UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

IP INNOVATION L.L.C. AND TECHNOLOGY LICENSING CORPORATION,	§	
	§	
Plaintiffs,	§	
	§	CASE NO. 2:07CV-503-LED
v.	§	
	§	JURY TRIAL REQUESTED
GOOGLE INC.,	§	
	§	
Defendant.	§	

DECLARATION OF NORMAN I. BADLER, PHD REGARDING CLAIM CONSTRUCTION FOR U.S. PATENT NO. 5,276,785

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing **DECLARATION OF NORMAN I. BADLER, PHD REGARDING CLAIM CONSTRUCTION FOR U.S. PATENT NO. 5,276,785** was served in compliance with the Federal Rules of Civil Procedure by the method of service indicated on this 8th day of September, 2009 to:

T. John Ward
jw@jwfirm.com
Ward & Smith
111 W. Tyler St.
Longview, TX 75601
Telephone: (903) 757-6400
Facsimile: (903) 757-2323
Via Electronic Filing

Eric M. Albritton
ema@emafirm.com
Attorney at Law
P.O. Box 2649
Longview, TX 75606
Telephone: (903) 757-8449
Facsimile: (903) 758-7397
Via Electronic Filing

Raymond P. Niro
rniro@nshn.com
Joseph N. Hosteny
hosteny@nshn.com
Arthur A. Gasey
gasey@nshn.com
Paul C. Gibbons
gibbons@nshn.com
Douglas M. Hall
dhall@nshn.com
David J. Mahalek
mahalek@nshn.com
Niro, Scavone, Haller & Niro
181 West Madison, Suite 4600
Chicago, IL 60602
Telephone: (312) 236-0733
Facsimile: (312) 236-3137
Via Electronic Filing

/s/ Brad Coffey
Brad Coffey

TABLE OF CONTENTS

Page

I, Norman I. Badler, PhD, declare:

I. INTRODUCTION

1. I have been retained as an expert in this case by Google Inc. ("Google") to provide my opinions regarding claim construction of U.S. Patent No. 5,276,785 ("the '785 Patent"). It is my opinion that a person of ordinary skill in the art would have understood the claim terms of the '785 Patent to have the meanings identified and discussed below.

2. I understand that IP Innovation L.L.C. and Technology Licensing Corporation (collectively, "IP Innovation") alleges that Google has infringed and continues to infringe claims 1-4, 9, 28-30, 41, 42, 52, and 55 (the "asserted claims") of the '785 patent.[1] I have not formed any opinions about whether Google's accused products practice the limitations of the asserted claims, but reserve the right to do so in the future should I be called upon by the parties or the Court to do so.

3. I understand that the parties have exchanged proposed constructions of certain terms in the asserted claims, along with intrinsic and extrinsic support for those constructions. I also understand that the parties have taken some but not all, depositions regarding claim construction. I have reviewed the parties' proposed constructions, intrinsic and extrinsic support, and deposition testimony.

4. This declaration sets forth my opinion regarding the meaning of disputed terms in the asserted claims and describes how a person of ordinary skill in the art would have understood those terms when the '785 patent was filed. In addition, this declaration provides an overview of the relevant technology.

---

1 I understand that after serving their opening claim construction brief stating that they assert only the claims listed above, the plaintiffs informed Google that they intend to assert an additional claim (claim 54). I understand that Google objects to the plaintiffs' attempt to add an additional asserted claim. If the plaintiffs are allowed to assert additional claim 54, my opinions set forth in this declaration apply equally to the disputed terms that appear in that claim.

II. QUALIFICATIONS AND MATERIALS REVIEWED

5. I received a Bachelor of Arts degree in Creative Studies (Mathematics) from University of California, Santa Barbara in 1970. In 1971, I was granted a Masters of Science degree in Mathematics from University of Toronto. I received a Ph.D. degree in Computer Science from University of Toronto in 1975. My Ph.D. Dissertation was entitled "Temporal scene analysis: Conceptual descriptions of object movements."

6. I have been employed by University of Pennsylvania ("Penn"), Philadelphia, Pennsylvania continuously since 1974.

7. My current position is Professor in the Computer and Information Science ("CIS") Department, a title which I have held since 1986.

8. Some of my previous appointments at University of Pennsylvania are as follows:

- Assistant Professor, 1974-79
- Associate Professor, 1979-86
- Cecilia Fitler Moore Professor and Chair, CIS Department, 1990-1994
- Associate Dean, School of Engineering and Applied Science, 2001-2005

9. I have been involved in the fields of computer graphics, computer animation, and interactive systems since the 1970s.

10. Some of my activities in this area include being Director and Originator of the Digital Media Design Undergraduate engineering degree program at University of Pennsylvania; Co-Director of the Computer Graphics and Game Technology Masters degree program at University of Pennsylvania; and Director of the Center for Human Modeling and Simulation at University of Pennsylvania.

11. I have presented at and participated in various computer graphics, computer animation, and interactive systems conferences and organizations starting from 1970 until the present.

12. From 1990 through 1994, I was involved in developing a computer animation digital human modeling system (referred to as Jack®). A software platform for Jack® was successfully produced for human modeling, and a book was published in 1993 describing this platform (N.I. Badler, C.B. Phillips, and B.L. Webber, Simulating Humans: Computer Graphics, Animation, and Control, Oxford University Press, Oxford, UK, 1993).

13. Also during the period 1990-1994, with the funds I received from various U.S. governmental agencies, I analyzed and produced interactive and real-time human figure interactive software systems for industrial and military applications, including human factors analysis, distributed interactive simulation, and a marksmanship trainer.

14. Further, between 1990 and 1994, I published 47 papers; my work-in-progress documents appeared in 12 additional papers during 1995. I also taught part of the SIGGRAPH 1990, 1991, and 1992 courses entitled "Advanced Techniques in Human Modeling, Animation, and Rendering." Further, I was the Keynote Speaker at Eurographics 1993 in Barcelona, Spain. I presented additional invited talks at 33 other venues, both domestic and international, including universities, industrial sites, and United States government agencies. In 1991, I was designated "Distinguished Lecturer" for talks I gave at Ohio State University and University of Toronto.

15. My work at the Center for Human Modeling and Simulation at Penn has also been widely recognized in the popular press. (See, e.g., Popular Mechanics, April 1979, page 21, "This dance is mine"; Science 3(4), May 1980, pages 24-33, "Video graphics and grand jetes"; American Way, July 1980, page 62, "Computers have designs" (image and credit); Self,

September 1984, pages 186, 188, "The first 3-D computer exercises"; Millimeter, April 1988, page 52, "Figuring it out: Academe Scene"; Forbes, December 10, 1990, page 276, "But can she act?"; NASA Tech Briefs 16(9), September 1992, page 148, "Mission accomplished"; Discover, June 1994, cover and pages 4, 66-74, "First stab at a virtual human being" and "Virtual Jack"; Harper's, August 1994, page 16, "Withdrawing from reality"; Newsweek , May 5, 1995, page 70, "Software au Naturel" (Jack screen images in photo background); Simulation 73(3), September 1999, cover, page 143 (Jack software); Discover, November 1999, pages 114, 116, "Bruckner's Anatomy" ("[Jack's] existence lured Bruckner to Philadelphia"); New York Times, May 11, 2000, page G1, "Jack is put through the wringer, so you won't be"; and Fortune , June 24, 2002, pages 162[H]-162[N], "Virtual people that help design products" (mentioned on p. 162[N]).

16. I was a co-author of a seminal paper describing a simulation of fully animated communicative agents – "Animated conversation: Rule-based generation of facial expression, gesture and spoken intonation for multiple conversational agents"–which was published in ACM SIGGRAPH in 1994. The number of times a paper is cited is widely regarded as a measure of its importance; and according to the online search tool Google Scholar, this paper has been cited 416 times.

17. I am a highly ranked computer scientist, having an "H-factor" of 46, reflecting the number of my publications that have been cited at least that many times (See http://www.cs.ucla.edu/~palsberg/h-number.html.).

18. I am being compensated at a rate of $300 per hour for my work on this case. Within the last four years I have testified in one deposition as an expert witness.

19. A complete listing of my qualifications and publications is set forth in my curriculum vitae, which is attached as Exhibit A.

20. I have attached as Exhibit B a list of materials that I considered in reaching my opinions.

III. UNDERSTANDING OF THE LAW

21. I have been informed and understand that claim construction is the process of determining a patent claim's meaning. I also have been informed and understand that the proper construction of a claim term is the meaning that a person of ordinary skill in the art (*i.e.*, the technical field to which the patent relates) would have given to that term at the time when the patent's application was filed.

22. I understand that, for claim construction, one must focus on the claim terms in the context of the claim as a whole, interpreting the claim language as it ordinarily would be understood. After the claim language, the most important sources to consider are the patent specification, including any publications incorporated by reference in the specification, and the prosecution history. I understand that, collectively, these sources—the claim language, specification, and prosecution history—are called "intrinsic evidence."

23. In addition, the person of ordinary skill in the art may consider dictionaries, technical references, and other information—called "extrinsic evidence"—that would have been available at the time when the patent's application was filed. I understand that the law considers extrinsic evidence to be less reliable than intrinsic evidence, and that extrinsic evidence cannot change the ordinary meaning of the claim language.

24. I also have been informed and understand that 35 U.S.C. § 112 ¶ 6 recites: "An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the

specification and equivalents thereof." Limitations that are read as means-plus-function limitations, *e.g.*, "means for ______" and "_____ means," are presumptively interpreted under 35 U.S.C. § 112 ¶ 6. I understand that, under certain circumstances, the presumption may be rebutted and the limitation would not be interpreted using 35 U.S.C. § 112 ¶ 6. Conversely, if a claim limitation is written in functional terms and does not recite sufficient structure to perform the recited function, the limitation should be construed as a "means-plus-function" limitation even if the word "means" is not recited in the limitation.

25. I understand that the construction of a means-plus-function limitation under 35 U.S.C. § 112, ¶ 6 requires a two-step approach. The first step is to identify the claimed function, staying true to the claim language and the limitations expressly recited by the claims. One must be careful not to adopt a function different from that explicitly recited in the claim, as such an error in identification of the function could improperly alter the identification of the structure corresponding to that function. The second step is to ascertain the corresponding structures in the written description that perform those functions. A disclosed structure is corresponding only if the specification clearly links or associates that structure to the function recited in the claim.

26. I have been informed and understand that the steps of a method claim need not be performed in the order written unless, logic, grammar, or the content of the specification dictates otherwise. Further, I understand that when determining whether a method claim requires an order, one first focuses on the claim language and whether as a matter of logic and/or grammar an order is required. Second, one must look to the specification to determine if it directly or implicitly requires that the steps be performed in a particular order.

IV. PERSON OF ORDINARY SKILL IN THE ART

27. The '785 patent was filed in the U.S. Patent Office on August 2, 1990, and does not claim priority to any earlier filings, either in the U.S. or any foreign patent offices. Accordingly, I understand that the patent's claims must be construed from the perspective of a person of ordinary skill in the art as of August 2, 1990.

28. Based on my understanding of the '785 patent and my knowledge, experience, and years of teaching, a person of ordinary skill in the art of the '785 patent has: (1) at least a B.S. or equivalent degree; and (2) at least two years' experience designing or developing three-dimensional graphics systems.

V. TECHNICAL BACKGROUND

29. The '785 patent relates to generating computer graphics that represent views seen from within a three-dimensional workspace. A three-dimensional workspace is a model of a physical space, like the one in which we live. A workspace could represent for example the inside of a room.

30. Although computer displays are two-dimensional, they can generate views representative of what an observer located within a three-dimensional workspace would "see" if they looked at the workspace. As explained by the '785 patent, the location from which an observer looks at the workspace is called the "viewpoint." '785 patent at 6:50-52.

31. Computers can be used to display still images as well as moving imagery. In moving imagery, the illusion of movement is created by presenting a series of still images in rapid succession. Creating the illusion of movement in this way is similar to operation of a "flip

book."[2] However, in the case of a "flip book," every page of the book must be prepared in advance, whereas in the case of computer graphics, each image need not be created in advance and can instead be created "on the fly" in response to inputs received from a user, or operator, of the computer graphics system.

32. One type of moving imagery represents movement of objects within the workspace that is observed from a static location. For example, computer graphics could be used to create moving imagery representative of what an observer would see while sitting in a stadium watching a football game. In this scenario, the observer would remain at a fixed location and observe from that location movements of the players and the ball.

33. Another type of moving imagery represents what an observer would see from a viewpoint that moves within the workspace. For example, computer graphics could be used to create moving imagery representative of what an observer would see from the cockpit of a plane while the plane flew through the workspace. Unlike the first example, in this scenario the viewpoint moves and the imagery creates an illusion or sensation of movement representing what the observer would see from this moving viewpoint.

34. The title of the '785 patent is "Moving viewpoint with respect to a target in three-dimensional workspace." As its title suggests, the '785 patent relates to computer graphics that represent what an observer would see when the viewpoint moves through a workspace.

35. Two parameters of a viewpoint are its "location" and its "orientation." For example, continuing the example of an observer located in the cockpit of a plane, the observer's location could be specified as, "altitude=10,000 feet; latitude=32 degrees; longitude=95 degrees," which happens to be a location near Tyler, Texas. However, knowing this location is

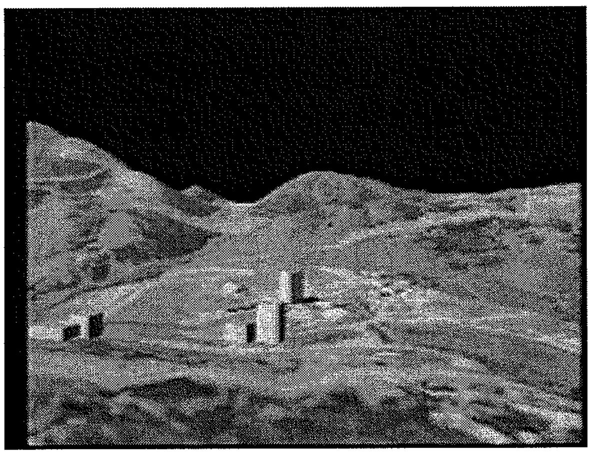
[2] A "flip book" is a book in which the drawing on each page is slightly different than the drawings on adjacent pages. Quickly "flipping" the pages creates the sensation of movement, e.g., of a bird flying.

not sufficient for specifying what an observer would see from that location. To generate a view representative of what the observer would see, we also need to know whether the plane is flying north, south, east or west, as well as whether it's pointing up, down, or something in between. The '785 patent describes the viewpoint's "direction of orientation" as "the direction from the viewpoint into the field of view along the axis at the center of the field of view." '785 patent at 6:52-55.

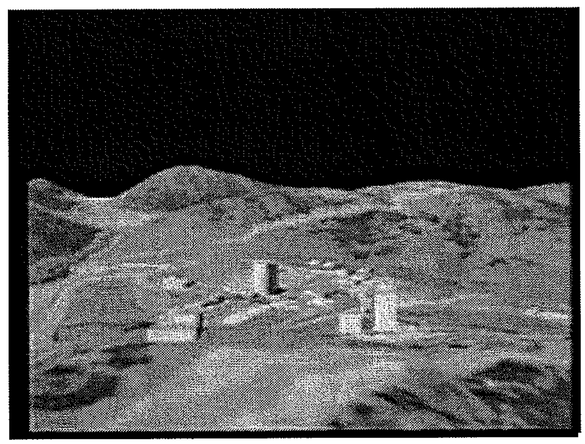
36. The '785 patent also explains that a change in the viewpoint's orientation is not the same as "viewpoint motion." The '785 patent states "The direction of orientation can shift without viewpoint motion." In other words, computer imagery could be used to create the sensation of (a) having an observer turn their head left or right or (b) having an observer walk forward ten steps. Although both would involve a sensation of movement, or moving imagery, the latter would be "viewpoint motion" and the former would not. It is also possible for the viewpoint's location and orientation to change simultaneously (e.g., an observer walks forward while turning their head).

37. Use of computer graphics to generate imagery representative of what an observer would see from a moving viewpoint is of course not new. For example, a paper by Hanson et al. describes an interactive three-dimensional mapping system called the Cartographic Modeling Environment. Hanson, Andrew J. and Quam, Lynn H., "Overview of the SRI Cartographic Modeling Environment," Proceedings of the Image Understanding Workshop, Boston, MA, pp. 576-82, Apr. 6-8, 1988 (the "Hanson paper"). Also, the Cartographic Modeling Environment was used to create a video publication that demonstrates some of its capabilities. Hanson et al. SRI, "Cartographic Modeling System," ACM SIGGRAPH VIDEO Review, Issue No. 29, Video No. 7, 1987 (the "Hanson video").

38. Two images from the Hanson video are copied below. These images represent views of a set of buildings taken from different viewpoints (i.e., viewpoints with different locations and orientations). The Hanson video shows continuous imagery that represents what an observer would see while moving smoothly and continuously between these two viewpoints. Also, in the Cartographic Modeling System the location and orientation of the viewpoint is under control of the user.



(*see, e.g.*, Cartographic Modeling Video, 00:25-00:34)



(*see, e.g.*, Cartographic Modeling Video, 00:25-00:34).

VI. THE '785 PATENT

39. Figures 2A and 2B of the '785 patent are copied below.

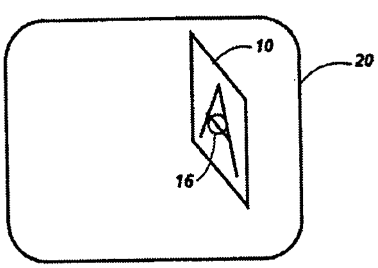


Fig. 2A

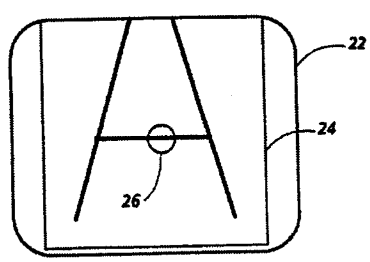


Fig. 2B

40. The '785 patent explains that these figures "show images before and after viewpoint motion." '785 patent at 8:53-54. That is, Figure 2A represents a view of a scene (of a card bearing the letter "A") taken from a viewpoint at one location and Figure 2B represents a view of the same scene from a viewpoint at a different location. The '785 patent further explains that the shift from Figure 2A to Figure 2B would be accomplished by a "sequence of images" such that the user would understand that the object viewed in Figure 2B is the same object that was viewed in Figure 2A. See '785 patent at 9:11-23.

41. Figure 3 of the '785 patent (copied below) is a flow chart that illustrates how a sequence of images, such as the ones used to transition from Figure 2A to Figure 2B are generated. '785 patent at 24-25.

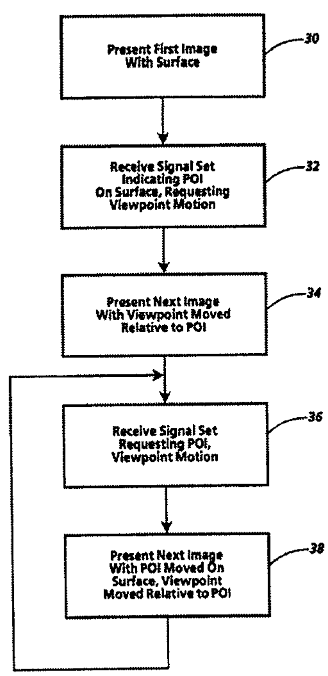


Fig. 3

42. As shown, the process begins with step 30, which presents a first image, such as the image 20 shown in Figure 2A. Then at step 32, the system receives a "signal set" identifying

a point of interest and requesting viewpoint motion. In other words, the system receives two signals, one identifying a point of interest and another requesting viewpoint motion. In Figure 2A, item 16 represents a point of interest. The '785 patent explains that a computer mouse can be used to identify a point of interest and a computer keyboard can be used to request motion of the viewpoint. See, e.g., '785 patent at 4:39-41 ("The user can control POI position using a user input device such as a mouse to indicate changes in position.") and 16:50-52 ("The space bar can indicate viewpoint motion toward the POI and the left alt key can indicate viewpoint motion away from the POI."). At step 34, a new image (e.g., an image intermediate to Figures 2A and 2B) is presented. The image of Figure 2B was taken after the viewpoint had moved closer to the point of interest selected by the user. In Figure 2B, item 26 represents the same point of interest (or location on the object) as did item 16 of Figure 2A. See '785 patent at 9:18-24.

43. Figures 4A, 4B, 5 and 6 all illustrate viewpoint motions with respect to a point of interest. Figure 4A shows radial viewpoint motion towards a point of interest. The '785 patent describes the type of motion shown in Figure 4A as "not sufficient" because the point of interest "remains at the periphery of the field of view." See '785 patent at 10:9-17.

44. Figure 4B illustrates a combination of radial viewpoint motion and viewpoint rotation. The '785 patent describes Figure 4B as "satisfactory." See '785 patent at 10:18-20. Unlike Figure 4A, the motion illustrated in Figure 4B allows the point of interest to be centered in the field of view.

45. Figure 5 illustrates lateral viewpoint motion, viewpoint rotation, and radial viewpoint motion. The patent also describes Figure 5 as "satisfactory." '785 patent at 10:43-45. An example of lateral viewpoint motion with rotation (and no radial motion) would be moving the viewpoint from 74 to 76 or 78, as shown in Figure 5. See '785 patent at 10:48-56. In such a

movement, the viewpoint is displaced in a clockwise direction and also rotates so as to keep the point of interest in view. See '785 patent at 10:60-63.

46. In Figure 5, the viewpoints 84, 86 and 88 illustrate a different type of motion. For example, in moving from 84 to 86, the viewpoint would move laterally (clockwise) and radially (towards the point of interest on surface 70) and also rotate to keep the point of interest in view. See '785 patent at 10:67-12. Figure 6 illustrates another example in which the viewpoint moves radially, laterally, and also rotates. See, e.g., '785 patent at 13-15.

47. Figure 7 shows a situation in which the viewpoint moves and the point of interest also moves. That is, the point of interest moves from 142 to 144. The patent explains that the mouse can be used to so move the point of interest and the keyboard can be used to move the viewpoint. See, e.g., '785 patent at Abstract ("While requesting viewpoint motion with a keyboard, the user can independently request POI motion with the mouse."). With this arrangement, movements of the point of interest are unrelated to movements of the viewpoint. See, e.g., '785 patent at 4:45-47 ("For example, the user can operate a mouse or other pointing device to request POI motion with one hand and can independently operate keys on a keyboard to request viewpoint motion with the other hand.").

48. Referring back to Figure 3, boxes 36 and 38 illustrate how motions of the type shown in Figure 7 are achieved. In step 36, a "signal set" is received, one signal requesting motion of the point of interest and a different signal requesting motion of the viewpoint. See '785 patent at 9:36-37. Then in step 38, a new image is presented in response to the requested motions.

49. Figure 8 (copied below) "shows steps that can be performed within the steps in boxes 34 and 38 in FIG. 3 to provide viewpoint motion as illustrated in FIGS. 4-7." '785 patent

at 12:20-23. In other words, Figure 8 illustrates how a new image can be presented in response to viewpoint motion. In Figure 8, first the point of interest is determined, e.g., by interpreting a signal from a mouse. See '785 patent at 12:23-35. Then the new location of the moved viewpoint is determined, e.g., by interpreting a signal from the keyboard. See '785 patent at 12:46-61.

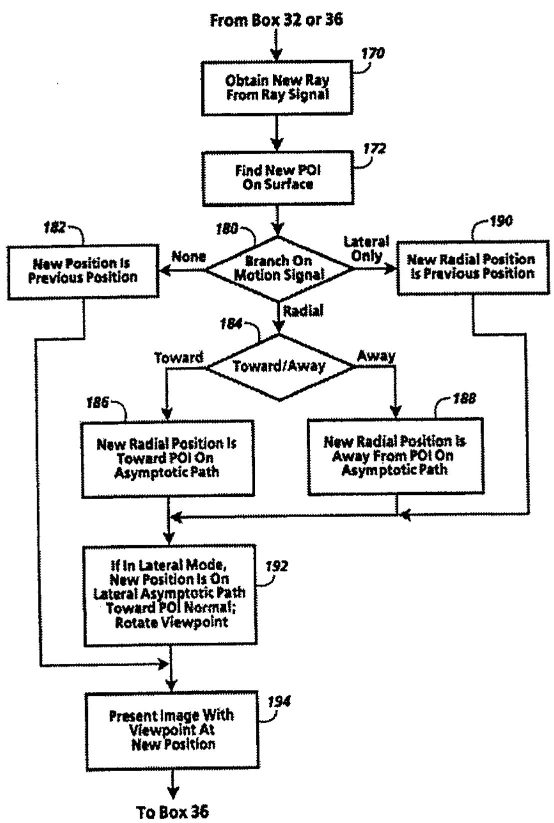


Fig. 8

50. Figure 9 illustrates a system that can generate the types of motions described in the '785 patent and Figure 10 is a flow chart of an animation loop that can run on the system illustrated in Figure 9. As with Figure 8, the animation loop illustrated in Figure 10 processes a signal that identifies a point of interest and another signal that requests viewpoint movement. In particular, Figures 12, 13, and 14 illustrate how step 270 of Figure 10 (i.e., Find Current POI, Viewpoint) can be implemented. Referring to Figure 12, one signal is processed to identify the

point of interest (see 352) and another signal is processed to move the viewpoint (see, e.g., box 364 and '785 patent at 16:38-46).

VII. THE '785 PATENT FILE HISTORY

51. The application that became the '785 Patent was filed on August 2, 1990, as U.S. Application No. 07/561,627.

52. In the only Office Action, all the pending claims (claims 1-62) were rejected. In response, Applicants filed an Amendment on November 12, 1992 ("the Amendment").

53. In the Amendment, Applicants argued that their alleged invention "solves a basic problem in moving [a] viewpoint in a three-dimensional workspace .... Although it is frequently desirable to move the viewpoint closer to a specific target, conventional techniques do not provide an easy way for the user to obtain viewpoint motion closer to a specific target. (Amendment of 11/12/92, p. 9).

54. Applicants argued that they "solv[e] the viewpoint targeting problem described above by providing appropriate viewpoint motion in response to a user signal indicating a region" and that their solution:

> can be implemented as described [by col. 3, lines 11-23 of the '785 patent] in relation to Figs. 2A and 2B: When a user indicates point 16 in image 20 in Fig. 2A and requests viewpoint motion toward point 16, a system can respond with a sequence of images that ends in image 22 in Fig. 2B so that the user can see point 26, perceptible as a continuation of point 16, and the surrounding area in greater detail. This solution can also be implemented to provide other kinds of viewpoint motion relative to an indicated region on a surface, such as motion, away from the indicated region or motion lateral to the indicated region, as described, for example, in relation to Fig. 8.

(Amendment of 11/12/92, p. 9). Applicants also stated that:

> [t]he invention as defined in claims 1 and 11 solves the viewpoint targeting problem by providing viewpoint displacement in response to a region indicating signal indicating a region on a surface in an image. In response to the region indicating signal, this solution presents another image that includes another surface that is perceptible as a continuation

> of the previous image. The other surface is viewed, however, from a viewpoint that is displaced from that of the previous image relative to the indicated region.

(Amendment of 11/12/92, p. 10).

In summary, Applicants argued that claim 1 was allowable because the prior art allegedly did not teach or suggest the ability for a user to select a region and for the system to generate viewpoint motion in response to that selection.

55. Applicants argued, with respect to independent claims 28 and 42, that the "Office Action does not recognize that Waller, Cawley, and Ware et al. fail to teach or suggest viewpoint displacement that is a function or a proportion of distance between a viewpoint and a region of a surface." (Amendment of 11/12/92, p. 11).

56. Applicants argued with respect to claim 52 that the "Office Action does not recognize that Waller, Cawley, and Ware et al. fail to teach or suggest user input means structured so that the user can request viewpoint motion and point of interest motion independently." (Amendment of 11/12/92, p. 13).

57. A Notice of Allowance was mailed on March 9, 1993.

58. The '785 Patent issued on January 4, 1994, and is entitled "Moving viewpoint with respect to a target in a three-dimensional workspace." Jock Mackinlay, George G. Robertson, and Stuart K. Card are listed as inventors.

VIII. THE PATENTED INVENTION

59. The supposed inventions in the '785 patent are merely old, generic methods for moving a viewpoint through a three-dimensional workspace.

60. The method of claim 1 displays a first image as viewed from a first viewpoint, receives both a region indicating signal and a motion requesting signal, and in response, displays a second image as viewed from a second viewpoint.

61. Claims 28 and 42 are similar to claim 1 in that they require moving a viewpoint from a first location to a second location. The movement from the first viewpoint to the second viewpoint is based on a function of the distance between the first viewpoint and a first region (e.g., an object being looked at). Claims 28 and 42 recite (1) a subset of the limitations recited by claim 1 and (2) one additional limitation (i.e., "the first displacement being a function of the first distance," in claim 28 or "the respective displacement of each following step being a function of the respective distance of the next preceding step," in claim 42).

62. Claim 52 is similar to claim 1 in that it requires moving a viewpoint from a first location to a second location but it also requires the user to provide a "motion requesting signal **set**" (emphasis added) that includes requests for viewpoint motion and motion of the point of interest. In addition, the claim requires the user to be able to request viewpoint motion and point of interest motion "independently."

IX. THE '785 PATENT CLAIM CONSTRUCTION

A. Agreed-Upon Claim Terms of the '785 Patent

63. I understand that IP Innovation and Google agree that the following term in claim 52 of the '785 Patent has the following meaning:

Claim Term	**Meaning**

Claim Term	Meaning
point of interest	A point indicated by the user and relative to which the viewpoint can move

64. Since the person of ordinary skill in the art would have understood the above claim term to have the meaning set forth above, I agree with the parties' agreed-upon construction for this claim term.

B. Disputed Claim Terms of the '785 Patent

65. I understand that the parties dispute the construction of the following terms in the asserted claims of the '785 Patent:

- "viewpoint coordinate data" (claims 1 and 52)
- "user input means for providing signals" (claim 52)
- "the user can request viewpoint motion and point of interest motion independently" (claim 52)
- "motion requesting signal set" (claim 52)
- "viewpoint motion" (claims 1, 28, 42, and 52)
- "point of interest motion" (claim 52)
- "radial motion" (claim 55)
- "ray" (claim 55)

66. I discuss each disputed claim term below.

1. "viewpoint coordinate data" (claims 1 and 52)

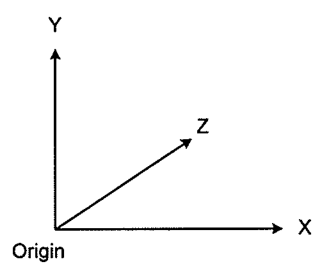
Claim Term	My Proposed Construction	IP Innovation's Proposed Construction
viewpoint coordinate data (claims 1 and 52)	The position on the x-axis, the y-axis, and the z-axis in a three-dimensional workspace from which the workspace is viewed	Information representing the position of the viewpoint in a three dimensional workspace

a) The plain claim language

i) "coordinate"

67. The word "coordinate" in the claim term "viewpoint coordinate data" is significant. One of ordinary skill in the art would understand that "coordinate data" does not refer to any type of data that describes a location. For example, "coordinate data" does not refer to location identifying data such as "a little to the left" or "one inch above the table." Rather, coordinates are numbers that specify a location with respect to a pre-defined reference frame.

68. The most common reference frame for describing a computer graphics three dimensional workspace is the Cartesian reference frame[3], which specifies three orthogonal axes, all of which intersect at a common point called the "origin," as shown in the diagram below.

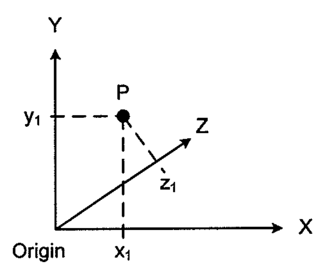


69. In the Cartesian reference frame, the three axes are conventionally labeled the "X," "Y," and "Z" axes. In the context of a three-dimensional computer graphics workspace, the

[3] Other coordinate systems such as spherical coordinates and cylindrical coordinates are known and used for various purposes.

X-axis typically extends horizontally across the screen, the Y-axis typically extends vertically across the screen, and the Z-axis typically represents depth and extends perpendicular to the plane of the screen.[4]

70. In a Cartesian reference frame, the location of any point in three-dimensional space is defined by its "coordinates" on the X, Y, and Z reference axes. For example, as shown in the drawing below, the location of the point P in three dimensional space is represented by three coordinates, x_1, y_1, and z_1. Each of these coordinates represents the distance between the origin and the point P as measured in a direction parallel to one of the three axes. For example, the value x_1 represents the distance between the origin and the point P as measured in a direction parallel to the X-axis:



71. As explained above, the words "coordinate data" do not refer to any sort of location identifying data. Instead, one of ordinary skill in the art would understand that the term "coordinate data" refers to values that specify a location in space with reference to a predefined reference frame, i.e., coordinates. Therefore, the claim term "viewpoint coordinate data" refers to the coordinates of the viewpoint.

72. Although IP Innovation's proposed construction might have been a suitable definition for the words "viewpoint location data," those are not the words that must be

[4] The diagram illustrates a "left-handed" coordinate system. In a "right-handed" coordinate system the Z-axis would point out of the page instead of into it. Left-handed coordinate systems are typically used for computer graphics. The "left-hand" and "right-hand" rules for determining the orientation of the Z-axis involve curling fingers of a hand from the X-axis towards the Y-axis. When the fingers are in that position, the thumb points in the direction of the-Z axis.

construed. As it stands, IP Innovation's proposed construction ignores the significance of the word "coordinate" in the claim term "viewpoint coordinate data" and is therefore incorrect. In contrast, my proposed construction gives meaning to the term "coordinate" by referring to the X, Y, and Z axes, i.e., the axes of a predefined reference frame against which the "coordinates" can be measured.

ii) "viewpoint"

73. IP Innovation's proposed construction is also wrong because it is circular. That is, IP Innovation's proposed construction includes the word "viewpoint." However, that word, i.e., "viewpoint," is part of the term that is being construed, i.e., "viewpoint coordinate data."

74. My proposed construction gives meaning to the term "viewpoint," i.e., it is the location from which the workspace is viewed.

b) The specification and file history

75. As described above, the word "coordinate" is significant and one of ordinary skill in the art would understand "coordinate data" to mean values that specify a location in space with reference to a predefined reference frame, i.e., coordinates. This understanding is supported by use of the term "coordinate" in the specification.

i) Portions of the '785 Patent That Specify What the Coordinates Are

76. For example, in the portion of the '785 patent quoted below, the patent provides mathematical equations for computing new coordinates (eye_x,eye_y,eye_z) of the viewpoint when the viewpoint is moving towards a point of interest.

> If the space bar is depressed, indicating motion toward the POI, the step in box 402 finds a new radial position of the viewpoint on an asymptotic path toward the POI. The following equations can be used to obtain new viewpoint coordinates eye_x, eye_y, and eye_z:

$$eye_x = eye_x - percentRadialApproach \times (eye_x - poi_x);$$

$$eye_y = eye_y - percentRadialApproach \times (eye_y - poi_y);$$

and

$$eye_z = eye_z - percentRadialApproach \times (eye_z - poi_z),$$

where percentRadialApproach can be a value stored during initialization. The choice of a value depends on the speed of the animation loop being used; a wide range of values around 0.15 have been used to produce satisfactory motion.

'785 patent at 16:55-17:3 (emphasis added).

77. In the portion of the '785 patent quoted immediately above, the term "eye_x" is the x-coordinate of the viewpoint, the term "eye_y" is the y-coordinate of the viewpoint, and the term "eye_z" is the z-coordinate of the viewpoint.[5] In other words, when the '785 patent specifies, or teaches how to compute, the coordinates of the viewpoint, it does so in terms of x, y, and z coordinates. Consistent with my proposed construction, these coordinates are "the position on the x-axis, the y-axis, and the z-axis in a three-dimensional workspace from which the workspace is viewed."

78. The '785 patent is consistent in this regard. That is, the patent teaches how to compute new coordinates of the viewpoint when the viewpoint is engaging in four different types of motion. The table below identifies the four motion types and the corresponding portion of the specification. In every instance, when the '785 patent teaches how to compute the coordinates of the viewpoint, it teaches computation of the viewpoint's x, y, and z coordinates, i.e., (eye_x,eye_y,eye_z).

	Type of viewpoint motion	Viewpoint coordinates taught by '785 patent	'785 patent citation

[5] That is, the coordinates (eye_x, eye_y, eye_z) specify the location of the "eye," or viewpoint, from which the workspace is viewed.

1	zoom in – move towards a point of interest	(eye_x, eye_y, eye_z)	'785 patent at 16:55-17:3
2	zoom out – move away from a point of interest	(eye_x, eye_y, eye_z)	'785 patent at 17:4-19
3	Chord mode	(eye_x, eye_y, eye_z)	'785 patent at 18:8-27
4	Arc mode	(eye_x, eye_y, eye_z)	'785 patent at 18:51-59

79. As described above, the '785 patent specifically uses Cartesian coordinates (i.e., coordinates of a Cartesian reference frame of X, Y, and Z axes) when it explains how to compute coordinates of the viewpoint when the viewpoint is moving. The '785 patent also uses Cartesian coordinates when it specifies for other purposes the coordinates of the viewpoint. For example, the '785 patent teaches, in the section quoted below, how to compute the horizontal distance between the viewpoint and the point of interest.

> The step in box 430 begins by finding the horizontal distance from the POI to the viewpoint, which is simply the square root of the sum of the squares of the differences between <u>the x and z coordinates of</u> the POI and <u>the viewpoint</u> . . .
>
> '785 Patent at 17:40-44 (emphasis added).

80. The portion of the '785 patent quoted immediately above, makes clear that the point of interest and the viewpoint have Cartesian coordinates. That is, the patent explains that the viewpoint has an x-coordinate and a z-coordinate, and those coordinates are used in the described computation.[6] So, once again, when the '785 patent specifies what the coordinates of the viewpoint are, it explicitly explains that those coordinates are Cartesian coordinates, i.e., x, y and z coordinates.

[6] The y-component is irrelevant to the described computation.

81. The '785 patent also specifies coordinates of points other than the viewpoint as being Cartesian coordinates. For example, at 17:39-66, the '785 patent explains how to compute coordinates of a point called the "normal point." Once again, the '785 patent gives equations for computing that point's Cartesian coordinates, i.e., ($normal_x$, $normal_y$, $normal_z$), in which $normal_x$ is the point's x-coordinate, $normal_y$ is the point's y-coordinate, and $normal_z$ is the point's z-coordinate.

ii) Portions of the '785 Patent That Use the term "Coordinates" Without Specifying What the Coordinates Are

82. As described above, whenever the '785 patent specifies what coordinates of a point are, it does so by using Cartesian coordinates. The '785 patent also uses the term "coordinate" in other places without saying what the coordinates are. Doing so was reasonable at least since, as stated above, one of ordinary skill in the art knows what coordinates are. Those other potions of the patent are all consistent with the coordinates being Cartesian coordinates. For example, the sections of the '785 patent quoted below refers to a "viewpoint data structure" in which the coordinates of the viewpoint can be stored. One of ordinary skill in the art would understand that the coordinate data stored in that data structure are the Cartesian coordinates of the viewpoint.

> Data memory 214 includes 3D workspace data structure 240, object data structures 242, viewpoint data structure 244, as well as other data stored and accessed during execution of instructions in program memory 212. 3D workspace data structure 240 can include a list of objects in the workspace and data indicating the extent of the workspace. Object data structures 242 can include, for each object, type data indicating its geometric shape, <u>coordinate data</u> indicating a position within the three-dimensional workspace, extent data indicating a region such as a cube or sphere that includes the object, and a list of other objects that are attached to the object, if any. <u>Viewpoint data structure 244 can include coordinate data indicating a position of the viewpoint within the three-dimensional workspace</u>, data indicating a direction of gaze, and data indicating a direction of body. Together, workspace data structure 240, object data

> structures 242, and viewpoint data structure 244 provide a model of the workspace and its contents. '785 patent at 13:65-14:15. (emphasis added)

> The step in box 270 finds the current POI and viewpoint position for use in redrawing the workspace and objects, as discussed in greater detail below. In the simplest case, the viewpoint does not move, so that coordinate data indicating the previous viewpoint position can be retrieved by accessing viewpoint data structure 244.
>
> '785 Patent at 14:43-49 (emphasis added).

83. As another example, the portions of the specification quoted below refer to the viewpoint's coordinates without saying what they are. However, it is noteworthy that the material below is all in reference to Figure 6, which shows the X, Y, and Z axes of the Cartesian reference frame. Also, the final paragraph quoted below refers to the x and z offsets and components. Once again, all of this material in the patent is consistent with the viewpoint's coordinates being Cartesian coordinates.

> In response to a signal requesting viewpoint motion from initial viewpoint 110 toward POI 102, coordinates of intermediate viewpoint 112 are found and used in obtaining coordinates of ending viewpoint 114. In other words, the viewpoint moves from initial viewpoint 110 to ending viewpoint 114 in a single step, with intermediate viewpoint 112 being used for computational purposes. '785 patent at 11:20-27.

> The coordinates of intermediate viewpoint 112 are found through a radial displacement from initial viewpoint 110 along the ray from POI 102 through initial viewpoint 110. Initial viewpoint 110 is below the horizontal plane that includes POI 102, so that the radial displacement includes x, y, and z components. '785 patent at 11:28-33.

> The coordinates of ending viewpoint 114 are found through a lateral displacement from intermediate viewpoint 112 along a chord. As shown, the chord can connect intermediate viewpoint 112 and normal point 116, a point on horizontal normal 106 which is at the same distance from POI 102 as intermediate viewpoint 112; alternatively, lateral displacement could be along a chord connecting intermediate viewpoint 112 to a point on normal 104 or along an arc as in FIG. 5. '785 patent at 11:34-42.

FIG. 6 shows the projection of viewpoints 110, 112, and 114 and of normal point 116 onto the x-z plane to illustrate how the lateral displacement can be obtained. After the coordinates of intermediate viewpoint 112 are obtained, projection 120 of initial viewpoint 110 is not involved in the computation of lateral displacement. Projection 122 of intermediate viewpoint 112 and projection 126 of point 116 are the endpoints of a projected chord. Projection 124 of ending viewpoint 114 is on the chord, offset from projection 122 by a proportion of the chord. The x and z offsets from projection 122 to projection 124 are the same as the x and z components of the lateral displacement from viewpoint 112 to viewpoint 114.

'785 Patent at 11:43-56 (emphasis added).

c) Extrinsic evidence

84. My proposed construction is also supported by extrinsic evidence.

85. The inventors of the '785 patent published a paper entitled, "Rapid Controlled Movement Through a Virtual 3D Workspace," Mackinlay et al., Computer Graphics, Volume 24, Number 4, August 1990 (the "Rapid paper"). A copy of the Rapid paper is attached as Exhibit T to the accompanying Appendix submitted by Google. In their depositions, inventors George Robertson and Jock Mackinlay testified that the Rapid paper described their (alleged) invention. Robertson Tr. (6/24/09) 154:16-155:1; Mackinlay Tr. (8/27/09) 195:17-196:5.

86. A portion of the Rapid paper is copied below.

$$\begin{aligned} eye_x &\leftarrow eye_x - k(eye_x - poi_x) \\ eye_y &\leftarrow eye_y - k(eye_y - poi_y) \\ eye_z &\leftarrow eye_z - k(eye_z - poi_z) \end{aligned} \quad (2)$$

where eye_x, eye_y, eye_z, poi_x, poi_y, and poi_z are the world coordinates of the viewpoint and the POI. This technique

Rapid Paper at 173.

87. Like the ‘785 patent itself, in the Rapid paper, the ‘785 inventors described the coordinates of the viewpoint as Cartesian coordinates (eye_x,eye_y,eye_z). Accordingly, the extrinsic evidence also supports my proposed construction.

2. “user input means for providing signals” (claim 52)

Claim Term	**My Proposed Construction**	**IP Innovation’s Proposed Construction**
user input means for providing signals (claim 52)	This is a means-plus-function element that should be construed pursuant to §112, ¶6. Structure: one or more user input devices that provide separate signals based on actions of a user, such as a keyboard, a mouse, a multidimensional input device such as a VPL glove or other input device and each of their equivalents. Function: providing signals requesting viewpoint motion and point of interest motion	This is a means-plus-function element that should be construed pursuant to §112, ¶6. Corresponding structure: one or more user input devices that provide signals based on actions of a user, such as a keyboard, a mouse, a multidimensional input device such as a VPL glove or other input device and each of their equivalents. Function: providing signals based on actions of a user

88. The parties agree that the term “user input means for providing signals” is a means-plus-function element that should be construed pursuant to §112, ¶6 of the patent statute. As set forth in more detail above, I understand that such elements must be construed by identifying the function required by the claim element and then identifying the structure that patent specification discloses as being clearly linked to performing that function.

i) Function

89. The function required by this means-plus-function element is “providing signals requesting viewpoint motion and point of interest motion.” This function is evident from the

plain claim language. Portions of claim 52, with highlighting to show occurrences of "user input means," are copied below.

> 52. A method of operating a system that includes a display, user input means for providing signals, . . . the user input means providing motion requesting signals; the motion requesting signals requesting viewpoint motion and point of interest motion; the user input means being structured so that the user can request viewpoint motion and point of interest motion independently; the method comprising steps of: . . .
>
> receiving a first motion requesting signal set from the user input means, the first motion requesting signal set requesting a first viewpoint motion and a first point of interest motion; . . .

90. In particular, as shown above, claim 52 requires the "user input means" to provide "motion requesting signals" and further requires those motion requesting signals to request "viewpoint motion and point of interest motion."

91. Accordingly, the function required by this claim element is "providing signals requesting viewpoint motion and point of interest motion."

92. IP Innovation's proposed function is partially correct. However, I cannot agree with IP Innovation's proposed function because it does not specify what kinds of signals the "user input means" must provide, whereas claim 52 clearly does specify the required signals.

ii) Structure

93. My proposed identification and IP Innovation's proposed identification of the corresponding structure differ by only one word. That is, my proposed identification includes the word "separate" whereas IP Innovation's does not. My proposed identification of the structure is set forth below with highlighting to identify the one-word difference (i.e., the addition of the word "separate") between my identification and IP Innovation's proposed identification of the corresponding structure.

one or more user input devices that provide separate signals based on actions of a user, such as a keyboard, a mouse, a multidimensional input device such as a VPL glove or other input device and each of their equivalents.

94. The '785 patent discloses providing the viewpoint motion requesting, and point of interest motion requesting, signals from a mouse, a keyboard, and a VPL glove. See, e.g., '785 patent at 4:27-47, 4:48-59; 5:56-62; 8:5-14; 9:3-10; 12:20-32; 12:46-61; 13:16-25; 13:38-47; 13:48-56; 15:25-37; 16:3-24; 16:38-46; 16:55-58; 17:4-7; 17:20-23; and 20:5-14. Based on the corresponding structures identified by the parties for this claim element, the parties appear to agree on at least this much.

95. However, what IP Innovation's proposed structure fails to acknowledge is that every input device, or combination of input devices, disclosed in the '785 patent for providing the viewpoint and point of interest motion requesting signals provides them as "separate" signals. There is no disclosure in the '785 patent of a single signal that somehow affects both viewpoint motion and point of interest motion. Similarly, there is no disclosure in the '785 patent of an input device, or collection of input devices, that can request viewpoint and point of interest motion by anything other than "separate" signals.

96. For example, the '785 patent's abstract says, "While requesting viewpoint motion with a keyboard, the user can independently request POI motion with the mouse." The abstract's clear teaching of separate signals (one from the keyboard for requesting viewpoint motion and a separate signal from the mouse for requesting point of interest motion) is representative of the patent's disclosure. See also, e.g., '785 patent at 8:5-14. As another example, at 4:17-47 the '785 patent teaches using the keyboard to control viewpoint motion and the mouse to control the point of interest position, and notes that with this arrangement "the user can use one hand to

request viewpoint motion and the other hand to control POI position." Again, in this arrangement the keyboard provides one signal and the mouse provides a "separate" signal.

97. The '785 patent also teaches that a multidimensional device like a VPL glove can provide both signals, but the signals are nonetheless separate – pointing generates one signal and squeezing generates another. See '785 patent at 20:5-14.

98. As yet another example, the '785 patent states:

> 'User input means' is means for providing signals based on actions of a user. User input means can include one or more 'user input devices' that provide signals based on actions of a user, such as a keyboard or a mouse. The <u>set of signals</u> provided by user input means can therefore include data indicating mouse operation and data indicating keyboard operation.
>
> '785 Patent at 5:56-62 (emphasis added).

99. The above quoted portion explains that the user input means provides a "set of signals," i.e., separate signals.

100. Summarizing, since all structures disclosed in the '785 patent for performing the required function are capable of providing only "separate" signals, I cannot agree with IP Innovation's proposed construction.

ii) Extrinsic evidence

101. The extrinsic evidence also supports my construction and refutes IP Innovation's proposed construction. A portion of inventor George Robertson's deposition testimony is copied below.

> A. No. Our intention on this invention was they are two separate signals. There's one to pick the target and another to engage forward or reverse motion.
> BY MR. MATUSCHAK:
> Q. And that's clarified if you looked on lines 38 to 43? Do you see that?
> A. Yes.

Q. And there do you see where it says that a user can click a mouse button to indicate a region and then also provide a signal requesting viewpoint motion toward an indicated point on that region?
A. Right, yes.
Q. And so that would have a user selecting a region of interest and requesting viewpoint motion with two signals, correct?
A. Yeah. One signal is identifying the object of interest and the point of interest, and the other signal is saying go toward it or go away from it.
Q. All right. And your invention involved using those two signals; is that correct?
A. That's correct.

Robertson Tr. (6/24/09) at 90:12-91:8.

Q. All right. The next step is receiving a region-indicating signal and motion-requesting signal from the user input device. Do you see that?

A. Yes.
Q. And this talks about the two signals that you mentioned before, a region-indicating motion and a motion-requesting signal, right?
A. That's correct.

Robertson Tr. (6/24/09) at 92:17-92:24.

102. This portion of inventor Robertson's testimony makes clear that the user input means provides "two separate signals."

3. "the user can request viewpoint motion and point of interest motion independently" (claim 52)

Claim Term	My Proposed Construction	IP Innovation's Proposed Construction
the user can request viewpoint motion and point of interest motion independently (claim 52)	The user can request viewpoint motion and point of interest motion separately and simultaneously	The user can request viewpoint motion and/or point of interest motion separately or simultaneously

a) The plain claim language

103. The plain language of claim 52 supports my construction of "the user can request viewpoint motion and point of interest motion independently" to mean that "the user can request viewpoint motion and point of interest motion separately and simultaneously," and underscores why IP Innovation's proposed construction is incorrect. Claim 52 recites "[a] method of operating a system that includes a display, user input means for providing signals, and a processor connected for receiving signals from the user input means . . . the user input means being structured so that the user can request viewpoint motion ***and*** point of interest motion ***independently***." (Claim 52 (emphasis added)).

104. As an initial matter, the claim language requires the user input means of claim 52 to be "structured so that the user can request viewpoint motion ***and*** point of interest motion independently." Therefore IP Innovation's suggestion that this limitation requires only the capability to "request viewpoint motion ***and/or*** point of interest motion" is flatly contrary to the functionality recited by the claim language. Those of ordinary skill in the art reading claim 52 would understand that the user input means must be structured so the user can request viewpoint motion and point of interest motion, not merely one or the other.

105. Moreover, in addition to making clear the user input means is structured so the user can request both kinds of motion, not merely one "and/or" the other, this language from claim 52 leaves no room for doubt that the user input means is structured so the user can request both kinds of motion – viewpoint motion and point of interest motion – "***independently***."

106. Those of ordinary skill in the art would understand that to be able to request viewpoint motion and point of interest motion "independently," as the plain language of claim 52 requires, the user must be able to request viewpoint motion and point of interest motion

separately ***and*** simultaneously as set forth in my proposed construction, not separately ***or*** simultaneously as IP Innovation proposes. Two things can be separate from one another, and yet dependent upon one another. They can also occur simultaneously but be dependent upon one another. Therefore, based on the plain meaning of the term, those of ordinary skill in the art would understand that for viewpoint and point of interest motion requests to be made "independently," they must not only be able to be made separately but also must be able to be made at the same time.

b) The specification

107. The '785 specification further supports my proposed construction and expressly refutes IP Innovation's. The specification defines what it means for the user to be able to request viewpoint motion and point of interest motion "independently," making clear that the user must be able to request both kinds of motion separately as well as simultaneously:

> If the user ***can request viewpoint and POI motion separately and can request both types of motion simultaneously***, the user input means is structured so that the user can request viewpoint motion and POI motion "***independently***."
>
> '785 Patent at 8:6-10 (emphasis added).

108. This clear definition from the specification would convey to those of ordinary skill in the art that my proposed construction – which follows this definition – is correct, and that IP Innovation's proposed construction – which contradicts this definition – is incorrect. Where two conditions must be satisfied, it is a flat contradiction to take the position that only one is required. IP Innovation's proposed construction does so not once but twice. First, IP Innovation would contradict the specification by changing "the user can request viewpoint ***and*** POI motion" to "the user can request viewpoint ***and/or*** POI motion." IP Innovation's proposed construction

would further contradict the specification by changing "the user can request viewpoint and POI motion separately ***and*** can request both types of motion simultaneously" to "the user can request viewpoint and POI motion separately ***or*** can request both types of motion simultaneously." Those of ordinary skill in the art would not interpret this limitation to contradict the specification once, let alone twice.

109. The intrinsic evidence confirms that for the user to be able to request viewpoint and point of interest motion independently, the user must be able to request both kinds of motion, and must be able to do so both separately and simultaneously.

c) Extrinsic Evidence

110. The testimony of named inventor Jock Mackinlay also supports my construction. Mackinlay Tr. (8/27/09) 143:20-25, 145:7-25 (testifying that the specification's reference starting at column 3, line three to allowing the user to reposition the POI as the viewpoint nears the target describes independent control) 146:11-147:7 (testifying that in the invention, the user could independently reposition the point of interest while moving the viewpoint forward or away at the same time, and could do so using separate signals).

4. "motion requesting signal set" (claim 52)

Claim Term	My Proposed Construction	IP Innovation's Proposed Construction
motion requesting signal set (claim 52)	A group of commands indicating a point of interest motion and a viewpoint motion relative to the point of interest	Signals representative of data for viewpoint motion and/or point of interest motion in a three-dimensional workspace

a) The plain claim language

111. The portion of claim 52 that contains this claim term is copied below with emphasis added.

receiving a first motion requesting signal set from the user input means, the first motion requesting signal set requesting a first viewpoint motion and a first point of interest motion;

112. This claim language is clear. The motion requesting signal set requests two types of motion: (1) a first viewpoint motion and (2) a first point of interest motion. My proposed construction is faithful to the claim's requirement and specifies that both a point of interest motion and a viewpoint motion are indicated.

113. IP Innovation's proposed construction improperly eviscerates this requirement of two types of motion requests by use of the term "and/or." That is, IP Innovation's proposed construction would improperly allow the claim to cover a system in which only one type of motion was requested: viewpoint motion or point of interest motion. Accordingly, IP Innovations proposed construction cannot be correct.

114. Also, IP Innovation's proposed construction's use of the term "data" improperly expands the scope of the claim. The motion requesting signal set is not any sort of data about viewpoint and point of interest motion. Rather, the signals in the set must request motion. For this reason also I disagree with IP Innovation's proposed construction.

b) The specification and file history

115. The '785 patent specification supports my construction. The whole point of the '785 patent is to provide motion of the viewpoint that is relative to a point of interest. The patent describes multiple methods of moving the viewpoint and every one of them is with respect to a point of interest. For example, the patent describes moving the viewpoint radially to approach or retreat from a point of interest. See, e.g., '785 patent at Abstract ("The user can request viewpoint motion radially toward or away from the POI.") (emphasis added); 2:16-19 ("When the user indicates a point of interest on an object, the viewpoint can approach the point of interest asymptotically, with both radial and lateral motion.") (emphasis added); 2:27-28 ("It is

frequently desirable to move the viewpoint closer to a specific target.") (emphasis added); 2:40-46 ("The user can also provide a signal requesting viewpoint motion toward an indicated point in the region, referred to as the 'point of interest' or 'POI'. When the user requests viewpoint motion toward the POI, referred to as a "POI approach", the system can provide animated motion so that object constancy is preserved.") (emphasis added); 2:47-48 ("A related aspect of the invention is based on the recognition of a problem in performing POI approach.") (emphasis added); 3:53-55 ("One example of this approach is the integration of POI approach with viewpoint motion away from the POI, referred to herein as 'POI retreat.'") (emphasis added).

116. As another example, the '785 patent teaches moving the viewpoint laterally with respect to a point of interest. The patent teaches that one problem with lateral viewpoint motion is that it can cause the point of interest to move out of the center of the field of view. Accordingly, the patent teaches combining lateral motion of the viewpoint with rotation of the viewpoint so as to keep the point of interested centered. See, e.g., '785 patent at Abstract ("The user can request viewpoint motion radially toward or away from the POI, and can also request viewpoint motion laterally toward a normal of the surface at the POI. . . The orientation of the viewpoint can be shifted during lateral motion to keep the POI in the field of view, and can also be shifted to bring the POI toward the center of the field of view.") (emphasis added); 2:16-24 ("When the user indicates a point of interest on an object, the viewpoint can approach the point of interest asymptotically, with both radial and lateral motion. The orientation of the viewpoint can rotate to keep the point of interest in the field of view. The field of view can also be centered about the point of interest by rotating the viewpoint.") (emphasis added); 3:17-19 ("One way to adjust the viewpoint is to move the viewpoint laterally toward the surface normal at the POI.") (emphasis added); 3:23-29 ("Lateral viewpoint motion has the incidental effect in many cases of

moving the POI away from the center of the field of view. This problem can be solved with compensating viewpoint rotation. If the viewpoint is rotated through an angle equal to the angle subtended by lateral viewpoint motion, the POI will stay at the same position in the field of view.") (emphasis added); and 3:64-66 ("Lateral viewpoint motion can also be integrated with POI approach and retreat to provide motion toward the surface normal at the POI.").

117. As yet another example, the '785 patent teaches moving the point of interest as the viewpoint approaches the point of interest. This sort of viewpoint motion would for example allow a user to initially zoom towards an image of a bookshelf and then, as the viewpoint moved closer to the wall, allow the user to zoom towards a particular book. See, e.g., '785 patent at Abstract ("While requesting viewpoint motion with a keyboard, the user can independently request POI motion with the mouse."); 4:17-22 ("As viewpoint motion progresses, the user may wish to adjust the POI position, especially during POI approach in which the POI and the surrounding area become progressively larger on the display."); 4:27-47 ("This aspect is further based on the discovery of a technique that adjusts POI position without interrupting viewpoint motion. With this technique, the user can produce a desired viewpoint motion while independently adjusting POI position. The user can control viewpoint motion by using keys to select from a few simple choices, such as moving the viewpoint toward the POI, moving the viewpoint away from the POI, or keeping the viewpoint at the previous position; in a lateral mode, each type of radial viewpoint motion can be combined with lateral viewpoint motion, with an additional choice for moving the viewpoint laterally without moving it toward or away from the POI. The user can control POI position using a user input device such as a mouse to indicate changes in position. Independently requesting viewpoint motion and POI position adjustment is especially effective because a typical user can readily make both types of requests at the same

time without confusion. For example, the user can use one hand to request viewpoint motion and the other hand to control POI position."). Once again, this motion of the viewpoint is done with reference to a point of interest.

118. In yet another example, the '785 patent teaches a method of controlling the rate at which the viewpoint approaches a point of interest. See, e.g., '785 patent at Abstract ("In a sequence of steps of viewpoint motion, the radial viewpoint displacement in each step can be a proportion of the distance to the POI so that the radial displacements follow a logarithmic function and define an asymptotic path that approaches but does not reach the POI."); 2:54-61 ("This aspect is further based on the discovery that this problem can be solved by performing POI approach asymptotically based on coordinate data indicating the positions of the viewpoint and the POI in the three-dimensional workspace. For example, the viewpoint can move toward the POI along a ray in successively smaller increments that approach a final viewing position asymptotically."); 2:62-3:9 ("This solution can be implemented with a logarithmic motion function. During each cycle of animation, the x-, y-, and z- displacements between the current viewpoint position and the POI can be reduced by the same proportional amount, referred to as an approach proportionality constant. As a result, a target object appears to grow at a constant rate of proportionality, making it easy to predict when the viewpoint will reach a desired position. This provides rapid motion initially, then progressively slower motion, allowing the user to control the motion more efficiently by repositioning the POI as the viewpoint nears the target. Also, this implementation provides the perception of natural movement in the three-dimensional workspace. POI approach can be constrained so that the viewpoint does not come too close to the POI."); 3:44-47 ("Another technique is based on the discovery that different types of viewpoint motion can be integrated if the displacement between two steps is a function

of distance between the viewpoint and the POI."); 3:55-63 ("As described above, POI approach can follow a logarithmic function with an approach proportionality constant. For symmetry between POI approach and retreat, the POI retreat function can be a logarithmic function with a retreat proportionality constant such that each retreating step between two points is equal in length to an approaching step in the opposite direction between the same two points.").

119. Summarizing, all of these viewpoint motions are made <u>with respect to a point of interest</u>. Also, even the title of the '785 patent makes clear that the patent is about moving a viewpoint relative to a point of interest. That is, the title of the '785 patent reads, "Moving Viewpoint <u>With Respect to a Target</u> . . ."

120. Also, the '785 patent states:

> One aspect of the invention is based on the recognition of a basic problem in moving viewpoint in a three-dimensional workspace. It is frequently desirable to <u>move the viewpoint closer to a specific target</u>. For example, a user may wish to examine a detail of an object at close range. <u>Conventional techniques do not provide an easy way for the user to obtain such viewpoint motion</u>.
>
> '785 Patent at 2:25-32 (emphasis added).

121. That is, the '785 patent described the prior art as suffering from an inability to provide viewpoint motion with respect to a target and purported to solve that problem.

122. Similarly, during prosecution the applicant argued, "Although it is frequently desirable to move the viewpoint closer to a specific target, conventional techniques do not provide an easy way for the user to obtain viewpoint motion closer to a specific target. . . The invention solves the viewpoint targeting problem described above . . ." Amendment dated 1992 Nov 16 at 9. That is, to obtain allowance, the applicant argued that the alleged invention of the '785 patent is about moving the viewpoint with respect to a target, or point of interest.

123. In summary, the entire thrust of the '785 patent is about moving a viewpoint relative to a point of interest. Accordingly, one of ordinary skill in the art reading the patent would understand the motion requesting signal set to request motion of the viewpoint that is relative to a point of interest.

c) Extrinsic evidence

124. The extrinsic evidence also supports my construction and refutes IP Innovation's proposed construction. A portion of inventor George Robertson's deposition testimony is copied below.

> A. No. Our intention on this invention was they are two separate signals. There's one to pick the target and another to engage forward or reverse motion.
> BY MR. MATUSCHAK:
> Q. And that's clarified if you looked on lines 38 to 43? Do you see that?
> A. Yes.
> Q. And there do you see where it says that a user can click a mouse button to indicate a region and then also provide a signal requesting viewpoint motion toward an indicated point on that region?
> A. Right, yes.
> Q. And so that would have a user selecting a region of interest and requesting viewpoint motion with two signals, correct?
> A. Yeah. One signal is identifying the object of interest and the point of interest, and the other signal is saying go toward it or go away from it.
> Q. All right. And your invention involved using those two signals; is that correct?
> A. That's correct.
>
> Robertson Tr. (6/24/09) at 90:12-91:8.

> Q. All right. The next step is receiving a region-indicating signal and motion-requesting signal from the user input device. Do you see that?
>
> A. Yes.
> Q. And this talks about the two signals that you mentioned before, a region-indicating motion and a motion-requesting signal, right?
> A. That's correct.
>
> Robertson Tr. (6/24/09) at 92:17-92:24.

125. This portion of inventor Robertson's testimony makes clear that the invention uses two separate signals, one for requesting viewpoint motion and another for requesting point of interest motion. This further refutes use of the "and/or" in IP Innovation's proposed construction which would require only a single signal and a single request.

5. "viewpoint motion" (claims 1, 28, 42, and 52)

Claim Term	**My Proposed Construction**	**IP Innovation's Proposed Construction**
viewpoint motion (claims 1, 28, 42, and 52)	A sequence of images that causes the viewpoint to appear to move from an initial position to other positions	A sequence of images that are perceptible as views of a three-dimensional workspace from a moving or displaced viewpoint

a) The plain claim language

126. Moving the viewpoint is like moving a camera along a trajectory from a starting location to an ending location. At each point along the trajectory, the camera would "see" a different view. In computer graphics, the sensation of such a camera motion is created by presenting a sequence of images, each of which corresponds to what the camera would "see" at each point along the trajectory. Accordingly, one of ordinary skill in the art would understand the term "viewpoint motion" to mean "a sequence of images that causes the viewpoint to appear to move from an initial position to other positions."

127. This understanding of the claim term is further supported by other language in the claims. That is, all of the asserted claims require that:

(a) the viewpoint motion is requested by a motion requesting signal;

(b) a first image includes a first surface that is viewed from a first viewpoint;

(c) a second image includes a second surface that is viewed from a second viewpoint; and

(d) the displacement between the first and second viewpoints is in accordance with the motion requesting signal.[7]

128. In other words, the claims require that the images be viewed from different viewpoints and that the "viewpoint motion" is the motion from a "first viewpoint" to a "second viewpoint." Thus, the plain language of the claims requires the "viewpoint motion" to be motion from "an initial position to other positions" as specified in my proposed construction.

129. The parties agree that "viewpoint motion" is a sequence of images. However, the parties disagree as to the nature of the image sequence. As explained above, one of ordinary skill in the art would understand that the image sequence is one that causes the viewpoint to appear to move from an initial position to other positions.

130. IP Innovation's proposed construction is confusing in that it requires that the sequence of images "are perceptible as views of a three-dimensional workspace from a moving or displaced viewpoint." The reference in IP Innovation's proposed construction to "views of a three-dimensional workspace" is both confusing and unnecessary as other parts of the claim already require the views to be of the three-dimensional workspace. As an example, claim 1 is reproduced below with highlighting for the term being construed ("viewpoint motion") and the claim's other references to the three-dimensional workspace.

> 1. A method of operating a system that includes a display, a user input device, and a processor connected for receiving signals from the user input device and for presenting images on the display; the user input device providing region indicating signals indicating regions within images presented and motion requesting signals requesting **viewpoint motion**; the method comprising steps of:
>
> presenting a first image on the display; the **first image including a first surface that is perceptible as <u>viewed from a first viewpoint</u>**

[7] Whereas independent claims 1, 28 and 52 refer to a "first" and "second" image and viewpoint, independent claim 42 refers to "respective" images and viewpoints. However, claim 42 effectively requires that there be at least a first and a second image and viewpoint.

> **within a three-dimensional workspace**; the step of presenting the first image comprising a substep of storing viewpoint coordinate data indicating a position of the first viewpoint in the three-dimensional workspace;
>
> receiving a first region indicating signal and a first motion requesting signal from the user input device; the first region indicating signal indicating a first region on the first surface; the first motion requesting signal requesting **viewpoint motion** relative to the first region; and
>
> presenting a second image on the display; the second image including a **second surface that is perceptible as a continuation of the first surface viewed from a second viewpoint within the three-dimensional workspace**, the second viewpoint being displaced from the position indicated by the stored viewpoint coordinate data relative to the first region on the first surface in accordance with the first motion requesting signal.

131. Since other portions of the claims require that the views be of the three-dimensional workspace, it is unnecessary and confusing to also attach that requirement to the term "viewpoint motion."

132. IP Innovation's proposed construction is also defective in that it refers to a "moving or displaced viewpoint." Once again, IP Innovations has introduced a disjunctive "or" where the claim has none. By doing so, IP Innovations replaces the claims' clarity with ambiguity. The claims are clear: the viewpoint must move from a first viewpoint to a second viewpoint. This clear requirement is not captured by IP Innovation's reference to a "moving or displaced viewpoint." Rather, the claims' requirement is captured by my proposed construction's requirement that the sequence of images causes "the viewpoint to appear to move from an initial position to other positions."

b) The specification and file history

133. The '785 patent specification also supports my proposed construction. It is clear that viewpoint motions of the '785 patent create a sensation of moving through a workspace (like a camera moving from a starting location to an ending location). See, e.g., '785 patent at 2:15-18 ("The present invention provides techniques for operating a system to produce the perception of a moving viewpoint within a three-dimensional workspace.") (emphasis added); 3:5-7 ("Also, this implementation provides the perception of natural movement in the three-dimensional workspace.") (emphasis added); 8:15-16 ("A moving viewpoint is perceived as following or defining a 'path' within a workspace."). Similarly, Figures 4A, 4B, 5, 6, and 7 all show a viewpoint following a trajectory through a workspace. Thus, the '785 patent specification supports my construction which requires the sequence of images to cause the sensation of movement, i.e., to cause "the viewpoint to appear to move from an initial position to other positions."

134. IP Innovation's proposed construction introduces inaccuracy and ambiguity by referring to "a moving or displaced viewpoint."

i) "viewpoint motion" vs. "viewpoint displacement"

135. As noted above, IP Innovation's proposed construction introduces inaccuracy and ambiguity by referring to "a moving or displaced viewpoint." A "moving viewpoint" and a "displaced viewpoint" are similar but not identical concepts. Similarly, the terms "viewpoint motion" and "viewpoint displacement" have similar but not identical meanings. The difference between the two, which is subtle, relates to whether the presented images create a sensation that the viewpoint is moving. In the case of "viewpoint motion" one of ordinary skill in the art would understand that the presented images create the sensation that the viewpoint is moving. However, in the case of "viewpoint displacement," the presented images could, but need not,

create the sensation that the viewpoint is moving. For example, a large viewpoint displacement between two images does not create the sensation of a camera moving through a space. Rather, it creates the sensation of a sudden scene shift. For example, if a movie instantly transitioned from one scene (e.g., showing the inside of a building) to a new scene many miles away (e.g., showing a boat on the ocean), one of ordinary skill in the art would consider such a transition to be "viewpoint displacement" but not "viewpoint motion." In other words, all viewpoint motions involve a displacement, but not all viewpoint displacements relate to viewpoint motion.

136. Although the text of the '785 patent refers to both "viewpoint motion" and "viewpoint displacement," the disputed claim terms do not. Since the claim term at issue is "viewpoint motion," it is important to distinguish between the two. For example, the '785 patent states:

> 'Viewpoint motion' or 'viewpoint displacement' occurs when a sequence of images is presented that are perceptible as views of a three-dimensional workspace from a moving or displaced viewpoint.
>
> '785 Patent at 7:41-44.

137. One of ordinary skill in the art understands the terms "viewpoint motion" and "viewpoint displacement" as I have described above and would interpret the above-quoted text as saying, "Viewpoint motion occurs when a sequence of images is presented that are perceptible as views of a three-dimensional workspace from a moving viewpoint" and as further saying, "Viewpoint displacement occurs when a sequence of images is presented that are perceptible as views of a three-dimensional workspace from a displaced viewpoint."

138. This understanding of the difference between "viewpoint motion" and "viewpoint displacement" is supported by the '785 patent specification. For example, the '785 patent states:

> 'Radial motion' or 'radial displacement' is perceived as motion or displacement along one or more rays.

‘785 Patent at 7:55-57.

> ‘Lateral motion’ or ‘lateral displacement’ is perceived as motion or displacement in a direction lateral to one or more rays.

‘785 Patent at 7:61-63.

139. As in the case of “viewpoint motion,” in both of the above quoted portions of the ‘785 patent, it again describes both a type of motion (i.e., radial or lateral) and a type of displacement.

140. The ‘785 patent, in the section quoted below, also identifies a particular type of displacement that can create a sensation of movement, i.e., a “displaced continuation.” However, although some displacements can create the sensation of movement, all displacements need not do so.

> A second display feature is perceptible as a ‘moved continuation’ or a ‘displaced continuation’ of a first display feature if it is perceptible as a continuation in a different position. The first display feature is perceived as ‘moving’ or as having ‘movement’ or ‘motion’ or as being ‘displaced’ within a workspace.

‘785 Patent at 7:35-40.

141. The ‘785 patent, in the section quoted below, again describes a type of displacement that can give the sensation of movement. However, again, all displacements need not do so.

> This solution can be implemented with a logarithmic motion function. During each cycle of animation, the x-, y-, and z- displacements between the current viewpoint position and the POI can be reduced by the same proportional amount, referred to as an approach proportionality constant. As a result, a target object appears to grow at a constant rate of proportionality, making it easy to predict when the viewpoint will reach a desired position. This provides rapid motion initially, then progressively slower motion, allowing the user to control the motion more efficiently by repositioning the POI as the viewpoint nears the target. Also, this implementation provides the perception of natural movement in the three-dimensional workspace. POI approach can be constrained so that the viewpoint does not come too close to the POI.

'785 Patent at 2:63-3:9 (emphasis added).

142. Summarizing, IP Innovation's use of the term "displaced viewpoint" in its proposed construction is both unnecessary and confusing. Accordingly, I cannot agree with it.

c) Extrinsic Evidence

143. The testimony of named inventor Jock Mackinlay also supports my proposed construction. Mackinlay Tr. (8/27/09) at 143:12-14, 143:16-19 (agreeing that viewpoint motion refers to a sequence of images that causes the viewpoint to appear to move).

6. "point of interest motion" (claim 52)

Claim Term	My Proposed Construction	IP Innovation's Proposed Construction
point of interest motion (claim 52)	A change in location of the point of interest as indicated by a user	A sequence of images that are perceptible as views of a three-dimensional workspace including a moving or displaced point of interest

a) The plain claim language

144. The words "point of interest" in this claim term are significant. Claim 52 requires the first image to contain a first "point of interest" and the second image to contain a second "point of interest." A point in an image is only "of interest" if it is "of interest" to someone. That is, to qualify as a "point of interest," the point must have been designated as being interesting, or "of interest."

145. In addition to the plain claim language, practical considerations of determining whether there is infringement also mandate that a "point of interest" be a point that has been designated by the user. If this were not so, infringement could depend on the state of mind of

someone watching the display screen. For example, if two users were watching identical imagery on identical screens, and one user had in mind a particular point of the computer imagery that was "of interest," and the other user had no such "point of interest" in mind, the only distinguishing characteristic between the two systems would be the states of mind of the users. Could one system be said to infringe (or at least satisfy the "point of interest" limitation) because its user had a point in mind and the other system be said not to infringe because its user had no points in mind? Doing so would be illogical. I understand that determinations of infringement cannot depend on someone's subjective state of mind. Rather, such determinations must be made based on evidence that is objectively observable. Accordingly, for this reason also a "point of interest" can only be a point that has been objectively designated as being "of interest." That is, the user must have taken some observable step, such as clicking a mouse button, to identify a point in the image as a "point of interest."

146. Since one of ordinary skill in the art would understand "point of interest" to mean a point that has been designated by the user as being of interest, one of ordinary skill would understand "point of interest motion" to mean "a change in location of the point of interest as indicated by a user." That is, "point of interest motion" refers to motion of the point of interest (or a change in location of the point of interest) that has been objectively indicated by a user.

147. This understanding of the term "point of interest motion" is further bolstered by other language in the claim. As noted above, claim 52 requires the first image to contain a "first point of interest" and the second image to contain a "second point of interest." Claim 52 further

requires the point of interest to be moved from the first point to the second point in response to the motion requesting signal set.[8]

148. So, claim 52 requires the motion of the point of interest to be controlled by a signal set that the system receives. This signal set provides objective indicia of how the point of interest is to be moved.

b) The specification and file history

149. The specification of the '785 patent supports my construction.

150. The '785 patent specification makes clear that points of interest are points that have been indicated by the user. Figures 3, 8 and 10 of the '785 patent are flow charts that explain operation of the invention. The '785 patent explains, in connection with each of these figures, that the point of interest is a point that has been indicated by the user. For example, box 32 of Figure 3 reads "Receive Signal Set Indicating POI On Surface . . ." The patent explains that in this step 32 of Fig. 3, a signal set is received "indicating a POI on the surface.") '785 patent at 9:28-31 (emphasis added). Similarly, box 172 of Figure 8 reads "Find New POI On Surface." The patent explains that in step 172 of Figure 8, the system finds the POI by finding where a ray indicated by the mouse intersects objects in the image. See '785 patent at 12:20-45. Also, box 270 of Figure 10 reads "Find Current POI, Viewpoint." Figure 12 provides additional detail regarding finding the POI. As in the case of Figure 8, the patent again explains that the POI is found by locating a point of intersection between an object in the image and a ray indicated by the mouse. See '785 patent at 16:3-38.

[8] That is, claim 52 specifies that "the first motion requesting signal set" requests a "first point of interest motion" and further requires that the displacement from the first point of interest to the second point of interest is "in accordance with the first point of interest motion." Collectively, these limitations require that the point of interest is moved from the first point to the second point in response to the motion requesting signal set.

151. The '785 patent is also replete with other explanations of how the point of interest is a point that has been indicated by the user. See, e.g., '785 patent at 2:16-18 ("When the user indicates a point of interest on an object, the viewpoint can approach the point of interest asymptotically, with both radial and lateral motion.") (emphasis added); 2:34-36 (The user can indicate a target region and, in response, the viewpoint moves to an appropriate viewing position ".") (emphasis added); 2:37-40 ("This technique can be implemented with a pointing device such as a mouse. The user can click a mouse button to indicate a region on the surface of the object to which the pointer is currently pointing.") (emphasis added); 6:67-7:1 ("A signal from a user input device 'indicates' a region of a surface if the signal includes data from which the region can be identified."); 9:8-10 ("Point 16 [in Fig. 1] is indicated by a circle whose position can be controlled by a user input device such as a mouse."); 9:18-24 ("When a user indicates point 16 and requests viewpoint movement toward point 16, a system presenting image 20 can respond with a sequence of images ending in image 22 so that the user can see point 26, perceptible as a continuation of point 16, and the surrounding area in greater detail.") (emphasis added); 9:47-48 ("FIG. 4A illustrates a technique for moving a viewpoint radially toward an indicated POI on surface 50.") (emphasis added).

152. Since IP Innovation's proposed construction does not explain that the point of interest, or its motion, has been indicated by the user, I cannot agree with it.

153. I also disagree with IP Innovation's proposed construction because (similar to the case of the claim term "viewpoint motion") it refers to "a moving or displaced point of interest." As explained above, the difference between "motion" and "displacement" is subtle, but the terms are not identical. IP Innovation's reference to "displacement" in its construction adds both error

and ambiguity. The '785 patent is clear that the "motion" of the point of interest is a "motion" and not a "displacement." For example, the '785 patent states:

> The step in box 36 receives another signal set, this time requesting both POI and viewpoint motion. The step in box 38 responds by presenting an image that is perceptible as a view with the POI moved and with the viewpoint moved relative to the POI. The image presented in box 38 includes a surface that is perceptible as a continuation of the surface presented in box 30 and the moved POI is perceptible as a moved continuation of the previous POI, with the POI motion occurring on the surface.
>
> '785 Patent at 9:36-45 (emphasis added).

7. "radial motion" (claim 55)

Claim Term	**My Proposed Construction**	**IP Innovation's Proposed Construction**
radial motion (claim 55)	Perceived movement along a ray	Motion or displacement along one or more rays

a) Plain claim language

154. The plain claim language supports my construction.

155. Claim 55 identifies the specific single ray along which the claimed "radial motion" occurs. It recites "[t]he method of claim 52 in which the first viewpoint motion includes radial motion, the second viewpoint being displaced ***radially along a ray extending from the second point of interest through the first viewpoint***." ('785 patent at claim 55 (emphasis added)).

156. Those of ordinary skill in the art would understand that the "ray extending from the second point of interest through the first viewpoint" would be a straight line, a specific ray along which the second viewpoint is displaced during the course of the claimed "radial motion."

157. Claim 55 does not leave room for the claimed "radial motion" to take place along multiple rays, as the plaintiffs propose.

b) The Specification

158. The specification provides further support for my proposed construction of "radial motion," to mean "perceived movement along a ray." Specifically, although it states that "[r]adial motion' or 'radial displacement' is perceived as motion or displacement along one or more rays," the next sentence of the specification clarifies that "[a] ray extends from a 'radial source.'" ('785 patent at 7:55-57). Those of ordinary skill in the art would understand that each ray is a straight line that extends from its own radial source, which is a single point in three-dimensional space. As a result, this portion of the specification would underscore that when claim 55 recites "radial motion" along a specifically identified ray, the motion is along a single ray, or straight line, extending from a single radial source. Additionally, those of ordinary skill in the art would understand this passage to indicate that although a first radial motion can begin along a first ray, and then can change to be a second radial motion along a second ray, this would merely be an example of two instances of radial motion. To be "radial motion," the motion at any specific instance of time must be perceived as movement along a ray." This passage would not suggest to those of ordinary skill in the art that "radial motion" can take place across multiple rays in an unbounded fashion.

159. Figures 4A and 4B and the accompanying text of the specification illustrate this principle, and show that in the '785 patent, "radial motion " is "perceived movement along a ray." They therefore provide further support for my proposed construction. Figures 4A and 4B are shown below:

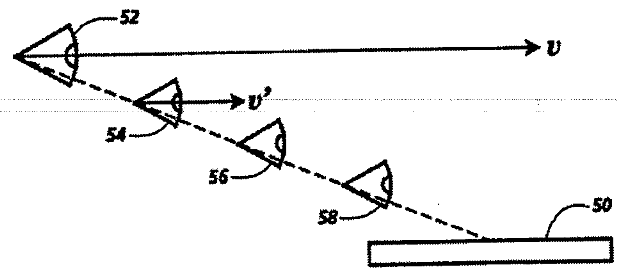


Fig. 4A

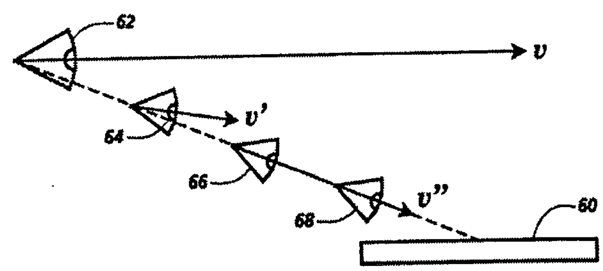


Fig. 4B

The text accompanying Figures 4A and 4B explains that Figures 4A and 4B illustrate radial motion:

> FIGS. 4A and 4B are plane views showing radial viewpoint motion along an asymptotic path toward a point of interest on a surface, with FIG. 4B also showing a centering operation.
>
> ('785 patent at 8:56-59).

It goes on to confirm that Figure 4A "illustrates a technique for moving a viewpoint radially toward an indicated POI on surface 50." (*Id.* at 9:47-48).

160. Figure 7 and the accompanying text again show radial motion along a ray, consistently with my proposed construction. Figure 7 is shown below:

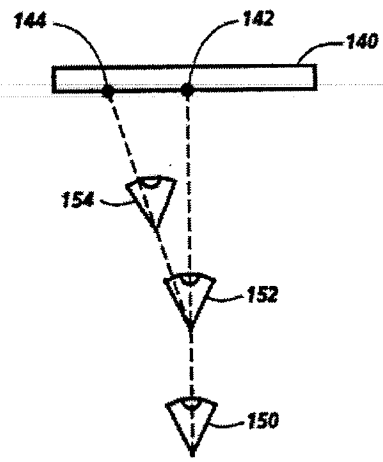


Fig. 7

The accompanying text states that "FIG. 7 is a plane view showing radial viewpoint motion with a point of interest motion on a surface." ('785 patent at 8:66-69). It makes clear that radial motion is perceived movement along a single ray, or straight line, defined by two points (here, the viewpoint and POI):

> FIG. 7 illustrates viewpoint motion together with point of interest motion. Surface 140 is perceptible in a three-dimensional workspace, and includes POI 142 and POI 144. From initial viewpoint 150, radial motion is requested toward POI 142, so that an image is presented from viewpoint 152 on the ray from POI 142 through viewpoint 150. Then, while the request for radial motion toward the POI continues, a request to move to POI 144 is also received, so that an image is presented from viewpoint 154 on the ray from POI 144 through viewpoint 152.
>
> ('785 patent at 12:9-19).

Those of ordinary skill in the art would understand from Figure 7 and the accompanying text that the radial source could change, thereby defining a different ray, but that "radial motion" refers to perceived movement along the ray. In other words, in this example, the requested radial motion is always along the ray, or single straight line, between the POI and the viewpoint. Indeed, the text explicitly identifies a first ray, starting a first point, along which first radial motion takes place ("on the ray from POI 142 through viewpoint 150") and then identifies a second ray, starting a second point, along which second radial motion takes place ("on the ray from POI 144 through viewpoint 152").

161. In light of the plain language of claim 55 and the specification, one of ordinary skill in the art would understand the claimed "radial motion" to mean "perceived movement along a ray."

8. "ray" (claim 55)

Claim Term	My Proposed Construction	IP Innovation's Proposed Construction
ray (claim 55)	A straight line extending from a radial source or point in a three-dimensional space	Extending from a radial source

162. A person of ordinary skill in the art would understand "ray" to mean "a straight line extending from a radial source or point in a three-dimensional space."

a) The plain claim language

163. The plain language of claim 55 supports my proposed construction. In claim 55, the radial source is a specific point in a three-dimensional space – "the second point of interest." ('785 patent at claim 55 ("[t]he method of claim 52 in which the first viewpoint motion includes radial motion, the second viewpoint being displaced radially along ***a ray extending from the second point of interest*** through the first viewpoint" (emphasis added)).

164. Claim 55 also makes clear that the ray of claim 55 extends from that source "through the first viewpoint." (*Id.*). As those of ordinary skill in the art would immediately recognize, the ray defined by the second point of interest and the first viewpoint will always be a straight line.

b) The specification

165. The specification also supports my proposed construction of "ray" as "a straight line extending from a radial source or point in a three-dimensional space."

166. Column 7 confirms that "[a] ray extends from a 'radial source.'" ('785 patent at 7:57). This confirms part of my construction, but leaves "radial source" undefined, and leaves unclear what, precisely, extends from that source to form the ray. Those same shortcomings apply to IP Innovation's proposed construction. The plain claim language (as described above) and the remainder of the specification (described immediately below) make clear that a "radial source" is a point in a three-dimensional space, and that a ray is the line that extends from the radial source, as my proposed construction recognizes.

167. In Figure 4A, "the ray along which radial motion occurs" is the straight line that "extends from the viewpoint through a POI on surface 50." ('785 Patent at FIG. 4 and 9:52-54). The same is true in Figure 7, with respect to each of the two points of interest. (*See id.* at FIG. 7 and 12:9-19 ("FIG. 7 illustrates viewpoint motion together with point of interest motion. Surface 140 is perceptible in a three-dimensional workspace, and includes POI 142 and POI 144. From initial viewpoint 150, radial motion is requested toward POI 142, so that an image is presented from viewpoint 152 ***on the ray from POI 142 through viewpoint 150***. Then, while the request for radial motion toward the POI continues, a request to move to POI 144 is also received, so that an image is presented from viewpoint 154 ***on the ray from POI 144 through viewpoint 152***." (emphasis added)).

c) The extrinsic evidence

168. The extrinsic evidence also supports my construction.

169. Specifically, the testimony of '785 patent inventor George Robertson and the inventors' *Rapid* article also support my proposed construction. Mr. Robertson testified that the *Rapid* article describes the '785 patent invention. (Robertson Tr. at 154:16-155:1).

170. The *Rapid* article explains that "[w]hen the user pushes a mouse button, the viewing transformation is inverted and a ray is cast into the 3D workspace. The closest object pierced by this ray determines the POI and a circle is drawn on the surface of the object as feedback to the user." (*Rapid*, p. 173, section 4, col. 1). Those of ordinary skill in the art would understand that the ray being cast is a straight line from the location of the viewpoint into the three-dimensional workspace.

171. Additionally, as shown by Computer Graphics, Macmillan Publishing Company, Francis S. Hill, Jr. (1990) and the McGraw-Hill Dictionary of Mathematics (1997), one of ordinary skill in the art would understand a ray to be a straight-line segment. In Section 4.4.1, Computer Graphics states, "A ray is 'semiinfinite. It starts at a point and extends infinitely far in a given direction (Figure 4.12c)." Also, the McGraw-Hill Dictionary of Mathematics defines "ray" as "A straight-line segment emanating from a point. Also known as a half line." See also the Mathematics Illustrated Dictionary, Franklin Watts (1989) at 190. Accordingly, one of ordinary skill would understand a ray to be a single line segment. While both parties agree that a ray extends from a radial source, a ray cannot be anything that extends from a radial source. For example, a pie-shaped section extending from a center is not a ray. As another example, a group of lines extending from a common point cannot be a single ray. As yet another example, curves or squiggles extending from a common point would also not be rays. Rather, as Computer

Graphics and the Dictionary of Mathematics make clear, a single ray cannot be more than a single line. Since IP Innovations' proposed construction encompasses things like pie-shaped, or wedge-shaped, sections, groups of lines, curves and squiggles, it cannot be correct.

X. HEARING AND TRIAL EXHIBITS

172. At any hearing that may be held on claim construction or at trial, I may rely on visual aids and demonstrative exhibits that demonstrate the bases of my opinions. Examples of these visual aids and demonstrative exhibits may include, for example, claim charts, patent drawings, excerpts from patent specifications, file histories, interrogatory responses, deposition testimony, deposition exhibits, published articles, and dictionaries, as well as optical components, charts, diagrams, videos, and animated or computer-generated video.

173. I have not yet prepared any exhibits for use at trial as a summary or support for the opinions expressed in this report, but I expect to do so in accordance with the Court's scheduling orders.

XI. SUPPLEMENTATION OF OPINIONS

174. I expect to testify regarding the matters set forth in this declaration, if asked about these matters by the Court or the parties' attorneys.

175. I understand that discovery is ongoing in this case. I therefore reserve the right to adjust or supplement my opinions after I have had the opportunity to review deposition testimony or in light of additional documents that may be brought to my attention. I also reserve the right to adjust or supplement my analysis in light of any critique of my report or alternative opinions advanced by or on behalf of Plaintiffs.

I declare under penalty of perjury that the foregoing is true and correct.

Dated this 8th day of September, 2009 in Philadelphia, Pennsylvania.

NORMAN I. BADLER, PhD