elements of the system 50 according to the present invention, comprising a suitable scanner 31, a microprocessor or computer 52, and a display means 54. According to the invention, digitised three-dimensional (3D) information W (FIG. 3) of the patient's intra-oral cavity, or part thereof, is created by the system 50 using scanner 31. Preferably, the 3D digitized data of the intraoral cavity is obtained, including the dentition and associated anatomical structures of a patient. The scanning means 31 may include, for example, a hand-held scanner that is used by the practitioner or other user to acquire the 3D data.” EX1006, ¶[0083] (EX1008, 12:4-16).

“Alternatively, the 3D digitized data may be obtained in any other suitable manner, including other suitable intra oral scanning techniques, based on optical methods, direct contact or any other means, applied directly to the patient's dentition.” EX1006, at ¶[0091] (EX1008, 14:14-17).

312. Further, Quadling also discloses its acquisition, reconstruction, and display of three-dimensional surface representations of intraoral structures occurs in real time for the purpose of ensuring adequate capture. Just like Kopelman:

“Multiple images of the object may be recorded and processed by the computer to produce a 3D map of the object. The multiple images can be captured from multiple positions and orientations with respect to the object. The individual images are merged to create an overall 3D map of the object. The images may be captured and processed **to provide a real time image of the surface of the object. The real time image may provide an instant feedback mechanism to an operator of the system. The digitizer system may include software that displays the overall 3D image captured in real time.** The software also may include feedback and identification provided to the operator of suggested viewpoints to complete the overall 3D image. The software also may identify crucial features in the scanned data set during a data acquisition process. These features include margins and neighboring dentition. This software also may display highlighted features or possible problem areas, as the operator captures additional viewpoints.” EX1007, ¶[0012] (emphasis added).

313. Thus, Quadling provides readily substitutable scanner elements into Kopelman's disclosure relating to scanning and reconstructing digital surface representations of intraoral structures.

3. A POSITA would have had a reasonable expectation of success based on the disclosures of Kopelman and Quadling and knowledge generally available in the art.

314. A POSITA would have had a reasonable expectation of success in making the combination of Kopelman with Quadling's scanner disclosure because Kopelman is agnostic regarding its three-dimensional scanning technique, and expressly motivates a POSITA to look to known methods:

“Alternatively, the 3D digitized data may be obtained in any other suitable manner, including other suitable intra oral scanning techniques, based on optical methods, direct contact or any other means, applied directly to the patient's dentition.” EX1006, ¶[0091] (EX1008, 14:14-17).

315. Combining the disclosures of Kopelman with Quadling would only require the use of “known methods”—using each in the same way they were used as disclosed. Specifically, Kopelman alone discloses acquisition, reconstruction, and real time display of digital surface representations of intraoral structures, and Quadling provides a video camera-based three-dimensional scanner used to capture the underlying images of the dentition and create the three-dimensional model of the

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

intraoral structures. None of the components or methods would need to be used in an unexpected or unintended way. Each would be fulfilling its original purpose and used in an expected way.

316. The combination of Kopelman and Quadling render obvious all the recited features of Claims 1, 3-11, 13-18, and 20-22.

**XII. ANY PURPORTED SECONDARY CONSIDERATIONS EVIDENCE
DOES NOT OVERCOME THE STRONG EVIDENCE OF THE
OBVIOUSNESS OF THE CLAIMS**

317. I am currently unaware of any secondary considerations evidence that may be commensurate with the challenged claims of the '257 Patent such as commercial products produced by the Patent Owner.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

XIII. CONCLUSION

318. For the reasons set forth above, it is my opinion that all elements of Claims 1, 3-11, 13-18, and 20-22 of the '257 Patent are disclosed or suggested by the prior art. In my opinion, Claims 1, 3-11, 13-18, and 20-22 of the '257 Patent would have been anticipated or rendered obvious by the prior art.

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

320. I hereby declare that all statements made herein of 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.

Date: August 12, 2024



Eli Saber

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

APPENDIX A

I have previously testified and/or been consulted as an expert in the
following matters:

Maxell, LTD. v. TCL Electronics Holdings Ltd. Et. al.

June 2024 – Present

Case 5:23-CV-00108-RSW-JBB (EDTX) and related proceedings including
against LG Electronics and Samsung

- Legal Firm: Mayer-Brown
- Retained as an expert on behalf of Maxell
- Provide expert opinions in support of legal proceedings.

3Shape A/S (Petitioner) v. Medit Corporation

Jan. 2024 – Present

US Patent and Trademark Office, Patent Trial and Appeal Board

- Legal Firm: Buchanan, Ingersoll and Rooney PC
- Retained as an expert on behalf of 3Shape A/S to provide expert opinions for multiple inter partes proceedings involving U.S. Patent US 10,076,391 (IPR2024-00548), US 11,234,798 (IPR2024-00549), US 9,191,648, US 9,262,864, US 7,912,257 and US 9,245,374.

3Shape A/S (Petitioner) v. Dental Imaging Technologies & Carestream Dental

Jan. 2024 – Present

US Patent and Trademark Office, Patent Trial and Appeal Board

- Legal Firm: Buchanan, Ingersoll and Rooney PC
- Retained as an expert on behalf of 3Shape A/S to provide expert opinions on inter partes proceedings involving U.S. Patent US 10,076,391 (IPR2024-00548), US 11,234,798 (IPR2024-00549) and US 9,191,648

Amazon v. Nokia

Jan. 2024 – Present

- Legal Firm: Perkins-Coie
- Retained as an expert on behalf of Amazon (Petitioner)

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

- Provided expert opinions and a declaration in support of US 7,724,818 (IPR2024-00572)
- Provide expert opinions and a declaration for an IPR proceeding re. US 6,856,701
- Provide expert opinions and a declaration for an IPR proceeding re. US 8,175,148
- Provide expert reports with regards to invalidity, non infringement and domestic industry with regards to ITC case No. 337-TA-1380
- Provided a Deposition on June 28st, 2024 for ITC case No. 337-TA-1380.

Autonomous Devices LLC v. Tesla, Inc

October 2022 - Present

US District Court, District of Delaware, case No.

- Legal Firm: McKool-Smith
- Retained as an expert by the Barr Group on behalf of Autonomous Devices.
- Provided declarations in support of legal proceedings.
- Working on multiple IPRs (5X): IPR2023-01054, IPR2023-01055, IPR2023-01169, IPR2023-01172, IPR2023-01173.
- Provided or in process of providing multiple declarations in support of Patent Owner Response and Motion to Amend with regards to the above IPRs
- Provided a Deposition on May 16th, 2024 with regards to IPR 2023-01054.
- Provided a Deposition on May 21th, 2024 with regards to IPR 2023-01055.
- Provided a Deposition on June 14th, 2024 with regards to IPR 2023-01169.
- Provided a Deposition on June 21st, 2024 with regards to IPR2023-01172 and IPR 2023-01173.

Medit USA, Crown Jade Co. Ltd. (Petitioner) v. 3Shape A/S (Patent Owner)

Oct. 2023 – Present

US Patent and Trademark Office, Patent Trial and Appeal Board

- Legal Firm: Buchanan, Ingersoll and Rooney PC
- Retained as an expert on behalf of 3Shape A/S to provide expert opinions on IPR proceedings involving U.S. Patent Nos. 10,695,151; 11,076,146; 11,368,667.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

- Provide expert opinions in support of Patent Owner Response.
- Institution was denied for 11,076,146; 11,368,667.
- Institution granted for U.S. 10,695,151 (IPR2023-01315)
- Provided a declaration in support of Patent Owner regarding US 10,695,151 (IPR2023-01315)
- Provided a Deposition on August 8th, 2024 for IPR2023-01315.

Meta Platforms, Inc.; Instagram, Inc.; WhattsAPP LLC; Meta Platforms Technologies, LLC; and Giphy, Inc. (Petitioners) v. VL Collective IP LLC (Patent Owner)

Jan. 2024 – Present

- Legal Firm: Reichman Jorgensen Lehman & Feldberg LLP
- Retained as an expert on behalf of VL Collective IP LLC
- Provided expert opinions and a declaration in support of Patent Owner Response with regards to IPR2023-00924.
- Provided a Deposition on May 30th, 2024 with regards to IPR 2023-00924.

Facetec, Inc. v. iProov Ltd., Case No. 2:21-cv-02252-ART-BNW

October 2022 - Present

US District Court, District of Nevada

- Legal Firm: OneLLP
- Retained as an expert by Teklicon on behalf of FaceTec, Inc.
- Provided expert opinions as needed in support of legal proceedings

TVISION INSIGHTS v. The NIELSEN Company (US), LLC

August 2023 - Present

US Patent and Trademark Office, Patent Trial and Appeal Board

- Legal Firm: Erise Intellectual Property Law
- Retained as an expert on behalf of the Nielsen Company (US), LLC
- Provided expert opinions and a declaration in support of patent owner in IPR2023-01014. Documents were filed on 10/11/2023.
- PTAB decision to institute was reached January 2024.
- Provided a Deposition on July 2nd, 2024.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

In Re Lyft Rideshare Litigation

Dec. 2021 – Present

Superior Court of the State of California, Case No. CJC-20-005061

- Legal Firm: Williams & Connolly, LLP
- Retained as an expert by WIT Legal, LLC on behalf of Lyft (Defendant)
- Provide reports and consulting services on the challenges of the use of Dashcam solutions in Vehicles
- Provided a Deposition on March 24th, 2023.
- The first portion of the Case that requires my expertise has been settled.

RealD, LLC v. Microsoft Corp., NO. 2:22-cv-00942-TL

Feb. 2023 – June 2024

- Legal Firm: Michelman & Robinson
- Retained as an expert on behalf of RealD, LLC
- Provided expert opinions and a declaration in support of IPR2023-01046. Patent Owner Preliminary Response filed on 10/13/2023.
- Provide expert opinions and additional reports in support of Federal case.
- Provide algorithm support for software review.
- Provided expert opinions and a declaration in support of Patent Owner Response with regards to IPR2023-01046. POR filed on March 15th, 2024
- Provided a Deposition on June 5th and 7th, 2024 with regards to IPR 2023-01046.

Meta Platforms, Inc. f/k/a Facebook, Inc. v. Angel Technologies Group LLC

May 2023 – October 2023

US District Court, District of Nevada

- Legal Firm: McKool-Smith
- Retained as an expert by Alliance Technical Staffing on behalf of Angel Technologies Group LLC.
- Provide expert opinions and declarations in support of four IPR proceedings (IPR2023-00057, IPR2023-00058, IPR2023-00059, IPR2023-00060).
- Provided a Deposition on October 20th, 2023 for IPR2023-00057, IPR2023-00058 and IPR2023-00059

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

- Provided a Deposition on October 23rd, 2023 for IPR2023-00060.

Alarm.com Incorporated v. Vivint, Inc NO. 2:23-CV-00004-JRG-RSP

March 2023 – Dec. 2023

- Legal Firm: Cravath, Swaine and Moore, LLP
- Retained as an expert on behalf of Alarm.com, Inc.
- Case has been settled

HL Holdings, Inc. v. LNHL, LLC, et al.

July 2023 – Dec. 2023

- Legal Firm: Nelson, Mullins, Riley and Scarborough LLP
- Retained as an expert by IMS Consulting and Expert Services on behalf of LNHL, LLC and Seek Now Inc. f/k/a Ladder Now LLC.
- Provided expert opinions and a report in support of legal proceedings.
- Provided a Deposition on November 29th, 2023
- Case has been settled.

Angel Group Co. Ltd. V. Sensen Networks Group Pty Ltd

July 2023 – Oct. 2023

- Legal Firm: Norton Rose Fulbright
- Retained as an expert on behalf of Angel Group Co. Ltd.
- Provide expert opinions in support of a potential IPR proceeding.
- Case has been settled.

United Services Automobile Association v. Truist Bank

March 2023 – Oct. 2023

- Case No. 2-22-CV-00291
- Legal Firm: Cravath, Swaine and Moore, LLP
- Retained as an expert on behalf of Truist Bank.
- Performed review of six patents.
- Case was settled.

Dental Imaging Technologies Corp. (Petitioner) v. 3Shape A/S (Patent Owner)

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

Feb. 2023 – July 2023

US Patent and Trademark Office, Patent Trial and Appeal Board

- Legal Firm: Buchanan, Ingersoll and Rooney PC
- Retained as an expert on behalf of 3Shape A/S.
- Provided consulting services in support of POPR for IPR2023-00387 (US 11,076,146).
- Provided consulting services in support of POPR for IPR2023-00400 (US 10,695,151).
- Provided consulting services in support of POPR for IPR2023-00411 (US 11,368,667).
- PTAB decision to NOT Institute on all three IPRs.

Nike v. Valmarc

January 2023 – Present

- Legal Firm: Hilgers Graben
- Retained as an expert on behalf of Valmarc Corporation
- Provided expert opinions in support of Patent Owner Preliminary Response on petitions IPR2022-01403 & IPR2022-01404
- PTAB granted institution but client opted not to pursue defending the patents.

Sensormatic Electronics, LLC v. Genetec, Inc. et al.

Oct. 2021 – Feb. 2023

US District Court, District of Delaware, Case 1:20-cv-00760-MN

- Legal Firm: Fish & Richardson, P.C.
- Retained as an expert by IMS Expert Services on behalf of Genetec, Inc. et al. (Defendant)
- Representing Genetec (USA) Inc. and Genetec Inc. (C. A. No. 20-760)
- Provided Opening, Rebuttal and Reply reports regarding invalidity & Non-infringement with regards to US 7,307,652.
- Sat in on a deposition of Plaintiff expert (April 29th, 2022) per counsel request.
- Provided a deposition on May 3rd, 2022
- Case is completed.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

Roku, Inc. v. Flexiworld Technologies, Inc.

June 2022 – October 2022

US Patent and Trademark Office, Patent Trial and Appeal Board, Case No.
IPR2022-01112

US Patent and Trademark Office, Patent Trial and Appeal Board, Case No.
IPR2022-001269

- Legal Firm: Perkins-Coie, LLP
- Retained as an expert by WIT Legal, LLC on behalf of Roku (Petitioner).
- Provided a declaration in June 2022 in support of the IPR petition for US 10,140,073.
- Provided a declaration in July 2022 in support of the IPR petition for US 7,944,577.
- Case was settled in October 2022.

CareView Communications, Inc. v. Interactive Digital Solutions, Inc.

Jan. 2022 – April 2022

- Legal Firm: Mintz, Levin, Cohn, Ferris, Glovsky & Popeo, P. C.
- Retained as an expert by IMS Expert Services on behalf of Interactive Digital Solutions, LLC (Defendant) to provide declarations in support of 3 IPR proceedings
- Case was settled in April 2022.

Sovereign Peak Ventures, LLC v. Hisense Co., LTD

Nov. 2021 – Dec. 2021

US District Court, Eastern District of Texas, Case No. 21-cv-00209

- Legal Firm: Perkins-Coie, LLP
- Retained as an expert by WIT Legal, LLC on behalf of Hisense Co. (Defendant).
- Working to provide a declaration in support of the IPR petition for US 8,019,169.
- Case was settled in Early 2022.

Perfect Corporation v. Lennon Image Technologies, LLC

Sept. 2021 – June 2022

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2021-00124

- Legal Firm: Perkins-Coie, LLP
- Retained as an expert by WIT Legal, LLC on behalf of Perfect Corporation (Petitioner).
- Provided a declaration in support of the IPR petition for US 6,624,843.
- Petitioner filed a motion to dismiss its petition on April 5th, 2022.

Apple Inc. v. Corephotonics, LTD

Jan. 2021 – May 2021

- Legal Firm: Russ, August & Kabat,
- Retained as an expert by WIT Legal, LLC on behalf of Corephotonics in two IPR cases.
- Provided two declarations in support of IPR Petitions IPR2020-00487 & IPR2020-00860.
- Provided a deposition on 04/14/2021.

Davis Polk

Aug. 2020 – Nov. 2021

- Legal Firm: Davis Polk
- Retained as an expert by WIT Legal, LLC
- Provided expert and consulting services for video and point cloud type imagery.

Cravath, Swaine & Moore, LLP

Feb. 2020 – Mar. 2020 and Jan. 2021

- Legal Firm: Cravath, Swaine & Moore, LLP
- Retained as an expert by WIT Legal, LLC
- Evaluated computer vision technology for various clients.
- No reports, depositions or expert testimonies were provided.

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

Wells Fargo & Co. v. Lighthouse Consulting Group

Feb. 2020 – Sept. 2020

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2020-00758 and IPR2020-00759

- Legal Firm: Winston & Strawn LLP
- Retained as an expert by DOAR on behalf of Petitioner Wells Fargo.
- Submitted two declarations in support of IPR Petitions IPR2020-00758 & IPR2020-00759 for US 8,590,940 and US RE44,274.

3Shape A/S v. Align Technology, Inc.

Jan. 2020 – April 2020

US District Court, District of Delaware, Case No. 18-cv-00886 (consolidated with 18-cv-00697)

- Legal Firm: Buchanan, Ingersoll and Rooney, PC
- Retained as an expert by DOAR on behalf of plaintiff for US Patents-in-Suit Nos. 9,962,244 and 9,629,551 with regards to invalidity.
- Case was transferred to Troutman Pepper LLP very shortly after my engagement.

3Shape A/S et al v. Align Technology, Inc.

Oct. 2019 – Oct. 2020

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2020-00222 and IPR2020-00223

- Legal Firm: Buchanan, Ingersoll and Rooney, PC
- Retained as an expert by DOAR on behalf of Petitioner 3Shape A/S with respect to US 7,156,661
- Provided two declarations in support of IPR petitions (IPR2020-00223 and IPR2020-0222) for US 7,156,661. Both petitions were filed in December 2019.
- Provided a deposition on July 30th, 2020 in support of IPR2020-00223 that was instituted by PTAB and supporting materials for follow on responses.

Uniloc 2017 LLC v. Netflix, Inc. (Petitioner) (18-cv-2055)

July 2019 – July 2020

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2020-00044

- Legal Firm: Perkins-Coie, LLP

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

- Retained as an expert by DOAR on behalf of Petitioner Netflix, Inc.
- Provided an expert declaration in support of IPR2020-00044 for US 6,584,229.
- Case was settled in July 2020.

Align Technology, Inc. v. 3Shape A/S et al

Feb. 2019 – Feb. 2022

US District Court, District of Delaware, Case No. 17-cv-01646 (LPS) (CJB)

- Legal Firm: Troutman Pepper LLP
- Retained as an expert by WIT Legal, LLC on behalf of Defendant 3Shape for US Patent-in-Suit No. 9,510,757 ('757 Patent).
- Served as expert for invalidity and non-Infringement for US 9,510,757
- Provided expert reports regarding Invalidity and non-infringement of '757
- Provided a deposition on 10 January 2020
- Case was settled in February 2022.

Certain Dental and Orthodontic Scanners and Software

Feb. 2019 – Oct. 2019

US International Trade Commission, Investigation No. 337-TA-1144 (3Shape v. Align)

- Legal Firm: Pepper Hamilton, PC
- Retained as an expert by DOAR on behalf of respondent 3Shape A/S with respect to US Patent-in-Suit No. 9,299,192 ('192 Patent).
- Served as expert on invalidity, non-infringement and domestic industry.
- Provided expert opinions and rebuttal reports in support of the above proceedings.
- Provided a deposition (8/13/2019).
- Provided trial testimony on October 30th, 2019 (Trial was held Oct. 24-30, 2019) with regards to Invalidity, Non-infringement and Domestic Industry.

3Shape A/S et al v. Align Technology, Inc.

Oct. 2018 – Sept. 2019

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2019-00132 and IPR2019-00134 and IPR2019-00148

- Legal Firm: Buchanan, Ingersoll and Rooney, PC

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

- Retained as an expert by DOAR on behalf of respondent 3Shape A/S with respect to US 7,112,065, US 9,451,873 and US 9,299,192
- Represented 3Shape (Petitioner) in three IPR Petitions v. Align (Patent Owner).
- Provided three declarations in support of the IPR petitions for US 7,112,065, US 9,299,192 and US 9,451,873. All three petitions were filed in November 2018 and all three were instituted.
- Provided three depositions with regards to US 7,112,065 (8/16/2019), US 9,451,873 (09/18/2019) and US 9,299,192 (09/30/2019).

Blackberry Corp. et al v. Maxell, Ltd

Sept. 2018 – Oct. 2018

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2019-00087 and IPR2019-00095 and IPR2019-00097

- Legal Firm: Oblon, McClelland, Maier and Neustadt, LLP
- Retained as an expert on behalf of petitioner Blackberry Corp.
- Provided three declarations in support of the IPR petitions for US 9,100, 604 (Joinder), US 6,765, 616 and US 7,995,897.
- Case settled in May 2019.

Exocad GmbH et al v. 3Shape A/S

March 2018 – Sept. 2019

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2018-00788

- Legal Firm: Buchanan, Ingersoll and Rooney, PC
- Retained as an expert by DOAR on behalf of 3Shape A/S in defending an IPR filings of EXOCAD (Petitioner) v. 3Shape (Patent Owner). Case No. IPR 2018-00788
- Provided a declaration in support of the Patent Owner response for US 9,336,336.
- Provided a deposition on April 1st, 2019.

Certain Intraoral Scanners and Related Hardware and Software

February 2018 – Sept. 2018

US International Trade Commission, Investigation No. 337-TA-1090 & No. 337-TA-1091 (Align v. 3Shape)

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

- Legal Firm: Pepper Hamilton, LLP
- Retained as an expert by DOAR on behalf of respondent 3Shape A/S.
- Provided expert opinions regarding claim construction, noninfringement, and the domestic industry analysis.
- Attended a *Markman* hearing and provided a tutorial for the technology in suit.
- Provided a Deposition on July 16, 2018.
- Provided trial testimony as an expert on Sept. 20th, 2018 with regards to Non-infringement and Domestic Industry.

Nikon Corporation et al v. ASML Netherlands BV et al

July 2017 – Nov. 2017

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2018-00227

- Legal Firm: Morrison & Foerster
- Retained as an expert on behalf of petitioner Nikon Corporation.
- Provided an expert declaration in support of IPR petition for US 7,209,167.

Raster Printing Innovations, LLC v. Hewlett-Packard Company et al

April 2016 – May 2016

US District Court, Northern District of Illinois, Case No. 15-cv-03967

- Legal Firm: Morgan, Lewis & Bockius, LLP
- Retained as an expert by IMS Expert Services on behalf of defendant Hewlett Packard.
- Contributed to the development of initial invalidity contentions charts.
- Case settled very quickly after my engagement in June 2016.

Qomo Hitevision LLC v. Pathway Innovations and Technologies, Inc.

Nov. 2015 – Jan. 2016

US Patent and Trademark Office, Patent Trial and Appeal Board, IPR2016-00661

- Legal Firm: Mei & Mark, LLP
- Retained as an expert on behalf of petitioner Qomo Hitevision.
- Provided an expert declaration in support of petition for inter partes review.

Sony Corp of America. v. Image Processing Technologies, LLC

Aug. 2014 – Nov. 2014

US Patent and Trademark Office, Patent Trial and Appeal Board

Declaration of Eli Saber in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 7,912,257

- Legal Firm: Lerner, David, Littenberg, Krumholz & Mentlik LLP
- Retained as an expert on behalf of Sony.
- Provided an expert declaration in support of petition to institute inter partes review of US Patent No. 6,959,293.

Image Processing Technologies, LLC v. Canon Inc. et al

June 2011 – Dec. 2012

Case: US District Court, Eastern District of New York, Case No. 10-cv-03867

- Legal Firm: Fitzpatrick, Cella, Harper & Scinto
- Retained as an expert on behalf of defendant Canon Inc.
- Traveled to Japan twice to meet with Canon Technical & Engineering Teams
- Provided reports related to Invalidity, Non-Infringement, Rebuttals, and summary judgement.
- Provided a Deposition in April 2012.