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Paper 43
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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 IPR2016-00652
Patent 8,743,076 B2

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

BUNTING, *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 and 4–6 of U.S. Patent No. 8,743,076 B2 (Ex. 1001, "the '076 patent"). Paper 2 ("Pet."). Advanced Touchscreen and Gesture Technologies, LLC ("Patent Owner") filed a Preliminary Response. Paper 6 ("Prelim. Resp."). Taking into account the arguments presented in the Preliminary Response, we determined that the information presented in the Petition establishes a reasonable likelihood that Petitioner would prevail with respect to its challenge of claims 1 and 4–6 ("the challenged claims") of the '076 patent. Pursuant to 35 U.S.C. § 314, we instituted this trial on August 31, 2016, based on the grounds identified in the Order section of the Decision on Institution. Paper 8, 44 ("Dec. on Inst.").

During the course of trial, Patent Owner timely filed a Patent Owner Response (Paper 16, "PO Resp."), and Petitioner filed a Reply (Paper 22, "Pet. Reply")). Patent Owner filed a Motion for Observation on Cross Examination (Paper 31), to which Petitioner responded (Paper 33). The parties also briefed whether Petitioner's Reply allegedly contained new matter. (Papers 28, 29).

A transcript of the oral hearing held on April 3, 2017 has been entered into the record as Paper 42 ("Tr.").[1]

[1] Consolidated oral hearings were held in Cases IPR2016-00652, IPR2016-00653, IPR2016-00654, and IPR2016-00655. Paper 41.

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a) as to the patentability of the challenged claims of the '076 patent. For the reasons that follow, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that claims 1 and 4–6 of the '076 patent are unpatentable.

II. BACKGROUND

A. Related Proceedings

The parties indicate that the '076 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 '076 patent, including: (1) U.S. Patent No. 8,717,303 (IPR2016-00653); (2) U.S. Patent No. 8,866,785 (IPR2016-00654); and (3) U.S. Patent No. 8,878,810 (IPR2016-00655). Pet. 4; Paper 5, 2.

B. The '076 Patent (Ex. 1001)

The '076 patent, titled "Sensor Array Touchscreen Recognizing Finger Flick Gesture From Spatial Pressure Distribution Profiles," was issued on June 3, 2014, from U.S. Patent Application No. 14/160,511, filed on January 21, 2014, and is a continuation of application No. 11/761,978, filed on Jun. 12, 2007, which is a continuation of application No. 09/812,400, filed on Mar. 19, 2001, now Pat. No. 7,786,370, which is a division of application No. 09/313,533, filed on May 15, 1999, now Pat. No.

6,610,917, and claims priority to provisional application No. 60/085,713, filed on May 15, 1998. Ex. 1001, at [54], [45], [21], [22], and [60]. The '076 patent is directed to a touch pad user interface for controlling external systems, including computers using at least three independent control signals. *Id.* at 1:26–28. The '076 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 "of appropriate sensitivity range, appropriate 'pixel' resolution, and appropriate physical size are capable of measuring pressure gradients of many parts of the human hand or foot simultaneously." *Id*. at 2:28–31.

According to the '076 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. The touch screen may "measure a spatial pressure distribution profile from a touch on the touch screen and recognize gestures based on dynamics among spatial pressure distribution profiles." *Id*. at Abstract. The '076 patent contemplates the use of pattern recognition software to discern hand contact with the touchpad, referred to as "postures." *Id*. at 7:39–40. Postures may be combined in sequence, recognized and treated as an additional type of recognized pattern, "such sequential dynamics among postures will be termed 'gestures.'" *Id*. at 7:53–55.

C. Illustrative Claim

Of the challenged claims, claim 1 is independent. Claims 4–6 depend directly from claim 1. Claim 1 is illustrative and is reproduced below:

> 1. An apparatus comprising:
>
> a transparent touchpad positioned over a visual display, the transparent touchpad configured to sense a contiguous region of contact from at least a portion of a human hand on a surface of the transparent touchpad, the transparent touch pad comprising a sensor array having a plurality of sensors, each sensor having a unique spatial location and an associated unique address, wherein the transparent touch pad is configured to sense the contiguous region of contact by a generation of sensor measurement values associated with each of the plurality of sensors 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 finger flick touch gesture, wherein the at least one control parameter is associated with the finger flick touch gesture; and
>
> at least one derived control parameter assigned to a specific control signal;
>
> wherein the finger flick touch gesture is recognized from sequential dynamics among postures derived from spatial pressure distribution profiles.

Ex. 1001, 10:65–11:24.

D. List of References and Declarations

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)
Stearns	U.S. 5,225,959	July 6, 1993	(Ex. 1011)
Beverly L. Harrison et al., *Squeeze Me, Hold Me, Tilt Me! An Exploration of Manipulative User Interfaces*, Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 17–24 (ACM Press/Addison-Wesley Publishing Co.) (Apr. 1998)			(Ex. 1010, Exhibit A, "Harrison").

Petitioner also relies on a Declaration and Rebuttal Declaration from Mr. Jean Renard Ward. Exs. 1033, 1034. With its response, Patent Owner submitted the Declaration of Dr. Jacob O. Wobbrock, and Dr. Michael C. Brogioli. Exs. 2009, 2012. The transcript of the deposition of Mr. Ward is entered in the record as Exhibit 2014.

E. Instituted Grounds

As explained in Introduction Section I. above, we instituted trial based on the following asserted grounds of unpatentability (Dec. on Inst. 44):

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

Challenged Claims	Basis	References
1 and 4–6	§ 103(a)[3]	Westerman and Bach
1 and 4–6	§ 103(a)	Ure, Edwards,[4] Harrison, and Stearns

III. ANALYSIS

Petitioner bears the burden of persuasion to prove unpatentability of the challenged claims, and that burden never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015); *see also* 35 U.S.C. § 316(e) ("[T]he petitioner shall have the burden of proving a proposition of unpatentability by a preponderance of the evidence."). To prevail, Petitioner must establish the facts supporting its challenge by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). Below, we explain why Petitioner has met its burden with respect to the challenged claims.

[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 grounds of unpatentability for clarity. Pet. 37–38, n.9.

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 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. 10–14; PO Resp. 11–17. 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.

1. "transparent touch pad"

Claim 1 recites "a transparent touchpad positioned over a visual display."[5] Ex. 1001, 10:66. In its Preliminary Response, Patent Owner asserted that the "term 'transparent touchpad' (when the touchpad is positioned over a visual display) is synonymous with a 'touch screen' and

[5] The claims at issue use the terms "touchpad" and "touch pad" interchangeably. *See, e.g.*, Ex. 1001, 10:65–11:24 ("wherein the transparent *touch pad* is configured to sense the contiguous region of contact") (emphasis added). On this record, neither party indicates a meaningful difference between these terms. For this Decision, we refer generally to "touch pad" for consistency.

should be construed as a '**display device configured to detect touch from regions of a hand or other parts of a body**.'" Prelim. Resp. 16–17; PO Resp. 11, 17. Patent Owner, in its Response, does not proffer a construction for the term "transparent touch pad," rather it clarifies "that a '*transparent* touch pad,' when positioned over a display, is synonymous with a touch screen. PO Resp. 11, n.2. Petitioner asserts that it is unnecessary to construe "touch pad" because "the parties do not dispute this term is met for each ground" and Patent Owner "has not proposed a construction" in its Patent Owner Response. Pet. Reply 6. Nevertheless, Petitioner proposes that "touch pad" be construed in light of the Specification as "interface that uses ***touch*** sensors to track the position of a touch on its surface." *Id*.; Ex. 1001, Abstract, 1:30–35, 2:13–17, 2:25–29, 12:17–26; Ex. 1033 ¶¶ 60–62.

Upon consideration of the evidence in this entire record, we agree with Patent Owner that the claim term "transparent touchpad positioned over a visual display" is synonymous with a touch screen in light of the Specification. At the same time, we also agree with Petitioner that the claim term "touchpad" alone does not require "pressure sensors."

Thus, we maintain our reasoning, as noted in the Decision on Institution (Dec. on Inst. 9), for declining to adopt Patent Owner's proposed claim construction as set forth in its Preliminary Response—a "display device configured to detect touch from regions of a *hand or other parts of a body*." Prelim. Resp. 16 (emphasis added). Specifically, because Patent Owner's proposed construction would exclude non-body parts (e.g., a stylus pen) for operating the touch screens, contrary to the Specification of the '076

patent. *See, e.g.*, Ex. 1001, 1:24–28. We note that the Specification provides for "[t]ouchpad user interfaces for controlling external systems such as computers, machinery, and process environments via at least three independent control signals" (Ex. 1001, 1:26–28) and further that the "touchpad may be operated by hand, other parts of the body, *or inanimate object*" (*id*. at 1:29–30 (emphasis added)). The Specification also explains that a touch screen may be an example of a touch pad, i.e., a "third possible enhancement is that of employing a touch-screen instance of null/contact touch pad and positioning it over a video display." *Id*. at 2:22–24, 4:51–53; *see also id*. at 3:6–20 (examples of null/contact touch pads include "two-dimensional-sensing see-through touchscreens").

In consideration of the foregoing, we construe the term "transparent touch pad," broadly, but reasonably, as an "interface device configured to detect the position of a touch on its surface."

2. "finger flick touch gesture"

Claim 1 also recites, in relevant part, "the finger flick touch gesture is recognized from sequential dynamics among postures derived from spatial pressure distribution profiles" ("finger flick touch gesture limitation"). Ex. 1001, 11:22–24. In our Decision on Institution, we construed the claim term "finger flick touch gesture" to encompass "a touch gesture in which the user's finger strokes a surface in a continuous movement and then lifts off from the surface." Dec. on Inst. 10–12. Petitioner agrees with this claim construction. Pet. Reply 3. Patent Owner, however, maintains that the claim term "finger flick" should be construed as a "touch gesture wherein the

user's finger *gains speed as it reaches the end point*." PO Resp. 12–16 (emphasis added). To support its position, Patent Owner relies on the prosecution history of a related patent that shares the same specification, U.S. Patent 8,743,068 B2 ("the '068 patent"), as evidence that a "finger flick" gesture is distinguishable from a "quick-drag" gesture. *Id*. at 13 (citing Ex. 2007, 106–07, 195). Patent Owner contends that "[t]he inventor's limiting statements about the 'finger flick touch gesture,' made in the prosecution of the '068 Patent to distinguish over prior art, must be applied to the same term in the '076 Patent." *Id*. at 14.

Based on the arguments and evidence presented, we decline to adopt Patent Owner's proposed claim construction because it would improperly import an extraneous limitation into the claims—namely, "the user's finger gains speed as it reaches the end point." Our reviewing courts instruct us that if a feature is not necessary to give meaning to what the inventor means by a claim term, it would be "extraneous" and should not be read into the claim. *Hoganas AB v. Dresser Indus., Inc*., 9 F.3d 948, 950 (Fed. Cir. 1993); *E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co*., 849 F.2d 1430, 1433 (Fed. Cir. 1988). There is a presumption that a claim term carries its ordinary and customary meaning. *CCS Fitness, Inc. v. Brunswick Corp*., 288 F.3d 1359, 1366 (Fed. Cir. 2002). To overcome this presumption, the patentee must "clearly set forth" and "clearly redefine" a claim term away from its ordinary meaning. *Bell Atlantic Network Servs., Inc. v. Covad Commc'ns Grp., Inc.*, 262 F.3d 1258, 1268 (Fed. Cir. 2001).

The disavowal must be "unmistakable" and "unambiguous." *Dealertrack, Inc. v. Huber*, 674 F.3d 1315, 1322 (Fed. Cir. 2012).

Here, as Petitioner points out, Patent Owner's proposed claim construction is supported by neither the Specification nor the prosecution history of the '076 patent. Pet. Reply 3–4. Notably, the Specification discloses that "the recognized postures described thus far may be combined in sequence with specific dynamic variations among them (such as a finger flick, double-tap, etc.)." Ex. 1001, 7:44–50. Patent Owner does not direct us to any description in the Specification of a "finger flick" as a "touch gesture wherein the user's finger *gains speed as it reaches the end*."

Although we recognize that the prosecution history of other related patents, as well as the prosecution history of the '076 patent, may be relevant as to the meaning and scope of the claim term at issue here, the evidence in the present record, as a whole, does not support Patent Owner's proposed claim construction. *See generally* Ex. 1002 (the prosecution history of the '076 patent); Ex. 1003 (the prosecution history of a related patent, U.S. Patent No. 8,717,303 ("the '303 patent")); Ex. 2013; Ex. 2007 (the prosecution history of the '068 patent, another related patent). For example, as Petitioner notes, the prosecution history of the '076 patent and the related patents shows that the Examiner repeatedly rejected the Applicant's construction, and consistently construed the claim term "finger flick" as "a type of gesture that comprises some movement over a surface." Pet. Reply 3 (internal citations omitted).

Indeed, the prosecution history of the '076 patent reveals that the Examiner rejected Applicant's proposed claim construction that requires the user's finger to gain "speed as it reaches the end point"—the very same construction now advanced by Patent Owner in this proceeding. *See* Ex. 2007, 113 (indicating that the Examiner maintained the rejection based on Beaton), 133 (indicating in the Examiner's Final Rejection that Applicant's arguments regarding "finger flick" were not persuasive, and that based on the Specification and the broadest reasonable interpretation of the term "finger flick," Beaton taught the "finger flick" claim limitation), 169. More importantly, the Examiner found that the Applicant's proposed claim construction was not supported by the *original disclosure* of the application, explaining that "the disclosure as originally filed does not describe finger-flick in this way," and "does not provide any details about the finger-flick gesture being different than quick drag gesture." *Id*. at 133. The Examiner further observed that "as defined in Dictionary, the term 'flick' is defined as 'a light and *rapid movement*,' so with respect to the claim term 'finger-flick,' it reads on gesture of 'a *quick* drag' which is taught by Beaton." *Id*. at 294 (emphasis in the original).

As such, we are not persuaded by Patent Owner's argument that "the applicant distinguished the 'finger flick' gesture from the 'quick-drag' gesture disclosed in U.S. Patent No. 6,037,937 to Beaton." PO Resp. 13 (citing Ex. 2007, 106–07); see Tr. 46–47 (citing Ex. 2007, 149). During oral argument, Patent Owner directed our attention to one of the references submitted by Applicant during prosecution to support its construction. Tr.

46–47. Our review of the cited portion of that reference, however, reveals that it is silent as to whether the user's finger gains speed as it reaches the end in a finger flick gesture. Ex. 2007, 149. Rather, it merely describes "informal findings suggest that the end of a drag-drop gesture requires a more precise targeting effort, hence a slower velocity at the end of the gesture." *Id.* Instead, the Examiner considered the evidence submitted by Applicant during prosecution, and determined that those cited references do not support the narrow claim construction advanced by Applicant because they were published after the effective filing date of the application and described the term "gesture" in the context of *mouse operation*. *Id.* at 169.

Significantly, the claims were allowed for reasons independent of the allegedly disclaiming statements, i.e., because Applicant amended the claims to require a limitation (reproduced below) that includes other additional features:

> wherein the control parameters include parameters derived from recognizing a finger-flick touch gesture, the finger-flick touch gesture recognized from ~~pattern recognition of variations between a plurality of pressure profiles~~a sequence of postures with specific dynamic variations among them, the sequence of postures being recognized from pressure profiles.

Id. at 379, 399–400.

As such, an unsuccessful argument or a proposed claim construction that was repeatedly rejected by the Examiner during prosecution does not constitute an "unmistakable" or "unambiguous" disavowal. It is well-settled that "the doctrine of prosecution disclaimer only applies to unambiguous disavowals." *Grober v. Mako Prods., Inc.*, 686 F.3d 1335, 1341 (Fed. Cir.

2012) (citing *Abbott Labs. v. Sandoz, Inc.*, 566 F.3d 1282, 1289 (Fed. Cir. 2009)). "It is inappropriate to limit a broad definition of a claim term based on prosecution history that is itself ambiguous." *Inverness Med. Switz. GmbH v. Warner Lambert Co.*, 309 F.3d 1373, 1382 (Fed. Cir. 2002).

Moreover, Patent Owner does not provide credible evidence or sufficient explanation as to why the finger necessarily gains speed as it reaches that end point. For example, Dr. Brogioli's testimony relies only on the statements made by the Applicant from the prosecution history of a related patent, which were rejected by the Examiner, as discussed above. Ex. 2012 ¶ 83. On the other hand, Mr. Ward testifies that our construction I.in the Decision on Institution of "finger flick" as "a touch gesture in which the user's finger strokes a surface in a continuous movement and then lifts off from the surface"—is consistent with the use of the term in the art as understood by an ordinarily skilled artisan. Ex. 1034 ¶¶ 45–47.

The prior art of record, which reflects the general knowledge of a skilled artisan at the time of the invention, also does not support Patent Owner's proposed claim construction. For instance, the prior art indicates that a "finger flick" gesture merely involves a finger stroke on the surface in a direction and then the finger lifts off from the surface. *See, e.g.*, Ex. 1013, 10:11–15 ("Examples of these 'gestures' are . . . single strokes or 'flicks' right, left, up or down, which are used for scrolling"); Ex. 1010, 19 ("a flick on the upper right corner from right to left to indicate 'forward one page' . . . a finger press, the direction of a stroke, and a release of pressure.");

Ex. 1014, Fig. 11 ("flick up—to scroll up"); Ex. 1015, 5:63–64 ("A 'flick' gesture is an upward or downward stroke that is used for scrolling.").

In light of the arguments and evidence in this record, including the Specification and prosecution history, as well as prior art references that show the general knowledge of an ordinarily skilled artisan, we construe the claim term "finger flick" to encompass "a touch gesture in which the user's finger strokes a surface in a continuous movement and then lifts off from the surface."

3. "recognized"

Claim 1 recites in relevant part that "the finger flick touch gesture is *recognized* from sequential dynamics among postures derived from spatial pressure distribution profiles." Ex. 1001, 11:22–24 (emphasis added). Patent Owner, citing to a general dictionary, 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. 16 (citing Ex. 2010, 976). According to Patent Owner, "a touch gesture must be perceived based on ***previously known*** sequential dynamics (a set of ***stored*** touch gestures)." *Id*.

Petitioner counters that the intrinsic evidence does not support Patent Owner's proposed claim construction. Pet. Reply 4–6. 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 variations among hand contact patterns, as claimed." *Id*. at

4–5 (citing Ex. 1034 ¶¶ 54–56). Petitioner urges us to give this term its plain and ordinary meaning, or construe it to mean "discerned," consistent with the Specification, "which refers to '***discern[ing]***' postures and gestures." *Id*. at 6 (citing Ex. 1001, 7:28–31, 38–40, 49–55, Abstract; Ex. 2010, 976; Ex. 1034 ¶ 59).

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 evidence, and decline to adopt Patent Owner's proposed claim construction because, once again, Patent Owner attempts to import an extraneous limitation into the claims—"a touch gesture must be perceived based on ***previously known*** sequential dynamics (a set of ***stored*** touch gestures)." PO Resp. 16–17 (emphasis in the original). Claim 1 merely recites "the finger flick gesture is recognized from sequential dynamics among postures derived from spatial pressure distribution profiles." Ex. 1001, 11:22–24. The challenged claims

do not recite "a set of stored touch gestures" or limit gesture recognition to looking up specific "previously known sequential dynamics." Pet. Reply 4–5.

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. 16–17 (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. Cir. 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 (a set of ***stored*** touch gestures)," as urged by Patent Owner. PO

Resp. 16 (emphasis 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, 7:38–55. 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*. at 7:38–40 (emphasis added).

Therefore, Patent Owner's arguments and evidence are not sufficient to support its proposed claim construction. As such, in light of the Specification, including the claim language, we give the claim element—"the finger flick touch gesture is recognized from sequential dynamics among postures derived from spatial pressure distribution profiles"—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.

4. Remaining Claim Terms

In the Petition, Petitioner contends we should adopt Patent Owner's proposed construction of the related terms "contiguous region," "contiguous region of contact" and "the sensed region of contact" as "connected region" from the district court proceeding. Pet. 12 (citing Ex. 1031, 14–16). Similarly, Petitioner contends we should adopt Patent Owner's proposed construction of "spatial pressure distribution profile(s)" as "one or more contiguous regions of contact which can vary as a user varies pressure on the screen" from the district court proceeding. *Id.* at 12–13 (citing Ex. 1031, 10–13). Petitioner notes that the parties in the district court proceeding

agreed to the constructions (reproduced in the table below) for the claim terms "gesture" and "hand contact patterns." Pet. 13.

We adopted these constructions in the Decision on Institution. Dec. on Inst. 13–14. Patent Owner takes no position on our construction of these terms. *See* Paper 9, 3 ("The patent owner is cautioned that any arguments for patentability not raised in the response will be deemed waived."). Given the parties' acceptance of our construction of these terms, we discern no reason to address or modify the claim constructions set forth in the Decision on Institution for the purposes of this Final Written Decision. As such, we maintain the following constructions:

Claim term	Construction
"contiguous region," "contiguous region of contact" and "the sensed region of contact"	"connected region"
"spatial pressure distribution profile(s)"	"one or more contiguous regions of contact which can vary as a user varies pressure on the screen"
"posture(s)" and "hand contact pattern(s)"	"the two-dimensional shapes of contiguous regions of contact"
"gesture"	"dynamic variations among postures or hand contact patterns combined in sequence"

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 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 a 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. 1033 ¶ 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. Additionally, we note that the prior art of record in this proceeding is indicative of 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. 17–22. Upon review of the parties' contentions and evidence, we are not persuaded that Patent Owner's overview of the prior art (PO Resp. 17–22) 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. 1034 ¶¶ 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. 1033 ¶¶ 19–29; Ex. 1034 ¶¶ 9–24; Ex. 1009, 10:3–22; Ex. 1001, 3:12–20 (explaining that "two-dimensional-sensing see-through touch-screens [were] often employed in public computer kiosks."). We credit Mr. Ward's testimony 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. 17, 20; Ex. 2009 ¶¶ 26, 33 (emphasis 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. 45 (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. 21 (citing Ex. 2009 ¶ 27)), we are not persuaded that Patent Owner provides sufficient explanation or credible evidence to support such a 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" (Ex. 1034 ¶ 9) 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 '076 patent itself" (*id*. 18). As discussed above, the Specification of the '076 patent explains that a touch screen may be an example of a touch pad. Ex. 1001, 2:22–24, 4:51–53; *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. 1034 ¶ 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. 21–22 (citing 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. 17–22. For instance, Sears also

discloses the advantages of using touch screens. *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 3 ("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 4 ("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*. at 5.

Additionally, Patent Owner's focus on the obstacles noted in the background section of Westerman is not convincing because such obstacles merely indicate the problems to be solved by the invention disclosed in Westerman and do not account for the express disclosure in Westerman that

> [i]t 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).

For these reasons, we are not persuaded that Patent Owner's overview of the prior art and Dr. Wobbrock's testimony regarding the background of the art accurately describe the state of the art at the time of the invention. Instead, we are more persuaded by Petitioner's arguments and evidence that the use of transparent touch pads was well known in the art at the time of the invention of the '076 patent. Pet. 2.

E. Obviousness Based on Westerman and Bach

Petitioner challenges the patentability of claims 1 and 4–6 of the '076 patent under 35 U.S.C. § 103(a) as obvious based on Westerman and Bach. Pet. 14–37. In support thereof, Petitioner provides explanations to account for all of the claim limitations recited in the challenged claims (*id.* at 20–37), and reasons to combine the teachings of Westerman and Bach (*id.* at 18–20). In support of its contentions, Petitioner cites the declaration of Mr. Ward in support of the analysis advocated in the Petition (Ex. 1033), as well as his rebuttal declaration (Ex. 1034).

Relying on Dr. Brogioli's Declaration (Ex. 2012), Patent Owner disagrees, arguing that the combination of Westerman and Bach fails to disclose certain claim limitations, and that Petitioner has not shown that one with ordinary skill in the art would have combined Westerman and Bach. PO Resp. 24–58.

We have reviewed the parties' contentions and supporting evidence. For the reasons given below, we conclude that Petitioner has demonstrated by a preponderance of the evidence that the challenged claims are obvious based on Westerman and Bach. We begin with an overview of the cited references followed by a discussion of the parties' contentions in turn.

1. Overview of Westerman (Ex. 1004)

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.

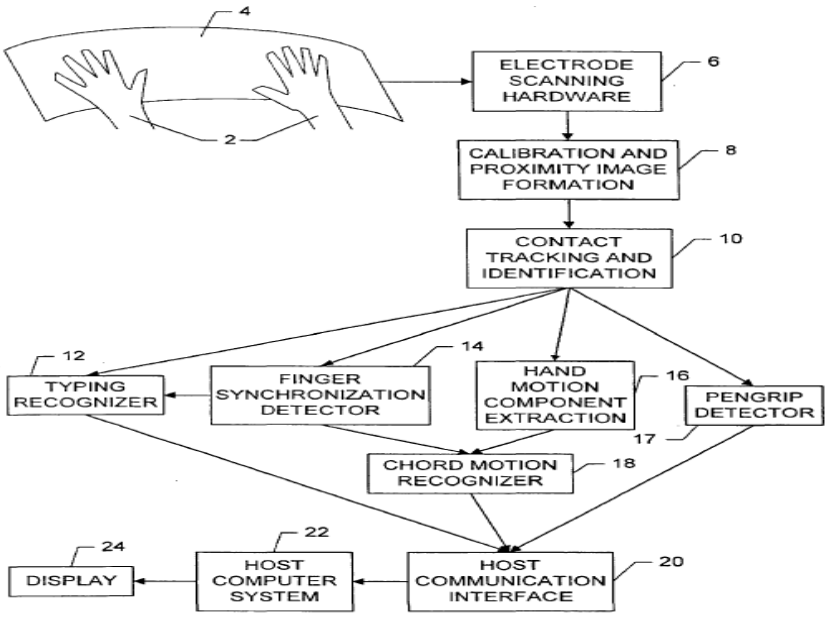

FIG. 1

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, 90[6] (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. Ex. 1004, 9:15–18.

2. Overview of Bach (Ex. 1005)

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.

3. Discussion

Petitioner relies on the disclosures in Westerman and Bach to describe each of the limitations recited in the challenged claims. Pet. 20–37. Patent Owner challenges the sufficiency of Petitioner's proofs directed to the limitations discussed *infra*. PO Resp. 24–33. Because the teachings of Westerman and Bach with respect to the remaining claim limitations of the challenged claims are undisputed, on the fully developed record, we find

[6] 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.

persuasive and adopt Petitioner's analysis of these limitations, including the arguments and evidence of record, as our own. *See generally* Pet. 20–37; Pet. Reply 7–8, 17–19; Ex. 1033; Ex. 1034.

a. Finger Flick Touch Gesture Limitation

Claim 1 recites in relevant part "wherein the finger flick touch gesture is recognized from sequential dynamics among postures derived from spatial pressure distribution profiles." Ex. 1001, 11:22–24 ("the finger flick touch gesture limitation"). As discussed in Section II.A.2 of this Decision, we construe the term "finger flick touch gesture" to encompass "a touch gesture in which the user's finger strokes a surface in a continuous movement and then lifts off from the surface." Petitioner takes the position that Westerman in combination with Bach meets the finger flick touch gesture limitation of claim 1. Pet. 32–34.

As to the surface, or transparent touch pad aspect of this limitation, 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 a light-emitting polymer display. *Id*. at 21–22 (citing, *e.g.*, Ex. 1004, 6:56–59, 8:11, 8:29, 8:46, 9:40, 9:62. 10:19. 10:42, 13:4–10, 14:25–28, 17:30–35, 55:4–8, 62:3–7, Figs. 1, 10, 41; Ex. 1006, 90; Ex. 1033 ¶¶ 63–69).

With respect to the finger flick touch gesture claim element, Petitioner submits that Westerman teaches recognizing a finger flick touch gesture on the multi-touch surface apparatus because Westerman discloses tracking the group position of hand contacts through successive proximity images and

calculating the velocity of each group along each path, and detecting the acceleration of the tangential motion of a finger before the finger is lifted. *Id.* at 27–30 (citing Ex. 1004, 9:15–36, 10:15–38, 10:39–65, 13:14–25, 14:31–34, 25:67–26:29, 27:19–29:32; 44:20–46:16, 50:64–51:21, 65:38–42, 71:10–12, 76:1–32, Figs. 1, 18, 22, 37, 40 A–b; Ex. 1006, 96, 106, 115; Ex. 1033 ¶¶ 99–117). According to Petitioner, a relevant skilled artisan "would have understood the "tangential motion of the touch device" and "accelerating…the tangential motion of the touch device before the touch device is lifted" to be a "finger flick touch gesture." *Id*. at 30 (citing Ex. 1033 ¶¶112, 115). In its Reply, Petitioner refers to our construction of "finger flick touch gesture" from the Decision on Institution and observes that "PO does not dispute that Westerman meets the 'finger flick' limitation under the Board's and PO's constructions." Pet. Reply, n.2 (citations omitted).

Petitioner observes that Westerman implicitly describes a *transparent* multi-touch surface positioned over a visual display (Pet. 19–20 (internal citations omitted)), while Bach expressly discloses a *transparent* sensing screen positioned over a visual display unit (*id*. at 21 (citing Ex. 1005, 1, 11)). According to Petitioner, it was well known to one of skill in the art "to make a touchpad positioned over a visual display transparent." *Id*. at 22 (citing Ex. 1033 ¶ 66; Ex. 1022A, 115–17; Ex. 1023, 4:21–42; Ex.1012, 3:35–5:7; Ex. 1019A, 446–47; Ex.1024, 1, 6–7).

As discussed in Section II.A.3, we accorded the term "recognized" its plain and ordinary meaning. Petitioner asserts that Westerman teaches

detecting a finger flick gesture by '"identifying hand contacts in a sequence of proximity images,' which are derived from 'groups of electrodes which indicate significant proximity."' *Id*. at 34 (citing Ex. 1004, 9:15–36). Petitioner further explains that Westerman states "that 'proximity' refers to 'pressure between a touch device such as finger and the [multi-touch] surface' and '[p]roximity measurements are…interpreted as pressure in a z axis normal to the surface.'" *Id*. (citing Ex. 1004, 14:31-37). Petitioner notes that "PO does not dispute that Westerman meets the 'recognized' limitation under PO's and Petitioners' constructions [(if the Board finds construction necessary)]." Pet. Reply 2, n.5.

Patent Owner counters that Westerman does not disclose "a ***touch screen*** (or transparent touch pad positioned over a display)" because it discloses a multi-touch touch pad separate from a display. PO Resp. 25 (citing Ex. 1004, 13:4–5, Fig. 1). Patent Owner directs our attention to the disclosure in Westerman of specialized sensors that provides a proximity measurement when part of a hand comes into contact with one or more sensors. *Id*. at 26–27 (citing Ex. 1004, 6:66–7:3, 8:10–27, Figs. 4, 5. Based on this disclosure, Patent Owner asserts that Westerman is concerned with "precisely separat[ing] and determin[ing the] properties of each proximity image." *Id*. at 28 (citing Ex. 1004, 20:55–27:17).

Patent Owner also argues that "Westerman clearly lacks components that recognize gestures from sequential dynamics among postures ***on a transparent touchpad***." *Id.* Patent Owner 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 29. 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 described in Westerman processes *finger taps*, which are not touch gestures. *Id*. at 29–31 (citing Ex. 1004, 55:4–8, Fig. 41). Key symbols "are embedded in the display, rather than positioning a transparent touchpad 'over' a display," according to Patent Owner. *Id*. at 30. Patent Owner also argues that Westerman uses circuitry that obscures the underlying display, citing to the prosecution history for support. *Id*. at 31 (citing Ex. 2013, 265, 335, 345, 396, 425).

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 finger flick limitation is supported by sufficient explanation and credible evidence. 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.*, 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, as discussed in Section II.D., Patent Owner's arguments are inconsistent with Westerman's disclosure.

As Petitioner points out (Pet. 20–22), 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 (emphasis added).

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 (1) 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 (Pet. 21), or (2) the Examiner allegedly determined that Westerman does not *expressly* disclose a transparent touch pad (Ex. 2013, 265, 335, 345, 396, 425) because, as Mr. Ward explains, the Examiner "did not address Westerman's key disclosure of a touchpad 'fabricated on' a display" (Ex. 1033 ¶ 29), does not undermine the teachings of Westerman or other evidence in this record before us, as implied by Patent Owner (PO Resp. 31, n.3).

Notably, Patent Owner's argument that Westerman discloses a multi-touch touchpad separate from a display and not a touch screen or transparent touch pad positioned over a display (PO Resp. 25), ignores

Westerman's express disclosure of a multi-touch surface apparatus "fabricated on or integrated with a display device" (Ex. 1004, 62:4). Contrary to Patent Owner's assertion 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 also is not supported by Westerman's disclosure. Westerman teaches 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. 1034 ¶ 67. Further, Patent Owner's argument that Westerman's key symbols are embedded in the display also squarely contradicts Westerman's express disclosure, namely — "the position of the key symbols would be reprogrammably displayed on the surface." Ex. 1004, 54:67–55:8.

Further, we are not persuaded by Patent Owner's argument that Westerman "lacks components that recognize gestures from sequential dynamics among postures ***on a transparent touch pad***." PO Resp. 28. Specifically, because "[t]yping recognition module 12 processes finger tap 718 in a typing recognition mode." *Id*. at 31. 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. 29–31). 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. Specifically, 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 (emphasis added).

Additionally, we agree with Petitioner that Westerman's disclosure is not limited to a typing recognition module, as alleged by Patent Owner. Pet. 14–17, 20–37; 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, Westerman also teaches detecting a *finger flick gesture*, generating a cursor movement or scrolling signal in response to a tangential motion of a user's finger that is accelerating on a touch-sensitive surface before the finger is lifted. Ex. 1004, 9:15–36, 10:39–65. Mr. Ward testifies Westerman discloses recognizing a finger flick gesture from specific

dynamic variations among a combination of hand contact patterns because Westerman teaches detecting a finger flick gesture by identifying hand contacts in a sequence of proximity images, which are derived from groups of electrodes which indicate significant proximity. Ex. 1033 ¶¶ 98–112; Ex. 1004, 9:15–36.

Thus, Patent Owner's argument and evidence that Westerman lacks components that recognize gestures from sequential dynamics on a transparent touchpad, and that Westerman does not disclose touch gestures on a transparent touch pad positioned over a display, are not sufficient to rebut Petitioner's showing to the contrary.

Based on the evidence in this record, we determine that, for the reasons set forth by Petitioner, the disclosure in Westerman regarding a multi-touch surface positioned over a visual display device, and that of Bach regarding a transparent, pressure-sensitive drawing pad, satisfies the finger flick touch gesture limitation, namely a transparent touch pad positioned over a visual display, and recognizing a finger flick gesture from a specific dynamic variations among hand contact patterns on the transparent touch pad.

i. 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. 18–20, 21–22. In support of Petitioner's contention, Mr. Ward testifies that "[i]t 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. 1033 ¶ 79 (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). 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. 18–19.

Patent Owner challenges these contentions, arguing that Petitioner has not established that a person of ordinary skill in the art would have combined Westerman and Bach. PO Resp. 33–54.

In its Reply, Petitioner points out that

> Patent Owner does not dispute that (1) a POSA would have known how to make Westerman's multi-touch surface transparent; (2) it would have been routine for a POSA 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.

Pet. Reply 11 (citing Pet. 20; Ex. 1033 ¶¶ 66–69, 78–79; *contra* PO Resp. 45). Petitioner 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, e.g., a keypad. *Id*. at 11–12.

With the record fully developed, we are persuaded Petitioner has provided sufficiently articulated reasoning with rational underpinning

explaining why a person with ordinary skill in the art would have combined the teachings of Westerman and Bach. Pet. 18–20. 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. 1033 ¶¶ 66–69, 71–79. *See also KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.")). As the Federal Circuit has made clear, when a reason to combine or modify references is in dispute, we must make a finding of a motivation to combine and must have an adequate evidentiary basis for that finding. *See In re Nuvasive, Inc.*, 842 F.3d 1376, 1382 (Fed. Cir. 2016). "'[C]onclusory statements' alone are insufficient and, instead, the finding must be supported by a 'reasoned explanation.'" *Id*. at 1383 (quoting *In re Lee*, 277 F.3d 1338, 1342, 1345 (Fed. Cir. 2002)); *accord id*. at 1384 (not permitting the Board to effectively adopt the petitioner's argument, which "amount[ed] to nothing more than conclusory statements that a PHOSITA would have been motivated to combine the prior art references to obtain additional information."). Moreover, the Board "cannot rely solely on common knowledge or common sense to support [our] findings." *Id*. at 1383.

Here, neither Patent Owner nor Dr. Wobbrock disputes that touch screens or transparent touch pads positioned over a display were well-known

in the art at the time of the invention. PO Resp. 17 (citing Ex. 2009 ¶¶ 26–28, 30). Relying on the testimony of Dr. Ward, Petitioner asserts that

> A POSA also would have found it obvious and straightforward to use transparent materials to form Westerman's multi-touch surface and to position the transparent multi-touch surface over a visual display as taught by Bach. Ex. 1033 ¶79; Ex. 1005 at 9, 11; Ex. 1012 at 1:44-45 ("known touch input devices use transparent overlays placed over the display screen"); Ex. 1021 at 10:10-14. For example, 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 the underlying display. Ex. 1033 ¶79; Ex. 1022A at 115-17; Ex. 1023 at 1:37- 2:4, 4:21-42; Ex. 1012 at 3:35-5:7; Ex. 1019A at 446-47; Ex. 1024 at 1, 6-7. It would have been routine for a POSA to make such an advantageous implementation choice, and clear to a POSA that such a combination would work and provide the expected functionality to yield predictable results. Ex. 1033 ¶79.

Pet. 20.

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." Ex. 1033 ¶ 67. Mr. Ward opines 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*. (citing Ex. 1004, 55:4–8).

We credit Mr. Ward's testimony, as his explanations are consistent with Westerman's disclosure as well as 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. 1019, 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.").

Patent Owner also argues that Westerman "expressly teaches away from [a combination with Bach]" (PO Resp. 33) 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***." *Id*. (citing Ex. 1004, 5:35–37). Patent Owner explains that "[t]hese negative comments discourage the added circuitry required by Bach including oscillators and frequency-to-voltage converter circuits, therefore explicitly constitute[ing] a teaching away." *Id.* at 34. Because Westerman rejected the complex circuity of Boie which uses one oscillator, Patent Owner contends that "a POSITA would understand

that Westerman would also reject the more complex circuitry of Bach which uses ***a separate oscillator at each sensor node***." *Id*. at 35.

Patent Owner's contention that one of skill in the art would have rejected the complex circuitry of Bach in view of the disclosure in Westerman regarding Boie is unsupported attorney argument. *See*, *e.g.*, Ex. 2012 ¶¶ 36–42. We agree with Petitioner "[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." Pet. Reply 15. 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)). *See Winner Int'l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n. 8 (Fed. Cir. 2000) ("The fact that the motivating benefit comes at the expense of another benefit, however, should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another. Instead, the benefits, both lost and gained, should be weighed against one another.").

We also are not persuaded by Patent Owner's related argument that Westerman teaches away from a combination with Bach because Westerman purportedly 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.").

> Indeed, the Federal Circuit recently confirmed that
>
> > [o]bviousness may be defeated if the prior art indicates that the invention would not have worked for its intended purpose or otherwise teaches away from the invention. A reference teaches away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken in the claim. A reference that merely expresses a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into the claimed invention does not teach away.
>
> *Meiresonne v. Google, Inc.*, 849 F.3d 1379, 1382 (Fed. Cir. 2017) (citations and quotation marks omitted).

Here, Patent Owner does not direct us to a passage in Westerman that criticizes, discredits, or otherwise discourages 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 replacing Westerman's sensors with Bach's sensors, but rather relies upon Bach for its express teaching of a *transparent* touch pad. Pet. 21–22. In fact, for both the obviousness grounds based on Westerman, alone, and in combination with Bach, Petitioner relies on Westerman, and not Bach, to teach or suggest the claimed sensors. *Id.* at 24–27. Our review of Westerman reveals the description of a multi-touch surface apparatus that is fabricated on a display device, as well as 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. 1033 ¶ 57. 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."

As such, we are not persuaded by Patent Owner's arguments and evidence that Westerman teaches away from a combination with Bach to arrive at the claimed invention.

Next, Patent Owner argues that Bach is not analogous art because it is not directed to a control system, is not reasonably pertinent to the particular problem solve by the '076 patent, and is not designed to control an external device. PO Resp. 36–39. Patent Owner explains that "the pertinent field of art of the '076 Patent is a 'control system, and in particular, to a tactile input ***controller*** for ***controlling*** an associated system.'" PO Resp. 37 (citing Ex. 1001, 1:20–22). Bach, according to Patent Owner, is directed to "providing 'a proximity sensor which is substantially more sensitive to the required changes to be detected than such sensors know[n] hitherto.'" *Id*. (citing Ex. 1005, 2). Patent Owner directs our attention to "***two sentences*** [that] make vague reference to a drawing pad, and that pad is not to be touched." *Id*. at 38 (citing Ex. 1005, 11). Patent Owner interprets Bach as disclosing "a non-touched stylus drawing pad at best, explicitly using a stylus or other ***non-touching*** means, and therefore is simply not in the same field as the touch-based user interface of the '076 patent." *Id*.

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 '076 patent is limited to a control system, as alleged by Patent Owner. Rather, based on the evidence before us, we find that both the '076 patent and Bach are in the field of touch-based user interface devices. Notably, the challenged claims of the '076 patent are directed to a "transparent touchpad." Ex. 1001, 10:66. The Specification of the '076 patent also repeatedly describes a touchscreen and a touchpad. For instance, the title of the '076 patent recites "sensor array touchscreen recognizing finger flick gesture from spatial pressure distribution profiles" (*id*. at [54]), and the both the abstract of the '076 patent and "summary of the invention" describes "touchscreen user interfaces" (*id.* at [57], 1:25–45). Touchpads and touchscreens, as described in the '076 patent, are touch-based user interface devices. *Id.*

Contrary to Patent Owner's characterization of Bach as limited to "a non-touched stylus drawing pad" (PO Resp. 38), 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") (emphasis 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 '076 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, 1:24–25 ("Touchpad user interfaces for controlling external systems such as computers").

Based on the evidence in this record, we find that both Bach and the '076 patent are in the same field of endeavor—namely, touch-based user interface devices. In short, Bach is analogous art.

Patent Owner additionally argues that Petitioner fails to establish a motivation to combine Westerman and Bach, contending that "[t]he Challenged Claims are more than just a transparent touchpad comprising an array of transparent sensors." PO Resp. 40. Specifically, Patent Owner argues that the '076 patent "overcame the barriers and doubts of the prior art, particularly the fat finger impediment, to incorporate hand contact on the surface over the display as an improvement to controlling a device." *Id*. According to Patent Owner, 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*. (citing Ex. 1005, 11). Patent Owner concludes, without support, that "a POSITA would not

have been motivated to combine a drawing pad that discourages touching with a touchpad that must be touched." *Id*.

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. 21), 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 are not persuaded 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; Pet. Reply 11–12) 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).

Further, Patent Owner characterizes Petitioner's three proffered motivations as "deficient." PO Resp. 41–45. Patent Owner contends that Petitioner's first "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. 41. We disagree. Once again, Patent Owner's contention is based on an unduly narrow reading of the prior art. Westerman expressly describes how "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 (emphasis added). More importantly, as discussed above, Westerman also teaches recognizing a finger flick gesture from specific dynamic variations among a combination of one or more hand contact patterns, as required by the challenged claims. Ex. 1004, 9:15–36; 10:39–65; Ex. 1033 ¶¶ 98, 111, 114, 126–27. 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.

Patent Owner's contention assumes, without providing credible support evidence, that the patentee of the '076 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. 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 419.

As to Petitioner's second reason, that a POSITA would have been motivated by "flexibility" to combine Bach with Westerman so that the user can choose a preferred keyboard, 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. 42–43. According to Patent Owner, "[n]othing that Petitioner cites for this alleged motivation to combine comes from Bach. A POSITA would have no motivation to combine Bach with Westerman to obtain functionality already expressly disclosed in Westerman. Indeed, striking keys on a keyboard does not entail gestures, or sequential dynamics among postures." *Id*. at 43.

As *KSR* informs us, 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, 1329 (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. 1033 ¶ 67. 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. (emphasis added). As Petitioner also notes (Pet. 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 performed. 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).

With respect to Petitioner's third reason, Patent Owner argues that Petitioner's "ease of learning and use" 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. 44. Patent Owner contends that "Petitioner fails to identify 'some articulated reason' required by *KSR* as to why a POSITA would use the alleged touch screen from Bach instead of the typing keyboard already disclosed in Westerman." *Id.*

This argument is unavailing because, once again, Patent Owner 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. Instead, Petitioner relies upon Westerman to teach detecting a finger flick gesture (Ex. 1004, 9:15–36, 10:39–65), and Bach for the express teaching of transparency (Ex. 1005, 1). Pet. 21–22, 27–34. 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 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. 1018, 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.

As to Petitioner's contention that transparent materials were well known and "[i]t would have been routine for a POSA to make such an advantageous implementation choice, and clear to a POSA that such a combination would work and provide the expected functionality to yield predictable results" (*see* Pet. 20), Patent Owner characterizes this argument as "conclusory" and lacking in "articulated reasoning with some rational

underpinning." PO Resp. 45. Patent Owner, however, does not support this position with sufficient arguments or credibleevidence demonstrating why Petitioner's stated reasoning lacks rational underpinnings.

Based on further review of the record and for the reasons discussed, Patent Owner's arguments and supporting evidence do not persuade us that Petitioner's articulated reason to modify Westerman's device using Bach's teachings of a transparent sensing screen over a visual display is lacking in rational underpinnings.

Patent Owner also argues that combining Bach's transparent sensing screen with Westerman would change Westerman's principle of operation and produce an inoperable device. PO Resp. 45–54. Patent Owner first argues that Petitioner did not meet its burden of demonstrating that the proposed combination would work. *Id*. at 45–46. Here, Patent Owner states that

> Petitioner did not meet its burden because it offered only one conclusory sentence that the combination would work." *See* Pet. at 20 ("It would have been routine for a POSA to make such an advantageous implementation choice, and clear to a POSA that such a combination would work and provide the expected functionality to yield predictable results.").

Id. at 46. Patent Owner's statement, by itself, does not inform us why the results of the proposed combination would not be predictable.

Next, Patent Owner argues that "Bach's alleged "transparent sensing screen" requires numerous active oscillators that would alter Westerman's principle of operation and/or would make Westerman inoperable for its intended purpose." *Id*. at 47 (emphasis omitted). According to Patent

Owner, "a POSITA would readily know substituting Bach's 'transparent sensing screen' will preclude Westerman's principle of operation" because Westerman teaches use of one or two hands on a multi-touch surface to input signals to a device using sequentially activated sensors within an array. *Id*. at 47 (citing Ex. 1004, 18:47–64, 19:21–25, Abstract, Figs. 4–7, 8, 13–15). Relying on the testimony of Dr. Brogioli, Patent Owner contrasts Bach's transparent touch screen, "which includes sensors each with separate oscillators that are always free-running regardless of any multiplexing that may be implemented" (*id*. at 49 (citing Ex. 2012 ¶ 39)) with Bach's sensor, which includes "an electrode, oscillator, frequency-to-voltage converter and related circuitry" (*id*. (citing Ex. 1005, 3)). Patent Owner opines that

> to incorporate Bach into Westerman, a vast number of replicas of Bach's sensor (electrodes plus always operating oscillator) must in some manner replace each of the Westerman sensors (boxes 47 in Westerman Figs 5A, 5B, and 6) in Westerman Fig. 6. As a result, the combined system will comprise a vast number of active free-running oscillators sensitive to capacitive variation and highly susceptible to capacitive coupling among one another.

Id. at 49–50.

Relying on the testimony of Dr. Brogioli, Patent Owner contends the proposed combination of Westerman and Bach would result in one or more fingers spanning multiple electrodes (*id*. at 50 (citing Ex. 2012 ¶ 53)), and "[a] POSITA would immediately realize that this inter-sensor coupling through the finger (and hand and other fingers in the case of Westerman's multi-touch) will knock those Bach oscillators out of normal, expected, and usable operation" (*id*. (citing Ex. 2012 ¶¶ 53, 57–58)). Patent Owner asserts

that coupling the oscillators of Bach to each sensor would create cross-talk "likely to obscure the proximity valley 210, and to lessen signals from desired pixels, all of which will blur the proximity images and detract from Westerman's multi-touch proximity images." *Id*. at 53 (citing Ex. 2012 ¶¶ 63–64). Patent Owner concludes that "a POSITA would have known that Bach's oscillating sensors impair Westerman's ability to measure or recognize multi-touch gestures, derived from control parameters on a touchscreen device and would not have been motivated to combine the two references." *Id*. at 54 (citing Ex. 2012 ¶¶ 49–67).

The principle or operation cited by Patent Owner, however, 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 (emphasis 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. 18–22). 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, 54:67–55:26, 62:3–4. As Petitioner explains and Mr. Ward testifies, "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 the underlying display." Pet. 20 (citing Ex. 1033 ¶ 79; Ex. 1022A, 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).

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 finger flick 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 finger flick

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 (1) that the background section of Westerman rejects the Gerpheide reference because it was prone to noise at the driving frequency, and (2) that 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. 51–52. 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. 1034 ¶ 105; Ex. 1004, 8:25–27, 16:26–41, 17:14–20, 23:21–32.

Thus, Petitioner has provided sufficient evidence demonstrating 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). We also 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.

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 recognizing a finger flick gesture on "a transparent touchpad positioned over a visual display," as required by claims 1, and 4–6.

b. *Control Parameter*

Claim 1 recites in relevant part:

> *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 finger flick gesture*,
>
> wherein the at least one control parameter is associated with the finger flick gesture.

Ex. 1001, 11:12–19 (emphasis added). By virtue of their dependency, all other challenged claims, claims 4–6, 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 (pressure, e_z, or proximity), the value obtained by performing a calculation on the associated sensor measurement values (the computed proximity-weighted center, tangential velocities, and liftoff velocity). Pet. 27–30 (internal citations omitted). Petitioner contends that Westerman teaches or suggests that the results of the calculation are interpreted as signifying a finger flick gesture, and that the control parameter (group position or velocity) is associated with a finger flick gesture ("tangential motion of a touch device" or accelerating "*the tangential motion of the touch device before the touch device is lifted*"). *Id*.

Petitioner further explains that Westerman discloses certain position parameters, including the group position, which reflects the hand contact position for determining the finger velocity. *Id*. at 30 (citing Ex. 1004, 25:67–26:4). Specifically, Westerman discloses: (1) obtaining the group position by calculating a proximity-weighted center responsive to a

measured change in the sensor values for each sensor (*id.* (citing Ex. 1004, 25:67–26:29; Ex.1033 ¶ 108)); (2) tracking the group position though successive proximity images and calculating velocity of each group (*id.* (citing Ex. 1004, 26:2–4, 27:19–29:32)); and (3) comparing the velocity of a finger just before liftoff to the tangential velocity (a finger flick touch gesture) (*id.* at 30–31 (citing Ex. 1004, 10:39–65, 14:31–34, 44:20–46:16, Fig. 37: Ex.1033 ¶¶ 112, 115)).

Patent Owner counters that Westerman combined with Bach does not disclose a value of at least one control parameter signifying a finger flick gesture. PO Resp. 55–58. 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.* at 56–57 (citing Ex. 1004, 26:2–4). 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*. at 57–58.

We find Petitioner's arguments and evidence persuasive for the reasons set forth below. Namely, that Petitioner demonstrates by a preponderance of the evidence that Westerman, in combination with Bach, teaches or suggests the aforementioned limitation as required by claims 1 and 4–6. Pet. 27–31; Ex. 1033 ¶¶ 99–117.

As an initial matter, Patent Owner's argument that Westerman does not disclose a value of at least one control parameter signifying a finger flick gesture is not commensurate in scope with the claims. Patent Owner implicitly construes the aforementioned limitation to require the "control parameter" to signify a *finger flick 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. Patent Owner's argument also is inconsistent with the Specification of the '076 patent, which expressly discloses that "control parameters" are "derived from each region of contact"—a static hand or finger pattern. *Id*. at 1:36–39, 2:39–40 ("various parameters are derived from each independent region), 2:44–49 ("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. 56–57. This 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, 11:12–13. 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 the 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. 1033 ¶ 108 (citing Ex. 1004, 26:8–29). Furthermore, as Petitioner notes (Pet. 15–16; Pet. Reply 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 finger flick has occurred (e.g., when a user's finger is continuously stroking a surface and when the finger lifts off the surface). Ex. 1004, 9:15–36; 10:39–65; Ex. 1032 ¶¶ 109–114.

Patent Owner's argument that Westerman's velocities are *raw data*, not a "value obtained by performing a calculation," does not rebut adequately Petitioner's arguments and evidence. PO Resp. 56–58. As Petitioner points out (Pet. 15–16, 27–31), 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. In addition, 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. 1033 ¶¶ 106. Furthermore, as Petitioner explains, by comparing the liftoff velocity to the tangential velocity, Westerman teaches detecting acceleration of the finger before it is lifted off.

Pet. 15–16, 27–32. Mr. Ward testifies that the results of the calculation of the proximity-weighted center of each group's position and tracking group paths through successive proximity images are interpreted as signifying a tangential motion of a finger (a finger flick gesture). Ex. 1033 ¶¶ 110–115. Given the evidence in the full trial record, we find 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 recited by the challenged claims.

For the reasons stated above, we find that Westerman describes "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 recited in claim 1, and required by claims 4–6.

For the foregoing reasons, we determine 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.

c. *Dependent Claims 4–6*

Patent Owner does not address the limitations expressly recited in dependent claims 4–6 with separate, specific arguments. As to the undisputed limitations, we find that, based on the evidence cited in the Petition (s*ee* Pet. 34–37; Ex. 1033 ¶¶ 134–150), Petitioner presents sufficient evidence to support a finding that those limitations are disclosed by

Westerman and Bach, arranged as recited in the claims. *See Nuvasive*, 842 F.3d at 1383 (Although the Board did not make findings as to whether any of the other claim limitations (such as fusion apertures or anti-migration teeth) are disclosed in the prior art, it did not have to: *NuVasive* did not present arguments about those limitations to the Board.).

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 4–6.

d. Secondary Considerations of Nonobviousness

We next turn to Patent Owner's evidence and arguments relating to secondary considerations of non-obviousness. As to secondary considerations, we note that factual inquiries for an obviousness determination include secondary considerations based on evaluation and crediting of objective evidence of nonobviousness. *Graham*, 383 U.S. at 17. 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).

Such a conclusion, however, requires the finding of a nexus to establish that the evidence relied upon traces its basis to a novel element in

the claim and not to something in the prior art. *Institut Pasteur & Universite Pierre Et Marie Curie v. Focarino*, 738 F.3d 1337, 1347 (Fed. Cir. 2013). All types of objective evidence of nonobviousness must be shown to have nexus. *GPAC*, 57 F.3d at 1580 (nexus generally); *In re Kao*, 639 F.3d 1057, 1069 (Fed. Cir. 2011) (unexpected results); *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996) (commercial success); *Rambus Inc. v. Rea*, 731 F.3d 1248, 1256 (Fed. Cir. 2013) (long-felt need).

Objective evidence of nonobviousness must also be reasonably commensurate in scope with the claim. *Kao*, 639 F.3d at 1068. This does not mean that the proffered evidence must reach every embodiment within the scope of the claim, so long as an "adequate basis to support the conclusion that other embodiments falling within the claim will behave in the same manner." *Id.*

Here, Patent Owner contends that "there were considerable obstacles to controlling a device with finger touch gestures directly rendered on the display." PO Resp. 5 (citing Section IV of its Response, *see id.* at 17–22 ("many of the disadvantages that plagued touch screens 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 41. 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. 17–22 (emphasis added).

A showing of nexus involves establishing that novel elements in the claim, not prior-art elements, account for the objective evidence put forward to show nonobviousness. *Kao*, 639 F.3d at 1068. 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. Pet. Reply 26. 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). *Id.* (citing Ex. 1034 ¶ 173). Patent Owner does not otherwise identify what novel elements in the claims anchor its objective evidence.

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.* (citations omitted).

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. 18, citing Ex. 1018, 2–5)—were solved by others before the '076 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 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. 1033 ¶¶ 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 interested 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. 17–19; 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 targets" 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 '076 patent. Ex. 1034 ¶ 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. PO Resp. 17; Ex. 2009 ¶ 26 (confirming that "touchpads and touch screens were known to persons of ordinary skill in the art before May 15, 1999"). Indeed, Mr. Ward confirms that touch screen and touch pad technology was well-known before May 15, 1999. Ex. 1033 ¶ 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 '076 patent." PO Resp. 18–19. 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 4–5; *see also Id*. at 17–18 (citing Ex. 2009 ¶ 31). Indeed, 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**."); 2:53–55. 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. 19–20. 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). *Id*. at 54:67–55:26, 62:3–7. 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, Edwards, and Harrison) 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 they afford to the user." PO Resp. 21 (citing Ex. 2009 ¶¶ 27). 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" (Ex. 1034 ¶ 9) 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 '076 patent itself" (*id*. ¶ 13).

Moreover, 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. 1034 ¶ 19. The fact that the prior art reference in that case is a doctoral dissertation authored by the inventor of Westerman (U.S. Patent No. 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. 21–22 (citing Ex. 2003, 202, 209–

210, 22). In contrast, the prior art reference 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.

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).

4. Summary

In view of the foregoing, we conclude that Petitioner has established by a preponderance of the evidence that claims 1 and 4–6 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Westerman and Bach.

F. Obviousness over Ure, Edwards, Harrison, and Stearns

Petitioner asserts that claims 1 and 4–6 are unpatentable under 35 U.S.C. § 103(a) as obvious over Ure, Edwards, Harrison, and Stearns, citing Mr. Ward's Declaration for support. Pet. 37–59. As to all challenged claims, Patent Owner relies on its arguments presented with respect to claim 1. *See generally* PO. Resp. 58–73. For that reason, our analysis and reasoning discussed *infra* with respect to claim 1 applies equally to claims 4–6. After a brief overview of the cited references, we address the parties' contentions in turn, focusing on the disputed limitations.

1. Overview of Ure (Ex. 1007) and Edwards (Ex. 1009)

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 display device and 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 onto a display window. Ex. 1007, 1:6–8, 6:27–34. Figure 6 of Ure is reproduced below.

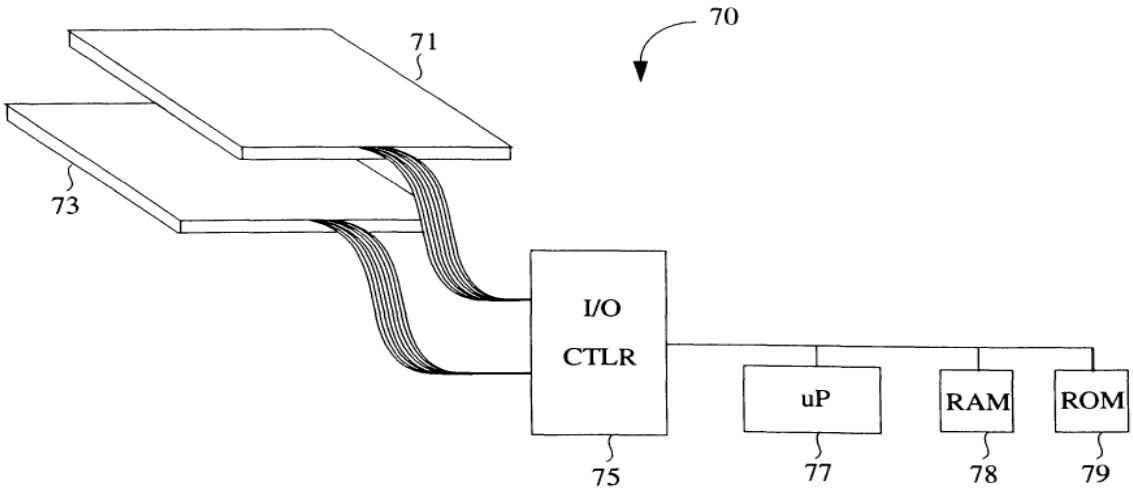

Figure 6 of Ure illustrates a simplified block diagram of touch-sensitive computer input device 70 having touch sensor array 71 that overlies display 73. *Id*. at 6:27–34. The input device also includes I/O controller 75, microprocessor 77, and memories 78, 79. *Id*.

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

(emphasis added). 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.

2. Overview of Harrison (Ex. 1010)

Harrison discloses a touch sensitive display, which can "detect a finger press, the direction of a stroke, and a release of pressure." Ex. 1010, 18–19, Fig. 1. The touch sensitive display can: (1) detect pressure points and their origin, (2) determine if this aligns with a document upper corner, (3) track the path of pressure to determine the stroke direction, and (4) execute the appropriate page turn. *Id*. at 19. For instance, a flick on the upper right corner from right to left indicates "forward one page," and a flick on the upper left corner from left to right indicates "back one page." *Id*. According to Harrison, these actions are "highly similar to the real world actions," and "[a]fter a page turning manipulation, both the page number and the contents change to reflect either the preceding or next page, depending upon the direction of the stroke." *Id*.

3. Overview of Stearns (Ex. 1011)

Stearns is directed to a method for providing an output corresponding to the pressure applied to the capacitor sensor elements of the array. Ex.

1011, 1:8–10. The capacitive tactile sensor array includes capacitive plates formed on a dielectric substrate, a conductive film is spaced from the capacitive plates, and a circuit that provide outputs corresponding to the pressure applied to each of the sensor capacitors is deposited on the dielectric substrate. *Id.* at Abstract.

4. Discussion

Petitioner relies on the disclosures in Ure, Edwards, Harrison, and Stearns to describe each of the limitations recited in the challenged claims. Pet. 37–59. Patent Owner challenges the sufficiency of Petitioner's proofs directed to the limitations discussed below.[7] PO Resp. 58–73. As to the undisputed limitations, we find that, based on the evidence cited in the Petition, Petitioner presents sufficient evidence, supported by the testimony of Mr. Ward, to support a finding that those limitations are disclosed by the cited references, arranged as required in the claims. *See generally* Pet. 37–59; Ex. 1033; Ex. 1034.

Nonetheless, Patent Owner takes the position that Petitioner fails to show that the prior art combination teaches or suggests (1) recognizing a finger flick gesture (*id.* at 65–67), and (2) the value of a control parameter that is interpreted to signify a finger flick gesture (*id.* at 67–70). Patent Owner also contends that an ordinarily skilled artisan would not have combined the references. *Id.* at 70–73. In support of its contentions, Patent

[7] *See* Paper 9, 3 ("[A]ny arguments for patentability not raised in the response will be deemed waived.").

Owner directs our attention to Dr. Brogioli's Declaration (Ex. 2012).

a. Finger Flick Touch Gesture

As discussed above, claim 1 recites in relevant part, "wherein the finger flick touch gesture is recognized from sequential dynamics among postures derived from spatial pressure distribution profiles." Ex. 1001, 11:22–24. Petitioner asserts that the combination of Ure, Edwards, Harrison and Stearns discloses this limitation. Pet. 54–56. Specifically, Petitioner argues that Ure detects a finger flick touch gesture because it detects when a finger is touching the touch sensitive surface, the movement of the finger on the surface, and when the finger is lifted from the surface. *Id*. at 51–54 (internal citations omitted). Petitioner relies on the disclosure in Edwards regarding a touch sensor array, specifically the description of how '"the sensing electrodes at least of the sensor elements should be transparent' and that 'there can be a 1:1 relationship between the individual sensing elements and display pixels of the display device."' *Id.* at 37–38 (citing Ex. 1009 at 1:7–18, 4:39–41, 10:5–13). Petitioner notes that Harrison discloses interpreting "a finger press, the direction of a stroke, and a release of pressure" as a "flick" to use as a user input command for a page turning manipulation. *Id*. at 55 (citing Ex. 1033 ¶¶ 200, 211–215). Petitioner further cites the disclosure in Stearns regarding the use of a capacitive sensor to output pressure measurements to satisfy the "spatial pressure distribution profile" claim element. *Id*. at 56 (citing Ex. 1011 1:6–10; 3:24–54). Mr. Ward testifies that, in light of Harrison, an ordinarily skilled artisan would have used a finger flick gesture in implementing Ure's

touch-sensitive display as a command for a page turning manipulation so that the user's interactions are "highly similar to the real world actions." Ex. 1033 ¶ 214.

Petitioner reasons that one of skill in the art would have recognized that it would be an obvious design choice "to apply Stearns' explicit teachings of a pressure sensor to Ure's capacitive sensor array (as implemented with teachings of Harrison) to provide the capability to measure pressure." *Id.* at 56–57 (citing Ex. 1033 ¶¶ 226–236).

Patent Owner counters that the prior art combination does not disclose a finger flick gesture because neither Ure (which incorporates Edwards by reference) nor Harrison discloses finger acceleration "as it reaches the end," citing Dr. Brogioli's testimony for support. PO Resp. 65–66 (citing Ex. 2012 ¶¶ 83–86). Patent Owner also contends that the prior art combination fails to teach any *recognition* of a finger flick gesture from sequential dynamics because "a finger flick gesture must be perceived based on *previously known* sequential dynamics (a set of *stored* touch gestures)." *Id*. at 66–67 (citing Ex. 2012 ¶¶ 87–89).

Upon review of the parties' contentions and evidence, we agree with Petitioner's analysis, finding that is supported by sufficient explanation and credible evidence. Patent Owner's evidence to the contrary is not sufficient to rebut Petitioner's showing that the combination of Ure, Edwards, Harrison and Stearns discloses the finger flick touch gesture limitation.

At the outset, Patent Owner's arguments and Dr. Brogioli's testimony (*id.* at 65–67; Ex. 2012 ¶¶ 83–89) mainly are based on Patent Owner's

proposed claim constructions, which we decline to adopt. *See supra* Section II.A.2. Instead, in light of the Specification and prosecution history, as well as the general knowledge of an ordinarily skilled artisan, we construe the claim term "finger flick," broadly, but reasonably, to encompass "a touch gesture in which the user's finger strokes a surface in a continuous movement and then lifts off from the surface." *Id.* We also are not persuaded by Patent Owner's argument that the term "flick," as used in the challenged claims, has a special meaning that deviates from the plain and ordinary meaning. PO Resp. 65. Moreover, we give the claim element—"the finger flick gesture is *recognized from* specific dynamic variations among a combination of one or more 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. *See supra* Section II.A.3.

Applying the same plain and ordinary meaning of the term "flick" to both the challenged claims and prior art, we find that Harrison's express disclosure of a "flick" teaches a "finger flick gesture," as recited in claim 1. Pet. 52–53 (citing Ex. 1010, Exhibit A, 18–19). Notably, Harrison teaches a user input command of a page turning manipulation that uses "a flick on the upper right corner from right to left to indicate 'forward one page,'" and a "flick on the upper left corner from left to right would indicate 'back one page.'" *Id.* According to Harrison, "[t]hese actions were highly similar to the real world actions"—"[v]isual feedback was similar; pages changed (with-out animation), and the new destination page and page number became

visible after the user action," and "[a]fter a page turning manipulation, both the page number and the contents change to reflect either the preceding or next page, depending upon the direction of the stroke." *Id*.

We also find that Harrison teaches recognizing the finger flick gesture "from sequential dynamics among postures," as recited in claim 1. Specifically, Harrison's teachings regarding "a finger press, the direction of a stroke, and a release of pressure" (Pet. Reply 23 (citing Ex1010, 19)); and "the use of logic to recognize gestures from a previously known set, such as 'flicks' in different directions and 'grasps'" (*id*. (internal citations omitted)).

While Ure does not use the term "flick" explicitly, Petitioner nonetheless demonstrates sufficiently that Ure recognizes a finger flick touch gesture, as recited in claim 1. Namely, because "Ure recognizes when a finger strokes a surface in a continuous movement (*e.g.* 'the cursor is moved by the user moving one or more fingers across the surface,' '[o]peration continues in this manner for so long as touch continues') and then lifts off from the surface (*e.g.*, '[w]hen a zero (absence of touch) is detected')." Pet. Reply 22 (citing Ex. 1007, 2:55–2:57, 8:51–55). Contrary to Patent Owner's argument that "Ure does not have or store any prior knowledge about any touch gestures, it is only concerned with mirroring the finger's 'change in position' with a mouse cursor" (PO Resp. 65–66), Petitioner's arguments and evidence demonstrate sufficiently that Ure discloses recognizing gestures from previously known sequential dynamics and stored gestures by detecting the number of fingers moving across the screen and moving a cursor at different speeds based on that number,

distinguishing between gestures of a previously known set, such as "registration," "twiddle," "double click," "triple click," "drag," and other types of touches. Pet. 54–56; Pet. Reply 23 (internal citations omitted).

Reasons to Combine Ure, Edwards, Harrison and Sterns

Petitioner asserts that it would have been obvious to one of skill in the art to combine Harrison's teaching of interpreting finger press, movement across the screen and lift off (i.e., a finger flick) in Ure's device because (1) both are in the same field of art (Pet. 41 (citing Ex. 1007, 2:55–3:8, 6:38–42, 8:44–55; Ex. 1010, 18–19; Ex. 1033 ¶ 212)); (2) both teach detecting finger press, movements across the screen, and lift off (*id*.); (3) "flick" gestures were well known (*id*. (citing Ex. 1013, 10:8–15; Ex.1014, Fig. 11; Ex. 1015 5:63–64; Ex. 1033 ¶ 213)); and (4) that '[i]t would have been routine for a POSA to make such an implementation choice, and it would have been clear to a POSA that such a combination would work and provide the expected functionality to yield predictable results" (*id*. at 42 (citing Ex. 1033 ¶ 215)). Indeed, Mr. Ward testifies that, in light of Harrison, an ordinarily skilled artisan would have used a finger flick gesture in implementing Ure's touch-sensitive display as a command for a page turning manipulation so that the user's interactions are "highly similar to the real world actions." Ex. 1033 ¶ 214.

To the extent Patent Owner argues the mere fact that the cited references are in the same field of art falls short of an adequate rationale — we agree. The same field of endeavor analysis is merely the jumping-off point in reaching the determination of whether a claimed invention is

obvious. *See K-TEC, Inc. v. Vita-Mix Corp.*, 696 F.3d 1364, 1375 (Fed. Cir. 2012) (to qualify as prior art in an obviousness analysis, references must be analogous art—either from the same field of endeavor, or reasonably pertinent to the problem with which the inventor is involved).

Patent Owner also argues that Ure was concerned with "mimicking a traditional mouse through basic mouse operations" (PO Resp. 70–71) and, therefore, an ordinarily skilled artisan would have no reason to incorporate Harrison's page stroke into such a device (*id*. at 71 (citing Ex. 2012 ¶¶ 93–95)). Further, Patent Owner argues that Ure teaches away from the combination, and that such an artisan would not have placed Harrison's *opaque* pressure strips on Ure's *transparent* display, rendering Ure's display inoperable for its intended purpose as a touch device with a display window overlaid by the touch sensor array. *Id*. at 71–72 (citing Ex. 1007, Abstract, 1:62–67; Ex. 2012 ¶¶ 93–95).

Having considered the parties' contentions and supporting evidence, Petitioner's articulated reason to combine the teachings of Ure (which incorporates Edwards by reference), Harrison, and Stearns is sufficient to support a finding that the cited references describes the finger flick touch gesture limitation. Contrary to Patent Owner's argument and Dr. Brogioli's testimony that Ure is limited to "mimicking a traditional mouse through basic mouse operations" (PO Resp. 70–71; Ex. 2012 ¶¶ 93–95), Ure also teaches replacing these operations with *finger touch gestures* "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." Ex. 1007, 1:55–57, 3:17–21. For instance, to perform a drag operation, at least one finger is moved to produce a dragging action when the thumb is stationary contacted with the touch-sensitive member. *Id.* As Mr. Ward notes, "moving a finger across a screen to move a cursor or drag an object is easier and more intuitive than moving a mouse as disclosed in Ure." Ex. 1034 ¶ 150 (citing Ex. 1007, 2:45–3:36).

We also are not persuaded by Patent Owner's arguments and Dr. Brogioli's testimony that Ure or Edwards teaches away from combining Ure with Harrison and such a combination would render the device inoperable for its intended purpose. PO Resp. 71–72; Ex. 2012 ¶¶ 93–95. Patent Owner's arguments and Dr. Brogioli's testimony improperly rest on the premise that Harrison's sensors must be opaque, and that Harrison's sensors also must be incorporated physically into Ure's transparent touch-sensitive display. As Mr. Ward testifies, "Harrison does not specify that its sensors are opaque or nontransparent, and in fact teaches 'a touch sensitive display' as its first option." Ex. 1034 ¶ 153 (citing Ex. 1010, 19).

Significantly, obviousness does not require that all of the features of the secondary reference be bodily incorporated into the primary reference. *Keller*, 642 F.2d at 425. Petitioner does not rely on Harrison's sensors in the prior art combination, but, rather, relies on Ure's sensors. As Petitioner explains, Ure discloses a touch-sensitive computer input device comprising a touch sensor array overlaid onto a display window, and Ure (which incorporates Edwards by reference) also discloses sensors that "can be addressed individually by row and column ('XY counter coordinates') and

selected by 'addressing means.'" Pet. 38 (citing Ex. 1007, 5:60–6:1; Ex. 1009, 1:7–13, 4:23–29, 8:12–15). Dr. Ward testifies that Edwards describes that "when used as an overlay to a display device, 'the sensing electrodes at least of the sensor elements should be ***transparent***.'" Ex. 1033 ¶ 155 (citing Ex. 4:39–41, 10:5–13).

Additionally, as discussed above, Harrison teaches a user input command of a page turning manipulation that uses "a flick on the upper right corner from right to left to indicate 'forward one page,'" and a "flick on the upper left corner from left to right would indicate 'back one page.'" Ex. 1010, 18–19. According to Harrison, "[t]hese actions were highly similar to the real world actions"—"[v]isual feedback was similar; pages changed (with-out animation), and the new destination page and page number became visible after the user action," and "[a]fter a page turning manipulation, both the page number and the contents change to reflect either the preceding or next page, depending upon the direction of the stroke." *Id*. As Mr. Ward further explains, a "flick" was known to be a standard gesture for touchscreens, which was used, for example, to control the direction of scrolling. Ex. 1033 ¶¶ 25, 204 (citing Ex. 1013, 10:8–15 ("The present invention utilizes approximately a dozen standard 'gestures.' Examples of these gestures are . . . single strokes or 'flicks' right, left, up or down, which are used for scrolling."); Ex. 1014, 5:67–68, 9:5–6, Fig. 11; Ex. 1015, 5:63–64 ("A 'flick' gesture is an upward or downward stroke that is used for scrolling.")).

For the foregoing reasons and based on the evidence before us, we credit Mr. Ward's testimony that, in light of Harrison, an ordinarily skilled artisan would have used a finger flick gesture in implementing Ure's touch-sensitive display as a command for a page turning manipulation so that the user's interactions are "highly similar to the real world actions." Ex. 1034 ¶ 154. As such, we determine that Petitioner has articulated an adequate rationale to combine Ure (which incorporates Edwards by reference) with Harrison.

Reason to Combine Ure, Edwards, Harrison and Stearns

As to the proposed combination of Ure, Edwards, Harrison, and Stearns, Petitioner asserts that this combination would have been obvious to one of skill in the art because (1) Ure, Harrison, and Stearns are all in the same field of touch input device and (2) both Ure and Stearns teach the use of transparent capacitive sensors in interface media applications. Pet. 42 (citing Ex. 1007, (54), (57); Ex. 1009, 2:19–22, 10:5–8; Ex. 1011, 1:6–10, 2:17–22, 2:5–6). Relying on the testimony of Dr. Ward, Petitioner reasons that:

> [a] POSA would have been motivated to use Stearns' express advantageous teachings of providing touch sensors that generate "an output corresponding to the pressure applied" in implementing the device taught by Ure in view of Edwards in view of Harrison [in order] to provide a device that, *e.g.*: (1) identifies errant touches; (2) responds to touch by non-conductive objects; and (3) avoids erroneous detections of touch caused by environmental factors.

Id. (citing Ex. 1033 ¶ 227–233). Petitioner notes that modifying the touch sensor array of Ure using the teachings in Stearns regarding adjusting

sensitivity to force, would "allow Ure's touch-sensitive input devices to more accurately detect touch and to identify errant touches." *Id*. at 43 (citing Ex. 1033 ¶ 228). Further, Petitioner notes the teachings in Stearns regarding detecting applied pressure by non-conducting objects, and opines that "Stearns' teachings would allow Ure's touch-sensitive devices to avoid erroneous detections of touch caused by nearby conductive objects or environmental effects . . . . [t]his is an advantage [particularly for] use in environments where, e.g., the touch sensors come into frequent contact with conductive liquids or contaminants." *Id*. (internal citations omitted). Petitioner concludes that "[i]t would have been routine for a POSA to use the teachings of Stearns' sensors for detecting pressure in implementing devices taught in Ure in view of Edwards and Harrison, and it would have been clear to a POSA that such a combination would work and provide the expected functionality." *Id*. at 43–44 (citing Ex. 1033 ¶¶ 235–236).

In addition to the arguments directed to the combination of Ure, Edward and Harrison, Patent Owner argues that Petitioner "fails to address what in Ure would lead a POSITA to adopt Stearns when implementing Ure." PO Resp. 73 (citing Pet. 42-44). Contrary to Patent Owner's position, Petitioner did explain advantages "that would have motivated a POSA to apply Stearns' teachings in implementing Ure and Edwards in view of Harrison, such as the ability of Stearns' pressure sensors to detect touch from non-conductive objects." Pet. Reply 21–22 (citing PO Resp. 42–44; Ex. 1034 ¶¶ 154–155). Patent Owner's argument to the contrary does not address squarely Petitioner's stated reasoning.

Patent Owner also asserts that Ure expressly teaches away from measuring pressure using the force sensors described by Stearns because "Ure mentions pressure only a single time, and that excerpt discloses that pressure is determined from the size of 'the area touched' by a finger, rather than by measuring the 'magnitude of the applied force' based on the "mechanical loading for a given sensor." PO Resp. 73 (comparing Ex. 1007, 7:24–28 with Ex. 1011, 2:12–14). This argument does not rebut adequately Petitioner's arguments and evidence. Our review of the entire passage in Ure reveals that the cited passage describes an example for determining pressure and velocities of the individual fingers, and does not discredit the use of other techniques. Ex. 1007, 7:24–28; Ex. 1011, 2:12–14. More persuasive is Petitioner's argument that "simply because Ure does not disclose 'force sensors' to measure pressure certainly does not mean it teaches away from such sensors. Pet. Reply 22. Indeed, we credit the testimony of Dr. Ward that "[t]he simple fact that Ure discloses determining pressure in a different manner than Stearns does not mean that a person of skill in the art would be discouraged from using Stearns' pressure detection in implementing Ure." Ex. 1034 ¶ 155. Patent Owner does not direct us to any teaching in Ure that would discourage one of skill in the art from applying Stearns in implementing Ure.

In addition to our findings directed to the combination of Ure, Edwards, and Harrison, for the foregoing reasons and based on the evidence before us, we find that one of ordinary skill in the art would have incorporated Stearns' touch sensors in the touch-sensitive device of Ure "in

order to provide a device that, *e.g.*, identifies errant touches, responds to touch by non-conductive objects, and avoids erroneous detections of touch caused by environmental factors." Ex. 1033 ¶ 228.

As such, we determine that Petitioner has articulated an adequate rationale to combine Ure (which incorporates Edwards by reference) with Harrison and Stearns.

b. Control Parameter Limitation

Petitioner asserts that the combination of Ure (which incorporates Edwards by reference), Harrison, and Stearns discloses the control parameter limitation. Pet. 51–54. Petitioner contends that the average X and Y values and difference value d (change in position and direction), as disclosed in Ure, are control parameters, and that Ure discloses the results of the calculation on the associated sensor measurement values is interpreted as signifying a finger flick gesture. *Id.* at 53. Petitioner also asserts that Harrison discloses interpreting results as signifying a finger flick gesture. *Id.* at 53–54. To support its assertions, Petitioner directs us to the passage in Harrison that discloses interpreting "a finger press, the direction of a stroke, and a release of pressure" as a finger flick gesture for a page turning manipulation. *Id*. (citing Ex. 1010, 18–19, 21). Specifically, Harrison's touch sensitive display can detect pressure points and their origin, track the path of pressure to determine the stroke direction, and execute the appropriate page turning manipulation. Ex. 1010, 19. Petitioner contends that "[a] POSA would have recognized that it would be obvious and a straightforward and beneficial design choice to use Harrison's method of

interpreting and using a 'flick' gesture in implementing the touch pad device of Ure." *Id*. at 54 (internal citations omitted).

Patent Owner disagrees, arguing that the asserted prior art combination fails "to teach or suggest the value of any 'control parameter' that is interpreted to signify a finger flick gesture." PO Resp. 68–70. According to the Patent Owner, (1) neither the average X and Y values, nor difference value d "is interpreted to signify 'dynamic variations among postures of hand contact patterns combined in sequence" (*id*. at 68 (citing Ex. 2012 ¶¶ 90–92)); (2) nor is the result of calculations "***interpreted*** as ***signifying*** a finger flick touch gesture" because average X and Y values "are coordinates for ***individual, stationary hand postures"*** (*id*.); and (3) "difference d" is a value that lacks a "component of time, speed, or velocity that can be used to signify variations among postures" (*id*.).

Upon consideration of the evidence before us, Patent Owner's arguments and evidence are not sufficient to rebut Petitioner's analysis demonstrating that Ure (which incorporates Edwards by reference) in combination with Harrison and Stearns teaches or suggests the control parameter limitation recited in claim 1 and required by claims 4–6.

Patent Owner's arguments that (1) the combination of prior art does not at least suggest interpreting the value of any control parameter, or the results of calculations to obtain the value of the control parameter, as signifying a finger flick gesture; and (2) Ure's average X and Y values are not control parameter, as they are merely "coordinates for individual, stationary hand postures" are not persuasive because they are not

commensurate in scope with the claim language. Patent Owner once again implicitly construes the aforementioned limitation to require the "control parameter" to signify a finger flick 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 finger flick gesture as alleged by Patent Owner. Patent Owner's argument also is inconsistent with the Specification of the '076 patent, which expressly discloses that "control parameters" are "derived from each region of contact"—a static hand or finger pattern. Ex. 1001, 1:36–39, 2:39–40 ("various parameters are derived from each independent region"), 2:44–49 ("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)).

Based on the record, we find that Ure discloses a value of at least one control parameter (the average X and Y values and difference value d) for the contiguous region of contact (area touched by a finger), as required by the claims. Pet. 51–54. Notably, Ure teaches using the average X and Y values and difference value d to detect when a finger is touching the touch sensitive surface, the movement of the finger on the surface, and when the finger is lifted from the surface. Ex. 1007, 3:9–14, 6:38–42, 8:22–57. As Petitioner explains, each time the sensor array is scanned in Ure, an XY table is created of the coordinates whose capacitance value (C_e) (the sensor measurement value) exceeds the value of the reference capacitance (C_r).

Ex. 1007, 5:62–66, 8:44–46, Figs. 4, 11; Ex. 1009, 5:38–54, 5:65–68. Using these XY tables, the average X and Y values are calculated for all of the locations where a touch is detected. Ex. 1007, 8:44–55. When a finger is touching the surface of the touch-sensitive input device, the average X and Y values correspond to the center of the contiguous region of contact. *Id*. at 3:9–14. The movement of the finger on the touch sensitive surface is detected by calculating difference value d (subtracting the most recent average XY value from the next-most-recent XY value) to determine the trajectory of the finger movement. *Id*.

We also credit Mr. Ward's testimony:

> ***Ure discloses that the results of the calculation on the associated sensor measurement values is interpreted as signifying a [finger flick] gesture (e.g., "moving one . . . finger[] across the touch-sensitive member"), wherein the at least one control parameter (e.g., "average X and Y values"; "difference value, d") is associated with the [finger flick] gesture.***

Ex. 1033 ¶ 209. Indeed, Ure discloses that "[t]he 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. Depending on the touch pattern, a speed factor is applied to d, and the result is sent to the host device." Ex. 1007, 8:45–51, 3:1–14. Ure also discloses that "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**." *Id*. at 2:55–57, 11:20–24 ("operative in a first mode of operation for producing a position-

related signal responsive to movement of a user's fingertip across the member."), Fig. 1.

Mr. Ward also explains:

> Ure detects when a finger is touched to the surface (*e.g.*, Ex. 1007 (Ure) at 6:38-42 ("…Once a touch has been detected, XY tables are built…")), the movement of the finger "across the touch-sensitive member" by calculating a "difference value, d" from the difference between the current average XY position and the previous average XY position to determine the trajectory of the finger movement (*e.g.*, *id.* at 8:43-51), and when the finger is lift from the surface—"absence of touch" (*e.g.*, *id.* at 8:51-55 ("Operation continues in this manner for so long as a touch continues. When a zero (*absence of touch*) is detected, timers used in click processing … is incremented.")).

Ex. 1033 ¶ 210.

In addition, we are not persuaded by Patent Owner's argument that Ure's difference value d is merely a value calculated from the two most recent scans of the input window, but "has no component of time, speed, or velocity." PO Resp. 68. As Mr. Ward testifies, Ure discloses that the scans are performed at a specific rate, which indicates that "d" times the rate (e.g., "60 times per second") is the velocity. Ex. 1034 ¶ 169 (citing Ex. 1007, 5:45–47).

Contrary to Patent Owner's argument that Harrison does not interpret the result as signifying a finger flick (PO Resp. 68–70), as Petitioner explains, Harrison interprets "a finger press, the direction of a stroke, and a release of pressure" as a flick for a page turning manipulation. Pet. 53–54 (citing Ex. 1010, 18–19, 21). Harrison's touch sensitive display can detect pressure points and their origin, track the path of pressure to determine the

stroke direction, and execute the appropriate page turning manipulation. *Id*. at 19. Further, as Mr. Ward explains, Harrison discloses that the values of the sensors are reported by each packet, which indicates the ID of the reporting sensor and the current value of the sensor, and that the location and pressure values are stored from the moment of pressure-down to pressure-up. Ex. 1033 ¶ 211 (citing Ex. 1010, 21). Harrison also describes that if the sum of the inter-location differences is negative, the user is deemed to be stroking from right to left, signifying a finger flick from right to left. Ex. 1010, 21. If the sum is positive, the user is deemed to be stroking from left to right, signifying a finger flick from left to right. *Id*. Given that, we agree with Mr. Ward's testimony that Harrison discloses the results of the calculation (the sum of inter-location differences, the value of which is calculated) are interpreted as signifying a finger flick. *Id*.; Ex. 1033 ¶ 211; Ex. 1034 ¶ 170. As a result, we find that Harrison discloses interpreting the results of the calculation on the associated sensor measurement values as signifying a finger flick gesture, as required by the claims.

For the reasons stated above, we find that that Ure (which incorporates Edwards by reference) discloses the control parameter limitation as recited in claim 1, and required by claims 4–6. Moreover, for the reasons discussed in Section II.F.4(a), we determine that one of skill in the art would have used the teachings of Harrison regarding a finger flick touch gesture in implementing the Ure's device because "it would have been clear to a person of skill in the art that such a combination would work and

provide the expected functionality to yield predictable results." Pet. 42 (citing Ex. 1033 ¶ 215).

c. Dependent Claims 4–6

Patent Owner does not address the limitations expressly recited in dependent claims 4–6 with separate, specific arguments. *See generally* PO Resp. 58–73. As to the undisputed limitations, we find that, based on the evidence cited in the Petition (*see* Pet. 57–59; Ex. 1033 ¶¶ 241–252), Petitioner presents sufficient evidence to support a finding that those limitations are disclosed by Ure (which incorporates Edwards by reference) with Harrison and Stearns, arranged as recited in the claims.

In light of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that the combination of Ure (which incorporates Edwards by reference) with Harrison and Stearns teaches or suggests all of the limitations recited in claims 4–6.

d. 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, 41. We have addressed those arguments and evidence above in Section II.E.3(d), 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.

5. Summary

For the foregoing reasons, we conclude that Petitioner has established by a preponderance of the evidence that claims 1 and 4–6 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Ure, Edwards, Harrison, and Stearns.

IV. CONCLUSION

Thus, based on our further review of the record, and for the reasons discussed above, Petitioner has demonstrated, by a preponderance of the evidence, that claims 1 and 4–6 of the '076 patent are unpatentable.

V. ORDER

For the foregoing reasons, it is

ORDERED that claims 1 and 4–6 of the '076 patent are held unpatentable under 35 U.S.C. § 103(a) over Westerman and Bach;

FURTHER ORDERED that claims 1 and 4–6 of the '076 patent are held unpatentable under 35 U.S.C. § 103(a) over Ure, Edwards, Harrison, and Stearns; 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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