

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner

v.

MAXELL, LTD.,
Patent Owner

IPR2020-00408
Patent 6,430,498

DECLARATION OF MICHAEL D. KOTZIN

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I, Dr. Michael D. Kotzin, hereby declare the following:

I. INTRODUCTION

1. My name is Michael D. Kotzin.
2. I am making this declaration at the request of Apple Inc. in the matter of the *Inter Partes* Review of U.S. Patent No. 6,748,317 (the “’317 Patent”), U.S. No. 6,430,498 (the “’498 Patent”), and U.S. No. 6,580,999 (“’999 Patent”) (collectively the “Challenged Patents”) each of which issued to Maruyama et al.¹
3. I am being compensated for my work in this matter at the rate of \$300/hour. My compensation in no way depends upon the outcome of this proceeding.
4. As part of my work and in forming my opinions in connection with this proceeding, I have reviewed the following materials, each of which I believe experts in my field would reasonably rely upon in forming opinions regarding the subject matter of this proceeding:

- U.S. Patent No. 6,430,498 (the “’498 Patent”) (Ex. 1001)
- File History for U.S. Patent 6,430,498 (the “’498 Patent File History”) (Ex. 1002);
- U.S. Patent 6,067,502 to Hayashida *et al.* (“*Hayashida*”) (Ex. 1004);
- Cyberguide: A Mobile Context-Aware Tour Guide by Abowd et al. (“*Abowd*”) (Ex. 1005);
- JPH09-311625 to Ikeda (Ex. 1006)
- English Translation of Ikeda (“*Ikeda*”) (Ex. 1007)
- CV of Michael D. Kotzin (Ex. 1008)

¹ Appendix A of this Declaration includes a roadmap for each patent showing which paragraphs discuss each limitation

- Munford Declaration (Ex. 1009)
- *Maxell Ltd. v. Apple Inc.*, 5:19-cv-00036, No. 1 (E.D. Tex. Mar. 15, 2019) (“*Maxell Complaint*”) (Ex. 1010)
- *Maxell Ltd. v. Apple Inc.*, 5:19-cv-00036, No. 99 (E.D. Tex. Nov. 16, 2019) (“*Joint Claim Construction Statement and Prehearing Statement*”) (Ex. 1011)
- *Maxell Ltd. v. Apple Inc.*, 5:19-cv-00036, No. 136 (E.D. Tex. Nov. 18, 2019) (“*Opening Claim Construction Brief*”) (Ex. 1012)
- *ZTE Corporation et al. v. Maxell, Ltd.*, IPR2018-00235, Paper 9 (Ex. 1013)
- *ASUSTeK Computer Inc. et al., v. Maxell, Ltd.*, IPR2019-00071, Paper 7 (P.T.A.B. Mar. 14, 2019) (“*the '498 IPR*”) (Ex. 1014)
- *Maxell, Ltd. v. ASUSTeK Computer Inc.*, et al., 3:18-cv-01788, No. 113-1 (N.D. Cal. Aug. 27, 2018) (Ex. 1015)
- Taubes, The Global Positioning System, The Role of Atomic Clocks, Beyond Discovery, National Academy of Science (1997) (“*Taubes*”) (Ex. 1016)
- A Brief History of Satellite Navigation, Stanford University News Service (June 13, 1995) (“*A Brief History of Satellite Navigation*”) (Ex. 1017)
- Georgiadou et al., The Issue of Selective Availability (“*Georgiadou*”) (Ex. 1018)
- Thompson, Global Positioning System: The Mathematics of GPS Receivers, Mathematics Magazine (“*Thompson*”) (Ex. 1019)
- U.S. Patent No. 5,589,835 to Gildea et al. (“*Gildea*”) (Ex. 1020)
- USRE42,927 to Want et al. (“*Want*”) (Ex. 1021)
- Tamura et al., Toward Realization of VICS – Vehicle Information and Communications System (1993) (“*Tamura*”) (Ex. 1022)
- Intelligent Transportation Systems Benefits: 1999 Update, U.S. Department of Transportation (May 28, 1999) (“*ITS Benefits*”) (Ex. 1023)
- Teruyuki, et al., Pedestrian Information and Communication Systems for Visually Impaired Persons, 2001 Conference Proceedings, available at <http://www.csun.edu/~hfdss006/conf/2001/proceedings/0148ohkubo.htm> (“*Teruyuki*”) (Ex. 1024)
- JPH10-197277 to Maruyama et al. (Ex. 1025)
- English translation of Maruyama (“*Maruyama*”) (Ex. 1026)
- NavTalk Owner’s Manual and Reference Guide (Rev. A) (January 1999) (“*Garmin NavTalk*”) (Ex. 1027)
- JPH07-280583 to Suzuki (Ex. 1028)
- English Translation of Suzuki (“*Suzuki*”) (Ex. 1029)

- U.S. Patent No. 6,525,768 to Obradovich (“*Obradovich*”) (Ex. 1030)
- U.S. Patent No. 5,781,150 to Norris (“*Norris*”) (Ex. 1031)
- Trimble unveils GPS for small mobile devices, *Digital Photography Review*, (June 22, 2000), available at <https://www.dpreview.com/articles/7140605260/trimblegps> (“*Digital Photography Review*”) (Ex. 1032)
- Trimble GPS Technology Enables Seiko Epson Communication Device and Wireless Data Service, Trimble News Release (November 8, 1999) (“*Trimble News Release*”) (Ex. 1033)
- JPH08-285613 to Akiyama et al. (Ex. 1034)
- English Translation of Akiyama (“*Akiyama*”) (Ex. 1035)
- JPH05-264711 (Ex. 1036)
- English Translation of the ’711 Patent (the “*711 Patent*”) (Ex. 1037)
- “A Collaborative Wearable System with Remote Sensing” by Bauer et al. (“*Bauer*”) (Ex. 1038)

5. In forming the opinions expressed below, I have considered:

- a) The documents listed above,
- b) The relevant legal standards, including the standard for obviousness provided in *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007), and
- c) My knowledge and experience based upon my work in this area, as described below.

II. QUALIFICATIONS AND PROFESSIONAL EXPERIENCE

6. I am a technical expert and do not offer any legal opinions. However, I have been informed about certain legal principles regarding patentability and related matters under United States patent law, which I have applied in performing my analysis and arriving at my technical opinions in this matter.

7. I received a B.S. in chemistry and a B.S. in electrical engineering from the University of Illinois in 1975, an M.S. in electrical engineering from Northwestern University in 1977, and a Ph.D. in electrical engineering and computer science from Northwestern University in 1981. During my graduate study at Northwestern (1975-1981), I performed research on communications and signal processing. My research dissertation was titled “Short Range Communication Using Diffusely Scattered Infrared Radiation.”

8. My knowledge and experience to address the '317, '498 and '999 Patents arises from activities and projects I was involved with over my career at Motorola. Specifically, I have been deeply involved in the technologies of location and positioning, GPS, handheld devices and infrared communications.

9. With regard to location and positioning, I designed and built a demonstration dead reckoning vehicle location system based on the use of a novel solid state rate gyroscope. The successful results of this activity were published and presented at an IEEE conference. The presentation included a video showing real-time map tracking of a vehicle in a Chicago suburb.

10. Between 1989 and 1998, I was the Vice President of Technical Staff and Director of Research and Advanced Technology in Motorola's Cellular Infrastructure and Networks division. Between 1998 and 2007, I transitioned to the Office of the Chief Technology Officer for Motorola's Mobile Devices division. In

these roles, I provided leadership and strategic directions for the adoption and creation of new technology for cellular base station and handheld devices.

11. Between 2006 and 2009, I was the Vice President of Technical Staff in the Corporate Law Department of Motorola's Patent Operations division. In this role, I created technology portfolio strategy across businesses including quantitative goals for new and retained intellectual property assets. I also managed processes and corporate-wide teams related to creating and maintaining patent portfolios.

12. Since 2009, I have been the President of MDK Consulting, Inc., where I regularly provide technical consulting services on all aspects of wireless systems, products and technology.

13. Over the past several decades I have performed extensive research on various aspects of systems, devices, and networks that acquire, store, process and transmit information, including for the purposes of navigation. My research has addressed software, algorithms, hardware, networking, protocols and other aspects of these systems and devices, and has included work on wireless mobile devices and systems, signal processing and communications, hardware design methodologies, and cybersecurity. For example, in the 1970s and 1980s, I worked on technologies that formed the basis and was essential to several new digital radio systems (cellular, public safety, and private mobile).

14. I am an inventor on approximately 133 issued U.S. patents and over

500 issued patents worldwide in areas including signal processing, provision of navigation information, communications, GPS, and wireless systems. I have published approximately 20 technical articles in peer-reviewed engineering journals and conference proceedings.

15. Since the availability of GPS, I have been involved in innovating improvement techniques and applications utilizing its capabilities in radio infrastructure and handsets. I was actively involved in investigating the inclusion of positioning technologies in Motorola devices. Evidence of some of my relevant GPS experience is apparent from an exemplary subset of US patents of which I am a named inventor:

- Infrastructure transceiver and method for configuration based on location information (US 5864764)
- Method and apparatus for GPS time determination (US6323804)
- GPS enabled mobile stations and location methods therefor (US6427077)
- Method and apparatus for location determination of a cellular telephone (US6438381)
- Method and device for choosing a system selection algorithm that is location dependent (US6954649)
- Emergency deployable GPS antenna (US7098855)
- Method and apparatus for storing a message for playback during a user-

initiated emergency telephone call from a wireless device (US8374574)

16. My work in the use of infrared radiation for the purposes of communication is extensive. My Northwestern Ph.D. dissertation, entitled, Short Range Communications Using Diffusely Scattered Infrared Radiation, was based on independent research as well as activities performed at Motorola. As part of this investigation, I designed and built a demonstration infrared in-building communication system providing two full duplex channels of digitized speech. Results were published and presented at an IEEE conference.

17. Of my career in Motorola, more than 30 years were spent in research and product development groups innovating in areas related to private and public radio systems. Nearly 10 of those years was specifically dedicated to improvements targeted to handheld cellular devices within the handset division.

18. In addition to my professional experience, I have previously taught courses in electrical engineering at Northwestern University as an Adjunct Professor. I have also served as Chairman and member of numerous Motorola patent committees.

19. My curriculum vitae, attached to this declaration as Exhibit 1008, lists my publication record in archival journals, international conferences, and workshops.

20. Based on my experience and education, I believe that I am qualified to opine as to the knowledge and level of skill of one of ordinary skill in the art at the time of the alleged invention of the Challenged Patents (which I further describe below) and what such a person would have understood at that time, and the state of the art during that time.

III. RELEVANT LEGAL STANDARDS

A. Obviousness

21. I have been asked to provide my opinions regarding whether the claims 1-3, 5, 10-15, 17, and 18 of the '317 Patent; claims 1, 3-5, 7-11, and 13 of the '498 Patent; and claims 1-6 of the '999 Patent and (collectively, the "Challenged Claims") would have been obvious to a person having ordinary skill in the art ("PHOSITA") at the time of the alleged invention, in light of the prior art.

22. I have been informed and understand that a patent claim is not patentable under 35 U.S.C. § 103 if the differences between the patent claim and the prior art are such that the claimed subject matter as a whole would have been obvious at the time the claimed invention was made to a person having ordinary skill in the art to which the subject matter pertains. Obviousness, as I have been informed, is based on the scope and content of the prior art, the differences between the prior art and the claim, the level of ordinary skill in the art, and, to the extent that they exist

and have an appropriate nexus to the claimed invention (as opposed to prior art features), secondary indicia of non-obviousness.

23. I have been informed that whether there are any relevant differences between the prior art and the claimed invention is to be analyzed from the view of a person of ordinary skill in the art at the time of the invention. As such, my opinions below as to a person of ordinary skill in the art are as of the time of the invention, even if not expressly stated as such; for example, even if stated in the present tense.

24. In analyzing the relevance of the differences between the claimed invention and the prior art, I have been informed that I must consider the impact, if any, of such differences on the obviousness or non-obviousness of the invention as a whole, not merely some portion of it. The person of ordinary skill faced with a problem is able to apply his or her experience and ability to solve the problem and also look to any available prior art to help solve the problem.

25. An invention is obvious if a person of ordinary skill in the art, facing the wide range of needs created by developments in the field, would have seen an obvious benefit to the solutions tried by the applicant. When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, it would be obvious to a person of ordinary skill to try the known options. If a technique has been used to improve one device, and a person of

ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique would have been obvious.

26. I have been informed that a precise teaching in the prior art directed to the subject matter of the claimed invention is not needed. I have been informed that one may take into account the inferences and creative steps that a person of ordinary skill in the art would have employed in reviewing the prior art at the time of the invention. For example, if the claimed invention combined elements known in the prior art and the combination yielded results that were predictable to a person of ordinary skill in the art at the time of the invention, then this evidence would make it more likely that the claim was obvious. On the other hand, if the combination of known elements yielded unexpected or unpredictable results, or if the prior art teaches away from combining the known elements, then this evidence would make it more likely that the claim that successfully combined those elements was not obvious.

27. I have been informed that hindsight must not be used when comparing the prior art to the invention for obviousness.

28. Obviousness may also be shown by demonstrating that it would have been obvious to modify what is taught in a single piece of prior art to create the subject matter of the patent claim. Obviousness may be shown by showing that it would have been obvious to combine the teachings of more than one item of prior

art. In determining whether a piece of prior art could have been combined with other prior art or combined with or modified in view of other information within the knowledge of one of ordinary skill in the art, the following are examples of approaches and rationales that may be considered:

- Combining prior art elements according to known methods to yield predictable results;
- Simple substitution of one known element for another to obtain predictable results;
- Use of a known technique to improve similar devices (methods, or products) in the same way;
- Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
- Applying a technique or approach that would have been “obvious to try” (choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success);
- Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art; or

- Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

29. I have been informed that even if a prima facie case of obviousness is established, the final determination of obviousness must also consider “secondary considerations” if presented. In most instances, the patentee raises these secondary considerations of non-obviousness. In that context, the patentee argues an invention would not have been obvious in view of these considerations, which include: (a) commercial success of a product due to the merits of the claimed invention; (b) a long-felt, but unsatisfied need for the invention; (c) failure of others to find the solution provided by the claimed invention; (d) deliberate copying of the invention by others; (e) unexpected results achieved by the invention; (f) praise of the invention by others skilled in the art; (g) lack of independent simultaneous invention within a comparatively short space of time; (h) teaching away from the invention in the prior art. I have been informed and further understand that secondary considerations evidence is only relevant if the offering party establishes a connection, or nexus, between the evidence and the claimed invention. The nexus cannot be to prior art features. The establishment of a nexus is a question of fact.

B. Claim Construction

30. I have been informed by counsel that the first step in an unpatentability analysis involves construing the claims, as necessary, to determine their scope. Second, the construed claim language is then compared to the disclosures of the prior art. I am informed that claims are generally given their ordinary and customary meaning as understood by one of ordinary skill in the art at the time of the invention, in light of the patent specification. For purposes of this proceeding, with the below noted exceptions, I have applied the plain and ordinary meaning of all remaining claim terms.

31. I have been informed that a special claim construction analysis is applied to claim limitations drafted in means-plus-function format pursuant to 35 U.S.C. § 112, ¶ 6. When construing a means-plus-function limitation, I understand that the claimed function must first be identified and then the corresponding structure that actually performs the claimed function must be identified from the specification. A means-plus-function claim term is limited to the disclosed structures and equivalents.

32. I have been informed that where the disclosed structure for a means-plus-function limitation is a computer, or microprocessor, programmed to carry out an algorithm, the corresponding structure is not the general purpose computer or processor, but rather is a special purpose computer or processor programmed to

perform the disclosed algorithm. In other words, I understand the disclosed algorithm is part of the corresponding structure for computer-implemented means-plus-function limitations.

33. I have been informed that where a patent specification fails to adequately disclose corresponding structure for a means-plus-function claim limitation, that claim is invalid as indefinite pursuant to 35 U.S.C. § 112, ¶ 2. But I also understand that indefiniteness may not be challenged in an Inter Partes Review. Accordingly, though it is my opinion that certain means-plus-function claim limitations in the Challenged Claims of the Challenged Patents may not have sufficiently described corresponding structure, I have assumed they are definite and have assessed their validity based on the structure actually disclosed.

34. I have reviewed the proposed claim constructions in Section III(D) of the Petition and have applied these constructions in my analyses herein.

IV. OPINION

A. Level of Skill of a Person Having Ordinary Skill in the Art

35. I am familiar with the knowledge and capabilities of persons of ordinary skill in portable navigation systems in the period around July 1999, the earliest claimed priority date for each of the Challenged Patents. I base this on my experience with personal navigation systems.

36. The level of ordinary skill in the art that one would need in order to have the capability of understanding the scientific and engineering principles applicable to the Challenged Patent is (i) a Bachelor degree (or higher degree) in an academic area emphasizing electrical engineering or computer engineering or equivalent and (ii) at least one year of experience working in the field of location- or sensor-based human-computer interaction. Additional industry experience or technical training may offset less formal education, while advanced degrees or additional formal education may offset lesser levels of industry experience.

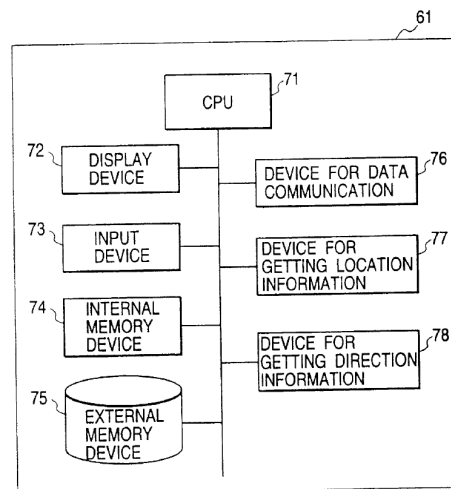
B. Overview of the Challenged Patents

37. This overview is not meant to describe my full understanding of the Challenged Patents, but is only used to generally describe the relevant functionalities of the Challenged Patents. For the purposes of this summary, I cite to the relevant cites of the '317 Patent, which has an identical specification to the remaining Challenged Patents.

38. The Challenged Patents generally describes a portable navigation device for pedestrian use. *'317 Patent* (Ex. 1001), 1:16–18. The portable navigation device obtains terminal information, which includes location information and direction information. *Id.* at 2:62–65. Location information, which is represented by a latitude/longitude or coordinates and an altitude is measured through the use of a GPS as well as an infrared ray sensor. *Id.* at 4:14-19. While direction information,

which represents the leading direction of the portable terminal or the orientation of the display, is measure with a compass, a gyro, or another sensor such as a clinometer. *Id.* at 4:23-27. The user is able to input a desired destination and the portable terminal will obtain and display information such as route guidance for reaching a destination. *Id.* at Abstract, 3:5–42; Fig. 5. In some cases, this destination may be the location of the user of another portable terminal. *Id.* at 8:45-48.

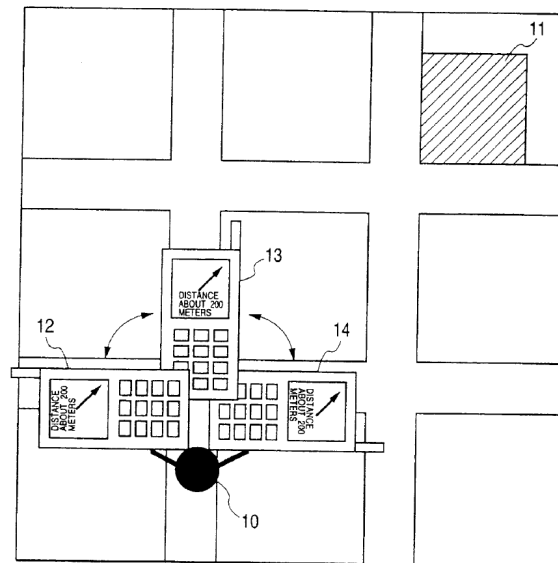
FIG. 10



Id. at Fig. 10.

39. The display may be provided in a manner so that the display changes according to a user's orientation as illustrated below:

FIG. 1



Id. at Fig. 1; *see also id.* at Figs 3(a) and 3(b). In some situations, this display may be in the form of a bent line representing the route to the destination. *See id.* at Figs. 3(e) and (f). While in other situations the direction of a destination is indicated with an orientation of a line that always points in the direction of the destination. *Id.* at Abstract, Figure 1.

C. Background of the Technology

40. I was asked to briefly summarize the background of the prior art from the standpoint of a POSITA prior to the assumed date of invention of July 12, 1999. For the convenience of the reader, I refer to the Apple Exhibit page number located at the lower right-hand side for any non-patent or patent-application reference cited herein.

i. Portable Navigation System Position Detection

41. Positioning Systems have been known well-before July 12, 1999. Originally developed for military applications in the 1970s, positioning systems expanded to the public when the manufacturing companies recognized the market potential for such devices, including air, sea, and vehicle navigation, surveying, and tracking.² As technology progressed and various components were manufactured to be smaller and less expensive, these were adapted into portable handheld receivers able to determine a user's position anywhere on the globe.³ At least position and orientation are the two starting points for personal navigation systems.⁴

42. The primary means of obtaining position, or latitude and longitude, was the Global Positioning System ("GPS"). As a compromise for the release of this military technology, civilian GPS's included a feature called Selective Availability, which added intentional, time varying errors of up to 100 meters to the publicly available navigation signals.⁵ Selective Availability was eventually discontinued, but prior to the discontinuation civilian use required a correction method in order to increase the accuracy of the GPS.⁶

² See *Taubes* (Ex. 1016), p. 7.

³ *A Brief History of Satellite Navigation* (Ex. 1017).

⁴ *Abowd* (Ex. 1005), 421.

⁵ *Taubes* (Ex. 1016), at p. 7; see also *Georgiadou* (Ex. 1018), p. 2.

⁶ *Thompson, generally* (Ex. 1019) (describing DGPS techniques).

43. In order to account for the degraded accuracy, these devices used another accuracy improvement technique known as differential GPS (“DGPS”). DGPS used signals from local base station beacons, using radio or infrared signals to correct the GPS signal, providing more accurate position information.⁷ The location of the base station beacon is fixed and already known.⁸ Equipment at the base station computes its current “GPS position,” compares this with its known location, and continuously broadcasts a correction term.⁹ The DGPS receiver, located in the portable terminal for example, receives the current correction and applies this to its computed position.¹⁰

44. These signals, including both infrared and radio waves, were used for other purposes beyond GPS correction. For example, in Japan, a Vehicle Information and Communication System (“VICS”) utilized signals such as infrared, microwaves, FM signals to deliver traffic and travel information to road vehicle drivers.¹¹ This information included traffic congestion data and alternate route calculations.¹² By 1998, similar systems in Japan also provided support for pedestrians including

⁷ *Id.* at 268-69; *see also Gildea* (Ex. 1020) at 6:54-67 (teaching the use of infrared signals for local GPS correction), Fig. 1; *Want* (Ex. 1021) at 6:15-7:3, Fig. 5 (same).

⁸ *Thompson* (Ex. 1019), 268-269.

⁹ *Id.*

¹⁰ *Id.*

¹¹ *Tamura* (Ex. 1022), p. 77.

¹² *ITS Benefits* (Ex. 1023).

pedestrian route guidance and vehicle-pedestrian accident avoidance.¹³ For example, Pedestrian Information and Communication System (“PICS”) used the same infrared technology as VICS, but was aimed at assisting pedestrians.¹⁴

45. This information could also be used as a replacement for GPS signals in areas where GPS signals were weak or unavailable. For example, when surrounded by tall buildings or in tunnels, GPS signals would not be received. However, such infrared signals could be used instead. In fact, some portable handheld devices utilized infrared signals to allow for navigation indoors where GPS signals typically are not available.¹⁵

46. In addition to position, the orientation was an important piece of information used by these devices. Due to cost, this information was often inferred based on the direction of travel in commercial devices. However, another way of determining orientation was through the use of devices such as a compass or gyroscope.¹⁶ Because these portable navigation devices were often used for recreational activities such as hiking, orientation determination was especially

¹³ *Tamura* (Ex. 1022), p. 75-76 (describing route guide function), 77 (teaching dynamic route guidance or simplified route guidance).

¹⁴ *Teruyuki* (Ex. 1024).

¹⁵ *Abowd* (Ex. 1005), 425, 432.

¹⁶ *Maruyama* (Ex. 1026), [0021], [0005]; *see also Norris* (Ex. 1031) (teaching inclusion of a compass for determining orientation), Abstract; 7:25-29; *Abowd* (Ex. 1005), 422 (teaching compass and inertial navigation system for determining orientation).

valuable because while hiking, users have the ability to walk about freely, rather than be limited by roads as vehicles were. And further, such devices would allow a hiker to determine orientation while standing still.

47. In order to determine orientation of a navigation device, these devices would use some type of reference bearing. One known reference bearing for measuring the orientation of the device was to determine the orientation of the display of the device.¹⁷ Another manner getting the direction based on the direction the direction pointed by the body of the device, assuming a fixed top and bottom.¹⁸

ii. Navigation to a Desired Destination

48. In order to navigate to a destination, both vehicle navigation device users and portable navigation device users needed some type of input device. Users were typically able to input a destination into the device using a keypad or touchscreen. Initially, such destinations were stored on the device itself. However, as technology progressed, small portable devices were able to perform a greater

¹⁷ *Maruyama* (Ex. 1026), [0007] (“It is possible to use display means capable of displaying the indication direction as the conveyance means, and the bearing detection means can grasp the orientation of the display means as the reference bearing, and a display such as an arrow or forward, back, left, and right may be used to show a relative indication direction.”).

¹⁸ *Suzuki* (Ex. 1028), [0006] (“[T]he map drawing means coincides the map information stored in the map information storage means with the actual orientation based on the azimuth of the main apparatus body detected by the main body-direction detection means and draws on the display means.”);

array of functions, including server connectivity.¹⁹ Such access was particularly desirable for portable navigation system users to access travel information. For example, as previously mentioned, navigation systems were already used to connect to servers with the VICS system to obtain travel information. *See* ¶ 44, *supra*. With this connectivity, users could access additional information including desirable destinations and detailed information about that destination.

49. Another feature that was often implemented in portable positioning systems was the ability to track other users in order to navigate to the other user. Such features were useful in military operations.²⁰ Eventually, these features were also used in commercial embodiments for civilians as well.²¹ The Garmin NavTalk included such a feature. The Garmin NavTalk could transmit about a user's geographic location to another device using DTMF tones.²² The NavTalk could also receive such information and plot the information allowing the user to navigate to that location.²³ In this situation, the location coordinates of the other user serve as a destination.²⁴ The Seiko Epson Locatio also included this feature. The Seiko Epson Locatio was promoted as the first combination PDA, wireless phone, personal

¹⁹ *Obradovich* (Ex. 1030), 20:13-24, 27:5-24.

²⁰ *Norris* (Ex. 1031), Abstract; *see also id.* at 6:49-57, Figs. 4 and 10.

²¹ *Maruyama* (Ex. 1026), [0009], [0037]; *see also Abowd* (Ex. 1005), 6.

²² *Garmin NavTalk* (Ex. 1027), p. 71; *see also id.* at p. 65 (discussing remote querying of device by another user).

²³ *Id.*

²⁴ *Id.* at p. 59.

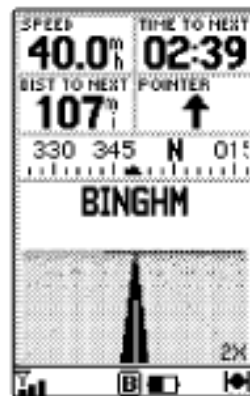
navigator and digital camera capable of accessing the Internet.²⁵ Through this Internet connection, users could access the location information of other users through the i-Point Network.²⁶

iii. Display in Navigation Devices

50. Personal navigation devices utilized this present position information and desired destination to generate a display to assist the user with navigation to the desired location. Some navigation devices provided simple displays such as an arrow oriented so as to point to the destination as depicted below,²⁷ while other displays showed arrows oriented so as to depict the next turn,²⁸ both of which are depicted below:



Compass Page



Highway Page
Selectable Data Fields

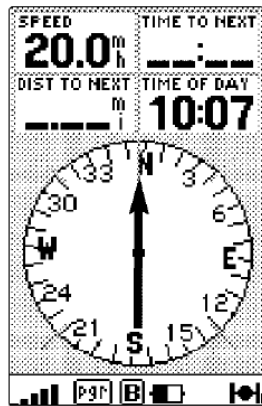
²⁵ *Digital Photography Review* (Ex. 1032).

²⁶ *Trimble News Release* (Ex. 1033).

²⁷ *Garmin NavTalk* (Ex. 1027), p. 19 (showing Compass page); *see also Maruyama* (Ex. 1026), [0005], [0015]-[0017], Figs. 2-4.

²⁸ *Garmin NavTalk* (Ex. 1027), p. 38 (showing pointer on Highway Page).

51. Additionally, as seen in the images above, the distance to the next turn or to the actual destination was frequently displayed as a number as depicted below.²⁹



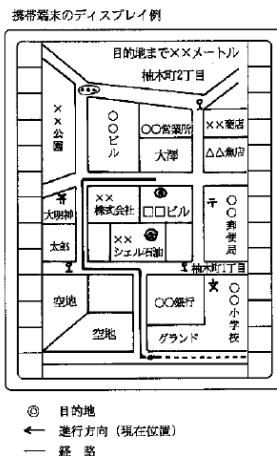
Compass Page



Highway Page

52. In addition to the simple figures, these displays often also showed an overall, or full, route (e.g., a bent line corresponding to the roads along the route) as shown below.³⁰

【図 7】



²⁹ *Id.* at p. 19.

³⁰ *Akiyama* (Ex. 1035), Fig. 7.

53. Symbols representing the user, destinations, and starting points were often included on the display.³¹ For example, the Garmin NavTalk used various symbols to mark waypoints and a pointer icon to depict the user's present position.³²



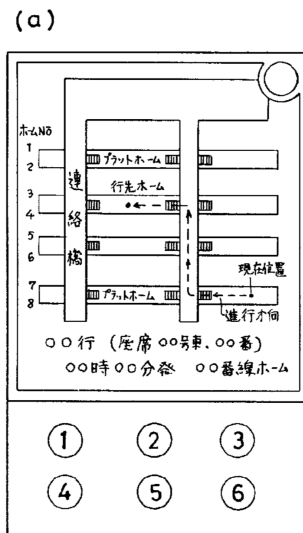
Choose from a list of symbols to help you recognize a waypoint feature

These symbols would be found along a line that represented the actual route that the user should follow as shown below.³³

³¹ *Abowd* (Ex. 1005), 424, 425, 429, Fig. 10; *see also* '711 Patent (Ex. 1037), Fig. 8(a) (showing symbols for destination and user position); *Akiyama* (Ex. 1035) [0011]-[0012], Fig. 7 (same).

³² *Garmin NavTalk* (Ex. 1027), p. 19 ("Your present position is identified by a pointer icon...Nearby waypoints are depicted on the map with any one of over 40 different symbols..."); *see also id.* at p. 33, 35.

³³ '711 Patent (Ex. 1037), Fig. 8(a); *see also Akiyama* (Ex. 1035), Fig. 7 (also showing user position symbol along route line).



Often this information would also be superimposed over a map of the surrounding area.³⁴

54. Additional information would be included on these maps including the arrows depicting the direction of the route.³⁵ Additionally, some devices distinguished between the length of the route that had been traveled by the user with different patterns or colors.³⁶

55. Some portable devices also adopted a head up display feature that was common in vehicles. For example, the Garmin NavTalk featured a track up display

³⁴ *Akiyama* (Ex. 1035), Fig. 7; *see also* '711 Patent (Ex. 1037), Figs. 8(a) and (b) (showing map with surrounding area information); *Garmin NavTalk* (Ex. 1027), p. 59 (same).

³⁵ '711 Patent (Ex. 1037), Figs. 8(a) and (b); *see also* *Akiyama* (Ex. 1035), Fig. 7.

³⁶ *Akiyama* (Ex. 1035), Fig. 7.

where the map displayed to a user was automatically oriented to keep the user's current direction of travel at the top of the screen.³⁷

D. Hayashida in View of the Knowledge of a PHOSITA

i. Overview of *Hayashida*

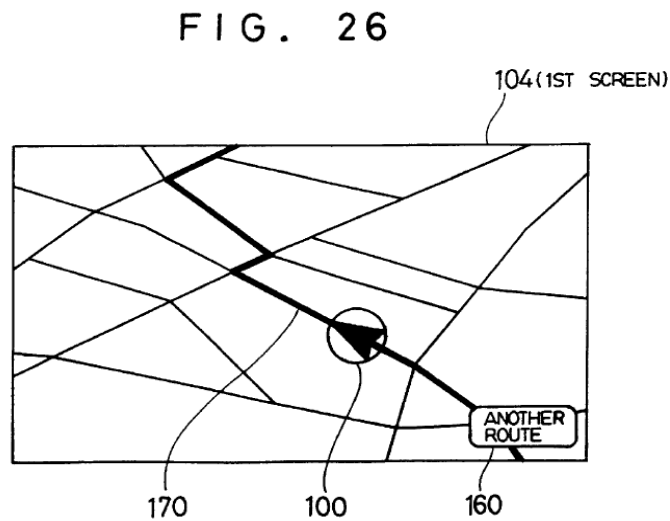
56. U.S. Patent 6,067,502 to Hayashida et al. ("*Hayashida*") relates to a navigation system. *See Hayashida* (Ex. 1004) at Abstract. While *Hayashida* describes this navigation device in a vehicle context, *Hayashida* explains that this device may be applied to a portable carrying-type device for pedestrian uses such as hiking or traveling. *See Hayashida* (Ex. 1004), 76:13-20. A PHOSITA would have understood that the following features and functionalities would have been applicable to both *Hayashida*'s vehicle embodiment and its pedestrian embodiment.

57. *Hayashida* teaches a navigation terminal that includes present position detector 20, which outputs data for detecting the present position of the car. *Hayashida* (Ex. 1004), 6:65-67. The present position detector includes a GPS and infrared ray sensor. *Hayashida* (Ex. 1004), 7:50-54 (teaching GPS receiver 25 and beacon receiver 26). Present position detector 20 also includes a device for determining direction of progress of the user. *Hayashida* (Ex. 1004), 7:28-42. A user

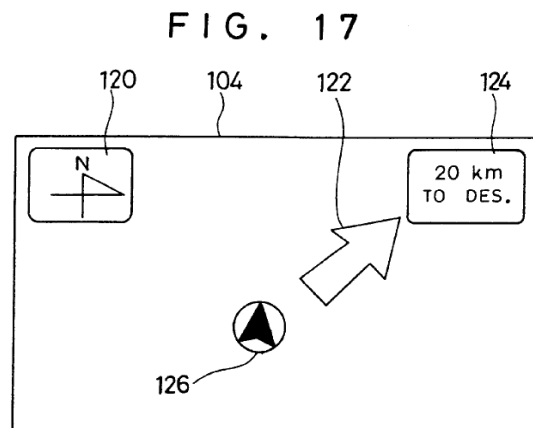
³⁷ *Garmin NavTalk* (Ex. 1027), p. 33; *see also id.* at p. 19 (teaching compass with arrow always pointing to destination); *Ikeda* (Ex. 1007), [0072]-[0073], Fig. 15; *Maruyama* (Ex. 1026), [0015]-[0017], Figs. 2-4 (showing an arrow which always points to the destination); *'711 Patent* (Ex. 1037), [0021]-[0023], Fig. 5 (showing a head up map).

is able to enter in a desired destination and the device will determine a route from the user's position, which is based on the position information, to the desired destination. *Id.* at 8:28-31.

58. *Hayashida* teaches that this information can be displayed as a route, which is shown below:



Id. at Fig. 26. *Hayashida* also describes a simple figure display as depicted below:



Id. at Fig. 17.

59. *Hayashida* is within the field of endeavor of the Challenged Patents. Like the Challenged Patents, *Hayashida* is related to a small portable “carrying-type navigation device” for pedestrians which includes both wireless data connectivity and satellite and land-based beacon positioning; therefore, *Hayashida* is within the same field of endeavor as the Challenged Patents. *Compare id.* at 7:60-8:8, 76:13-20 *with* ’317 Patent (Ex. 1001) at 2:36-61.

60. Further, *Hayashida* is reasonably pertinent to at least one problem with which the Challenged Patents were concerned. Specifically, *Hayashida* is concerned with displaying various position, destination, and direction information in a manner that the user can clearly grasp. *See Hayashida* (Ex. 1004) at 58:37-43; *see also id.* at 50:64-51:2; *compare with* ’317 Patent (Ex. 1001) at 6:19-20 (“The information is thus displayed more easily for the walker to understand.”); *see also id.* at 10:29-34.

ii. *Hayashida*’s Position Determination

- a. Limitations [1(a)] and [10(a)] of the ’317 Patent; limitations [1(a)], [5(a)], and [10(a)] of the ’498 Patent; and limitations [1(a)], [5(a)], and [6(a)] of the ’999 Patent: “a device for getting location information...”**

61. *Hayashida* teaches a device for getting location information of a portable terminal. Specifically, *Hayashida* teaches that a GPS is used to obtain latitude and longitude coordinates, which are corrected for accuracy by information from data transmitter receiver 26. *See Hayashida* (Ex. 1004), 7:66-8:8. These functions are carried out by a CPU. *See id.* at 6:49-47; 6:65-67. *Hayashida* explains

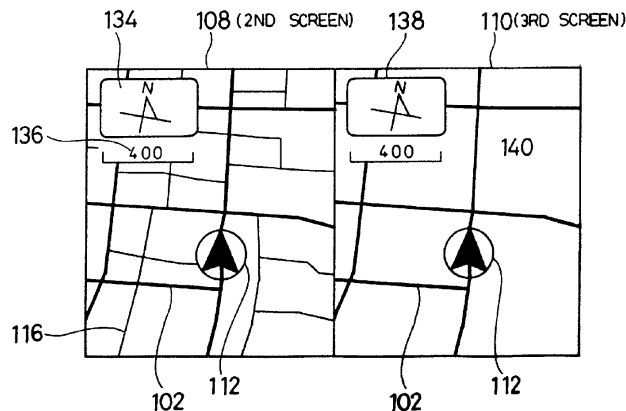
that data transmitter receiver 26 may be a beacon receiver, such as a VICS beacon receiver. *Id.*; *see also id.* at 7:50-54. As discussed above, a PHOSITA would have understood that the VICS system employed infrared ray sensors to perform data communication. Accordingly, *Hayashida* teaches a CPU, GPS, and infrared ray sensor to perform the function of getting the location of a portable terminal.

62. It would have been obvious to that such features would be included in a pedestrian device. At the time of the invention of the Challenged Patents, Selective Availability was still employed and therefore position information from GPS would not have provided an accurate position. A PHOSITA would have recognized that some form of DGPS would have been required. Additionally, a PHOSITA would have recognized that this supplemental positioning information would have been particularly beneficial in urban environments with tall structures that were well known at the time to have caused problems with GPS-positioning due to blocked GPS satellite signals. Given *Hayashida*'s disclosures relating to infrared ray sensors, a PHOSITA would have been motivated to employ infrared technology. Further a PHOSITA would have recognized that infrared technology would have less interference with other signals used in the device. A PHOSITA would have had a reasonable expectation of success in implementing this technology because, as discussed above, other portable navigation devices at the time used infrared for GPS correction. ¶¶ 43-45, *supra*.

- b.** Limitations [1(b)] and [10(b)] of the '317 Patent, limitations [1(b)], [5(b)], and [10(b)] of the '498 Patent and limitations [1(b)], [5(b)], and [6(b)] of the '999 Patent: "a device for getting direction information..."

63. *Hayashida* renders obvious implementing a device for getting direction information of a portable terminal in a portable device context. *Hayashida* teaches the use of a terrestrial magnetism sensor, which detects south-and-north direction) and gyroscope for determining the direction of travel of a vehicle. *Hayashida* (Ex. 1004), 7:31-36. A PHOSITA would have understood this terrestrial magnetism sensor to refer to a compass, as compasses are sensors that detect the south-and-north direction based on the Earth's magnetism. *Hayashida* teaches that absolute direction data ZD and relative direction angle data D θ are used to determine direction information. *Id.* at 13:35-41. The absolute direction data ZD represents the south-north direction relying upon the terrestrial magnetism and are found based upon the data from an absolute direction sensor 21. *Id.* at 10:58-61. The relative direction angle data D θ represent an angle of the direction in which the vehicle is traveling with respect to the absolute position data ZD and are found based upon the data from a relative direction sensor 22. *Id.* at 10:61-64. A PHOSITA would recognize that the direction of travel is reflective of orientation and as depicted below, these data are indeed used to denote an orientation:

FIG. 10



Id. at Fig. 10

64. A PHOSITA would have been motivated to implement such a device in a portable carrying-type navigation device for pedestrians because a PHOSITA would have recognized that while vehicles are typically limited to driving along roads, pedestrians have more freedom to walk along paths that are not defined by roads and therefore would have a greater need for orientation determination. A PHOSITA would have had a reasonable expectation of success in implementing this device because portable navigation devices at the time commonly included compasses and gyroscopes at the time for determining orientation. ¶ 46, *supra*.

c. Claims 3 and 7 of the '498 Patent: getting orientation of a display of said portable terminal

65. A PHOSITA would have recognized the desirability / necessity to create an association between an expected direction of travel and an indicated display orientation. A PHOSITA would have recognized that in order to determine

the direction of travel (i.e., the orientation of a device), a reference point must be assumed. In the context of a vehicle navigation system, displayed orientation would intuitively be associated with the orientation of the vehicle since the vehicle is generally constrained to move in a forward direction. This is simply implemented by fixedly mounting the direction sensor to the vehicle to measure the vehicle's bearing – most likely within the navigation system – and calibrating the sensor such that a displayed direction properly associates with a vehicles subsequent forward motion. However, in a portable context, where the device may be moved about freely, another type of association between expected direction of travel and an indicated display orientation must be provided. It was well known that handheld devices were intended to be used (or even required to be used) in a particular orientation with respect to the user. For example, when a user held the device in the recommended / mandatory manner, the display on the device would be oriented in a specific manner and consistent with regard to an expected direction of travel. A PHOSITA would have recognized that all users would hold the device in the same way when using the device in order to view the screen. This is implemented by including a direction sensor in the device – said device also incorporating a fixedly mounted display. The sensor is calibrated in such a manner that a direction indicated on the display properly associates with a defined forward movement of the device. That the recommended/mandatory orientation of the device would be used as a

reference point for purposes of orientation-focused tasks in a handheld navigation device would have been obvious to any PHOSITA familiar with human-machine interactions. Accordingly, using the display screen would be consistent across all users giving accurate results regardless of the person using the device. Additionally, a PHOSITA would have known that it was common for portable navigation devices at the time to measure orientation in this manner. ¶ 47, *supra*.

iii. *Hayashida*'s Navigation to a Destination—limitations [1(c)], [15(a)] and [18(a)] and claim 17 of the '317 Patent; and claim 8 of the '498 Patent

a. Limitation [15(a)], [18(a)] and claim 17 of the '317 Patent: "a device for retrieving a route..."

66. *Hayashida* that a user may input a desired destination through a touchscreen, which is an input device as required by limitation [1(c)] of the '317 Patent. *Hayashida* (Ex. 1004), 8:28-31 ("By using the touch panel 34, data necessary for setting the destination, such as start point, destination, passing points, drop-in places, etc. are input to the navigation device."). Upon inputting the destination, *Hayashida* teaches the retrieval of a route to said destination. *Id.* at 14:58-59 ("In other words, a guide route is searched and this searched guide route is shown in display 33."). Although *Hayashida* teaches this input function in the context of its primary vehicle embodiment, it would have been obvious to include such a function in a carrying-type embodiment for pedestrians. Indeed, pedestrians must be able to input information into a pedestrian-focused device just like drivers must input

information into vehicle-focused device. *Hayashida* teaches a device for retrieving this route to the inputted destination. Specifically, *Hayashida* teaches data/transmitter receiver 27 is connected to a VICS server or ATIS server under the control of CPU 2. *See id.* at 8:9-21, 75:33-42. *Hayashida* teaches that such servers may also be an information or area center, which a PHOSITA would have recognized as akin to standard data servers on a communication network such as the Internet. A PHOSITA would recognize these to be servers. A PHOSITA would have understood area center and information processing center to be servers that a cellular phone could connect to via a cellular network or TCP/IP connection.

67. It would have been obvious to a PHOSITA that this connection would be used for the functions of retrieving a route. Indeed, as noted above, *Hayashida* teaches that the navigation device retrieves information from the VICS server. And further teaches that such calculations can be performed at the VICS server. *Hayashida* (Ex. 1004), 75:34-38. A PHOSITA would have recognized that the VICS server performed route retrieval functions to assist users with avoiding traffic congestion. ¶ 44, *supra*.

68. A PHOSITA would have understood that such route retrieval function would be desirable in a portable embodiment for pedestrians, as pedestrians may need assistance navigating to a destination. As such the display of the route that should be followed would be logical. Additionally, *Hayashida* teaches that routes

may include backlanes, which may be footpaths. *Id.* at 12:21-25; *see also id.* at 10:6-14. A PHOSITA would have recognized that footpaths would not have been applicable to a vehicle embodiment. A PHOSITA would have had a reasonable expectation of success in implementing these features because *Hayashida* teaches that various functions such as the guidance beginning, searching the return route and identifying the route only operate at slow speeds. *Hayashida* (Ex. 1004), 50:10-14. Accordingly, a PHOSITA would have recognized that a pedestrian embodiment would allow these functions to operate, given that pedestrians move much more slowly than vehicles. A PHOSITA would have had a reasonable expectation of success in implementing a device that performed this function because portable devices at the time typically included similar route retrieval functions. ¶¶ 44, 48, *supra*.

b. Claim 8 of the '498 Patent: Retrieving Neighborhood Guidance Information

69. *Hayashida* teaches a navigation device that is able to retrieve a list of facilities along a route. *Hayashida* (Ex. 1004), 51:43-56. Specifically, *Hayashida* teaches that these facilities may include destinations such as gas stations, restaurants or other stores. *Id.* at 51:51-54. A PHOSITA would recognize this retrieval as the retrieval of neighborhood guidance information because this information is specific to only the nearby area. Further because this information is retrieved along a route,

such information is retrieved in a direction from said present place so as to supply navigation information.

70. Although *Hayashida* teaches the neighborhood guidance function in the context of a vehicle, it would have been obvious to a PHOSITA to include such a function in a carrying-type embodiment for pedestrians. For example, *Hayashida* teaches that routes may include backlanes, which may be footpaths. *Id.* at 12:21-25; *see also id.* at 10:6-14. A PHOSITA would have recognized that footpaths would not have been applicable to a vehicle embodiment. A PHOSITA would have had a reasonable expectation of success in implementing these features because *Hayashida* teaches that various functions such as the guidance beginning, searching the return route and identifying the route only operate at slow speeds. *Hayashida* (Ex. 1004), 50:10-14. Accordingly, a PHOSITA would have recognized that a pedestrian embodiment would allow these functions to operate, given that pedestrians move much more slowly than vehicles. Additionally, a PHOSITA would have recognized that such a function was common in portable navigation devices at the time. ¶¶ 44 and 48 (discussing route retrieval), 48 and 53 (discussing retrieval of neighborhood guidance information). *supra*.

iv. *Hayashida's* Display

- a. Hayashida's Display in a Pedestrian Navigation Device—limitations [1(e)(iii)], [10(e)(iii)], [15(b)], and [18(b)] and claims 2, 3, 5, 11, 12, 13, 14, 17, of the '317

Patent; limitations [1(d)(ii)], [5(d)(ii)], and [6(d)(ii)] and Claims 2, 3, and 4, of the '999 Patent; and limitations [1(c)(ii)], [5(c)(ii)], and [10(e)(ii)] of the '498 Patent

71. *Hayashida* describes several techniques for display of navigation information to a user including a full route display and a simple diagram. A PHOSITA would also have been aware that portable navigation devices at the time featured many of the same display techniques taught by *Hayashida* and would therefore have incorporated such techniques in the portable embodiment described by *Hayashida*. ¶¶ 50-55, *supra*. Further, a PHOSITA would have been motivated to make such a modification to further assist the user with grasping location and direction information—another goal of *Hayashida*'s display. *Hayashida* (Ex. 1004) at 14:6-9, 31:34-38; *see also id.* at 50:64-61:4, 58:37-43 (teaching display to allow a user to clearly grasp surroundings). A PHOSITA would have had a reasonable expectation of success in implementing these features because *Hayashida* teaches that various functions such as the guidance beginning, searching the return route and identifying the route only operate at slow speeds. *Hayashida* (Ex. 1004), 50:10-14. Accordingly, a PHOSITA would have recognized that a pedestrian embodiment would allow these functions to operate, given that pedestrians move much more slowly than vehicles. Further, *Hayashida* discloses that backlanes, which may be footpaths, may sometimes be selected as a route. *Id.* at 12:21-25; *see also id.* at 10:6-14. A PHOSITA would recognize that while footpaths are seldom selected for a

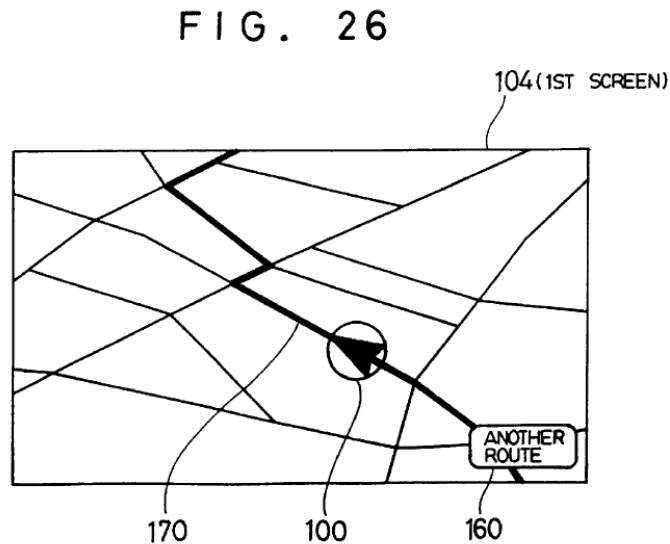
vehicle embodiment, these backlanes would be applicable to the carrying-type navigation device taught by *Hayashida*.

b. *Hayashida's* Route Display—limitations [1(c)(i)], [5(c)(i)], and [10(e)(i)] of the '498 Patent; limitations [1(e)(i)] and [10(e)(i)], and claims 2, 5, 11, 14, and 17 of the '317 Patent; and limitations [1(d)(i)], [5(d)(i)], and [6(d)(i)] of the '999 Patent

72. *Hayashida* teaches the display of routes at various scales and at varying levels of detail. *Hayashida* (Ex. 1004), 9:58-67. For example, *Hayashida* teaches that the user may select a whole route display (i.e., a full route as required by limitation [10(e)(i)] of the '498 Patent) or only a portion of the route. *Id.* at 37:10-26, Fig. 40. A PHOSITA would have recognized such a route to be a local route as required by limitation [5(c)(i)] of the '498 Patent because the route depicts only a portion of the route, as opposed to the whole route. *Hayashida* teaches that in some instances the displayed route has varying levels of detail and may include backlanes. *See e.g., Hayashida* (Ex. 1004), 16:63-17:6. A backlane display may be displayed automatically or may be manually selected by a user by pressing a “details” button, should the user wish to see more details of the surrounding area. *Id.* at 37:20-26; *see also id.* at 22:9-14 (teaching automatic backlane display based on speed of car); 72:24-29 (teaching manual selection of backlane display). *Hayashida* explains that backlanes are narrower than a predetermined width, such as footpaths or lanes. *Id.* at 12:21-25; *see also id.* at 10:6-14. A PHOSITA would recognize such a backlane

display to be a local route display as required by limitation [5(c)(i)] of the '498 Patent.

73. *Hayashida* teaches a route display depicting the route the user should follow as a line that bends or turns (i.e., a bent line) according to the layout of various roads that should be used to reach a destination as required by limitations [5(c)(i)] and [10(e)(i)] of the '498 Patent; and claim 17 of the '317 Patent. Such a route display is depicted below:



Id. at Fig. 26. A PHOSITA would understand this route to represent a direction from said present place to said destination as required by limitation [1(c)(i)] of the '498 Patent; and limitations [1(d)(i)], [5(d)(i)], and [6(d)(i)] of the '999 Patent. A PHOSITA would also have understood that these routes represent a distance between the two locations as required by limitations [1(e)(i)] and [10(e)(i)] of the '317 Patent; limitation [1(c)(i)] of the '498 Patent; and limitation [1(d)(i)] and

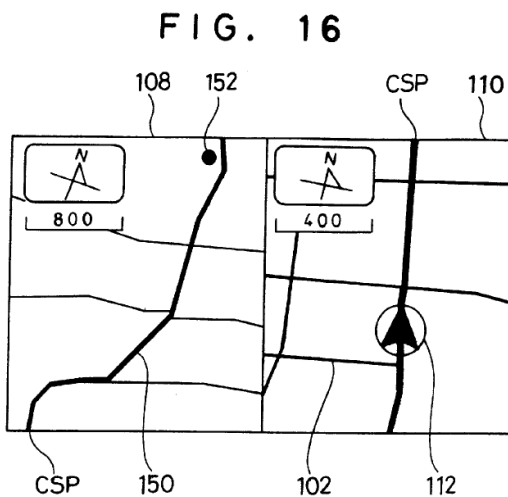
[5(d)(i)] of the '999 Patent. A PHOSITA would also have been aware that portable navigation devices at the time featured this route display technique and would therefore have incorporated this in the portable embodiment described by *Hayashida*. ¶ 52, *supra*.

74. This route line is generated with “connection data,” which represent road connections which in turn is represented by other types of data, including length data and shape data. *Id.* at 12:6-56. “The length data represent a length from the start point to the end point of a road, lengths from the start point to the nodes, and lengths among the nodes.” *Id.* at 12:55-58. A PHOSITA would understand each connection to be an individual length of a line as required by claims 5 and 14 of the '317 Patent; and limitation [1(c)(i)] of the '498 Patent. And that when combined to form the route, the line lengths represent a distance between two locations as required by limitation [1(c)(i)] of the '498 Patent. *Hayashida* further explains that shape data indicate the direction of the road. *Id.* at 25:67-26:1. A PHOSITA would have understood that a direction of a road is an orientation. Accordingly, a PHOSITA would also understand that each of these line lengths, oriented according to the road layout, to be orientations of a line as required by claims 2 and 11 of the '317 Patent; and limitation [1(c)(i)] of the '498 Patent.

- c. *Hayashida's* Symbol Display—limitations [1(e)(i)], [10(e)(i)], [15(b)], and [18(b)] and claims 12 and 17 of the '317 Patent; limitations [1(d)(i)], [5(d)(i)], and

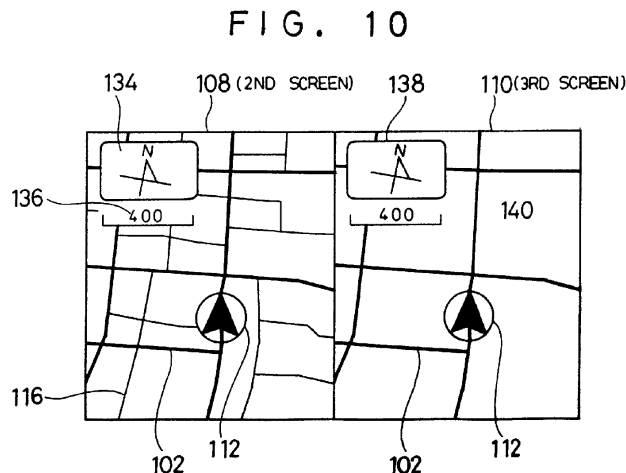
[6(d)(i)], and claim 3 of the '999 Patent; and limitations
[1(c)(i)] and [10(e)(i)] of the '498 Patent

75. *Hayashida* teaches various symbols to be shown on the route display which represent a desired destination as required by limitations [1(e)(i)] and [10(e)(i)] and claim 12 of the '317 Patent; and claim 3 of the '999 Patent. *Hayashida* (Ex. 1004), 64:38-42. Such a display is depicted below:



Id. at Fig. 16 (depicting destination 152). A PHOSITA would have recognized that depicting such symbols along a route would distinguish the route line from starting and ending points as required by claim 17 of the '317 Patent; claim 4 of the '999 Patent; and limitations [1(c)(i)] and [10(e)(i)] of the '498 Patent. A PHOSITA would also have been aware that portable navigation devices at the time featured this display technique and would therefore have incorporated this technique in the portable embodiment described by *Hayashida*. ¶ 53, *supra*.

76. *Hayashida* also teaches that a user's present position is displayed in the route display as a pointer symbol which also represents the user's direction of travel as required by limitations [1(e)(i)] and [10(e)(i)] and claims 12 and 17 of the '317 Patent; and claim 3 of the '999 Patent. *Hayashida* (Ex. 1004), 50:47-48 (referring to symbol 100). In other words, *Hayashida* teaches that an arrow symbol represents a direction of movement as required by limitations [15(b)] and [18(b)] of the '317 Patent. This symbol is depicted below:

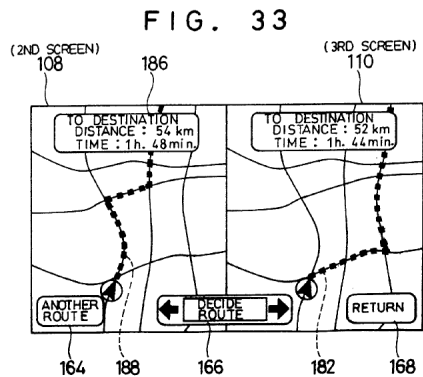
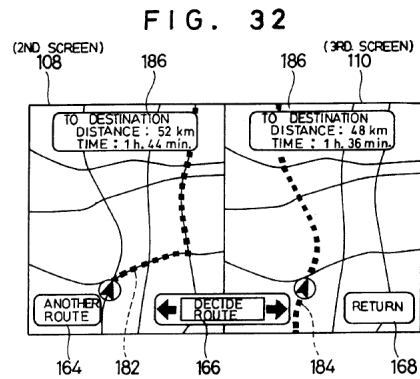


Id. at Fig. 10; *see also id.* at Figs. 14 and 16 (showing symbol 112); *see also id.* at Figs. 9, 20, 23-26, 28-31, 41-46, 50-52, and 73 (showing symbol 100). Because this information is generated based on direction information, a PHOSITA would understand a route to represent a direction from said present place to said destination as required by limitations [1(e)(i)] and [10(e)(i)] of the '317 Patent; limitations [1(d)(i)], [5(d)(i)], and [6(d)(i)] of the '999 Patent; and limitation [1(c)(i)] of the '498

Patent. *See id.* at 13:34-47 (explaining that the determined position of the vehicle determined from the GPS information is collated with map data and corrected with direction information). And a PHOSITA would further understand that because the direction information reflects orientation, such a symbol represents a relation of a direction (i.e., orientation) as required by limitations [5(d)(i)] and [6(d)(i)] of the '999 Patent. And a PHOSITA would also recognize that upon initialization of a route, a present position would also represent a starting position as required by claim 17 of the '317 Patent; claim 4 of the '999 Patent; and limitations [1(c)(i)] and [10(e)(i)] of the '498 Patent. A PHOSITA would also have been aware that portable navigation devices at the time featured this display technique and would therefore have incorporated this technique in the portable embodiment described by *Hayashida*. ¶ 53, *supra*.

d. Claims 3 and 13 of the '317 Patent; and Claim 2 of the '999 Patent: Denoting Distance with a Number

77. *Hayashida* also teaches that the distance to a destination may be represented by a number. *Hayashida* (Ex. 1004), 34:51-67. *Hayashida's* display is depicted below:

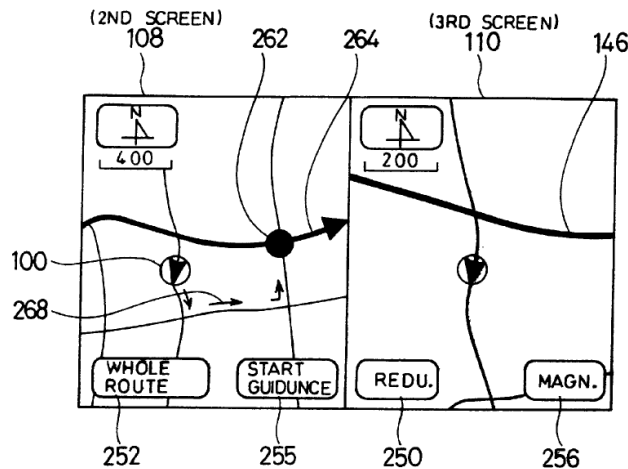


Id. at Figs. 32 and 33. A PHOSITA would also have been aware that portable navigation devices at the time featured this display technique and would therefore have incorporated such a technique in the portable embodiment described by *Hayashida*. ¶ 51, *supra*.

e. *Hayashida* Displays Routes as Arrows—limitations [15(b)] and [18(b)] of the '317 Patent; claim 4 of the '999 Patent; and limitations [1(c)(i)] and [10(e)(i)] of the '498 Patent

78. *Hayashida* also discloses a map display depicting a direction of movement by arrow as required by limitations [15(b)] and [18(b)] of the '317 Patent.

FIG. 46

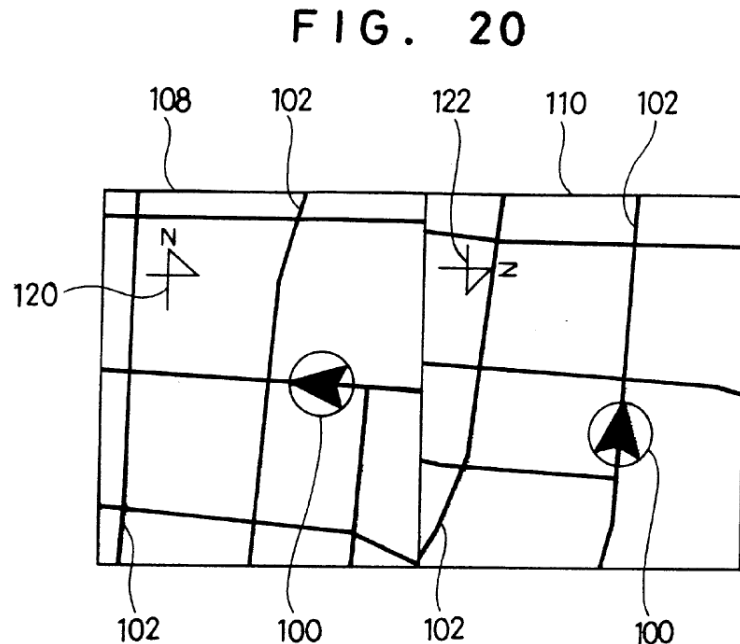


Id. at Fig. 46. A PHOSITA would have understood that the use of this arrow display to be an orientation and a length of a line that is distinguished between starting and ending points as required by limitations [1(c)(i)] and [10(e)(i)] of the '498 Patent; and claim 4 of the '999 Patent. A PHOSITA would also have been aware that portable navigation devices at the time featured this display technique and would therefore have incorporated such a technique in the portable embodiment described by *Hayashida*. ¶ 54, *supra*.

- f. *Hayashida*'s Head Up Display—limitations [1(e)(i)] and [10(e)(i)] and claims 2 and 11 of the '317 Patent; claim 2 of the '999 Patent; and limitation [1(c)(i)] of the '498 Patent

79. *Hayashida* further teaches a head up display that is applied to the various route displays. *Hayashida* (Ex. 1004) at 2:10-12; *see also id.* at 23:39-42. A comparison of the head up display, where the direction of travel is shown at the top

of the screen compared to a north up map, where north is always shown at the top of the screen is depicted below:



Id. at Fig. 20. By definition, a head up map necessarily changes in accordance with direction information as required by limitations [1(e)(i)] and [10(e)(i)] of the '317 Patent. And *Hayashida* further explains that direction information $D\theta$ are used in display of a head up map. *See id.* at 10:58-64, 43:31-40. A PHOSITA would recognize the head up display applied to a route display to be an orientation of each of the route connection lines and of the entire bent route line as required by claims 2 and 11 of the '317 Patent; claim 2 of the '999 Patent; and limitation [1(c)(i)] of the '498 Patent. A PHOSITA would further recognize that because the head up display is based on direction information; such a display represents the relation between said

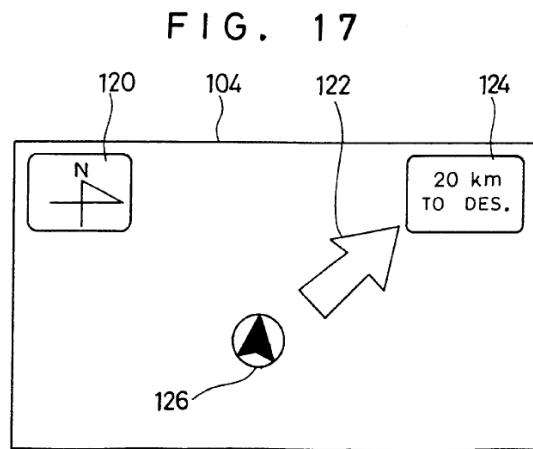
orientation and a direction. A PHOSITA would have been aware that portable navigation devices at the time featured this display technique and would therefore have incorporated such a technique in the portable embodiment described by *Hayashida*. ¶ 55, *supra*. Indeed, such a technique was desired by many novice navigators as the feature helps a user become oriented in an unfamiliar surrounding more easily.

g. Modifying *Hayashida*'s Route Display—limitation [1(c)(i)] of the '498 Patent; and claims 5 and 14 of the '317 Patent

80. It would have been obvious to a PHOSITA to further modify the display of *Hayashida* to show the length of the route (i.e., a length of a line) that has already been traveled compared to what is left to travel by changing the color or pattern of the line. Such a modification would require little modification as the various colors and patterns are already taught by *Hayashida*. *Hayashida* (Ex. 1004), 14:5-9, *see also id.* at 22:65-23:7, 31:35-38, 45:51-53, 46:12-14, 65:54-56. A PHOSITA would have been motivated to make such a modification to further assist the user with grasping location and direction information—another goal of *Hayashida*'s display. *Hayashida* (Ex. 1004) at 14:6-9, 31:34-38; *see also id.* at 50:64-61:4, 58:37-43 (teaching display to allow a user to clearly grasp surroundings). A PHOSITA would have further recognized that this display technique was common in hand-held navigation devices at the time. ¶ 54, *supra*.

h. Hayashida's Simple Figure Display—limitations [1(e)(i)] and [10(e)(i)] of the '317 Patent; claim 4 of the '999 Patent; and limitations [1(c)(i)] and [10(e)(i)] of the '498 Patent

81. In addition to the full route display, *Hayashida* teaches a simple display, consisting of an arrow which points to the destination as depicted below:



Id. at Fig. 17. A PHOSITA would recognize that arrow 122 is an orientation of a line and that the point of the arrow distinguishes the destination (ending point) from the flat bottom of the arrow (starting point) as required by limitations [1(c)(i)] and [10(e)(i)] of the '498 Patent; and claim 4 of the '999 Patent. A PHOSITA would have recognized that this arrow represents both a direction to the destination as well as a relation of a direction (as well as orientation) to a destination as required by limitations [1(e)(i)] and [10(e)(i)] of the '317 Patent. This display also includes other features, including distance represented as a number and a symbol representing the present position of the user. *Id.* at 34:51-67 (teaching characters 124 which

“designates a distance to the destination”). Further, such a display also includes the head up feature taught by *Hayashida*. *Id.* at 22:32-44; *see also id.* at 21:64-22:31. A PHOSITA would also have been aware that portable navigation devices at the time featured this display technique and would therefore have incorporated such techniques in the portable embodiment described by *Hayashida*. ¶¶ 50-51, *supra*.

E. Hayashida in View of Ikeda

i. Overview of *Ikeda*

82. *Ikeda* relates to a map image display method in a portable navigation device that changes according to a state of a main body of the display device. *Ikeda* (Ex. 1007), [0001]. A CPU 10 controls the display of navigation information based on the detection information from the sensor unit 17, detection information from the GPS receiver 18. *Id.* at [0017]; *see also id.* at [0011] (“[A] CPU 10 is provided as a part that performs overall operation control.”). GPS receiver 18 obtains current-position information by a so-called GPS (global positioning system) including position information (latitude/longitude). *Id.* at [0015]. The sensor unit 17 is equipped with at least one sensor that can detect movement such as an acceleration sensor, velocity sensors, or a magnetic-field sensor. *Id.* at [0023]; *see also id.* at [0022] (“[T]he present example also detects an orientation posture of the electronic map device 1 in terms of absolute orientation. As such, the sensor unit 17 is equipped with an orientation sensor such as an electronic compass.”).

83. Because *Ikeda*, like the '498 Patent, teaches a small portable “carrying-type navigation device” for pedestrians that obtains both location and direction information, *Ikeda* is in the same field of endeavor as the '498 Patent. *Compare id.* at [0015], [0017], [0022] with '498 Patent (Ex. 1001) at 2:45-65. Further, *Ikeda* is reasonably pertinent to the claims in the '498 Patent because *Ikeda* is directed to display of navigation from the perspective of the user, so as to make the information easier to understand for the user. *Compare Ikeda* (Ex. 1007), [0003]-[0004], [0076] with '498 Patent (Ex. 1001) at 2:45-65. Therefore, *Ikeda* is also analogous to the claimed invention in the '498 Patent.

ii. Hayashida in View of Ikeda—claims 3 and 7 of the '498 Patent

84. It would have been obvious to a PHOSITA to modify *Hayashida's* device for getting direction information to get the orientation of the display of the portable navigation device. *Hayashida* teaches a compass and gyroscope to detect the direction of travel of a user (i.e., orientation). *Ikeda* teaches similar sensors to detect the posture of the navigation device including velocity sensors, acceleration sensors, or magnetic-field sensors. *Ikeda* (Ex. 1007), [0016], [0023]. *Ikeda* teaches that through the use of these sensors, a display matching an actual orientation can be generated based on the posture or movement of the main body of the device. *Id.* at [0006]. A PHOSITA would understand that because the display of the portable

device disclosed by *Ikeda* is fixed, determining the orientation of the body of the device also determines the orientation of the display.

85. It would have been obvious to a PHOSITA to modify the compass and gyroscope disclosed by *Hayashida* to use the orientation of the display of the portable terminal as a reference bearing, as taught by *Ikeda*. *Hayashida* includes a general teaching that the navigation device may be a portable navigation device used by pedestrians but does not elaborate on this teaching. A PHOSITA therefore would have looked to other references such as *Ikeda* that expressly disclose a handheld device, in order to implement the teachings of *Hayashida*. And given the similarity between the architecture of the two disclosures (e.g., use of GPS for location, compass and gyroscope for direction, and map display), a PHOSITA would have understood that the devices would have been able to perform the same functions. A PHOSITA would have had a reasonable expectation of success in making such a modification because *Hayashida* already teaches the necessary components for determining this orientation information obtained by *Ikeda*.

F. Hayashida in View of Abowd

i. Overview of Abowd

86. I understand Cyberguide: A Mobile Context-Aware Tour Guide by Abowd et al. ("*Abowd*") was publicly available at least as of October 1997 and

therefore qualifies as prior art to the Challenged Patents under 35 U.S.C. § 102(b) (pre-AIA). *Abowd* (Ex. 1005); *Munford Dec.* (Ex. 1009).

87. *Abowd* describes a contextually-aware, hand-held navigation device called the Cyberguide (earlier versions called the CyBARguide), which was developed by a team at Georgia Tech. *Abowd* (Ex. 1005), 421, 428. *Abowd* teaches a modular system including a map module, an information module, a positioning module, and a communications module. *Id.* at 423-24. The positioning module, using a GPS (outside) or an infrared ray sensor (inside) determines the location of the user. *Id.* at 423, 425-26. The map module provides a visual display of the surroundings and the determined position of the user is plotted on this map. *Id.* at 423. The information module provides the user with information relating to the surroundings, which are shown on the map. *Id.* The communications module allows the user to communicate data to other users and to centralized servers. *Id.* at 423-24. For example, *Abowd* teaches that a user may upload their present position to a central server, which can be accessed by other users who may want to navigate to the first user. *See id.*

88. *Abowd* is both within the field of endeavor of and reasonably pertinent to the Challenged Patents. Like the Challenged Patents, *Abowd* is related to a portable hand-held navigation device for pedestrian use; therefore, *Abowd* is within the same field of endeavor and is analogous to the Challenged Patents. *Compare id.*

at 422 (“One major application of mobile context-aware devices are personal guides...walking tours of cities or historical sites could be assisted by these electronic guidebooks.”) *with '317 Patent* (Ex. 1001) at 2:51-61.

ii. Reasons to Combine *Hayashida* and *Abowd*

89. A PHOSITA would have found it obvious to modify *Hayashida* in light of the teachings of *Abowd*. Both *Hayashida* and *Abowd* describe portable navigation devices. While *Hayashida* generally describes the invention in the context of a vehicle embodiment, *Hayashida* also provides that the invention may be applied to a pedestrian embodiment. *Hayashida* (Ex. 1004) at 76:13-20. However, because *Hayashida* does not describe the implementation of these features in a pedestrian embodiment in detail, A PHOSITA would have looked to other references describing portable navigation devices at the time used in a pedestrian context, such as *Abowd* to provide insight as to the most desirable features for pedestrians and for their implementation.

90. Indeed, with respect to many desirable functions of the Cyberguide, *Abowd* notes that “[s]ome of these functions are currently being provided by automobile on-board navigation systems.” *Id.* at 422. Accordingly, it would have been obvious to a PHOSITA that the functions as performed by a vehicle navigation system would be provided in a pedestrian navigation system.

91. In order to accomplish many of the functions in a pedestrian device, a PHOSITA would have been motivated to include the modules taught by *Abowd*, including the map module, information module, positioning module, and communications module in the system of *Hayashida*. *Abowd* (Ex. 1005) at 423-24. Indeed, *Hayashida* already discloses the same functions performed by the *Abowd* modules. *Hayashida* (Ex. 1004), 7:60-8:8 (teaching determining position, including location and direction), 58:37-43 (providing mapping of positioning information); 8:10-21 (teaching data communication device 27, which exchanges information with outside servers for provision to the user). A PHOSITA, would thus have been motivated to use the modules taught by *Abowd* to perform the various functions including positioning and display of navigation information.

92. A PHOSITA would have had a reasonable expectation of success in modifying the portable system of *Hayashida* to include the modules taught by *Abowd* due to the similarity in the architecture of *Hayashida* and *Abowd*. Both *Hayashida* and *Abowd* teach similar means for determining a user's position (i.e., a GPS and infrared ray sensor), both *Hayashida* and *Abowd* teach direction detecting devices to further enhance determining a user's position, and both references provide for display of this information in relation to a desired destination to assist users with traveling to that destination. *Compare Hayashida* (Ex. 1004), 7:66-8:8, 7:60-64, 8:22-31 *with Abowd* (Ex. 1005), 431, 422, 428. And because *Abowd* describes a

modular system, such modifications would have been straightforward, and would not have required undue experimentation and would have yielded predictable results.

Abowd (Ex. 1005), 424.

iii. Position Determination in *Hayashida* as modified by *Abowd*

- a. Limitations [1(e)(i)] and [10(e)(i)] of the '317 Patent; limitations [1(c)(i)], [5(c)(i)], and [10(e)(i)] of the '498 Patent; and limitations [1(d)(i)], [5(d)(i)], and [6(d)(i)] of the '999 Patent: “a device for getting location information...”

93. It would have been obvious to a PHOSITA, when implementing the carrying-type portable navigation device taught by *Hayashida*, to include an infrared beacon receiver along with a GPS to get location information of the portable terminal, as taught by *Abowd*.

94. As described above, *Hayashida* teaches a device for getting location information. ¶¶ 61-62, *supra*. Specifically, *Hayashida* teaches a device (i.e., central processor 1, including CPU 2, and present position detector 20, including GPS receiver 25, and beacon receiver 26) for getting location information (i.e., latitude and longitude information) denoting a present place of said portable terminal.

95. Similarly, *Abowd* teaches a GPS for getting location information. *Abowd* (Ex. 1005), 422. *Abowd* notes that GPS signals may be weak in some areas, such as indoors. *Id.* at 425. *Abowd* proposes a solution, which is to use an infrared beacon system for these weak areas. *See id.* *Abowd* explains that ideally, the two

systems would be integrated into the same system “to allow a tourist to wander in and out of buildings.” *Id.* at 432.

96. A PHOSITA would have recognized that beacon receiver 26 taught by *Hayashida* could be replaced with the IR positioning system taught by *Abowd*. The infrared ray sensor taught by *Abowd* is very similar to the VICS and PICS systems that were known in the art. A PHOSITA would also have recognized that a CPU would process the data from the two devices.

97. A PHOSITA would have been motivated to make such a modification because a PHOSITA would have recognized that an infrared ray sensor would be able to determine a user’s position in areas where GPS signals are weak, such as indoors, as noted by *Abowd*. *Abowd* (Ex. 1005), 425, 432. *Hayashida* also acknowledges this possibility. *Hayashida* (Ex. 1004), 13:45-47. A PHOSITA would have been further motivated to make this combination because such a combination of an infrared ray sensor and GPS for determining position is expressly suggested by *Abowd*. *Abowd* (Ex. 1005) at 432. A PHOSITA would have recognized that because pedestrians are indoors more frequently than vehicles, such an implementation on a pedestrian device is logical. Such a modification is a simple substitution of a known method of infrared positioning (i.e., position correction) with another known method of infrared positioning (i.e., position determination) that would have been straightforward, and would not have required undue

experimentation and would have yielded predictable results. And given the modular nature of *Abowd's* system, a PHOSITA would have had a reasonable expectation of success in making this substitution. *Abowd* (Ex. 1005), 424.

- b. Limitations [1(e)(i)] and [10(e)(i)] of the '317 Patent; limitations [1(c)(i)], [5(c)(i)], and [10(e)(i)] of the '498 Patent; and limitations [1(d)(i)], [5(d)(i)], and [6(d)(i)] of the '999 Patent: "a device for getting direction information..."**

98. In light of the teachings of *Abowd* it would have been obvious to a PHOSITA, when implementing the carrying-type portable navigation device taught by *Hayashida*, to include at least a compass to determine the orientation of the portable terminal, as taught by *Abowd*.

99. As described above, *Hayashida* teaches a device for getting direction information, including use of a terrestrial magnetism sensor for determining direction information. ¶¶ 63-64, *supra*. Similarly, *Abowd* teaches the use of an electronic compass in a portable device. *Abowd* (Ex. 1005), 422. *Abowd* explains that while the compass provides information as to the orientation of the device, because the device is hand-held, such information reflects the orientation of the user. *See id.* *Abowd* expressly teaches that the compass is used to detect user orientation, noting the importance of orientation to context awareness. *See id.* at 422, 425, 430. *Abowd's* compass teaching would have been an obvious extension of *Hayashida's* portable embodiment.

100. It would have been obvious to a PHOSITA to modify *Hayashida* to determine orientation in light of this express teaching of *Abowd*. Moreover, a PHOSITA would have been aware that portable navigation devices used by pedestrians commonly included compasses and gyroscopes for getting direction information denoting an orientation of said portable terminal. See ¶¶ 63, 46, *supra*. Such a modification would have been well-within the skills of a PHOSITA because *Hayashida* already teaches the collection of the relevant data from a compass or gyroscope. *Hayashida* (Ex. 1004), 10:61-64. Such a modification is a simple use of a known method of direction determination with another known method that would have been straightforward and would not have required undue experimentation and would have yielded predictable results.

101. A PHOSITA would have been motivated to implement orientation measurements as taught by *Abowd* in the system of *Hayashida* because detecting orientation, as opposed to traveling direction, would produce more accurate results, due to the hand-held nature of the device. For example, because a hand-held device may be freely moved about, rather than fixed as in a vehicle embodiment, a PHOSITA would have understood that detection of orientation would provide more accurate results. And the increased accuracy would increase the versatility of the navigation device, allowing it to provide greater detail to the user relating to

surroundings based on the user's orientation as well as the user's position, as taught by *Abowd*. *Abowd* (Ex. 1005), 424.

102. Accordingly, detecting orientation is a simple modification of a known method taught by *Hayashida* to achieve a known result taught by *Abowd*. Such a modification would have been straightforward and would not have required undue experimentation and would have yielded predictable results. Moreover, as discussed above, because *Abowd's* system is modular, a PHOSITA would have had a reasonable expectation of success in making this substitution. *Abowd* (Ex. 1005), 424.

- c. Claims 3, 7, 11, and 13 of the '498 Patent: getting portable terminal display orientation or getting information in a direction pointed by the tip of said portable terminal

103. A PHOSITA would have recognized that in a portable context, where the device may be moved about freely, some type of association between expected direction of travel and an indicated display orientation must be provided. *Abowd* expressly notes because of the handheld nature of the device, determining the position of the device determines the position of a user as well. *Abowd* (Ex. 1005), 421. It was well known that handheld devices were intended to be used (or even required to be used) in a particular orientation with respect to the user. For example, when a user held the device in the recommended / mandatory manner, the display on the device would be oriented in a specific manner and consistent with regard to

an expected direction of travel. A PHOSITA would have recognized that all users would hold the device in the same way when using the device in order to view the screen. A PHOSITA would have understood, in light of *Abowd's* teaching, that because users would hold the device in the same way, the orientation of the display of the device would be an accurate reference to determine the orientation of the user. This is implemented by including a direction sensor in the device - said device also incorporating a fixedly mounted display. The sensor is calibrated in such a manner that a direction indicated on the display properly associates with a defined forward movement of the device. Accordingly, using the display screen would be consistent across all users giving accurate results regardless of the person using the device. Additionally, a PHOSITA would have known that it was common for portable navigation devices at the time to measure orientation in this manner. ¶ 47, *supra*.

104. A PHOSITA would have recognized that the tip of the display device would be another choice, as it can be assumed that users will hold the device in a manner so that the tip (top) of the device points outward in the direction that the person is facing. A PHOSITA would have been motivated to choose this reference point because this would be a consistent manner of holding the device across all users, because this is the position the device must be held, in order to view the screen. Further, when used with the head up display, such an orientation would allow the user to match the device with actual directions. Additionally, a PHOSITA would

have known that it was common for portable navigation devices at the time to measure orientation in this manner. ¶ 47, *supra*.

d. Limitations [4(a)], [9(a)], and [10(c)] of the '498 Patent: Determining User's Location According to Location Information and Direction Information

105. *Hayashida* teaches that a user's position is determined based on both location information (i.e., latitude and longitude coordinates) and direction information (i.e., user orientation). See *Hayashida* (Ex. 1004), 13:29-33, 13:34-31, 31:45-47. Although *Hayashida* describes this position determination in the context of a vehicle embodiment, it would have been obvious to a PHOSITA, when implementing the portable carrying type navigation device taught by *Hayashida*, to determine a user's position based on both location information and direction information as required by limitations [4(a)], [9(a)], and [10(c)] of the '498 Patent.

iv. Navigation to Desired Destination in *Hayashida* as modified by *Abowd*

a. Limitations [10(c)] of the '317 Patent; limitations [1(c)], [5(c)], and [6(c)] of the '999 Patent; and limitations [4(b)], [9(b)], and [10(d)] of the '498 Patent: Navigation to Another Portable Terminal

106. Both *Hayashida* and *Abowd* teach a system to assist users with navigating to a desired destination. And both *Hayashida* and *Abowd* teach that this destination may be retrieved from a server. *Abowd* (Ex. 1005), 430 (“[T]here is a need to have high bandwidth communication to the mobile unit...information should

be provided on demand and relative to the position/orientation of the tourist.”). *Abowd* further teaches that in some cases, it is desirable for a user to know the location of another user. *Id.* at 423-24. *Abowd* explains that this would be accomplished by allowing users to upload their location information to a central server. *See id.* A PHOSITA would have been motivated to include such a functionality in order to increase the versatility of the navigation device, allowing the device to suggest places of potential interest to users based on the location of other users. *Id.* at 431. It would have been obvious to a PHOSITA that the location information of another portable device obtained from this server would then serve as a destination for the user to navigate to and would denote said direction in the same manner.

107. It would have been obvious to a PHOSITA to modify *Hayashida* to include a device for getting the location information of another portable terminal, as taught by *Abowd* and as required by limitation [10(c)] of the '317 Patent; limitations [1(c)], [5(c)], and [6(c)] of the '999 Patent; and limitations [4(b)], [9(b)], and [10(d)] of the '498 Patent. Specifically, a PHOSITA would have modified data transmitter receiver 27, using a cellular connection taught by *Hayashida* to upload the position information, including location and direction information, of a user to a central server and to retrieve the position information of another user to a central server, as taught by *Abowd*. *Hayashida* (Ex. 1004), 8:10-21; *Abowd* (Ex. 1005), 423-24. A

PHOSITA would recognize that this modification would result in the location of another user being determined according to at least location information (i.e., latitude and longitude) as required by limitations [4(b)], [9(b)], and [10(d)] of the '498 Patent.

108. And because *Hayashida* already uses data transmitter receiver 27 to exchange this information with the VICS server and uses such information to generate figures for map display, such a modification would have been a simple and straightforward change. *Hayashida* (Ex. 1004), 8:10-21. And due to the modular nature of *Abowd* such a modification would not require undue experimentation and would yield predictable results. *Abowd* (Ex. 1005), 424. It would have been obvious to a PHOSITA to make such a modification in light of the express teachings of *Abowd* and because a PHOSITA would have recognized that other portable navigation devices commonly included this feature. ¶ 49, *supra*.

b. Limitations [15(a)] and [18(a)] of the '317 Patent: “a device for retrieving a route...”

109. It also would have been obvious to a PHOSITA, in light of the teachings of *Abowd*, to include a device for route retrieval in the portable pedestrian embodiment taught by *Hayashida*. As discussed above, *Hayashida* teaches a device for retrieving a route. ¶¶ 66-68, 70.

110. *Abowd* expressly teaches that “[t]he personal guide could also assist in route planning and providing directions” and that similar functions provided by

automobile on-board navigation systems already perform this function. *Abowd* (Ex. 1005) at 422. *Abowd* further teaches that the Internet should be leveraged. *Abowd* (Ex. 1005) at 431 (“[M]uch of the information we wanted to display was already available on the Web...It makes sense to leverage this available information resource and mode of interaction for all of the information needs.”).

111. A PHOSITA would have modified *Hayashida* which describes retrieving routes in a vehicle context to retrieve routes for pedestrians utilizing central processor 1, including CPU 2, and data transmitter/receiver 27 to retrieve a route from the Internet, in light of this express teaching of *Abowd*. In addition to the express teaching of *Abowd* mentioned above, it would have been obvious to a PHOSITA to utilize the route retrieval device taught by *Hayashida* in a portable embodiment for pedestrians because a PHOSITA would have recognized that other portable navigation devices commonly included this feature. See ¶¶ 44, 48, *supra*.

112. A PHOSITA would have been motivated to make such a modification because a PHOSITA would have recognized that such a modification is the application of a known technique of route retrieval used by vehicles to a known navigation device for pedestrians to achieve a known result of navigating to a destination. A PHOSITA would have had a reasonable expectation of success in implementing route retrieval because *Hayashida* teaches that various functions such as the guidance beginning, searching the return route and identifying the route only

operate at slow speeds. *Hayashida* (Ex. 1004), 50:10-14. Accordingly, a PHOSITA would have recognized that a pedestrian embodiment would allow these functions to operate, given that pedestrians move much more slowly than vehicles.

c. Claim 8 of the '498 Patent: Retrieving Neighborhood Guidance Information

113. As described above, *Hayashida* teaches retrieving neighborhood guidance information in a direction from said present place so as to supply said neighborhood guidance information as navigation information. ¶¶ 69-70, *supra*. *Abowd* similarly provides a map component that can provide varying levels of detail relating to the surrounding area. *Abowd* (Ex. 1005), 428.

114. In light of the teachings of *Abowd*, it would have been obvious to a PHOSITA to include this function in a portable carrying-type navigation device for pedestrians. Indeed, *Hayashida* already retrieves footpaths that would be necessary for pedestrian navigation, but inapplicable to vehicles. *Hayashida* (Ex. 1004), 12:21-25; *see also id.* at 10:6-14. Further, a PHOSITA would also have recognized that it was common for portable navigation devices at the time to perform this function. ¶¶ 69-70, 48, 53, *supra*.

115. A PHOSITA would have had a reasonable expectation of success in implementing neighborhood guidance retrieval because *Hayashida* teaches that various functions such as the guidance beginning, searching the return route and identifying the route only operate at slow speeds. *Hayashida* (Ex. 1004), 50:10-14.

Accordingly, a PHOSITA would have recognized that a pedestrian embodiment would allow these functions to operate, given that pedestrians move much more slowly than vehicles.

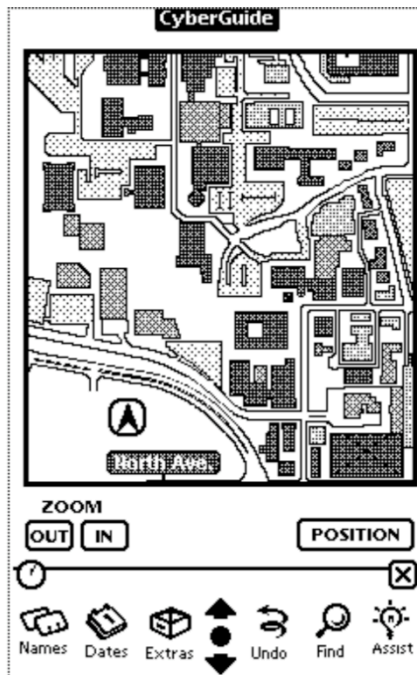
- v. **Displaying Navigation Information in *Hayashida* as modified by *Abowd***—limitations [1(e)(i)], [1(e)(ii)], [1(e)(iii)], [10(e)(i)], [10(e)(ii)], and [10(e)(iii)], and claims 2, 3, 5, 11, 12, 13, 14, [15(b)], 17, and [18(b)] of the '317 Patent; limitations [1(c)(i)], [1(c)(ii)], [5(c)(i)], [5(c)(ii)], [10(e)(i)], [10(e)(ii)] of the '498 Patent; and claims [1(d)(i)], [1(d)(ii)], [5(d)(i)], [5(d)(ii)], [6(d)(i)], [6(d)(ii)], and claims 2 and 4 of the '999 Patent

116. It would have been obvious to a PHOSITA, in light of the teachings of *Abowd*, that each of the display techniques taught by *Hayashida*, including the full route display and the simple figure display, would be implemented in a portable carrying-type navigation device. *Hayashida* teaches a number of display techniques, which are discussed in detail above. See ¶¶ 71-81, *supra*.

117. *Abowd* also expressly teaches or suggests many of these specific concepts disclosed by *Hayashida* in a pedestrian embodiment. For example, *Abowd* expressly teaches that route planning functions are desirable. And a PHOSITA would have been aware that other portable navigation devices at the time included route displays. ¶¶ 71-81, 50-55, *supra*. Accordingly, a PHOSITA would have been motivated to include a route display in a pedestrian device.

118. *Abowd*, like *Hayashida*, displays a symbol representing a user (or a starting point) as required by claim 3 of the '999 Patent; limitation [10(e)(i)] of the

'498 Patent; and limitations [1(e)(i)] and [10(e)(i)] and claims 12 and 17 of the '317 Patent. *Abowd* (Ex. 1005), 424. And like the symbol taught by *Hayashida*, the symbol reflects the user's orientation. *Abowd* (Ex. 1005), 425. *Abowd*'s display is depicted below:



Abowd (Ex. 1005), Fig. 4; *see also id.* at Fig. 10.

119. *Abowd* also displays symbols on a map representing various destinations (or end points), like *Hayashida* and as required by limitations [1(e)(i)] and [10(e)(i)] and claims 12 and 17 of the '317 Patent; claim 3 of the '999 Patent; and limitation [10(e)(i)] of the '498 Patent. *Abowd* (Ex. 1005), 424, 428-29. *Abowd*'s display is depicted below:



Abowd (Ex. 1005), Fig. 10. *Abowd* further explains that such symbols may be differently colored depending on whether the user has visited each place. *Id.* at 429 (“The left shows the interactive map indicating the user’s location (the triangle) and the location of establishments previously visited (the beer mugs)”); *see also id.* at 427 (“Checks on demo sites indicate the user has been to visit that demo already...”). A PHOSITA would recognize that because *Abowd* teaches display of a destination and present position, *Abowd* teaches the display of a direction, via the display of distance information between said locations (in this case, the destination of the location of another portable terminal and a present place) as required by limitations [1(d)(i)] and [5(d)(i)] of the ’999 Patent.

120. *Abowd* teaches generally that “[t]he personal guide could also assist in route planning and providing directions” and notes that “[s]ome of these functions

are currently being provided by automobile on-board navigation systems.” *Abowd* (Ex. 1005), 422. In light of *Abowd*’s express teachings, it would have been obvious to display navigation information to pedestrians in the same way such information would be displayed to vehicle driver. Further, as described above, a PHOSITA would have recognized that portable devices at the time included each of these display techniques. ¶¶ 71-81, 50-55, *supra*. Accordingly, it would be obvious to a PHOSITA that the remainder of the techniques taught by *Hayashida* would be included in the portable pedestrian embodiment.

121. In addition to these express teachings, a PHOSITA would have been motivated to include each of *Hayashida*’s displays in a pedestrian embodiment because such information would further *Hayashida*’s goals of presenting information to a user to allow the user to grasp the surroundings. *Hayashida* (Ex. 1004), 58:37-43; *see also id.* at 50:64-51:2; *compare with* ’317 Patent (Ex. 1001) at 6:19-20 (“[T]he information is thus displayed more easily for the walker to understand.”); *see also id.* at 10:29-34. A PHOSITA would have had a reasonable expectation of success in making the modifications in light of *Hayashida*’s teachings relating to the use of backlanes, which would be useful in a pedestrian embodiment. *Hayashida* (Ex. 1004), 12:21-25; *see also id.* at 10:6-14. And because such operations work only while moving at slow speeds, they would be especially well-suited to a pedestrian navigation device. *Id.* at 50:10-14. And because both

Hayashida and *Abowd* teach display techniques involving similar displays, such a modification would require only minor modifications to software that would have been straightforward and yielded predictable results.

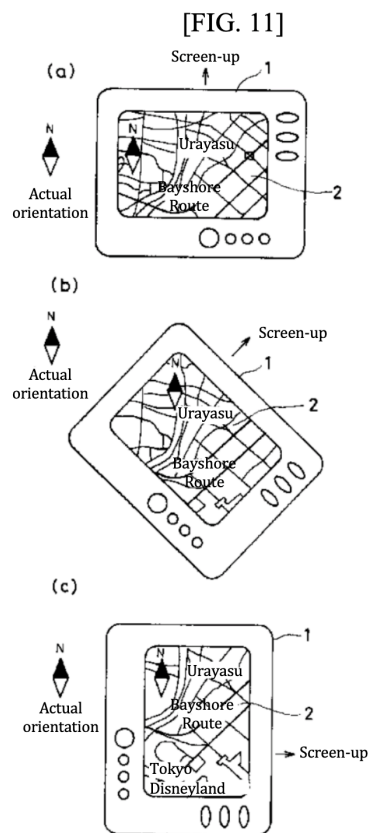
G. *Hayashida* in View of *Abowd* in further view of *Ikeda*—claims 3, 7, 11, and 13 of the '498 Patent

122. Each of these references are described in detail above. See ¶¶ 56-60 (describing *Hayashida*), ¶¶ 82-83 (describing *Ikeda*), ¶¶ 86-88 (describing *Abowd*), *supra*. It would have been obvious to a PHOSITA to modify the *Hayashida-Abowd* navigation device described above pursuant to the teachings of *Ikeda*.

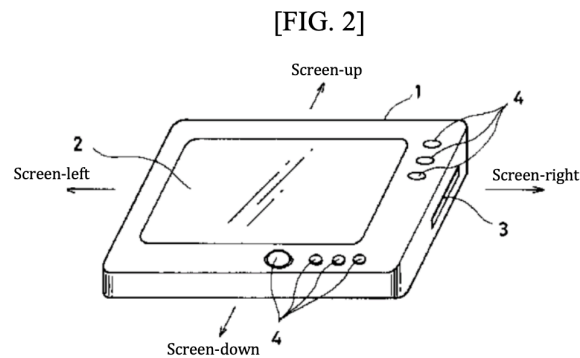
123. It would have been obvious to a PHOSITA to modify the *Hayashida-Abowd* navigation device to get the orientation of the display of said portable terminal as taught by *Ikeda*. *Abowd* expressly notes that location of a device locates a user as well, because the device is hand-held. *Abowd* (Ex. 1005), 421. It would have been obvious to a PHOSITA, in light of this disclosure by *Abowd*, that determining the orientation of a navigation device would similarly determine the orientation of a user. A PHOSITA would recognize that because the device is handheld, a reference bearing for the device would need to be determined in advance.

124. In light of the teachings of *Ikeda*, a PHOSITA would have been motivated to use the orientation of the display of the device as a reference bearing. *Ikeda* teaches that when the navigation device is moved, the movement direction and the movement amount are detected in terms of screen-up, -down, -left, and -right.

Ikeda (Ex. 1007), [0023], Fig. 2. These movements are detected in terms of absolute orientation and aligns cardinal directions of the map image with actual cardinal directions by providing a display that uses the actual orientation of the device to match the actual cardinal direction. *See id.* at [0003], [0022], [0049]. The resulting display shows from the user's perspective, a map reflecting actual cardinal directions which can be viewed regardless of which direction the user faces while holding the device. *Id.* at [0049]. This functionality is reflected in the following image:



125. A PHOSITA would further recognize that the screen-up portion of the device corresponds to the tip of the device, which is the leading direction of the device when held horizontally by a user. *Id.* at Fig. 2.



A PHOSITA would have recognized that *Ikeda* therefore teaches that information can be gotten in a direction pointed by the tip of the navigation device.

126. A PHOSITA would have been motivated to make such modifications because *Hayashida* and *Abowd* are silent with respect to the bearing reference used for orientation determination. Accordingly, a PHOSITA would have looked to other references like *Ikeda*. Further a PHOSITA would have recognized that other portable navigation devices included these functionalities. And given the similarity between the architecture of the *Hayashida-Abowd* combination and *Ikeda* (e.g., use of GPS for location, compass and gyroscope for direction, and map display), a PHOSITA would have understood that the devices would have been able to perform the same functions. A PHOSITA would have had a reasonable expectation of success in

making such a modification because *Hayashida* as modified by *Abowd* already teaches the necessary components (i.e., a compass and a gyroscope) for determining this orientation information obtained by *Ikeda*.

V. OPINIONS CONCERNING CLAIM CONSTRUCTIONS

127. Claims 1 and 10 of the '317 Patent; claims 1, 5, and 6 of the '999 Patent; and claims 1, 5, and 10 of the '498 Patent recite a “a device for getting location information denoting a [p]resent place of said portable terminal.” I understand that this term was previously construed by the Board in a prior proceeding and the same construction has been proposed here. Based on my review of the specification, I agree with Petitioner’s proposed construction that the means for performing the claimed function of getting location information denoting a present place of said portable terminal includes “a wireless or cellular antenna, or a GPS, or a Personal Handyphone System (PHS); and an infrared ray sensor; and a control unit for analyzing received data, with the control unit calculating location information as disclosed in the '317 Patent at 5:59-67 (or alternatively the '999 Patent at 5:55-63 or the '498 Patent at 5:48-56) and Fig. 2; or equivalents thereof.”

128. A PHOSITA would have understood that infrared beacon systems were a common solution for walking navigation, which often demands location information indoors where traditional location technology such as GPS is not available. The goal of the Challenged Patents is to provide location and navigation

information, specifically to a walking user. *See '317 Patent* (Ex. 1001), 1:16-18. Although satellite positioning technology such as GPS was well-established for determining a location outdoors, it was known at the time of the alleged invention of the Challenged Patents that these technologies were not suitable for determining a location when indoors. ¶¶ 43-45, *supra*. A PHOSITA would have further known at the time of the alleged invention of the Challenged Patents that infrared beacon systems were a solution to provide location information indoors. *Id.* at ¶ 45.

VI. CONCLUSION

129. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Date: January 8, 2020

By: Michael D. Kotzin
Michael D. Kotzin

Appendix A – Declaration Reference Charts

'317 Patent Reference Chart

Claim/Element number	Element language	<i>Hayashida</i> in view of the knowledge of a PHOSITA	<i>Hayashida</i> in view of <i>Abowd</i>
1[P].	1. A portable terminal, comprising:	¶¶ 56-60	¶¶ 56-60 ¶¶ 86-88
[1(a)]	a device for getting location information denoting a resent place of said portable terminal;	¶¶ 61-62 ¶¶ 41-45	¶¶ 93-97 ¶¶ 61-62 ¶¶ 41-45
[1(b)]	a device for getting a direction information denoting an orientation of said portable terminal;	¶¶ 61-62 ¶¶ 41, 46- 47	¶¶ 98-102 ¶¶ 61-62 ¶¶ 41, 46- 47
[1(c)]	an input device for inputting a destination; and	¶ 66 ¶ 48	¶ 66 ¶ 48
[1(d)]	a display, wherein	¶ 71 ¶¶ 50-55	¶¶ 116-121 ¶ 71 ¶¶ 50-55
[1(e)(i)]	said display displays positions of said destination and said present place, and a relation of said direction and a direction from said present place to said destination, and	¶ 73 ¶¶ 75-76 ¶¶ 80-81 ¶ 50 ¶¶ 52-53	¶¶ 116-121 ¶ 73 ¶¶ 75-76 ¶¶ 80-81 ¶ 50 ¶¶ 52-53

[1(e)(ii)]	said display changes according to a change of said direction of said portable terminal orientation	¶ 79 ¶ 50 ¶ 55	¶¶ 116-121 ¶ 79 ¶ 50 ¶ 55
[1(e)(iii)]	for walking navigation.	¶ 71 ¶¶ 50-55	¶¶ 116-121 ¶ 71 ¶¶ 50-55
2.	A portable terminal according to claim 1, wherein said direction from said present place to said inputted destination is denoted with an orientation of line.	¶ 71 ¶ 74 ¶ 79 ¶ 50 ¶ 52	¶¶ 116-121 ¶ 71 ¶ 74 ¶ 79 ¶ 50 ¶ 52
3.	A portable terminal according to claim 1, wherein a distance between said present place and said destination is denoted with a number.	¶ 71 ¶ 77 ¶ 51	¶¶ 116-121 ¶ 71 ¶ 77 ¶ 51
5.	A portable terminal according to claim 2, wherein a distance between said present position and said destination is denoted with a length of said line.	¶ 71 ¶ 74 ¶ 80 ¶ 52 ¶ 54	¶¶ 116-121 ¶ 71 ¶ 74 ¶ 80 ¶ 52 ¶ 54
10[P].	A portable terminal, comprising:	¶¶ 56-60	¶¶ 56-60 ¶¶ 86-88

[10(a)]	a device for getting location information denoting a present place of said portable terminal;	¶¶ 61-62	¶¶ 93-97 ¶¶ 61-62
[10(b)]	a device for getting direction information denoting an orientation of said portable terminal;	¶¶ 62-63	¶¶ 98-102 ¶¶ 62-63
[10(c)]	a device for getting a location information of another portable terminal from said another terminal via connected network; and	N/A	¶¶ 106-107 ¶ 49
[10(d)]	a display, wherein	¶ 71 ¶¶ 50-55	¶¶ 116-121 ¶ 71 ¶¶ 50-55
[10(e)(i)]	said display displays positions of said destination and said present place, and a relation of said direction and a direction from said present place to said destination,	¶ 73 ¶ 75 ¶¶ 52-53	¶¶ 116-121 ¶ 73 ¶ 75 ¶¶ 52-53
[10(e)(ii)]	and said display changes according to a change of said direction of said portable terminal orientation	¶ 79 ¶ 50 ¶ 55	¶¶ 116-121 ¶ 79 ¶ 50 ¶ 55
[10(e)(iii)]	for walking navigation.	¶ 71 ¶¶ 50-55	¶¶ 116-121 ¶ 71 ¶¶ 50-55

11.	A portable terminal according to claim 10, wherein said direction from said present place to said location of another portable terminal is denoted with an orientation of line.	¶ 71 ¶ 74 ¶ 79 ¶ 50 ¶ 52	¶¶ 116-121 ¶ 71 ¶ 74 ¶ 79 ¶ 50 ¶ 52
12.	A portable terminal according to claim 10, wherein said direction from said present place to the location of said another portable terminal is displayed using the symbols denoting the said present location and said location of another portable terminal.	¶ 71 ¶¶ 75 – 76 ¶ 53	¶¶ 116-121 ¶ 71 ¶¶ 75-76 ¶ 53
13.	A portable terminal according to claim 10, wherein said display displays a distance between said present location to said location of another portable terminal with a number.	¶ 71 ¶ 77	¶¶ 116-121 ¶ 71 ¶ 77
14.	A portable terminal according to claim 11, wherein a distance between said present location to said location of another portable terminal is denoted with a length of said line.	¶ 71 ¶ 74 ¶ 80 ¶ 52 ¶ 54	¶¶ 116-121 ¶ 71 ¶ 74 ¶ 80 ¶ 52 ¶ 54

[15(a)]	A portable terminal with walking navigation according to claim 1, further comprising: a device for retrieving a route from said present place to said destination, wherein	¶¶66-68 ¶ 44	¶¶109-112 ¶¶66-68 ¶ 44
[15(b)]	said display displays said route and displays a direction of movement by the arrow.	¶ 71 ¶ 76 ¶ 78 ¶ 52	¶¶ 116-121 ¶ 71 ¶ 76 ¶ 78 ¶ 52
17.	A portable terminal with walking navigation according to claim 15, wherein said display displays said route with a bent line using symbols denoting starting and ending points and displays symbols denoting said present place on said route.	¶ 71 ¶ 73 ¶¶ 75-77 ¶ 52 ¶ 54	¶¶ 116-121 ¶ 71 ¶ 73 ¶¶ 75-77 ¶ 52
[18(a)]	A portable terminal with walking navigation according to claim 10, further comprising: a device for retrieving a route from said present place to said destination, wherein	¶¶ 66-68	¶¶ 109-112 ¶¶ 66-68
[18(b)]	said display displays said route and displays a direction of movement by the arrow.	¶ 71 ¶ 76 ¶ 78 ¶ 52	¶¶ 116-121 ¶ 71 ¶ 76 ¶ 78 ¶ 52

'498 Reference Chart

Claim/ Element number	Element language	<i>Hayashida</i> in view of the knowledge of a PHOSITA	<i>Hayashida</i> in view of the knowledge of a PHOSITA in further view of <i>Ikeda</i>	<i>Hayashida</i> in view of <i>Abowd</i>	<i>Hayashida</i> in view of <i>Abowd</i> in further view of <i>Ikeda</i>
1[P].	1. A portable terminal with the function of walking navigation, comprising:	¶¶ 56-60	¶¶ 56-60	¶¶ 56-60 ¶¶ 86-88	¶¶ 56-60 ¶¶ 86-88
[1(a)]	a device for getting location information denoting a present place of said portable terminal; and	¶¶ 61-62 ¶¶ 41-45	¶¶ 61-62 ¶¶ 41-45	¶¶ 93-97 ¶¶ 61-62 ¶¶ 41-45	¶¶ 93-97 ¶¶ 61-62 ¶¶ 41-45
[1(b)]	a device for getting direction information denoting an orientation of said portable terminal,	¶¶ 61-62 ¶¶ 41, 46-47	¶¶ 61-62 ¶¶ 41, 46-47	¶¶ 98-102 ¶¶ 61-62 ¶¶ 41, 46-47	¶¶ 98-102 ¶¶ 61-62 ¶¶ 41, 46-47
[1(c)(i)]	wherein a direction and a distance of a destination from said present place are denoted with an orientation and a length of a line that is distinguished between starting and ending points	¶¶ 73-74 ¶¶ 75-76 ¶ 78 ¶ 80	¶¶ 73-74 ¶¶ 75-76 ¶ 78 ¶ 80	¶¶ 116-121 ¶¶ 73-74 ¶¶ 75-76 ¶ 78 ¶ 80	¶¶ 116-121 ¶¶ 73-74 ¶¶ 75-76 ¶ 78 ¶ 80

[1(c)(ii)]	to supply route guidance information as said walking navigation information.	¶ 71 ¶¶ 52-55	¶ 71 ¶¶ 52-55	¶ 71 ¶¶ 52-55	¶ 71 ¶¶ 52-55
3.	A portable terminal with the function of walking navigation according to claim 1, wherein said device for getting direction information gets orientation information of a display of said portable terminal.	¶ 65 ¶ 47	¶¶ 84-85 ¶ 65 ¶ 47	¶¶ 103-104 ¶ 65 ¶ 47	¶¶ 122-126 ¶¶ 103-104 ¶¶ 84-85 ¶ 65 ¶ 47
[4(a)]	A portable terminal with the function of walking navigation according to claim 1, wherein location of a user is of said portable terminal is determined according to said location information and said direction information, and	N/A	N/A	¶ 105 ¶ 49	¶ 105 ¶ 49
[4(b)]	wherein location of partner of the user is determined according to a location information from the partner's portable terminal.	N/A	N/A	¶¶ 106-108 ¶ 49	¶¶ 106-108 ¶ 49

5[P].	A portable terminal with the function of walking navigation, comprising:	¶¶ 56-60	¶¶ 56-60	¶¶ 56-60 ¶¶ 86-88	¶¶ 56-60 ¶¶ 86-88
[5(a)]	A device for getting location information denoting a present place of said portable terminal; and	¶¶ 61-62 ¶¶ 41-45	¶¶ 61-62 ¶¶ 41-45	¶¶ 93-97 ¶¶ 61-62 ¶¶ 41-45	¶¶ 93-97 ¶¶ 61-62 ¶¶ 41-45
[5(b)]	a device for getting direction information denoting an orientation of said portable terminal,	¶¶ 61-62 ¶¶ 41, 46-47	¶¶ 61-62 ¶¶ 41, 46-47	¶¶ 98-102 ¶¶ 61-62 ¶¶ 41, 46-47	¶¶ 98-102 ¶¶ 61-62 ¶¶ 41, 46-47
[5(c)(i)]	wherein a local route around said present place is shown with a bent line and a direction of movement is shown with an arrow on said bent line	¶¶ 73-74 ¶¶ 75-76 ¶ 78 ¶ 80	¶¶ 73-74 ¶¶ 75-76 ¶ 78 ¶ 80	¶¶ 116-121 ¶¶ 73-74 ¶¶ 75-76 ¶ 78 ¶ 80	¶¶ 116-121 ¶¶ 73-74 ¶¶ 75-76 ¶ 78 ¶ 80
[5(c)(ii)]	to supply route guidance information as said walking navigation information.	¶ 71 ¶¶ 52-55	¶ 71 ¶¶ 52-55	¶ 71 ¶¶ 52-55	¶ 71 ¶¶ 52-55

7.	The portable terminal with said function of walking navigation according to claim 5, wherein said device for getting direction information gets orientation information of a display of said portable terminal.	¶ 65 ¶ 47	¶¶ 84-85 ¶ 65 ¶ 47	¶¶ 103-104 ¶ 65 ¶ 47	¶¶ 122-126 ¶¶ 103-104 ¶¶ 84-85 ¶ 65 ¶ 47
8.	The portable terminal with said function of walking navigation according to claim 5, wherein neighborhood guidance information is retrieved in a direction form said present place so as to supply said neighborhood guidance information as said walking navigation information.	¶¶ 69-70 ¶ 53	¶¶ 69-70 ¶ 53	¶¶ 113-115 ¶¶ 69-70 ¶ 53	¶¶ 113-115 ¶¶ 69-70 ¶ 53
[9(a)]	The portable terminal with said function of walking navigation according to claim 5, wherein location of a user is of said portable terminal is determined according to said location information and said direction information, and	N/A	N/A	¶ 105 ¶ 49	¶ 105 ¶ 49

[9(b)]	wherein location of partner of the user is determined according to a location from the partner's portable terminal.	N/A	N/A	¶¶ 106-108 ¶ 49	¶¶ 106-108 ¶ 49
10[P].	A portable terminal with the function of walking navigation, comprising:	N/A	N/A	¶¶ 56-60 ¶¶ 86-88	¶¶ 56-60 ¶¶ 86-88
[10(a)]	a device for getting location information denoting a present place of said portable terminal; and	N/A	N/A	¶¶ 93-97 ¶¶ 61-62 ¶¶ 41-45	¶¶ 93-97 ¶¶ 61-62 ¶¶ 41-45
[10(b)]	a device for getting direction information denoting an orientation of said portable terminal,	N/A	N/A	¶¶ 98-102 ¶¶ 61-62 ¶¶ 41, 46-47	¶¶ 98-102 ¶¶ 61-62 ¶¶ 41, 46-47
[10(c)]	wherein location of a user is of said portable terminal is determined according to said location information and said direction information,	N/A	N/A	¶ 105 ¶ 49	¶ 105 ¶ 49
[10(d)]	wherein location of a partner of the user is determined according to a location information from the partner's portable terminal, and	N/A	N/A	¶¶ 106-108 ¶ 49	¶¶ 106-108 ¶ 49

[10(e)(i)]	wherein a full route from said starting point to said destination is shown with a bent line that is distinguished between starting and ending points and said present place is shown with a symbol on said line	N/A	N/A	¶¶ 116-121 ¶¶ 73-74 ¶¶ 75-76 ¶ 78 ¶ 80	¶¶ 116-121 ¶¶ 73-74 ¶¶ 75-76 ¶ 78 ¶ 80
[10(e)(ii)]	to supply said route guidance information as said walking navigation information.	N/A	N/A	¶ 71 ¶¶ 52-55	¶ 71 ¶¶ 52-55
11.	The portable terminal with said function of walking navigation according to claim 10, wherein said device for getting direction information gets information in a direction pointed by the tip of said portable terminal.	N/A	N/A	¶¶ 122-126 ¶ 47	¶¶ 122-126 ¶ 47
13.	The portable terminal with said function of walking navigation according to claim 10, wherein said device for getting direction information gets orientation information of a display of said portable terminal.	N/A	N/A	¶¶ 103-104 ¶ 65 ¶ 47	¶¶ 122-126 ¶¶ 103-104 ¶¶ 84-85 ¶ 65 ¶ 47

'999 Reference Chart

Claim/Element number	Element language	<i>Hayashida in view of Abowd</i>
1[P].	A portable terminal with the function of walking navigation, comprising:	¶¶ 56-60 ¶¶ 86-88
[1(a)]	a device for getting location information denoting a present place of said portable terminal;	¶¶ 93-97 ¶¶ 61-62 ¶¶ 41-45
[1(b)]	a device for getting direction information denoting an orientation of said portable terminal; and	¶¶ 98-102 ¶¶ 61-62 ¶¶ 41, 46-47
[1(c)]	a device for getting the location information of another portable terminal, wherein	¶¶ 106-108 ¶ 49
[1(d)(i)]	a direction from said present place to the location of said another portable terminal is displayed with the distance information between said locations	¶¶ 73-76 ¶ 78 ¶ 81 ¶ 106 ¶ 108 ¶ 116-121
[1(d)(ii)]	to supply route guidance information as said walking navigation information.	¶¶ 89-92 ¶¶ 118-120
2.	A portable terminal with the function of walking navigation according to claim 1; wherein said direction is denoted with an orientation of line and said distance is denoted with number.	¶¶ 71 ¶¶ 73-74 ¶ 79 ¶ 81 ¶¶ 116-121 ¶¶ 51, 52, 54, 50

3.	A portable terminal with the function of walking navigation according to claim 1; wherein said direction from said present place to the location of said another portable terminal is displayed using the symbols denoting the said present location and said location of another portable terminal.	¶ 106 ¶¶ 116-121 ¶¶ 52-53
4.	A portable terminal with the function of walking navigation according to claim 1; wherein said direction from said present place to the location of said another portable terminal is denoted with an orientation of a line that is distinguished between starting and ending points.	¶¶ 73-76 ¶ 78 ¶ 81 ¶¶ 116-121 ¶ 53
5[P].	A portable terminal with the function of walking navigation, comprising:	¶¶ 56-60 ¶¶ 86-88
[5(a)]	a device for getting location information denoting a present place of said portable terminal;	¶¶ 93-97 ¶¶ 61-62 ¶¶ 41-45
[5(b)]	a device for getting direction information denoting an orientation of said portable terminal; and	¶¶ 98-102 ¶¶ 61-62 ¶¶ 41, 46-47
[5(c)]	a device for getting the location information of another portable terminal, wherein	¶¶ 106-108 ¶ 49
[5(d)(i)]	a relation between said orientation and a direction from said present place to the location of said another portable terminal is displayed with the distance information between said locations	¶ 76 ¶ 81 ¶¶ 116-121 ¶ 51 ¶ 53

[5(d)(ii)]	to supply route guidance information as said walking navigation information.	¶¶ 89-92 ¶¶ 118-120
6[P].	A portable terminal with the function of walking navigation, comprising:	¶¶ 56-60 ¶¶ 86-88
[6(a)]	a device for getting location information denoting a present place of said portable terminal;	¶¶ 93-97 ¶¶ 61-62 ¶¶ 41-45
[6(b)]	a device for getting direction information denoting an orientation of said portable terminal; and	¶¶ 98-102 ¶¶ 61-62 ¶¶ 41, 46-47
[6(c)]	a device for getting the location information of another portable terminal from said another terminal via connected network, wherein	¶¶ 106-108 ¶ 49
[6(d)(i)]	a relation between said orientation and a direction from said present place to the location of said another portable terminal is displayed	¶ 76 ¶ 81 ¶¶ 116-121 ¶ 51 ¶ 53
[6(d)(ii)]	to supply route guidance information as said walking navigation information.	¶¶ 89-92 ¶¶ 118-120