

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. and
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,

v.

ADVANCED TOUCHSCREEN and
GESTURE TECHNOLOGIES, LLC,
Patent Owner.

Case IPR2016-00655
Patent 8,878,810 B2

Before JONI Y. CHANG, BEVERLY M. BUNTING, and
MICHELLE N. WORMMEESTER, *Administrative Patent Judges*.

CHANG, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively “Petitioner”) filed a Petition requesting *inter partes* review of claims 1, 3–5, and 10 of U.S. Patent No. 8,878,810 B2 (Ex. 1001, “the ’810 patent”). Paper 2 (“Pet.”). Advanced Touchscreen and Gesture Technologies, LLC (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). Upon consideration of the Petition and Preliminary Response, we determined that there was a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim, and instituted this trial, in pursuance to 35 U.S.C. § 314(a), as to claims 1, 3–5, and 10 of the ’810 patent. Paper 8 (“Dec.”).

Subsequent to institution, Patent Owner filed a Patent Owner Response (Paper 15, “PO Resp.”), and Petitioner filed a Reply (Paper 21, “Reply”). A transcript of the oral hearing held on April 3, 2017 has been entered into the record as Paper 41 (“Tr.”).¹

This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we conclude that Petitioner has demonstrated by a preponderance of the evidence that 1, 3–5, and 10 of the ’810 patent are unpatentable.

¹ The oral hearings in the following cases were consolidated: Cases IPR2015-00652, IPR2015-00653, IPR2015-00654, and IPR2015-00655. Paper 41.

A. Related Matters

The parties indicate that the '810 patent has been asserted in *Advanced Touchscreen v. Samsung Electronics Co. Ltd.*, Case No. 3:16-cv-000557-VC (N.D. Cal.). Pet. 4; Paper 5, 2. Additionally, the parties identify three other petitions challenging the patentability of patents related to the '810 patent, including: (1) U.S. Patent No. 8,743,076 B2 (IPR2016-00652); (2) U.S. Patent No. 8,717,303 B2 (IPR2016-00653); and (3) U.S. Patent No. 8,866,785 B2 (IPR2016-00654). Pet. 4; Paper 5, 2.

B. The '810 Patent

The '810 patent generally relates to touch pad user interfaces for controlling external systems, including computers. Ex. 1001, 1:26–28. The '810 patent describes two types of touch pads: null/contact touch pads and pressure-sensor array touch pads. *Id.* at 2:15–45. Null/contact touch pads are “contact-position sensing devices that normally are in a null state unless touched and produce a control signal when touched whose signal value corresponds to typically one unique position on the touch-pad.” *Id.* at 2:15–19. Pressure-sensor array touch pads are “capable of measuring pressure gradients of many parts of the human hand or foot simultaneously.” *Id.* at 2:28–31. According to the '810 patent, one of the purported enhancements is “employing a touch-screen instance of null/contact touch-pad and positioning it over a video display.” *Id.* at 4:53–55.

C. Illustrative Claim

Of the challenged claims, claim 1 is independent. Claims 3–5 and 10 depend directly from claim 1. Claim 1 is illustrative:

1. An apparatus comprising:

a *touch screen* having a contiguous region sensing contact from at least a portion of a human hand on a surface of the touch screen,

the touch screen comprising a display and a sensor array comprising a plurality of sensors in physical contact with the display,

each of the plurality of sensors configured with a unique spatial location and an associated unique address,

each of the plurality of sensors configured to generate sensor measurement values,

wherein a plurality of sensor spatial locations are configured to provide associated sensor measurement values responsive to the contiguous region of contact;

a *value of at least one control parameter* for the contiguous region of contact responsive to a measured change in at least one of the associated sensor measurement values, the value obtained by performing a calculation on the associated sensor measurement values and interpreting the results as *signifying a touch gesture*, wherein the at least one control parameter is associated with the touch gesture; and

at least one derived control parameter assigned to a specific control signal;

wherein the touch gesture is recognized from sequential dynamics among hand contact patterns from a first posture associated with a first portion of a user hand at a first location on the touch screen to a second posture associated with a second portion of the user hand at a second location on the touch screen,

wherein the first portion of the user hand and the second portion of the user hand are different.

Ex. 1001, 10:65–11:27 (emphases added).

D. Prior Art of Record

Petitioner presents the references listed below.²

Westerman	U.S. 6,323,846 B1	Nov. 27, 2001	(Ex. 1004)
Bach	WO 90/14604	Nov. 29, 1990	(Ex. 1005)
Ure	U.S. 5,982,302	Nov. 9, 1999	(Ex. 1007)
Edwards	U.S. 5,194,862	Mar. 16, 1993	(Ex. 1009)
Greanias	U.S. 5,386,219	Jan. 31, 1995	(Ex. 1012)
Behrens	U.S. 4,899,137	Feb. 6, 1990	(Ex. 1017)
Jin	U.S. 4,644,101	Feb. 17, 1987	
(Ex. 1020, “Jin ’101 patent”)			
Boie	U.S. 4,526,043	July 2, 1985	(Ex. 1021)
Clancy	U.S. 5,952,998	Sept. 14, 1999	(Ex. 1023)
Yonekura	EP 0088132	Sept. 14, 1983	(Ex. 1024)
Young	U.S. 5,708,460	Jan. 13, 1998	(Ex. 1025)
Maw	WO 92/13328	Aug. 6, 1992	(Ex. 1026)
Gerpheide	U.S. 5,861,875	Jan. 19, 1999	(Ex. 1027)
Caldwell	EP 1562293 A2	Oct. 8, 2005	(Ex. 1028)

Andrew Sears et al., *A New Era for Touchscreen Applications: High Precision, Dragging Icons, and Refined Feedback*, Human-Computer Interaction Laboratory, Department of Computer Science, University of Maryland, 1–38, (June 1990) (Ex. 1018, Exhibit A, “Sears”).

S. Jin et al., *Optically Transparent, Electrically Conductive Composite Medium*, 24 SCIENCE 255, 446–48, (Jan. 1992) (Ex. 1019, Exhibit A, “Jin”).

² The citations to the references refer to the original page or column numbers, and not to the page numbers added by Petitioner.

Larry K. Baxter, *Capacitive Sensors: Design and Applications* 1–5, 105–146 (Robert J. Herrick, ed., IEEE Press 1997) (Ex. 1022, Exhibit A, “Baxter”).

E. Instituted Grounds of Unpatentability

We instituted the instant trial based on the following grounds of unpatentability (Dec. 33):

Challenged Claims	Basis	References
1, 3–5, and 10	§ 103(a) ³	Westerman and Bach
1, 3–5, and 10	§ 103(a)	Ure and Edwards ⁴

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are given their broadest reasonable interpretation in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b). Under the broadest reasonable interpretation standard, claim terms generally are given their

³ Because the claims at issue have a filing date prior to March 16, 2013, the effective date of the Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), we apply the pre-AIA version of 35 U.S.C. § 103 in this Decision.

⁴ Although Ure incorporates Edwards by reference (Ex. 1007, 1:37–45, 1:52–67), Petitioner identifies Edwards expressly in the statement of the asserted ground of unpatentability for clarity. Pet. 42 n.8.

ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

The parties propose constructions for several claim terms. Pet. 11–12; PO Resp. 10–13. We note that only those claim terms and elements which are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999). For purposes of this Decision, we find it necessary to address only the claim terms identified below.

“touch screen”

Claim 1 recites “the touch screen comprising a display and a sensor array comprising a plurality of sensors in physical contact with the display.” Ex. 1001, 11:1–3. In our Decision on Institution, we construed the term “touch screen,” broadly, but reasonably, as a “screen designed to recognize the location of a touch on its surface.” Dec. 9. And, in light of the Specification, we determined that a “touch pad” may encompass a touch screen. *Id.*; Ex. 1001, 2:24–26, 3:9–22, 4:53–55. Although Patent Owner does not challenge our claim construction in its Patent Owner Response, Patent Owner clarifies that a “transparent touch pad” when positioned over a display, is synonymous with a “touch screen.” PO Resp. 10–11. In its Reply, Petitioner asserts that no construction is necessary for the term “touch screen,” but nevertheless agrees with our claim construction. Reply 4. Upon review of the present record, we discern no reason to modify our claim construction for this term for purposes of the Final Written Decision.

“gesture,” “hand contact patterns,” and “posture”

Claim 1 recites:

wherein the touch *gesture* is recognized from sequential dynamics among *hand contact patterns* from a first *posture* associated with a first portion of a user hand at a first location on the touch screen to a second posture associated with a second portion of the user hand at a second location on the touch screen, wherein the first portion of the user hand and the second portion of the user hand are different.

Ex. 1001, 11:20–27 (emphases added).

In the Decision on Institution (Dec. 9–10), we adopted the following constructions in view of the parties’ arguments (Pet. 12; Prelim. Resp. 16–17):

Claim term(s)	Construction
“gesture”	“dynamic variations among postures or hand contact patterns combined in sequence”
“hand contact patterns” and “posture”	“the two-dimensional shapes of contiguous regions of contact”

Subsequent to institution, neither party challenged any aspect of the claim constructions as to these terms. PO Resp. 11–12; Reply 2–4. Upon consideration of the record before us, we discern no reason to change our claim constructions for these terms for purposes of this Final Written Decision.

“recognized”

Claim 1 recites “wherein the touch gesture is *recognized* from sequential dynamics among hand contact patterns.” Ex. 1001, 11:20–22 (emphasis added).

Patent Owner, citing to a general dictionary (Ex. 2010, 976), asserts that the term “recognized” should be construed as “to perceive to be something previously known,” consistent with the term’s plain dictionary meaning. PO Resp. 12–13. According to Patent Owner, “a touch gesture must be perceived based on *previously known* sequential dynamics (a set of *stored* touch gestures).” *Id.* (citing Ex. 1001, 7:35–38, 44–50) (emphases in the original).

Petitioner counters that the intrinsic evidence does not support Patent Owner’s proposed claim construction. Reply 2–4. In Petitioner’s view, the challenged claims “do not recite a ‘set of stored touch gestures’ or limit gesture recognition to looking up specific ‘previously known sequential dynamics’—rather, the gesture need only be recognized *from* observed specific dynamic among hand contact patterns, as claimed.” *Id.* Petitioner also urges us to give the term its plain and ordinary meaning, or construe it to mean “discerned,” consistent with the Specification. *Id.* (citing Ex. 1001, 7:23–26, 33–35, 44–50).

In construing the claims, our analysis begins with, and remains centered on, the language of the claims themselves. *See Interactive Gift Express, Inc. v. Compuserve Inc.*, 256 F.3d 1323, 1331 (Fed. Cir. 2001).

“The claims, of course, do not stand alone.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005) (en banc). “Rather, they are part of a fully integrated written instrument, consisting principally of a specification that concludes with the claims.” *Id.* (internal quotation marks and citation omitted). “For that reason, claims must be read in view of the specification, of which they are a part.” *Id.* (internal quotations marks and citation omitted). Indeed, apart from the claims, the specification is “the single best guide to the meaning of a disputed term.” *Id.*

We are not persuaded by Patent Owner’s arguments and decline to adopt Patent Owner’s proposed claim construction because Patent Owner attempts to import an extraneous limitation into the claims—“a touch gesture must be perceived based on *previously known* sequential dynamics among hand contact patterns (a set of *stored* touch gestures).” PO Resp. 12–13 (emphases in the original). Claim 1 merely recites “the touch gesture is recognized from sequential dynamics among hand contact patterns.” Ex. 1001, 11:20–22. As noted by Petitioner, the challenged claims do not recite “a set of *stored* touch gestures” or limit gesture recognition to looking up specific “*previously known* sequential dynamics.” Reply 2–4.

Moreover, Patent Owner’s proposed claim construction relies upon an extrinsic general dictionary definition of the term “recognize” in isolation, not in the context of the entire claim element as a whole, in light of the Specification. PO Resp. 12–13 (citing Ex. 2010, 976). As noted by our reviewing court, the fact that a term “has multiple dictionary meanings does not mean that all of these meanings are reasonable interpretations in light of

[the] specification.” *PPC Broadband, Inc. v. Corning Optical Commc’ns RF, LLC*, 815 F.3d 747, 752 (Fed. Circ. 2016). In fact, the dictionary cited by Patent Owner also sets forth two other definitions that do not have the “previously known” requirement—namely, (1) “to acknowledge formally . . . to admit as being of a particular status . . .”; and (2) “to acknowledge or take notice of in some definite way . . .” Ex. 2010, 976. Patent Owner does not explain why these other definitions are not reasonably applicable. As Petitioner noted, as an example, “you don’t need to have previously known Judges Chang[,] Bunting and Wormmeester to recognize each of them as a judge. We can simply detect this in advance by [certain] characteristics.” Tr. 86–87.

Patent Owner does not identify, nor can we find, any portion of the Specification that unambiguously defines the term “recognized” to require a touch gesture to “be perceived based on *previously known* sequential dynamics among hand contact (a set of *stored* touch gestures),” as urged by Patent Owner. PO Resp. 12–13 (emphases in the original). In fact, the Specification does not describe “a set of *stored* touch gestures” or recognizing touch gestures based on “*previously known* sequential dynamics.” Ex. 1001, 7:33–50. As Petitioner points out, the Specification merely describes that “[r]elatively simple pattern recognition software can be used to *discern* . . . hand contact patterns” (i.e., postures) and gestures. *Id.* (emphasis added).

Therefore, we agree with Petitioner that the evidence in this record does not support Patent Owner’s proposed claim construction. In light of the

Specification including the claim language, we give the claim element—“wherein the touch gesture is *recognized from* sequential dynamics among hand contact patterns”—its plain and ordinary meaning. For example, the term “recognized” encompasses “discerned,” “acknowledged,” or “taken notice of” based on certain characteristics of the touch gesture.

B. Principles of Law

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

C. Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citation omitted). In that regard, Mr. Jean Renard Ward, Petitioner’s expert,

testifies that a person of ordinary skill in the art at the time of the invention “would have had a minimum of bachelor’s degree in mechanical engineering, electrical engineering, computer engineering, or computer science, or an equivalent technical degree and at least two years of experience in the design of computer user interface devices, or the equivalent.” Ex. 1029 ¶ 15. Michael C. Brogioli, Ph.D., Patent Owner’s expert, adopts Mr. Ward’s testimony as to the level of ordinary skill in the art. Ex. 2012 ¶¶ 26–27. Jacob O. Wobbrock, Ph.D., another of Patent Owner’s declarants, seems to agree with the testimony of Mr. Ward, but further testifies that an ordinarily skilled artisan would have “experience building interactive computer applications, including taking readings from input devices and portraying user interfaces on-screen.” Ex. 2009 ¶ 22.

Based on the evidence before us, we do not observe meaningful differences between the parties’ assessments of a person with ordinary skill in the art. Therefore, we adopt Mr. Ward’s assessment of a person with ordinary skill in the art. We also find that the prior art references themselves represent the level of ordinary skill in the art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (the level of ordinary skill in the art may be evidenced by the references themselves); *GPAC*, 57 F.3d at 1579 (finding that the Board did not err in concluding that the level of ordinary skill in the art was best determined by the references of record).

D. Background of the Art

In this proceeding, both parties submit arguments and supporting evidence concerning the state of the art at the time of the invention. Pet. 1–4; PO Resp. 13–18; Ex. 1029 ¶¶ 19–27; Ex. 1030 ¶¶ 9–24; Ex. 2009 ¶¶ 26–34. Upon review of the parties’ contentions and evidence, we are not persuaded that Patent Owner’s overview of the prior art (PO Resp. 13–18) and Dr. Wobbrock’s testimony regarding the background of the art (Ex. 2009 ¶¶ 26–34) are supported by the evidence in this record. *See, e.g.*, Ex. 1030 ¶¶ 9–24 (providing examples of how “Dr. Wobbrock and Patent Owner inaccurately describe the state of the art before May 15, 1999.”). Rather, we agree with Petitioner’s description of the state of the art, which is supported by Mr. Ward’s testimony, the prior art disclosures, and other evidence in this record. *See, e.g.*, Ex. 1029 ¶¶ 19–27; Ex. 1030 ¶¶ 9–24; Ex. 1009, 10:3–22; Ex. 1001, 3:16–20 (“two-dimensional-sensing see-through touch-screens [are] often employed in public computer kiosks.”). We credit Mr. Ward’s testimony (Ex. 1029 ¶¶ 19–27; Ex. 1030 ¶¶ 9–24) as it is consistent with the prior art in this record.

Notably, both Patent Owner and Dr. Wobbrock assert that “[m]ulti-touch screens *were not widely used* in research or embraced commercially until after 2000,” and multi-touch screens “did not become *popularized* until as late as 2005.” PO Resp. 13, 17; Ex. 2009 ¶¶ 26, 33 (emphases added). Those assertions do not undermine the fact that using touch screens as input devices was known in the art at the time of the invention, as evidenced by the prior art in this record. *See, e.g.*, Ex. 1018, 3;

Ex. 1022, 115–17; Ex. 1023, 1:48–60; Ex. 3001, 3 (defining “touch screen” as a “computer screen designed or modified to recognize the location of a touch on its surface”); *see also* Prelim. Resp. 44 (admitting that the ease of learning and use of touch screens was a well-known “benefit of all touch screens,” and that “[t]ouch screens were used, for example, to select button-options on ATM’s”); Ex. 2009 ¶ 26 (confirming that “touchpads and touch screens were known to persons of ordinary skill in the art before May 15, 1999”). For instance, Patent Owner does not dispute that Ure discloses a multi-touch touch screen. Ex. 1007, 1:52–59, 2:55–57. Edwards also describes touch sensor systems that may be used as a stand-alone input interface or, alternatively, they may be used as an overlay to a display device, with transparent sensor elements. Ex. 1009, 10:3–8. According to Edwards, “[t]ouching of the sensing elements for example may be by means of a user’s finger or by means of a stylus.” *Id.* at 1:47–48.

To the extent that Patent Owner contends that the technical features of touch screens and touch pads cannot be combined because they “are different both technologically and in the interactive capabilities” (PO Resp. 17–18; Ex. 2009 ¶¶ 27–34), we are not persuaded that Patent Owner provides sufficient explanation or credible evidence to support such an contention. Rather, we agree with Mr. Ward’s testimony that Patent Owner’s arguments and Dr. Wobbrock’s testimony “inaccurately describe the state of the art before May 15, 1999,” and that they “do not account for the fact that touchpads and touch screens are presented as alternatives in the prior art and in the ’810 patent itself.” Ex. 1030 ¶¶ 9–24; Ex. 1029 ¶¶ 29,

56, 58–59; Ex. 1004, 3:6–10, 62:3–7; 1005, 9; Ex. 1001, 1:37–38, 2:24–26, 6:26–65, 10:22–37. For example, the Specification of the ’810 patent explains that a touch screen may be an example of a touch pad. Ex. 1001, 2:25–26, 4:53–55; *see also id.* at 3:6–20 (Examples of null/contact touch pads include “two-dimensional-sensing see-through touchscreens”).

In addition, Patent Owner’s reliance on a passage of an Initial Determination from the United States International Trade Commission (“ITC”) (Ex. 2003, 202, 209–210), concerning a different patent and a different prior art reference cited in a completely different evidentiary record, is misplaced. As Mr. Ward testifies, that quotation is taken out of context and is incomplete. Ex. 1030 ¶ 19. The fact that the prior art reference in that case is a doctoral dissertation authored by the inventor of Westerman (U.S. Patent 6,323,846, Ex. 1004), without more, does not compel us to make the same finding here in the instant proceeding. Patent Owner’s argument conflates the dissertation in that case and the prior art reference, Westerman (Ex. 1004), in this proceeding.

Significantly, the cited portion of the ITC’s Initial Determination makes clear that the dissertation in that case discloses *a touch pad that has a separate display*, rather than “a touch screen, which is a combination of a display and an input device.” PO Resp. 17; Ex. 2003, 209–210. In contrast, the prior art reference here in the instant proceeding, Westerman (Ex. 1004), discloses recognizing a gesture (e.g., a layout homing gesture, where all five fingers are placed on the surface synchronously) on a *multi-touch surface apparatus “fabricated on or integrated with a display device,”* as a user

input command (to control the location of the key symbols that are reprogrammably displayed on the surface so that the home row keys will be moved automatically under the synchronized fingertips). Ex. 1004, 54:67–55:26; 62:3–4.

Furthermore, merely pointing out that the prior art acknowledges certain “perceived disadvantages” in the early development of the touch device technology, as in Sears (Ex. 1018), does not undermine the actual teachings in the prior art. PO Resp. 13–17; Ex. 2009 ¶¶ 26–34. For instance, as discuss below in Section II.E. (“Secondary Considerations of Nonobviousness”) of this Decision, Sears also discloses the advantages of using touch screens and how those “perceived disadvantages” had been overcome or reduced, including the obscuring the screen problem and the “fat finger problem” (PO Resp. 14; Ex. 2009 ¶ 27). *See, e.g.*, Ex. 1018, 3–6 (“Many of these problems [had] been overcome or reduced by improvements in touchscreen technology or design strategies that have been developed for touchscreen interfaces.”); *id.* at 4 (“Careful design of the interface, placing selectable items in locations that will keep the user’s hand from obscuring the screen, can significantly reduce this problem.”); *id.* at 5 (“touchscreens have improved dramatically in recent years, and, as a result, high precision, low error rate tasks can now be performed using a touchscreen”); Ex. 1030 ¶¶ 14–19.

Additionally, Patent Owner’s reliance on the problems noted in the background section of Westerman also is unavailing, as they are those that

are to be solved by the invention disclosed in Westerman. PO Resp. 15–17; Ex. 2009 ¶ 32. Westerman expressly discloses that

It is also an object of the present invention to provide a system and method for distinguishing different types of manual input such as typing, multiple degree-of-freedom manipulation, and handwriting *on a multi-touch surface, via different hand [configurations] which are easy for the user to learn and easy for the system to recognize.*

Ex. 1004, 6:60–65 (emphasis added). Patent Owner and Dr. Wobbrock’s testimony do not address the advantages of using touch screens and the technological advancements disclosed in Sears, Westerman, and other prior art in this record, but rather unduly focus on the “perceived disadvantages” or noted problems in the early development of the touch screen technology. PO Resp. 13–18; Ex. 2009 ¶¶ 26–34.

For these reasons, we are not persuaded that Patent Owner’s overview of the prior art (PO Resp. 13–18) and Dr. Wobbrock’s testimony regarding the background of the art (Ex. 2009 ¶¶ 26–34) describe the state of the art at the time of the invention accurately.

E. Obviousness over Westerman and Bach

Petitioner asserts that claims 1, 3–5, and 10 are unpatentable under 35 U.S.C. § 103(a) as obvious over Westerman in combination with Bach. Pet. 13–41. Petitioner provides explanations to account for all of the claim limitations recited in the challenged claims (*id.* at 21–41), and reasons to combine the teachings of Westerman and Bach (*id.* at 18–21). In support of its contentions, Petitioner directs our attention to a Declaration of Mr. Ward.

Ex. 1029 ¶¶ 42–143. Based on the evidence in this record, we are persuaded by Petitioner’s showing and we credit Mr. Ward’s testimony (Ex. 1029 ¶¶ 42–143) as it is consistent with the prior art disclosures.

Relying on Dr. Brogioli’s Declaration (Ex. 2008 ¶¶ 28–68), Patent Owner argues that the combination of Westerman and Bach fails to disclose certain claim limitations, and that Petitioner has not established that one with ordinary skill in the art would have combined Westerman and Bach. PO Resp. 20–54. In our discussion below, we begin with a brief overview of Westerman and Bach, and then we address the parties’ contentions in turn, focusing on the disputed claim limitations.

Westerman

Westerman discloses a multi-touch surface apparatus for sensing configurations and activities of fingers. Ex. 1004, 8:45–47. Westerman also describes a method for generating cursor movement or scrolling signals from a tangential motion of a user’s finger that is accelerating on a touch-sensitive surface before the finger is lifted. *Id.* at 10:40–65.

Figure 1 of Westerman is reproduced below.

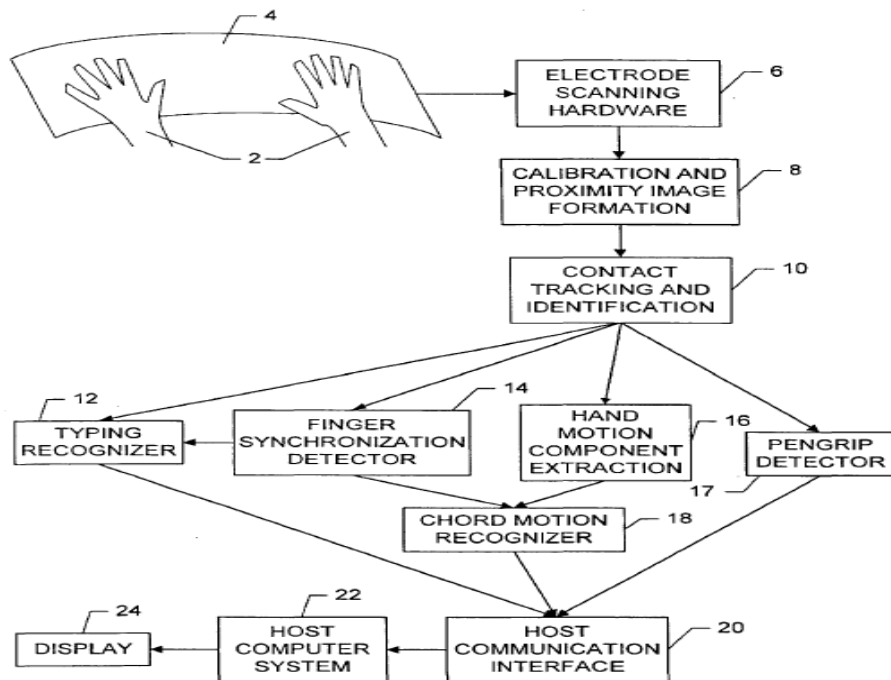


FIG. 1

Figure 1 of Westerman illustrates a block diagram of an integrated manual input apparatus, which includes multi-touch surface 2, electronic scanning hardware 6, calibration and proximity image formation module 8, and contact tracking and identification module 10. *Id.* at 13:4–26.

Westerman's multi-touch surface apparatus comprises an array of capacitive proximity sensors, which sense the distance and pressure between the user's finger and the surface. *Id.* at 11:21–23, 14:31–37, 15:1–42. The multi-touch surface apparatus can be fabricated on or integrated with a display device.

Id. at 62:3–4; Ex. 1006, 90⁵ (providing the same disclosure in Westerman’s original claims 14 and 15). It also can be used for tracking and identifying hand contacts in a sequence of proximity images, in order to support interpretation of hand configurations and activities. *Id.* at 9:15–18.

Bach

Bach relates to touch-sensitive and pressure-sensitive devices. Ex. 1005, 1. These devices include a layer of material that overlays one or more sensors. *Id.* at 4. The layer of material has dielectric characteristics that change with pressure applied thereto, and the sensors can detect the dielectric changes and generate an output indicative of the pressure. *Id.* Bach also discloses forming a superior sensing screen over a visual display unit using sensors and transparent means. *Id.* at 11.

Recognizing a Touch Gesture on a Touch screen

Claim 1 recites “a *touch screen* having a contiguous region sensing contact from at least a portion of a human hand on a surface of the touch screen,” and “the touch gesture is *recognized* from sequential dynamics among hand contact patterns.” Ex. 1001, 10:66–11:3, 20–21 (emphases added). By virtue of their dependency, claims 3–5 and 10 also require these limitations.

⁵ The citations to Exhibit 1006, which contains Westerman’s original disclosure, refer to the original page numbers, and not to the page numbers added by Petitioner.

In this regard, Petitioner asserts that Westerman, in combination with Bach, teaches or suggests recognizing a touch gesture on a touch screen, as required by the claims. Pet. 18–25, 36–38 (citing Ex. 1029 ¶¶ 62–82, 113–19). Specifically, Petitioner avers that Westerman describes a multi-touch surface apparatus fabricated on or integrated with a display device, which comprises a liquid crystal display or light-emitting polymer display. *Id.* (citing, *e.g.*, Ex. 1004, 55:4–8, 62:3–7; Ex. 1029 ¶¶ 62–72). Petitioner contends that Westerman also discloses that sensors are embedded in the multi-touch surface for detecting proximity of a finger or hand to the surface, and the electronic scanning hardware of the multi-touch surface apparatus controls and reads from each proximity sensor of a sensor array. *Id.* (citing Ex. 1004, 13:4–26). Petitioner further submits that Westerman discloses recognizing a touch gesture (*e.g.*, fingertip pair chord slide ongoing, two more fingers new subset pressed in sync, and whole subset four fingers sliding) from sequential dynamics among hand contact patterns. *Id.* at 36–38 (citing Ex. 1004, 20:15–25, 51:64–52:9, 52:64–53:28, 54:12–21, 74:65–75:27, Figs. 40A–B; Ex. 1029 ¶¶ 113–19).

Petitioner observes that Westerman implicitly describes a *transparent* multi-touch surface positioned over a visual display (Ex. 1004, 55:4–8), but nevertheless submits that Bach expressly discloses a *transparent* sensing screen positioned over a visual display unit (“VDU”) (*i.e.*, forming a touch screen). *Id.* at 17–25 (citing Ex. 1005, 1, 11). In addition, Petitioner contends that one with ordinary skill in the art would have made Westerman’s multi-touch surface *transparent*, forming a touch screen, in

light of Bach, so that a user could view the underlying display. *Id.* at 18–21; Ex. 1029 ¶¶ 68–72, 82.

Patent Owner counters that Westerman “does not disclose a *touch screen* (or transparent touch pad positioned over a display).” PO Resp. 21. According to Patent Owner, Westerman discloses a multi-touch touchpad separate from a display. *Id.* (citing Ex. 1004, 13:4–5, Fig. 1). Patent Owner also argues that Westerman uses circuitry that obscures the underlying display, citing to the prosecution history for support. *Id.* at 26–27 (citing Ex. 2007, 265, 335, 345, 396, 425). Patent Owner further contends that Westerman refers to a typing keyboard, “which uses a simple ‘key layout’ where key symbols are *embedded* in the display, rather than positioning a transparent touchpad ‘over’ a display.” *Id.* at 25–26. Patent Owner also argues that Westerman “lacks components that recognize gestures from sequential dynamics among hand contact patterns *on a touch screen*.” *Id.* at 24–26. In Patent Owner’s view, Westerman does not disclose *touch gestures* on a transparent touch pad positioned over a display because the typing recognition module processes *finger taps*, which are not touch gestures. *Id.*

Upon review of the parties’ contentions and the evidence before us, we agree with Petitioner’s analysis and find that Petitioner’s showing of how the cited passages of Westerman and Bach satisfy the limitations that require recognizing a touch gesture on a touch screen is supported by sufficient explanation and credible evidence.

We are not persuaded by Patent Owner's arguments. The relevant issue here is whether the teachings of Westerman and Bach, taken as a whole, would have suggested the patentees' invention to a person having ordinary skill in the art. *See In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). Attacking Westerman's teachings individually does not undermine Petitioner's showing of obviousness. *See In re Keller*, 642 F.2d 413, 426 (CCPA 1981) (nonobviousness cannot be established by attacking prior art teachings individually where the ground of unpatentability is based upon a combination of the prior art teachings). Furthermore, Patent Owner's arguments are inconsistent with Westerman's disclosure.

As Petitioner points out (Pet. 21–23), Westerman expressly discloses a multi-touch surface apparatus *fabricated on a display device*, which comprises a liquid crystal display or a light-emitting polymer display. Ex. 1004, 62:3–7 (emphasis added). More importantly, Westerman also discloses that “[t]o provide *feedback to the user* about changes in the position of the key layout, the position of the key symbols . . . would not be printed permanently on the [multi-touch] surface. Instead, the position of the key symbols would be *reprogrammably displayed on the [multi-touch] surface.*” *Id.* at 54:67–55:8 (emphases added). As Mr. Ward testifies, a “person of ordinary skill in the art would have understood that when the multi-touch surface is fabricated on or integrated with a display, key symbols can be displayed on the display and thus shown on the multi-touch surface.” Ex. 1030 ¶ 58.

Given the evidence before us, and reading Westerman, as a whole, we find that Westerman reasonably suggests that the multi-touch surface fabricated on a display device is transparent. The mere fact that we did not institute Petitioner's ground based solely on Westerman because Petitioner also relies upon Bach for the express teaching of a *transparent* touch pad or touch screen (Pet. 23–24), or the Examiner allegedly determined that Westerman does not *expressly* disclose a transparent touch pad (Ex. 2007, 265, 335, 345, 396, 425) because, as Mr. Ward explains, the Examiner “did not address Westerman’s key disclosure of a touchpad ‘fabricated on or integrated with’ a display” (Ex. 1029 ¶ 57; Ex. 1030 ¶ 29), does not undermine the teachings of Westerman, as implied by Patent Owner (PO Resp. 26–27 n.3).

Notably, Patent Owner’s argument that Westerman discloses a multi-touch touchpad separate from a display (PO Resp. 21) ignores Westerman’s express disclosure of a multi-touch surface apparatus *fabricated on a display device* (Ex. 1004, 62:3–7). Contrary to Patent Owner’s assumption that Westerman discloses only “display 24,” Westerman clearly discloses two displays, including the display device integrated under the multi-touch surface apparatus.

Patent Owner’s contention that Westerman’s touch surface purportedly uses circuitry that obscures the underlying display (PO Resp. 26–27) also is not supported by Westerman’s disclosure. Westerman specifically discloses that the multi-touch surface fabricated on a display provides feedback to the user about changes in the position of the key

layout, where the key symbols are *reprogrammably displayed on the surface*, and thus shown on the multi-touch surface. Ex. 1004, 54:67–55:8; Ex. 1030 ¶ 58. Further, Patent Owner’s argument that Westerman’s key symbols are embedded in the display (PO Resp. 25–26) also squarely contradicts Westerman’s disclosure—“the position of the key symbols would be reprogrammably displayed on the surface.” Ex. 1004, 54:67–55:8.

We also are not persuaded by Patent Owner’s argument that Westerman lacks components for recognizing *touch gestures* from sequential dynamics among hand contact patterns on a touch screen. PO Resp. 24–26. Patent Owner’s argument narrowly focuses on only the finger tapping disclosure of Westerman, and fails to consider Westerman, as a whole, from the perspective of an ordinarily skilled artisan. A prior art reference must be considered for everything it teaches by way of technology and is not limited to the particular example it is describing. *EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985). Furthermore, in an obviousness analysis, we must consider the combination of references, as a whole, in light of the general knowledge of an ordinarily skilled artisan. *Merck*, 800 F.2d at 1097.

Significantly, nothing in Westerman limits its multi-touch surface apparatus to a static typing keyboard that only recognizes an individual finger tap at a time, as alleged by Patent Owner (PO Resp. 24–26). Indeed, Westerman expressly discloses the recognition of a *layout homing gesture*, where all five fingers touch the surface synchronously to control the location of the key symbols that are reprogrammably displayed on the surface, so that

the home row keys will be moved automatically under the synchronized fingertips. Ex. 1004, 54:67–55:26. Westerman describes using the following procedure:

Given such [a multi-touch surface] apparatus, step 702 retrieves the current paths from both hands and awaits what will be known as *a layout homing gesture*. If decision diamond 704 decides with the help of a hand's synchronization detector that *all five of the hand's fingers have just been placed on the surface synchronously*, step 706 will attempt to *snap the key layout to the hand such that the hand's home row keys lie under the synchronized fingertips*, wherever the hand is on the surface. Step 706 retrieves the measured hand offsets from the hand position estimator and translates all key regions which are normally typed by the given hand in proportion to the measured hand offsets. Note the currently measured rather than filtered estimates of offsets can be used because when all five fingers are down there is no danger of finger misidentification corrupting the measured offsets. This procedure assumes that the untranslated locations of the home row keys are the same as the default finger locations for the hand.

Ex. 1004, 55:4–26 (emphases added).

In addition, we agree with Petitioner that Westerman's disclosure is not limited to a typing recognition module, as alleged by Patent Owner. Pet. 13–17, 21–25, 36–38; Ex. 1004, Abstract (Apparatus “for simultaneously tracking multiple finger and palm contacts as hands approach, touch, and slide across a proximity-sensing . . . multi-touch surface.”), 6:60–65 (The present invention provides a system and method for “distinguishing different types of manual input such as typing, multiple degree-of-freedom manipulation, and handwriting on a multi-touch surface.”), 7:25–28 (“Another object of the present invention is to identify

different hand parts as they contact the surface so that a variety of hand configurations can be recognized and used to distinguish different kinds of input activity.”), 9:15–36, 10:15–38 (generating input signals “in response to tapping or *sliding of fingers on a multi-touch surface*” (emphasis added)), 10:39–65 (generating cursor movement or scrolling signals from a tangential motion of a touch device, e.g., a finger).

In fact, as Petitioner explains, Westerman also teaches recognizing a touch gesture (e.g., fingertip pair chord slide ongoing, two more fingers new subset pressed in sync, and whole subset four fingers sliding) from sequential dynamics among hand contact patterns. Pet. 36–38; Ex. 1029 ¶¶ 113–19; Ex. 1004, 20:15–25, 51:64–52:9, 52:64–53:28, 54:12–21, 74:65–75:27, Figs. 40A–B.

Based on the evidence in this record, we are not persuaded by Patent Owner’s arguments that “Westerman clearly lacks components that recognize gestures from sequential dynamics among hand contact patterns on a touch screen,” and that Westerman does not disclose touch gestures on a transparent touch pad positioned over a display.

For the reasons stated above, we determine that Petitioner has shown sufficiently that the combination of Westerman and Bach teaches or suggests “a touch screen having a contiguous region sensing contact from at least a portion of a human hand on a surface of the touch screen,” and “the touch gesture is recognized from sequential dynamics among hand contact patterns,” as required by claims 1, 3–5, and 10.

Reasons to Combine Westerman and Bach

As discussed above, Petitioner contends that one with ordinary skill in the art would have made Westerman's multi-touch surface *transparent*, in light of Bach, so that a user could view the underlying display. Pet. 18–25. In support of Petitioner's contention, Mr. Ward testifies that “it was well-known that Westerman's multi-touch surface could be made of transparent materials (*e.g.*, conductive and dielectric materials) to allow a user to view an underlying display.” Ex. 1029 ¶ 82 (citing Ex. 1022 A, 115–17; Ex. 1023, 1:37–2:4, 4:21–42; Ex. 1012, 3:35–5:7; Ex. 1019, 446–47; Ex. 1024, 1, 6–7). Petitioner further articulates several other advantages for making a touch sensitive surface that is positioned over a visual display *transparent*—namely to achieve compactness, the flexibility of allowing the user to select the keyboard layout, and ease of learning and use, such as allowing the user to input data directly on the display. Pet. 18–25.

Patent Owner counters that Petitioner has not established that a person with ordinary skill in the art would have combined Westerman and Bach, advancing several arguments. PO Resp. 29–50.

In its Reply, Petitioner argues that Patent Owner does not dispute that (1) a person with ordinary skill in the art would have known how to make Westerman's multi-touch surface transparent; (2) it would have been routine for such an artisan to make such an advantageous implementation choice; and (3) it would have been clear that such a combination would work and provide the expected functionality to yield predictable results. Reply 10–11 (citing Pet. 20–21; Ex. 1029 ¶¶ 70–72, 81–82; PO Resp. 40–41). Petitioner

further avers that transparency would enable a user to see the underlying display of a multi-touch surface fabricated on a display, and would, therefore, promote Westerman’s intended purpose of allowing the user to interact with what can be seen on the multi-touch surface. *Id.*

Upon review of the parties’ contentions and the evidence before us, we agree with Petitioner’s analysis and determine Petitioner has articulated sufficiently reasoning with rational underpinning why a person with ordinary skill in the art would have combined the teachings of Westerman and Bach. Pet. 18–21, 24–25. For the reasons discussed below, we find that Petitioner’s reasons to combine the prior art teachings are supported by sufficient explanation and credible evidence. *See, e.g.*, Ex. 1029 ¶¶ 68–70, 81–82 (citing Ex. 1019, 446–48; Ex. 1020, 5:7–9; Ex. 1023, 1:37–2:3).

As Patent Owner and the prior art of record confirm, touch screens or transparent touch pads were well-known in the art at the time of the invention. Prelim. Resp. 44 (conceding that touch screens and their benefits were well known); Ex. 2009 ¶ 26 (confirming that “touchpads and touch screens were known to persons of ordinary skill in the art before May 15, 1999.”); Ex. 1018, 2–3, Ex. 1019, 446–48; Ex. 1020, 1:9–14, 5:7–9, Ex. 1023, 1:37–2:3; *see also* Ex. 1001, 3:16–22 (explaining that “two-dimensional-sensing see-through touch-screens [were] often employed in public computer kiosks.”). More importantly, as Petitioner explains, other prior art of record recognizes the advantages of making a touch sensitive surface that is positioned over a visual display *transparent*. Pet. 18–21; Ex. 1022, 115–17; Ex. 1023, 1:48–60. For instance, as described in Sears, it

was recognized in the art that “[t]ouchscreens free desk space for other uses.” Ex. 1018, 3. Further, as explained in Clancy, having a transparent touch pad positioned over a visual display would provide a convenient and space efficient way to receive information. Ex. 1023, Abs., 1:28–33; *see also* Ex. 1019, 446–47; Ex. 1020, 1:9–14, 5:7–9 (“The pressure sensor can be made from transparent materials so that, e.g., a display screen can be viewed through a write pad or finger-touch-sensitive pad Similarly, transparency of the pressure sensor is an advantage for tracing an underlying pattern such as . . . a map or chart.”).

In addition, Mr. Ward testifies that it was well known in the art at the time of the invention to make a touch pad positioned over a visual display *transparent*. Ex. 1029 ¶ 68 (citing Ex. 1022A, 115–17 (“Transparent thin films are used in capacitive touch screens for touch-sensitive input application over computer monitors.”); Ex. 1023, 4:21–42; Ex. 1012, 1:44–45, 3:35–5:7; Ex. 1019A, 446–47; Ex. 1024, 1, 6, 7). According to Mr. Ward, “[i]t was well known that ‘[t]he transparency of the pressure sensor is an advantage for tracing an underlying pattern such as a map or chart or for minimizing the loss of display quality underneath the touch-sensitive screen.’” *Id.* ¶¶ 70–71 (citing Ex. 1019, 446–48; Ex. 1020, 5:7–9; Ex. 1023, 1:37–2:3).

Mr. Ward explains that an ordinarily skilled artisan would have had a reason to make Westerman’s multi-touch surface apparatus transparent “so that users could see the display underlying the multi-touch surface apparatus.” *Id.* ¶ 70. Mr. Ward further explains that such an artisan “would

have been motivated to make the ‘multi-touch surface apparatus’ transparent to take advantage of Westerman’s disclosure that ‘the position of key symbols [can] be reprogrammably displayed on the surface by light emitting polymers, liquid crystal, or other dynamic visual display means embedded in the multi-touch surface apparatus.’” *Id.*

We credit Mr. Ward’s testimony as his explanations are consistent with Westerman’s disclosure and other evidence in this record that shows the general knowledge of an ordinarily skilled artisan regarding transparent touch pads or touch screens. *See, e.g.*, Ex. 1004, 55:4–26; Ex. 1019A, 446–48 (“The transparency of the pressure sensor is an advantage for tracing an underlying pattern such as a map or chart or for minimizing the loss of display quality underneath a touch-sensitive screen.”); Ex. 1020, 5:7–9 (“The pressure sensor can be made from transparent materials so that, *e.g.*, a display screen can be viewed through a write pad or finger-touch-sensitive pad.”); Ex. 1023, 1:37–63, 1:64–2:3 (“[A] substantially transparent touchpad [has] a substantially transparent substrate The substrate is situated over a flat panel display. Visual images are produced on the flat panel display in such fashion that the images are arranged to substantially project through the array of traces on the substrate.”).

We are not persuaded by Patent Owner’s arguments (PO Resp. 29–50) and supporting evidence, as they do not undermine Petitioner’s showing of obviousness and articulated reasons to combine Westerman and Bach. We address below each of Patent Owner’s arguments in turn.

First, Patent Owner argues that a person of ordinary skill in the art would have used the stylus suggested by Bach, rather than finger touch gestures, because Bach expressly discourages touching and smudging. *Id.* at 36–37 (citing Ex. 1005, 11). However, Patent Owner’s argument fails to consider Bach as a whole, focusing narrowly on the stylus disclosure of Bach. As Petitioner points out (Pet. 23–24), Bach also discloses that “[t]he present invention relates to proximity sensors and in particular to capacitive proximity sensors for use for example in *touch-sensitive keyboards or pressure-sensitive pads.*” Ex. 1005, 1 (emphasis added). Therefore, considering Bach, as a whole, we do not discern that Bach discourages an ordinarily skilled artisan from using touch-sensitive keyboards or pressure-sensitive pads to recognize *touch gestures*, as Patent Owner alleges. Instead, we agree with Petitioner (Pet. 19–20; Reply 5–7) that such an artisan would have appreciated that making Westerman’s multi-touch surface transparent would enable a user to see the underlying display, advancing Westerman’s stated purpose—namely, it is “an object of the present invention to provide a system and method for distinguishing different types of manual input such as typing, multiple degree-of-freedom manipulation, and handwriting *on a multi-touch surface, via different hand [configurations] which are easy for the user to learn and easy for the system to recognize.*” Ex. 1004, 6:60–65 (emphasis added).

Second, Patent Owner contends that Petitioner’s “compactness” argument fails to establish a specific rationale to combine Westerman and Bach because Westerman compounds the “fat finger problem” by using

multiple parts of two hands, rather than a single fingertip. PO Resp. 37–38. We disagree. Once again, Patent Owner’s contention is based on an unduly narrow reading of the prior art. Westerman expressly describes that “multi-touch surface 2 may be large enough to accommodate motion of *one hand*, but may be flexible so that it can be *fitted to an armrest or clothing*.”

Ex. 1004, 13:12–14 (emphases added). More importantly, as discussed above, Westerman also teaches recognizing finger gestures from sequential dynamics among hand contact patterns, as required by the challenged claims. Ex. 1004, 20:15–25, 51:64–52:9, 52:64–53:28, 54:12–21, 74:65–75:27, Figs. 40A–B; Ex. 1029 ¶¶ 113–19. The prior art of record also recognizes that touchscreens “free desk space for other uses,” which supports the Petitioner’s reasons to combine Westerman and Bach. Ex. 1018, 3.

Furthermore, Patent Owner’s contention assumes, without providing credible support evidence, that the patentee of the ’810 patent overcame the alleged “fat finger” problem, and rests on the premise that the references must be combined for the same reason contemplated by the patentee. PO Resp. 35–38. As our reviewing court has held repeatedly, the reason “to modify a prior art reference to arrive at the claimed invention need not be the same motivation that the patentee had.” *Alcon Research Ltd. v. Apotex Inc.*, 687 F.3d 1362, 1369 (Fed. Cir. 2012); *In re Beattie*, 974 F.2d 1309, 1312 (Fed. Cir. 1992) (explaining that “the law does not require that the references be combined for the reasons contemplated by the inventor”). “The question is not whether the combination was obvious to the patentee

but whether the combination was obvious to a person with ordinary skill in the art.” *KSR*, 550 U.S. at 420. “In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls.” *Id.* at 417.

Third, Patent Owner argues that there is no reason to combine Westerman with Bach because Westerman already expressly offered the flexibility including the choice of different keyboards. PO Resp. 38–39. According to Patent Owner, “[n]othing that Petitioner cites for this alleged motivation to combine comes from Bach.” *Id.* at 38.

However, a reason to combine or modify the prior art is not required to be found explicitly in the applied prior art. *KSR*, 550 U.S. at 418–21. Indeed, such a reason may be found explicitly or implicitly in market forces, design incentives, the “interrelated teachings of multiple patents,” “any need or problem known in the field of endeavor at the time of invention and addressed by the patent,” and the background knowledge, creativity, and common sense of the person of ordinary skill. *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1328–29 (Fed. Cir. 2009) (citing *KSR*, 550 U.S. at 418–21) (internal quotation marks omitted).

Here, as discussed above, Mr. Ward testifies that an ordinarily skilled artisan would have had a reason to make Westerman’s multi-touch surface apparatus transparent “so that users could see the display underlying the multi-touch surface transparent.” Ex. 1029 ¶¶ 80–81. Mr. Ward further explains that such an artisan

would have been motivated to make the “multi-touch surface apparatus . . . fabricated on or integrated with a display device” *transparent* to take advantage of Westerman’s disclosure that “the position of key symbols [can] be reprogrammably displayed on the surface by light emitting polymers, liquid crystal, or other dynamic visual display means embedded in the multi-touch surface apparatus.”

Id. (emphasis added). As Petitioner also notes (Pet. 18–19), other prior art has recognized that “[t]ouchscreen interfaces offer flexibility not available with a keyboard. Each interface can be customized for each specific task person. Users can choose which keyboard layout they prefer, QWERTY, Alphabetic, or Dvorak, since it is display on the screen.” Ex. 1018, 2–3 (emphasis added).

Fourth, Patent Owner argues that Petitioner’s “ease of learning and use” argument is “just an alleged general benefit of all touch screens,” which does not show that a person of ordinary skill in the art “would have overcome the barriers of the prior art and actually employ the use of gestures rendered by fingers directly on the surface of an interactive display.” PO Resp. 39–40. Patent Owner’s argument once again rests on the premise that the references must be combined for the same reason contemplated by the patentee. *Id.* Patent Owner’s argument also conflates Petitioner’s proposed modification for having a *transparent* touch pad over a display (a touch screen), with detecting touch gestures. Petitioner relies upon Westerman to teach detecting a touch gesture (Ex. 1004, 20:15–25, 51:64–52:9, 52:64–53:28, 54:12–21, 74:65–75:27, Figs. 40A–B; Ex. 1029 ¶¶ 113–19), and Bach for the express teaching of transparency (Ex. 1005, 1). Pet. 18–24, 36–38.

Petitioner’s “ease of learning and use” reason to combine Westerman and Bach directly addresses why an ordinarily skilled artisan would have made Westerman’s multi-touch surface fabricated on a display *transparent*. *Id.* at 18–19. As Petitioner notes (*id.*), other prior art of record recognizes “[t]ouchscreens are easy to learn to use,” and “[o]nce users realize that they must simply touch the screen to interact with the computer, they quickly master simple actions such as touching buttons or dragging items across the screen.” Ex. 1018A, 2. Furthermore, Patent Owner’s argument that criticizes Bach for allegedly disclosing “only keying and not gestures,” attempts to attack each reference individually, rather than considering the combination of the references, as a whole. *See Keller*, 642 F.2d at 426.

Analogous art

In addition, Patent Owner argues that Bach is not analogous art. PO Resp. 32–35. According to Patent Owner, the pertinent field of art, with respect to the ’810 patent, is a control system, and Bach is not directed to a control system. *Id.* Patent Owner also alleges that Bach discloses a non-touched stylus drawing pad and, therefore, is not in the same field as the touch-based user interface of the ’810 patent. *Id.* at 34–35. We disagree.

A prior-art reference is considered to be analogous if it is either:
(1) from the same field of endeavor, regardless of the problem addressed; or
(2) reasonably pertinent to the particular problem with which the inventor is concerned, regardless of the field of endeavor. *See In re Clay*, 966 F.2d 656, 658–59 (Fed. Cir. 1992). “The field of endeavor of a patent is not limited to the specific point of novelty, the narrowest possible conception of the field,

or the particular focus within a given field.” *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1001 (Fed. Cir. 2016). To determine if art is analogous, we look to the purposes of both the claimed invention and the prior art. *Id.*

Here, we are not persuaded that the field of endeavor of the ’810 patent is limited to a *control system*, as alleged by Patent Owner. Rather, based on the evidence before us, we find that both the ’810 patent and Bach are in the field of *touch-based user interface devices*.

Notably, the challenged claims of the ’810 patent are directed to a “touch screen.” *See, e.g.*, Ex. 1001, 10:66. The Specification of the ’810 patent also repeatedly describes a touchscreen and a touchpad. For instance, the title of the ’810 patent recites “*touch screen* supporting continuous grammar touch gestures,” and the abstract of the ’810 patent describes *touch screen user interfaces*, as well as the “summary of the invention” section of the ’810 patent describes *touchpad user interfaces*. *Id.* at [54], Abstract, 1:24–43 (emphasis added). Touchpads and touchscreens, as described in the ’810 patent, are touch-based user interface devices. *Id.*

Contrary to Patent Owner’s characterization that Bach is limited to “a non-touched stylus drawing pad” (PO Resp. 34), Bach expressly discloses that “[t]he present invention relates to proximity sensors and in particular to capacitive proximity sensors for use for example in *touch-sensitive keyboards or pressure-sensitive pads*,” and a “pressure sensitive *finger pad*.” Ex. 1005, 1, 9, 11 (“Using the proximity keypad in a dual mode in which *touching* signifies one thing and proximity only signifies another”) (emphases added). Touch-sensitive keyboards and pressure sensitive finger

pads, as described in Bach, are likewise *touch-based user interface devices*. *Id.* More importantly, both Bach and the '810 patent use their touch-based user interface devices as user input devices, similar to a keyboard for controlling a computer, a display, or other electronic devices. *Id.* at 11 (“Using the keypad as a pressure sensitive musical instrument keyboard, or replacing conventional capacitive sensors with the present more sensitive sensors in all keyboard applications”); Ex. 1001, 1:26–27 (“Touchpad user interfaces for controlling external systems such as computers”).

Based on the evidence in this record, we find that both Bach and the '810 patent are in the same field of endeavor—namely, touch-based user interface devices. In short, Bach is analogous art.

Teaching away argument

Patent Owner argues that Westerman teaches away from a combination with Bach, citing Dr. Brogioli’s declaration as support. PO Resp. 29–32; Ex. 2012 ¶¶ 39–41. According to Patent Owner, because, in the background section, Westerman allegedly rejected the capacitance transduction circuitry of Boie (U.S. Patent 5,463,388, Ex. 2006) as too complex to be reproduced economically at each electrode, “Westerman would also reject the more complex circuitry of Bach which uses a separate oscillator at each sensor node.” *Id.*

As Petitioner notes (Reply 13), however, “[t]hat a given combination would not be made by businessmen for economic reasons does not mean that persons skilled in the art would not make the combination because of some technological incompatibility.” *In re Farrenkopf*, 713 F.2d 714, 718 (Fed.

Cir. 1983); *Velander v. Garner*, 348 F.3d 1359, 1368 (Fed. Cir. 2003) (“expense, time, and effort involved” are distinct from likelihood of success). Additionally, as our reviewing court explains, the existence of better alternatives “does not mean that an inferior combination is inapt for obviousness purposes.” *In re Mouttet*, 686 F.3d 1322, 1334 (Fed. Cir. 2012) (citing *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994)).

We also are not persuaded by Patent Owner’s argument that Westerman teaches away from a combination with Bach purportedly because Westerman prefers simpler sensors. *See Depuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) (“A reference does not teach away, however, if it merely expresses a general preference for an alternative invention but does not “criticize, discredit, or otherwise discourage” investigation into the invention claimed.”). Westerman does not criticize, discredit, or otherwise discourage investigation into the claimed subject matter—a “transparent touchpad positioned over a visual display.” Nothing in the challenged claims requires complex sensors. Petitioner did not propose to replace Westerman’s sensors with Bach’s sensors, but rather relies upon Bach for its express teaching of a *transparent* touch pad. Pet. 18. In fact, for both the obviousness grounds based on Westerman, alone, and in combination with Bach, Petitioner relies on Westerman, not Bach, to teach or suggest the claimed sensors. *Id.* at 21–28. Moreover, Westerman describes a multi-touch surface apparatus that is fabricated on a display device, displaying reprogrammable key symbols on

the surface to provide feedback to the user about changes in the position of the key layout. Ex. 1004, 54:67–55:26, 62:3–7; Ex. 1029 ¶ 56.

For these reasons, we do not discern that Westerman criticizes, discredits, or otherwise discourages the claimed subject matter—a “transparent touchpad positioned over a visual display.”

Patent Owner’s arguments and Dr. Brogioli’s testimony also improperly rest on the premise that Bach’s sensors and circuitries must be physically incorporated into Westerman’s multi-touch surface apparatus in order for the touch surface to be operated transparently, so that the user could see the display underlying the multi-touch surface apparatus. PO Resp. 29–32, 41–50; Ex. 2008 ¶¶ 43–68. “It is well-established that a determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements.” *Mouttet*, 686 F.3d at 1332; *In re Etter*, 756 F.2d 852, 859 (Fed. Cir. 1985) (en banc); *Keller*, 642 F.2d at 425 (Obviousness does not require that all of the features of the secondary reference be bodily incorporated into the primary reference). More importantly, Patent Owner’s arguments and Dr. Brogioli’s testimony also rest on the premise that Westerman’s sensor circuitry obscures the underlying display. As discussed above, that premise squarely contradicts Westerman’s disclosure that describes “reprogrammably displaying” key symbols on the surface of the multi-touch surface using “light emitting polymer, liquid crystal, or other dynamic visual display means embedded in the multi-touch surface apparatus along the proximity sensor arrays.” Ex. 1004, 54:67–55:8, 62:3–7; Ex. 1029 ¶ 56; Ex. 1030 ¶ 56.

Consequently, it would not be necessary to substitute physically Westerman's sensors with Bach's sensors, as alleged by Patent Owner.

For the foregoing reasons, we are not persuaded by Patent Owner's argument that Westerman teaches away from a combination with Bach to arrive at the claimed invention.

Inoperable device argument

Patent Owner argues that combining Bach's transparent sensing screen with Westerman would produce an inoperable device because Bach's transparent sensing screen allegedly requires sensors with separate oscillators, citing Dr. Brogioli's declaration for support. PO Resp. 41–50; Ex. 2008 ¶¶ 39, 49–67. Once again, Patent Owner's argument and Dr. Brogioli's testimony are premised on the notion that Bach's sensors and circuitries must be physically incorporated into Westerman's multi-touch surface apparatus.

As discussed above, however, such a physical substitution is not required (*see Mouttet*, 686 F.3d at 1332), and Petitioner did not propose such a substitution (Pet. 18–25; Ex. 1029 ¶¶ 72, 82; Ex. 1030 ¶ 92). More importantly, Westerman reasonably suggests using its own sensors and circuitry in a transparent multi-touch surface apparatus to recognize a touch gesture. Ex. 1004, 62:3–4; 54:67–55:26. As Petitioner explains and Mr. Ward testifies, it was well-known at the time of the invention to make a multi-touch surface with transparent materials (e.g., conductive and dielectric materials) to allow users to view the underlying display. Pet. 19–20; Ex. 1029 ¶¶ 72, 82 (citing Ex. 1022A, 115–17; Ex. 1023, 1:37–2:4,

4:21–42; Ex. 1012, 3:35–5:7; Ex. 1019A, 446–47; Ex. 1024, 1, 6–7); Ex. 1030 ¶¶ 92–118. On this record, Petitioner has provided sufficient evidence to show that making Westerman’s multi-touch surface *transparent* would not be “uniquely challenging or difficult for one of ordinary skill in the art” at the time of the invention. *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007) (citing *KSR*, 550 U.S. at 418).

Based on the evidence before us, we are not persuaded by Patent Owner’s arguments and supporting evidence that the prior art combination, as proposed by Petitioner, would produce an inoperable device.

Principle of operation argument

Patent Owner argues that combining Bach’s transparent sensing screen with Westerman would change Westerman’s principle of operation purportedly because Bach’s transparent sensing screen allegedly requires sensors with separate oscillators, citing Dr. Brogioli’s declaration for support. PO Resp. 42–48 (citing Ex. 2008 ¶¶ 39, 52–67). In particular, Patent Owner contends that Westerman’s principle of operation is to use economically replicated simple proximity transduction circuitry under each electrode to maximize signal-to-noise ratio and to reduce wiring complexity. *Id.* at 43–44.

However, that is merely one aspect of Westerman’s invention, not Westerman’s principle of operation. According to Westerman, “[i]t is a *primary object* of the present invention to provide a system and method for integrating different types of manual input such as typing, multiple degree-of-freedom manipulation, and handwriting on a multi-touch surface.”

Ex. 1004, 6:56–59 (emphases added). Westerman further explains that “[c]lassification of intuitive hand configuration and motions enables unprecedented integration of typing, resting, pointing, scrolling, 3D manipulation, and handwriting into a versatile, ergonomic computer input device.” *Id.* at Abstract.

Significantly, Patent Owner’s argument and Dr. Brogioli’s testimony again are based on the premise that Bach’s sensors and circuitries must be physically incorporated into Westerman’s multi-touch surface apparatus. As discussed above, however, such a physical substitution is not required (see *Mouttet*, 686 F.3d at 1332), and Petitioner did not propose such a substitution (Pet. 18–25; Ex. 1029 ¶¶ 72, 82; Ex. 1030 ¶ 92). More importantly, as discussed above, Westerman reasonably suggests using its own sensors and circuitry in a transparent multi-touch surface apparatus to recognize a touch gesture as an input signal. Ex. 1004, 62:3–4 (The multi-touch surface apparatus fabricated on a display device.); 54:67–55:8 (“*To provide feedback to the user about changes in the position of the key layout, . . . the position of the key symbols would be reprogrammably display on the surface.*”); 55:9–26 (“Given such an apparatus, step 702 retrieves the current paths from both hands and awaits what will be known as a *layout homing gesture.*”).

We are mindful that if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d

810, 813 (CCPA 1959). However, as our reviewing court has explained, the proposition set forth in *Ratti* is inapplicable where the modified apparatus will operate “on the same principles as before.” See *Mouttet*, 686 F.3d at 1332 (citing *In re Umbarger*, 407 F.2d 425, 430–31 (CCPA 1969)).

Here, recognizing a touch gesture as a user’s input signal using a transparent multi-touch surface apparatus that is fabricated on a visual display would not change Westerman’s principle of operation or primary objective of providing a system and method for integrating different types of manual input on a multi-touch surface. In fact, the proposed modification would improve Westerman’s multi-touch surface apparatus so that users can view the underlying display when performing a touch gesture—improving on “[c]lassification of intuitive hand configurations and motions enables unprecedented integration of typing, resting, pointing, scrolling, 3D manipulation, and handwriting into a versatile, ergonomic computer input device” (Ex. 1004, Abstract).

In addition, we are not persuaded by Patent Owner’s argument that, because, in the background section, Westerman rejects the Gerpheide reference, which was prone to noise at the driving frequency, a person of ordinary skill in the art would have known that coupling and cross-talk would impair the multi-touch capabilities that are central to Westerman’s principle of operation, blurring the multi-touch proximity images. PO Resp. 47–48. Significantly, the problems noted in the background section of Westerman are those that are to be solved by the invention disclosed in Westerman. Notably, Westerman discloses that it is “an object of the

present invention to provide a system and method for distinguishing different types of manual input such as typing, multiple degree-of-freedom manipulation, and handwriting *on a multi-touch surface, via different hand [configurations] which are easy for the user to learn and easy for the system to recognize.*” Ex. 1004, 6:60–65 (emphasis added). Westerman further discloses that it is “a further object of the present invention to provide an electronic system which can provide images of flesh proximity to an array of sensors with *such resolution that a variety of hand configurations can be distinguished.*” *Id.* at 7:16–19 (emphasis added). As Mr. Ward testifies, “Westerman addresses cross talk and capacitive coupling by selectively activating and multiplexing signals from sensors, filtering, and smoothing.” Ex. 1030 ¶ 96; Ex. 1004, 8:25–27, 16:26–41, 17:14–20, 23:21–32. For these reasons, we do not find Patent Owner’s argument persuasive.

For the foregoing reasons and based on the present record, we determine that Petitioner has articulated an adequate reason to combine the teachings of Westerman and Bach, as well as established by a preponderance of the evidence that the combination of Westerman and Bach teaches or suggests “a *touch screen* having a contiguous region sensing contact from at least a portion of a human hand on a surface of the touch screen,” and “the touch gesture is *recognized* from sequential dynamics among hand contact patterns,” as required by claims 1, 3–5, and 10.

Control Parameter

Claim 1 recites:

a value of at least one control parameter for the contiguous region of contact responsive to a measured change in at least one of the associated sensor measurement values,

the value obtained by performing a calculation on the associated sensor measurement values and interpreting the results as signifying a touch gesture,

wherein the at least one control parameter is associated with the touch gesture;

Ex. 1001, 11:10–17 (emphases added). By virtue of their dependency, claims 3–5 and 10 also require this limitation. As we discussed above in the claim construction section, we construe “gesture” as “dynamic variations among postures or hand contact patterns combined in sequence,” and construe “hand contact patterns” as “the two-dimensional shapes of contiguous regions of contact.” *See supra* Section II.A. To be clear, a “gesture” is different from a “contiguous region of contact” (e.g., hand or finger contact pattern).

Petitioner relies upon Westerman, in combination with Bach, to teach or suggest a value of at least one control parameter (group position or velocity) for the contiguous region of contact (a hand contact pattern) responsive to a measured change in at least one of the associated sensor measurement values, the value obtained by performing a calculation on the associated sensor measurement values (the computed proximity-weighted center and velocity). Pet. 28–34; Ex. 1029 ¶¶ 94–108. In Petitioner’s view, Westerman teaches or suggests that the results of the calculation are

interpreted as signifying a touch gesture (fingertip pair chord slide ongoing, two more fingers new subset pressed in sync, and whole subset four fingers sliding), and that the control parameter (group position or velocity) is associated with the touch gesture. *Id.*

Patent Owner counters that Westerman does not disclose a value of at least one control parameter signifying a touch gesture. PO Resp. 50–54. To substantiate its position, Patent Owner argues that Westerman’s group position does not signify a *touch gesture* because Westerman’s group position is “a determination for the static location of fingers *before* velocity is determined.” *Id.* (citing Ex. 1004, 26:2–4) (emphasis added). Patent Owner further argues that Westerman’s velocity does not disclose a value of a control parameter that is obtained by performing a calculation, as required by the challenged claim, because the cited portions of Westerman disclose only *raw data and formulas* that have yet to be calculated or solved. *Id.*

Having reviewed the evidence in this record, we are not persuaded by Patent Owner’s arguments. Rather, we agree with Petitioner’s analysis, and determine that Petitioner has shown by a preponderance of the evidence that Westerman, in combination with Bach, teaches or suggests the aforementioned limitation as required by claims 1, 3–5, and 10. Pet. 28–34; Ex. 1029 ¶¶ 94–108.

As an initial matter, Patent Owner’s argument that Westerman does not disclose a value of at least one control parameter signifying a touch gesture (PO Resp. 50–54) is not commensurate in scope with the claims.

Patent Owner implicitly construes the aforementioned limitation to require the “control parameter” to signify a *touch gesture*. On the contrary, claim 1 expressly recites a “control parameter for the *contiguous region of contact*”—which encompasses a static hand or finger pattern on the touch surface, not a finger gesture, as alleged by Patent Owner. Ex. 1001, 11:10–11. Patent Owner’s argument also is inconsistent with the Specification of the ’810 patent, which expressly discloses that “control parameters” are “derived from each region of contact”—a static hand or finger pattern. *Id.* at 1:41–42, 2:41–42 (“various parameters are derived from each independent region), 2:46–49 (“It is possible to derive a very large number of independent control parameters For example, six degrees of freedom can be recovered from the *contact of a single finger*.” (emphasis added)).

We are not persuaded by Patent Owner’s argument that Westerman’s group position is not a “control parameter” as it allegedly is “a determination for the static location of fingers before velocity is determined.” PO Resp. 52–53. That argument is based on Patent Owner’s implicit construction that requires the claimed “control parameter” to signify a *finger gesture*, contradicting the actual claim language—namely, “control parameter for the *contiguous region of contact*” (e.g., a hand or finger contact pattern). *Id.*; Ex. 1001, 11:10–11. More importantly, Westerman’s group position reflects hand contact position and is necessary to determine finger velocity. Ex. 1004, 25:67–26:29, Fig. 18. Westerman teaches obtaining a basic indicator of “group position” by calculating a “proximity-weighted center” using the values e_x , e_y , and e_z for each sensor, as shown in equations 12–14.

Id. Mr. Ward testifies that the group position proximity-weighted center is responsive to a measured change in the sensor values. Ex. 1029 ¶ 103 (citing Ex. 1004, 26:8–29). Furthermore, as Petitioner notes (Pet. 28–34; Reply 17–18), Westerman’s group position is a variable that changes with the movement of a finger, and the calculations of the group position are interpreted to signify when a touch gesture has occurred. Ex. 1004, 9:15–36, 50:64–51:10, 53:12–28, Figs. 22, 40A–B; Ex. 1029 ¶¶ 104–108.

We also are not persuaded by Patent Owner’s argument that Westerman’s velocities are *raw data*, not a “value obtained by performing a calculation.” PO Resp. 53–54. As Petitioner notes (Pet. 33–34), Westerman teaches tracking the group position through successive proximity images and *calculating* the velocity of each group along each path. Ex. 1004, 26:2–4, 27:19–29:32. Mr. Ward testifies that the velocities calculated in Westerman are responsive to a measured change because group paths are “tracked through successive proximity images which correspond to the same physical hand contact, and the ‘velocity’ and ‘position vectors’ of each group are calculated along each path.” Ex. 1029 ¶¶ 98–103. Mr. Ward further testifies that

Westerman discloses that the results of the calculation of the proximity-weighted center of each group’s position and velocity are used to “track[] group paths through successive proximity images,” to detect when hand parts touch down simultaneously, and to produce gesture commands when the user slides two or more fingers across the surface—forming a “slide chord.”

Ex. 1029 ¶ 104 (citing Ex. 1004, 9:58–10:2, 48:37–49, 50:64–51:47, Figs. 39A–B, 40A–B). Given the evidence in this record, we are persuaded

that the velocities in Westerman, are not merely raw data, as Patent Owner alleges, but rather “a value of at least one control parameter for the contiguous region of contact,” as required by the challenged claims.

For the reasons stated above, we determine that Petitioner has demonstrated sufficiently that Westerman teaches or suggests “a value of at least one control parameter for the contiguous region of contact . . . , the value obtained by performing a calculation on the associated sensor measurement values and interpreting the results as signifying a finger flick gesture, wherein the at least one control parameter is associated with the finger flick gesture” as required by claims 1, 3–5, and 10.

Dependent Claims 3–5 and 10

For the foregoing reasons, we conclude that Petitioner has established by a preponderance of the evidence that independent claim 1 is unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Westerman and Bach. Patent Owner does not address the limitations expressly recited in dependent claims 3–5 and 10 with separate, specific arguments. Based on the evidence before us, we also determine that the explanations and supporting evidence presented by Petitioner sufficiently show how the combination of Westerman and Bach renders dependent claims 3–5 and 10 obvious. *See* Pet. 38–41; Ex. 1029 ¶¶ 120–143.

For instance, as to claim 3, Petitioner explains and Mr. Ward testifies that Westerman, in combination with Bach, discloses a touch screen configured to sense the contiguous region of contact (a hand contact) by a generation of the associated sensor measurement values (pressure, e_z , and

proximity) based on identifying a point of contact for the sensed region of contact relative to the surface of the multi-touch surface apparatus (electrodes which indicate significant proximity), as required by claim 3. Pet. 38; Ex. 1029 ¶¶ 120–125 (citing Ex. 1004, 8:45–55, 9:15–36, 18:13–19, 23:33–49, 63:59–64:3, Figs. 10, 13–15, 18–19). Indeed, as discussed above, Westerman in combination with Bach discloses a touch screen. More importantly, Westerman teaches a multi-touch surface apparatus having an array of proximity sensing means embedded in the surface, scanning means for forming digital proximity images from the proximities measured by the sensing means, and image segmentation means for collecting into groups those proximity image pixels intensified by contact of the same distinguishable part of a hand. Ex. 1004, 8:45–55. Westerman further discloses tracking and identifying hand contacts in a sequence of proximity images, as well as segmenting each proximity images into groups of electrodes which indicate significant proximity. *Id.* at 9:15–36.

For claim 4, Petitioner explains and Mr. Ward testifies, that Westerman, in combination with Bach, discloses the touch screen configured to sense the contiguous region of contact (a hand contact) by a generation of associated sensor measurement values (proximity, pressure, and e_z) based on identifying measurement values that exceed a threshold (significant proximity), as required by claim 4. Pet. 39–40; Ex. 1029 ¶¶ 126–131 (citing Ex. 1004, 9:15–36, 13:14–25, 16:44–56, 23:21–54, 24:43–55, Figs. 1, 7A, 18, 21). Indeed, Westerman teaches that, as part of segmenting each proximity images, it searches the smoothed image for local maximum pixels

whose filtered proximity exceeds a significant threshold and exceeds the filtered proximities of nearest neighbor pixels. Ex. 1004, 23:28–54, Fig. 18. Westerman also describes that when determining what other electrodes belong to the group, it performs edge tests to check whether the unsmoothed proximity of the electrode is greater than the background proximity levels to determine whether the unsmoothed proximity is significant. *Id.* at 24:43–51.

With respect to claim 5, Petitioner explains and Mr. Ward testifies, that Westerman, in combination with Bach, discloses the touch screen configured to track a trajectory of movement (trajectories of paths) of the portion of the human hand contacting the surface of the touch screen, as required by claim 5. Pet. 40; Ex. 1029 ¶¶ 132–135 (citing Ex. 1004, 9:15–36, 13:14–25, 19:26–29, 27:22–24, 63:66–64:6, 65:38–42, Figs. 1, 16, 22). Indeed, Westerman teaches tracking and identifying hand contacts in a sequence of proximity images including by maintaining estimates of hand and finger positions from trajectories of paths currently assigned to the fingers. Ex. 1004, 9:15–36, 13:15–26, Fig. 1. Westerman further explains that the path tracking process matches the parameterized electrode group with the predicted continuations of contact path data structures extracted from previous images. *Id.* at 19:26–29.

With respect to claim 10, Petitioner explains and Mr. Ward testifies that Westerman, in combination with Bach, discloses the touch gesture (fingertip pair chord slide ongoing, two more fingers new subset pressed in sync, and whole subset four fingers sliding) comprised a plurality of finger postures executed sequentially without breaking contact with the touch

screen, as required by claim 10. Pet. 40–41; Ex. 1029 ¶¶ 136–143 (citing Ex. 1004, 53:12–28, 54:12–21, Fig. 40A). Indeed, Westerman teaches synchronized lifting and pressing of multiple fingers subsequent to slide initiation to create a new synchronized subset and change the selected chord, and that finger synchronization allows the user to switch to a different activity without forcing the user to lift the whole hand from the surface. Ex. 1004, 52:64–67.

In light of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that the combination of Westerman and Bach teaches or suggests all of the limitations recited in claims 3–5 and 10.

Secondary Considerations of Nonobviousness

We next turn to Patent Owner’s evidence and arguments relating to secondary considerations of non-obviousness. Factual inquiries for an obviousness determination include secondary considerations based on evaluation and crediting of objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). Notwithstanding what the teachings of the prior art would have suggested to one with ordinary skill in the art at the time of the invention, the totality of the evidence submitted, including objective evidence of nonobviousness, may lead to a conclusion that the claimed invention would not have been obvious to one with ordinary skill in the art. *In re Piasecki*, 745 F.2d 1468, 1471–1472 (Fed. Cir. 1984). Secondary considerations may include any of the following: long-felt but unsolved needs, failure of others, unexpected results, commercial success,

copying, licensing, and praise. *See Graham*, 383 U.S. at 17; *Leapfrog*, 485 F.3d at 1162.

Here, Patent Owner contends that “there were considerable obstacles to controlling a device with finger touch gestures directly rendered on the display.” PO Resp. 4 (citing Section IV of its Response, *id.* at 13–18 (“many of the disadvantages that plagued touch screen during the relevant time, including low resolution, arm fatigue, glare smudges, limited tactile feedback, undesired touches, price, and ‘obscuring the screen’”). In Patent Owner’s view, “[t]hese problems evidence secondary considerations of nonobviousness, including long felt but unresolved needs and the failure of others.” *Id.* In support of its contentions, Patent Owner argues that “these barriers in the prior art are secondary considerations expressly recognized,” for example, in *Sears* (Ex. 1018). *Id.* at 36–37. According to Patent Owner, “[e]arly touch devices were incorporated into pen-based computing devices that employed a stylus, and therefore *could not detect multi-touch gestures*,” due partly “to problems with early touch screens, including the ‘*fat finger problem*.’” PO Resp. 13–18 (emphases added).

Petitioner counters that Patent Owner fails to establish the requisite nexus, arguing that Patent Owner has not shown any evidence of long-felt need or failure of other that demonstrates both that a demand existed for the claimed subject matter, and that others tried but failed to satisfy that demand. Reply 25. Petitioner further contends that solutions to Patent Owner’s alleged “barriers” in the prior art had already been recognized, for example, by *Sears* (Ex. 1018). We agree with Petitioner.

The relevance of long-felt need to the issue of obviousness depends on several factors. First, the need must have been a persistent one that was recognized by those of ordinary skill in the art. *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1383 (Fed. Cir. 1983). Second, the long-felt need must not have been satisfied by another before the invention by the patent owner. *Newell Cos. v. Kenney Mfg. Co.*, 864 F.2d 757, 768 (Fed. Cir. 1988) (“[O]nce another supplied the key element, there was no long-felt need or, indeed, a problem to be solved.”). Third, the invention must in fact satisfy the long-felt need. *In re Cavanagh*, 436 F.2d 491, 496 (CCPA 1971). Moreover, an allegation of failure of others is not sufficient evidence of nonobviousness, unless it is shown that widespread efforts of skilled workers having knowledge of the prior art had failed to find a solution to the problem. *In re Allen*, 324 F.2d 993, 997 (CCPA 1963).

“For objective evidence of secondary considerations to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention.” *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1220, (Fed. Cir. 2016) (citations omitted). “A nexus may not exist where, for example, the merits of the claimed invention were readily available in the prior art.” *Id.*

Here, in fact, the alleged “problems” concerning touch screens—“low resolution, arm fatigue, glare smudges, limited tactile feedback, undesired touches, price, and ‘obscuring the screen’” (PO Resp. 14, citing Ex. 1018, 2–5)—were solved by others before the ’810 patent’s earliest priority date, May 15, 1999. Significantly, Sears (Ex. 1018), the very same reference

relied upon by Patent Owner for establishing these “problems” concerning touch screens, expressly discloses that “[m]any of these problems [had] been overcome or reduced by improvements in touchscreen technology or design strategies that have been developed for touchscreen interfaces.” *See, e.g.*, Ex. 1018, 3–5. Patent Owner’s arguments and Dr. Wobbrock’s testimony unduly focus on the “perceived disadvantages” discussed in Sears regarding the early development of the touch screen technology, ignoring the known technological advancements in the art.

More importantly, as Mr. Ward testifies (Ex. 1030 ¶¶ 13–15), Sears discloses how those “perceived disadvantages” had been overcome or reduced by 1990, when Sears was published, nearly *nine years* prior to May 15, 1999. Ex. 1018, 1–5. For instance, Sears discloses that *low resolution* “is one of the biggest misconceptions about touchscreens,” and “[r]ecent research has shown that targets as small as 0.4x0.6mm could be selected with touchscreens . . . and concluded that targets 1.7x2.2mm could be selected as fast with a touchscreen as they could with a mouse, with similar error rates.” *Id.* at 3. Sears also explains that “[r]enewed interest in *reducing [arm] fatigue* appears to have resulted in simple changes to the touchscreen position that will significantly reduce this problem.” *Id.* at 3, 22–23 (emphasis added).

As to the “*fat finger problem*” alleged by Patent Owner and Dr. Wobbrock (PO Resp. 13–15; Ex. 2009 ¶¶ 27, 29, 31), Sears discloses that “[c]areful design of the interface, placing selectable items in locations that will keep the user’s hand from obscuring the screen, can significantly reduce

this problem.” Ex. 1018, 4–5 (“Design guidelines can significantly reduce the problems associated with obscuring the screen, the lack of tactile feedback, and undesired touches.”). With respect to the “*error prone*” problem, Sears discloses that “touchscreens are the fastest device for selecting stationary objects” and “alternative selection strategies can result in very low error rates.” *Id.* at 6 (“It also showed that selection of very small targets (0.4x0.6mm) is possible with the touchscreen, refuting claims that the size of the user’s finger determines the minimum target size.”).

Sears warns “the historical prejudices against the touchscreen,” and that, at the time of publication in 1990, “many people still picture touchscreens as low precision, high error rate input devices.” *Id.* at 5. Nevertheless, Sears explains that “touchscreens have improved dramatically in recent years, and, as a result, high precision, low error rate tasks can now be performed using a touchscreen.” *Id.* Sears also describes that “[t]he directness of the touchscreen as an input device makes it desirable for direct manipulation interfaces.” *Id.* at 15. As Mr. Ward testifies, reading Sears as a whole, an ordinarily skilled artisan would have understood “how to address each identified problem with touch screens, including the so-called ‘fat finger [problem],’ before the claimed priority date” of the ’810 patent.” Ex. 1030 ¶ 14.

Notably, Patent Owner and Dr. Wobbrock do not dispute that touch screens and the benefits of using touch screens as user input devices were well known at the time of the invention. Prelim. Resp. 44; PO Resp. 13; Ex. 2009 ¶ 26 (confirming that “touchpads and touch screens were known to

persons of ordinary skill in the art before May 15, 1999”). Indeed, Patent Owner admits that the ease of learning and use of touch screens was a well-known “*benefit of all touch screens.*” Prelim. Resp. 44; *see also* Ex. 1018, 1 (“Touchscreens have long been thought of as being simple to use.”). Moreover, Mr. Ward confirms that touch screen and touch pad technology was well-known before May 15, 1999. Ex. 1029 ¶ 19.

We are not persuaded by Patent Owner’s argument that “researchers had not yet conceived of using postures, control parameters and touch gestures on a touch screen as disclosed in the ’810 patent.” PO Resp. 14–15. Patent Owner’s assertions that “[e]xisting touch devices at the time, and their designers, were entirely focused on mimicking the operation of basic controllers such as the computer mouse, trackball, or stylus,” and that “[e]arly touch devices were incorporated into pen-based computing devices that employed a stylus, and therefore *could not detect multi-touch gestures*” are conclusory and unsupported by sufficient evidence. *Id.* at 4, 13–14 (citing Ex. 2009 ¶ 31). In fact, those unsupported assertions squarely contradict the prior art of record.

Notably, Sears, published in 1990, recognizes “[f]ree hand input and gestures allow many novel applications.” Ex. 1018, 16; *see also* Ex. 1013, 6:49–7:26, 10:8–15, 11:12–15; Ex. 1015, 1:16–43, 5:63–67. Ure, filed on March 7, 1994, and patented on November 9, 1999, discloses a multi-touch touch screen, which allows the user to control the cursor movement by moving at least one finger across the surface, such as the drag gesture. *See, e.g.*, Ex. 1007, 1:52–59 (“The invention provides for the software

manipulation of data obtained from a touch sensor array . . . to achieve a simple, powerful method of user interaction in which the traditional keyboard and mouse disappear, being replaced by a display window . . . overlaid by the touch sensor array.”); 2:55–57 (“the cursor is moved by the user moving one or more fingers across the surface of the touch-sensitive member as shown in FIG. 1.”); 3:17–21. Edwards, filed on June 7, 1991, and patented on March 16, 1993, describes *touch sensor systems* that may be used as a stand-alone input interface or, alternatively, they may be used as an overlay to a display device, with *transparent sensor elements*. Ex. 1009, 10:3–8. According to Edwards, “[t]ouching of the sensing elements for example may be by means of a *user’s finger* or by means of a stylus.” *Id.* at 47–48 (emphasis added). Furthermore, Westerman teaches a multi-touch surface apparatus for sensing diverse *configurations and activities of fingers* (e.g., a layout homing gesture, and the finger flick gesture). Ex. 1004, 8:45–47, 9:15–36, 10:15–65, 54:67–55:26.

Patent Owner’s arguments and Dr. Wobbrock’s testimony also narrowly focus on the problems identified in the background section of Westerman, but fail to appreciate that those are the stated problems that are to be solved by the invention disclosed in Westerman. PO Resp. 15–17; Ex. 2009 ¶ 32. For instance, Westerman discloses that it is “an object of the present invention to provide a system and method for distinguishing different types of manual input such as typing, multiple degree-of-freedom manipulation, and handwriting *on a multi-touch surface, via different hand [configurations] which are easy for the user to learn and easy for the system*

to recognize.” Ex. 1004, 6:60–65 (emphasis added). Indeed, Westerman discloses apparatuses and methods for simultaneously tracking multiple finger contacts as the fingers slide across a proximity-sensing, compliant, and flexible multi-touch surface. *Id.* at Abstract. As discussed above, Westerman describes a multi-touch surface apparatus fabricated on or integrated with a display device, and recognizing finger touch gestures (e.g., a layout homing gesture, fingertip pair chord slide ongoing, two more fingers new subset pressed in sync, and whole subset four fingers sliding). *Id.* at 54:67–55:26, 62:3–7, 20:15–25, 51:64–52:9, 52:64–53:28, 54:12–21, 74:65–75:27, Figs. 40A–B. Identifying the problems stated in the background section of Westerman, without taking into account the advancements made in Westerman and the other prior art of record (e.g., Sears, Ure, and Edwards) does not establish both that a demand existed for the claimed subject matter, and that others tried but failed to satisfy that demand.

We also are not persuaded by Patent Owner’s argument that “[t]ouch screens and touch pads are different both technologically and in the interactive capabilities.” PO Resp. 17–18; Ex. 2009 ¶¶ 27–34. Rather, we agree with Mr. Ward’s testimony that Patent Owner’s arguments and Dr. Wobbrock’s testimony “inaccurately describe the state of the art before May 15, 1999,” and that they “do not account for the fact that touchpads and touch screens are presented as alternatives in the prior art and in the ’810 patent itself.” Ex. 1030 ¶¶ 9–24; Ex. 1029 ¶¶ 30, 56, 58–59; Ex. 1004, 3:6–10, 62:3–7; 1005, 9; Ex. 1001, 1:37–38, 2:24–26, 6:26–65, 10:22–37.

As we discussed previously in Section II.D. (“Background of the Art”) of this Decision, Patent Owner’s reliance on a passage of an Initial Determination of an ITC case (Ex. 2003, 202, 209–210), concerning a different patent and a different prior art reference cited in a completely different evidentiary record, is misplaced. As Mr. Ward testifies, that quotation is taken out of context and is incomplete. Ex. 1030 ¶ 19. The fact that the prior art reference in that case is a doctoral dissertation authored by the inventor of Westerman (U.S. Patent 6,323,846, Ex. 1004), without more, does not compel us to make the same finding in the instant proceeding. Patent Owner’s argument conflates the dissertation in that case and the prior art reference, Westerman (Ex. 1004), in this proceeding.

Significantly, the cited portion of the ITC’s Initial Determination makes clear that the dissertation in that case discloses a *touch pad that has a separate display*, rather than “a touch screen, which is a combination of a display and an input device.” PO Resp. 17; Ex. 2003, 209–210. In contrast, the prior art reference here in the instant proceeding, Westerman (Ex. 1004), discloses recognizing a gesture (e.g., a layout homing gesture, where all five fingers are placed on the surface synchronously) on a *multi-touch surface apparatus “fabricated on or integrated with a display device,”* as an user input command (to control the location of the key symbols that are reprogrammably displayed on the surface so that the home row keys will be moved automatically under the synchronized fingertips). Ex. 1004, 54:67–55:26; 62:3–4.

For the foregoing reasons, Patent Owner has not shown any evidence of long-felt need or failure of others that demonstrates both (1) that a demand existed for the claimed subject matter, and (2) that others tried but failed to satisfy that demand. Therefore, the objective evidence proffered by Patent Owner is accorded little weight.

We have weighed Patent Owner's objective evidence of nonobviousness against the evidence of obviousness in the present record. Based on the evidence in this record, we conclude that, on balance, the strong evidence of obviousness outweighs the weak evidence of nonobviousness. *See Leapfrog*, 485 F.3d at 1162 (holding that the objective considerations of nonobviousness presented, including substantial evidence of commercial success, praise, and long-felt need, were inadequate to overcome a strong showing of primary considerations that rendered the claims at issue invalid).

Conclusion on Obviousness Over Westerman and Bach

In view of the foregoing, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 1, 3–5 and 10 are unpatentable over the combination of Westerman and Bach.

F. Obviousness over Ure and Edwards

Petitioner asserts that claims 1, 3–5, and 10 are unpatentable under 35 U.S.C. § 103(a) as obvious over Ure and Edwards, citing Mr. Ward's Declaration for support. Pet. 41–59; Ex. 1029 ¶¶ 144–221. Based on the evidence in this record, we are persuaded by Petitioner's showing and we

credit Mr. Ward's testimony (Ex. 1029 ¶¶ 144–221) as it is consistent with the prior art disclosures.

Patent Owner counters that Petitioner fails to show that the prior art combination discloses certain limitations. PO Resp. 54–66. As support, Patent Owner directs our attention to Dr. Brogioli's Declaration. Ex. 2008 ¶¶ 69–83. We first provide a brief overview of Ure and Edwards below, and then address the parties' contentions in turn.

Ure (which incorporates by reference Edwards)

Ure is directed to touch-sensitive computer input device, and expressly incorporates Edwards (Ex. 1009) by reference. Ex. 1007, 1:37–45, 1:52–67. The touch-sensitive computer input device of Ure functionally replaces the interaction of a traditional keyboard or mouse. *Id.* at 1:48–50. Edwards discloses a touch sensor array system in which the sensing elements of the array are positioned over the display output of the display device. Ex. 1009, 3:28–42. When using the touch sensor system as a display overlay, the sensing electrodes of the sensor elements should be transparent, and a 1:1 correspondence between pixels and sensing elements can be provided. *Id.* at 3:35–42, 4:39–41, 10:3–22.

Ure also discloses a touch-sensitive computer input device having a touch sensor array that overlies a display window. Ex. 1007, 1:6–8, 6:27–34. Figure 6 of Ure is reproduced below.

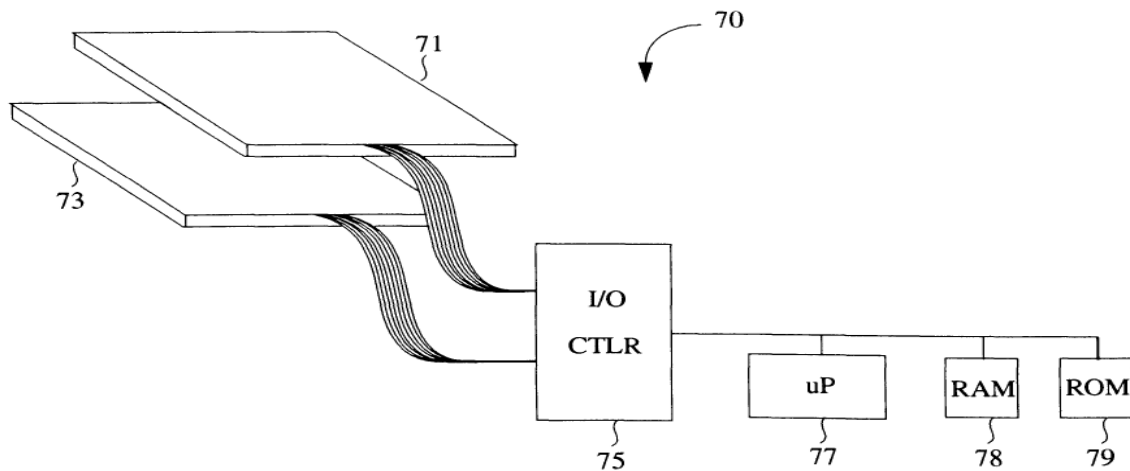


Figure 6 of Ure illustrates a simplified block diagram of touch-sensitive computer input device 70 having touch sensor array 71 that overlies display 73. *Id.* at 6:27–34. The input device also includes I/O controller 75, microprocessor 77, and memories 78, 79. *Id.*

Ure's touch-sensitive device allows a user to move the cursor by moving a finger across the surface of the touch-sensitive member. *Id.* at 2:55–57. The device detects the change in position of the touch by scanning the input window repeatedly, and builds XY tables and computing *average XY values* for each time. *Id.* at 8:44–46. The average values from the two most recent scans are stored, and the most recent value is subtracted from the next-most-recent value to produce a *difference value, d*. *Id.* at 8:46–49. Depending on the touch pattern, a speed factor is applied to the difference value, and the result is sent to the host device. *Id.* at 8:49–51.

In short, Ure discloses producing a position-related signal responsive to movement of a user's finger across the surface. *Id.* at 11:20–24. Ure further states that the pressure and velocity of a finger may be determined in

accordance with the area touched by the finger and the rate of change of the area. *Id.* at 7:24–28.

Touch Gesture

Claim 1 recites “wherein the *touch gesture* is recognized from sequential dynamics among hand contact patterns.” Ex. 1001, 11:18–22 (emphasis added). By virtue of their dependency, claims 3–5 and 10 also require this limitation.

Petitioner asserts that the combination of Ure and Edwards discloses this limitation because Ure discloses recognizing a drag gesture. Pet. 51–56. In particular, Ure describes that, to complete a drag gesture, the thumb is placed on the surface of the touch-sensitive member and then one or more fingers are moved across the surface to produce a dragging action in a similar manner as in normal mouse operation. Ex. 1007, 3:17–21, 8:22–57, 9:59–63; Ex. 1029 ¶¶ 199–205.

Patent Owner counters that Ure fails to disclose a touch gesture recognized from sequential dynamics among hand contact patterns. PO Resp. 58–63. According to Patent Owner, Ure recognizes a drag from the presence of a single, stationary thumb contact, and the number/movement of other finger(s) on the touch sensitive surface merely convey additional information used downstream to characterize the previously recognized drag operation. *Id.* at 58–60; Ex. 2008 ¶¶ 79–80. Patent Owner argues that moving other fingers across the screen affect the speed and direction, and not the recognition, of the drag operation. PO Resp. 58–60. Patent Owner also argues that Petitioner did not identify any logic within Ure based on a

set of previously known touch gestures from which the drag can be recognized and that Ure does not store any prior knowledge about any touch gestures. *Id.* at 64–65; Ex. 2008 ¶ 81.

Upon review of the parties’ contentions and the evidence before us, we agree with Petitioner’s analysis, finding that Petitioner’s showing is supported by sufficient explanation and credible evidence. We are not persuaded by Patent Owner’s arguments and Dr. Brogioli’s testimony as discussed below.

At the outset, Patent Owner’s arguments and Dr. Brogioli’s testimony mainly are based on Patent Owner’s proposed claim construction, interpreting the claim term “recognized” to require that “a touch gesture must be perceived based on *previously known* sequential dynamics (a set of *stored* touch gestures)” (PO Resp. 12–13). As discussed above, we decline to adopt that claim construction. *See supra* Section II.A. Instead, we give the claim element—“wherein the touch gesture is recognized from sequential dynamics among hand contact patterns”—its plain and ordinary meaning. For example, the term “recognized” encompasses “discerned,” “acknowledged,” or “taken notice of” based on certain characteristics of the touch gesture.

We also are not persuaded by Patent Owner’s arguments and Dr. Brogioli’s testimony, which are based on an overly narrow reading of the prior art without sufficient consideration of the knowledge of a person having ordinary skill in the art. *See In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 199) (rejecting an argument that “fails to recognize that a prior art

reference must be ‘considered together with the knowledge of one of ordinary skill in the pertinent art.’”) (citing *In re Samour*, 571 F.2d 559, 562, (CCPA 1978)). It is well-settled that a prior art reference must be considered for everything it teaches by way of technology and is not limited to the particular invention it is describing and attempting to protect. *EWP*, 755 F.2d at 907.

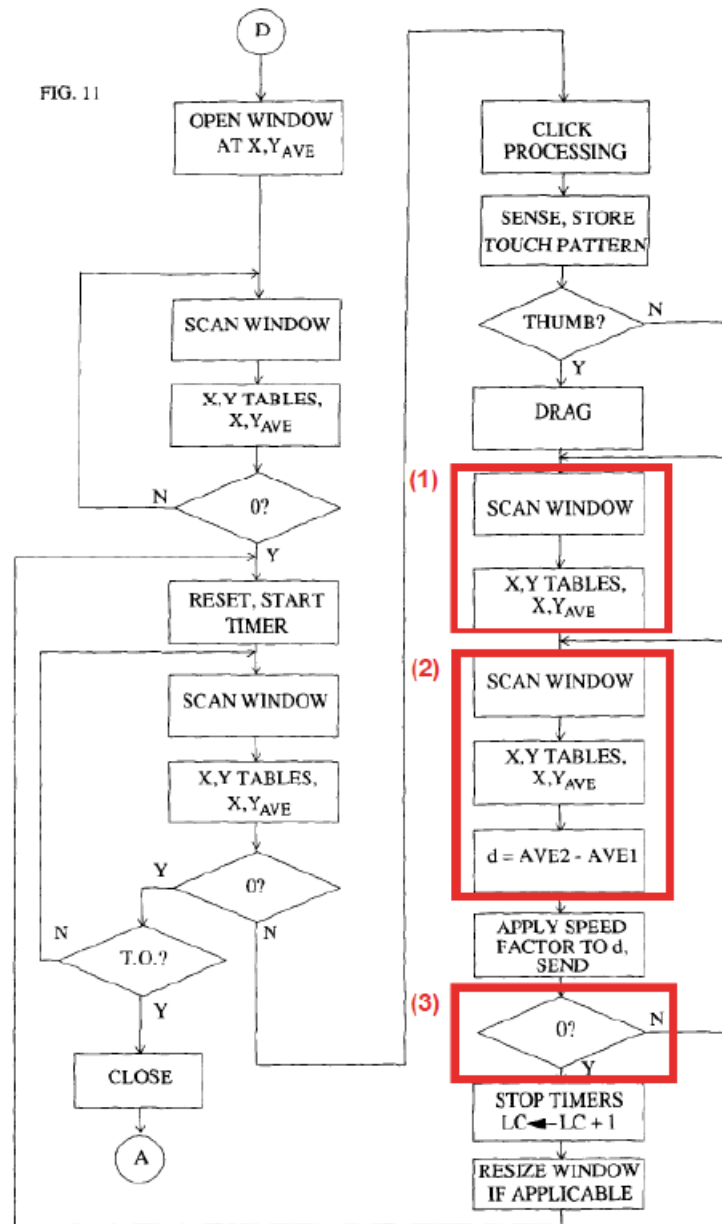
Here, Patent Owner’s arguments ignores Ure’s teaching that the completion of the drag gesture requires moving one or more fingers across the touch-sensitive surface. Ex. 1007, 3:17–21, 8:22–57, 9:55–63 (claim 1 of Ure recites “*moving a fingertip across said member while a user’s thumb is applied to said member; and sensing said fingertip and said thumb by means of said touch-sensitive statuary member in order to drag said icon across said display.*” (emphases added)). Ure clearly explains that “the thumb is *first* ‘grounded’, i.e., place in stationary contact with the touch sensitive member, *effecting and sustaining a click*. With the thumb grounded, one, two or three fingers may be moved *to produce a dragging action* in a similar manner as in normal mouse operation.” *Id.* at 3:17–21. A “click” by itself using a mouse will not produce a “drag” operation. Similarly, a thumb placement without moving any finger would not produce a complete “drag” operation. As Mr. Ward testifies, an ordinarily skilled artisan would have understood “that a ‘drag’ requires finger movement; without movement, there is simply no drag.” Ex. 1030 ¶ 141.

We also are not persuaded by Patent Owner’s argument that the *presence* of one or more fingers on the touch-sensitive surface affects the

speed, and not the recognition, of the drag operation. As Petitioner explains (Pet. 54), Ure detects the *movement* of the finger(s) on the surface by calculating average XY values of the areas being touched and a difference value (subtracting the most recent average XY value from the next-most-recent XY value) to determine the trajectory of the finger movement. Ex. 1007, 8:22–57. Ure also detects when the finger is lifted from the surface. *Id.* Patent Owner’s argument ignores Ure’s detection of the *movement* of the finger on the touch-sensitive surface (e.g., the direction and distance of the movement), and ignores Ure’s recognition of *when the finger is lifted* from the surface. Ure’s drag gesture is not complete until the finger stops moving and lifts from the surface.

Likewise, Patent Owner’s reliance on two steps (“THUMB?” and “DRAG”) shown in Figure 11 of Ure, ignoring other subsequent detecting steps, is misplaced.

Figure 11 of Ure is reproduced below with annotation added by Mr. Ward (Ex. 1030 ¶ 144).



As shown in annotated Figure 11 of Ure above and explained by Mr. Ward (*id.*), in addition to detecting the thumb on the touch-sensitive surface, Ure teaches further detecting steps, such as recognizing: (1) when a finger

touches the touch-sensitive surface; (2) the movement of the finger on the surface; and (3) when a finger is lifted from the surface. Ex. 1007, 8:22–57.

Therefore, Ure differentiates a drag gesture from more than a single, stationary thumb contact. As Petitioner also notes (Reply 23), even under Patent Owner’s proposed claim construction, which we decline to adopt, Ure also distinguishes between gestures of a previously known set, such as “registration,” “twiddle,” “double click,” “triple click,” “and other types of touching. Ex. 1007, 1:52–58, 3:15–26, 5:13–20, 5:30–38, 6:43–51, 6:58–65, 8:43–44, 8:58–62; Ex. 1030 ¶ 146.

Based on Ure’s disclosure, we credit the testimony of Mr. Ward (Ex. 1029 ¶¶ 199–205; Ex. 1030 ¶¶ 136–148) over that of Dr. Brogioli (Ex. 2008 ¶¶ 79–81). *See Yorkey v. Diab*, 601 F.3d 1279, 1284 (Fed. Cir. 2010) (holding that Board has discretion to give more weight to one item of evidence over another “unless no reasonable trier of fact could have done so”). We find Mr. Ward’s explanations are supported by Ure’s disclosure, as a whole. *See, e.g.*, Ex. 1007, 3:17–21, 8:22–57, 9:59–63. Dr. Brogioli’s testimony narrowly focuses on one statement in Ure that “[i]f the thumb is touched, then a drag operation is indicated” (Ex. 2008 ¶ 80), ignoring Ure’s complete disclosure regarding the drag gesture. Ex. 1030 ¶ 137.

Given the evidence in this current record, we determine that Petitioner has established by a preponderance of the evidence that the combination of Ure and Edwards discloses recognizing a touch gesture “from specific dynamic variations among a combination of one or more hand contact patterns,” as recited in claim 1 and required by claims 3–5 and 10.

Control parameter

Claim 1 recites

a value of at least one control parameter for the contiguous region of contact responsive to a measured change in at least one of the associated sensor measurement values,

the value obtained by performing a calculation on the associated sensor measurement values and interpreting the results as signifying a touch gesture,

wherein the at least one control parameter is associated with the touch gesture.

Ex. 1001, 11:10–17 (emphases added). By virtue of their dependency, claims 3–5 and 10 also require this limitation. As we discussed above in the claim construction section, we construe “gesture” as “dynamic variations among postures or hand contact patterns combined in sequence,” and construe “hand contact patterns” as “the two-dimensional shapes of contiguous regions of contact.” *See supra* Section II.A. To be clear, a “gesture” is different from a “contiguous region of contact” (e.g., hand or finger contact pattern).

Petitioner takes the position that the combination of Ure and Edwards discloses this limitation. Pet. 51–55. Petitioner asserts that Ure’s *Y string length* is “at least one control parameter for the contiguous region of contact.” *Id.* Petitioner notes that, when moving a fingertip on the touch-sensitive surface while a user’s thumb is applied to the surface, Ure’s touch-sensitive device detects the fingertip and thumb in order to perform the drag operation of an icon. *Id.* at 55 (citing Ex. 1007, 9:59–63). According to Petitioner, Ure discloses that the results of the calculation on

the associated sensor measurement values (contact in a vertical or semi-vertical direction for a length of about 5) is interpreted as signifying a drag gesture. *Id.* at 51–54; Ex. 1007, 3:17–21, 6:21–22, 8:43–44, 9:55–63; Ex. 1029 ¶¶ 185–196.

Patent Owner opposes, arguing that the prior art combination does not disclose the value of a control parameter that is interpreted to signify a touch gesture. PO Resp. 65–66. In Patent Owner’s view, Ure’s Y string length is merely the length of a stationary thumb, and is not interpreted to signify “dynamic variations” among multiple hand postures. *Id.* (citing Ex. 2008 ¶¶ 82–83). Patent Owner further contends that Ure’s Y string length is relevant only to the detection of a grounded thumb and, therefore, cannot be a control parameter for the finger movement. *Id.* Patent Owner also argues that Ure does not disclose interpreting the results of calculations to obtain the value of the control parameter as signifying a touch gesture. *Id.*

Upon consideration of the evidence before us, we are not persuaded by Patent Owner’s arguments and Dr. Brogioli’s testimony. Rather, we agree with Petitioner’s analysis, which is supported by sufficient evidence, and determine that Petitioner has shown by a preponderance of the evidence that the combination of Ure and Edwards teaches or suggests the aforementioned limitation as required by the challenged claims. Pet. 51–55; Ex. 1029 ¶¶ 185–196.

At the outset, Patent Owner’s arguments and Dr. Brogioli’s testimony are not commensurate in scope with the claims. PO Resp. 65–66; Ex. 2008 ¶¶ 82–83. Patent Owner once again implicitly construes the aforementioned

limitation to require the “control parameter” to signify a *touch gesture*. On the contrary, as discussed above, claim 1 expressly recites a “control parameter for the *contiguous region of contact*”—which encompasses a static hand or finger pattern on the touch surface, not a touch gesture as alleged by Patent Owner. Ex. 1001, 11:10–11. Patent Owner’s arguments and Dr. Brogioli’s testimony also are inconsistent with the Specification of the ’810 patent, which expressly discloses that “control parameters” are “derived from each region of contact”—a static hand or finger pattern. *Id.* at 1:41–42, 2:41–42 (“various parameters are derived from each independent region), 2:46–49 (“It is possible to derive a very large number of independent control parameters For example, six degrees of freedom can be recovered from the *contact of a single finger*.” (emphasis added)).

In addition, Patent Owner’s arguments and Dr. Brogioli’s testimony essentially interpret the claims to require the values for *all* of the control parameters that are associated with the entire touch gesture, and *all* of the derived control parameters assigned to a specific control signal. PO Resp. 65–66; Ex. 2008 ¶¶ 82–83. Claim 1 merely requires “a value of *at least one* control parameter” and “*at least one* derived control parameter.” Ex. 1001, 11:10–19 (emphases added). In this regard, nothing in the claim language requires Petitioner to identify all of the control parameters associated with the *drag* gesture or all of the derived control parameters assigned to the *drag* operation, as Patent Owner alleges.

More importantly, Patent Owner ignores Ure’s disclosure for *detecting the finger contact patterns* associated with the drag gesture and the

movement of the finger on the touch-sensitive surface for the drag operation. As discussed above, we determine that Petitioner has provided a sufficient showing that Ure's drag gesture discloses a "touch gesture," as recited in claim 1. For example, Ure's drag gesture involves: (1) placing a thumb on the touch-sensitive surface, and then (2) *moving at least one finger across the surface to produce a dragging action* in a similar manner as in normal mouse operation. Ex. 1007, 3:17–21, 9:55–63. Ure also discloses that "a thumb touch will typically result in a Y string of length 5," and "[i]f the thumb is touched, then a *drag operation is indicated*." *Id.* at 6:21–22, 8:43–44 (emphasis added).

Accordingly, we are persuaded by Mr. Ward's testimony (Ex. 1029 ¶¶ 185–196), as it is consistent with Ure's disclosure, that Ure discloses a value of at least one control parameter (Ure's Y string length) for the contiguous region of contact (the area touched by a thumb), and also discloses interpreting the results of the calculation to obtain the value of the control parameter (a Y string of length 5) as signifying a touch gesture (a drag gesture), wherein the at least one control parameter (Y string length) is associated with the drag gesture.

Petitioner also identifies other control parameters, including the *average X and Y values* and the *difference value* in Ure, which are associated with the drag gesture and are assigned to the drag operation. Pet. 51–54. In particular, Petitioner explains (*id.*) that

Ure also detects the movement of a finger(s) "across the touch-sensitive member" by calculating the average XY value of the areas being touched and a "difference value, d" ("the most

recent [average XY] value is subtracted from the next-most-recent [average XY] value”) to determine the trajectory of the finger movement (*e.g.*, [Ex. 1007,] 8:44–51).

Based on the evidence before us, we determine that Petitioner has demonstrated by a preponderance of the evidence that Ure (which incorporates Edwards by reference) teaches or suggests “a value of at least one control parameter for the contiguous region of contact . . . , the value obtained by performing a calculation on the associated sensor measurement values and interpreting the results as signifying a touch gesture . . . ,” as required by the challenged claims.

Dependent claims 3–5 and 10

For the foregoing reasons, we conclude that Petitioner has established by a preponderance of the evidence that independent claim 1 is unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Ure and Edwards. Patent Owner does not address the limitations expressly recited in dependent claims 3–5 and 10 with separate, specific arguments. Based on the evidence before us, we also determine that the explanations and supporting evidence presented by Petitioner sufficiently show how the combination of Ure and Edwards renders dependent claims 3–5 and 10 obvious. *See* Pet. 56–59; Ex. 1029 ¶¶ 206–221.

For instance, as to claim 3, Petitioner explains and Mr. Ward testifies that the combination of Ure and Edwards discloses a touch screen configured to sense the contiguous region of contact (an area touched by a thumb) by a generation of the associated sensor measurement values (the value of the capacitance) based on identifying a point of contact for the

sensed region of contact relative to the surface of the multi-touch surface apparatus (pixels at which a touch is detected), as required by claim 3. Pet. 56–57; Ex. 1029 ¶¶ 206–210 (citing Ex. 1007, 2:12–15, 5:56–58, 5:60–6:3, 7:24–28, 8:44–46, Figs. 3–4, 11). Indeed, Ure teaches storing the XY counter coordinates of the pixels at which a touch is detected. Ex. 1007, 5:60–65. Ure also discloses that, using a high-resolution touch array and a high scanning rate, the pressures and velocities of the individual fingers may be determined in accordance with the area touched by that finger and the rate of change of that area. *Id.* at 7:24–28, 8:44–46, Fig. 11.

For claim 4, Petitioner explains and Mr. Ward testifies that the combination of Ure and Edwards discloses the touch screen configured to sense the contiguous region of contact (an area touched by a thumb) by a generation of associated sensor measurement values (the value of the capacitance) based on identifying measurement values that exceed a threshold (reference capacitance), as required by claim 4. Pet. 57–58; Ex. 1029 ¶¶ 211–215 (citing Ex. 1009, 2:19–58, 5:38–61, 7:52–8:6, Fig. 7). Indeed, Ure, which incorporates Edwards by reference, discloses identifying measurement values that exceed a threshold (the reference capacitance) as part of sensing the area touched by a finger. Ex. 1007, 1:37–45, 1:52–59; Ex. 1009, 5:38–61, 7:52–8:6.

With respect to claim 5, Petitioner explains and Mr. Ward testifies that the combination of Ure and Edwards discloses the touch screen configured to track a trajectory of movement (difference value, d) of the portion of the human hand contacting the surface of the touch pad, as

required by claim 5. Pet. 58–59; Ex. 1029 ¶¶ 216–218 (citing Ex. 1007, 2:55–3:3, 3:9–14, 8:44–51, Figs. 1, 11). Indeed, Ure teaches that the transparent touch pad is further configured to track a trajectory of movement of the portion of the human hand contacting the surface of the transparent touch pad by calculating difference value, d. Ex. 1007, 2:55–3:3, 3:9–14, 8:44–51, Figs. 1, 11. Ure also discloses that in performing ordinary cursor movement, the input window is scanned repeatedly each time building the XY tables and computing the average X and Y values, and that the average values from the two most recent scans are stored and the most recent value is subtracted from the next-most-recent value to produce a difference value, d. *Id.*

With respect to claim 10, Petitioner explains and Mr. Ward testifies that the combination of Ure and Edwards discloses the touch gesture (thumb is first grounded, and then fingers move across the surface to generate a drag operation) comprises a plurality of finger postures executed sequentially without breaking contact with the touch screen, as required by claim 10. Pet. 59; Ex. 1029 ¶¶ 219–221 (citing Ex. 1007, 3:17–22, 8:43–55, 9:59–63, Fig. 11). Indeed, as discussed above, Ure discloses that to drag, the thumb is first grounded, and then at least one finger is moved to produce a dragging action. Ex. 1007, 3:17–22, 8:43–55, 9:59–63.

In light of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that the combination Ure and Edwards teaches or suggests all of the limitations recited in claims 3–5 and 10.

Secondary considerations of nonobviousness

Patent Owner relies upon the same arguments and evidence of secondary considerations of nonobviousness presented in connection with the obviousness ground based on *Westerman and Bach*. PO Resp. 4, 13–18, 36–37; Ex. 2009 ¶¶ 26–34. We have addressed those arguments and evidence above, and we determine that they are likewise unavailing here.

Accordingly, Patent Owner’s objective evidence is accorded little weight. We conclude that, on balance, the strong evidence of obviousness outweighs the weak evidence of nonobviousness. *See Leapfrog*, 485 F.3d at 1162.

Conclusion on obviousness over Ure and Edwards

For the foregoing reasons, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 1, 3–5 and 10 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Ure and Edwards.

III. CONCLUSION

For the foregoing reasons, we determine that Petitioner has established by a preponderance of the evidence that claims 1, 3–5, and 10 of the ’810 patent are unpatentable based on the following grounds:

Challenged Claims	Basis	References
1, 3–5, and 10	§ 103(a)	<i>Westerman and Bach</i>
1, 3–5, and 10	§ 103(a)	<i>Ure and Edwards</i>

IV. ORDER

For the foregoing reasons, it is

ORDERED that claims 1, 3–5, and 10 of the '810 patent are held unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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