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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte BRUNO LUONG

Appeal 2019-001602
Application 13/883,377
Technology Center 2600

Before JAMES B. ARPIN, PHILLIP A. BENNETT, and IFTIKHAR AHMED, *Administrative Patent Judges*.

AHMED, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant[1] appeals under 35 U.S.C. § 134(a) from a final rejection of claims 1 and 3–15, all of the pending claims. Claim 2 has been cancelled. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm-in-part.

Technology

The application relates to "a method for detecting objects of interest in a disturbed environment, applicable to gesture interfaces," and to "a gesture interface device implementing the method." Spec., 1.

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42(a). According to Appellant, the real party-in-interest is Quickstep Technologies LLC. Appeal Br. 2.

Illustrative Claim

Claim 1 is illustrative and reproduced below with certain limitations at issue emphasized:

> 1. A method for detecting one or several objects of interest moving in an environment, comprising:
>
> - implementing at least one measurement electrode in capacitive coupling with said one or several objects of interest and with one or more other disturbing objects present in the environment;
>
> - for each measurement electrode, measuring a total capacitance between said measurement electrode and said environment, including a capacitance of interest due to said one or several objects of interest and a leakage capacitance due to said one or more disturbing objects;
>
> - storing said total capacitance for each measurement electrode; and
>
> - for each measurement electrode,
>
> ***selecting a minimum stored total capacitance measurement within a history of measurements of previously stored total capacitance measurements for said measurement electrode including total capacitances measured during a sliding time window of a predetermined duration by identifying a smallest of the individual stored total capacitance measurements***, wherein the history of measurements retain only those total capacitances measured during the sliding time window,
>
> ***equating the leakage capacitance to said selected minimum stored total capacitance measurement***,
>
> calculating the capacitance of interest by subtracting said leakage capacitance from the total measured capacitance, and

> processing said thus-calculated capacitance of interest so as to produce detection information for said one or several objects of interest.

REJECTIONS

Claims 1, 6, 8–10, and 14 stand rejected under 35 U.S.C. § 103(a) as obvious over the combined teachings of Sinclair (US 2009/0128511 A1; May 21, 2009), Noguchi (US 2011/0267296 A1; Nov. 3, 2011), and Kent (US 2012/0162123 A1; June 28, 2012). Final Act. 3.

Claims 3–5 stand rejected under 35 U.S.C. § 103(a) as obvious over the combined teachings of Sinclair, Noguchi, Kent, and Wu (US 2010/0214253 A1; Aug. 26, 2010). Final Act. 11.

Claim 7 stands rejected under 35 U.S.C. § 103(a) as obvious over the combined teachings of Sinclair, Noguchi, Kent, and Lemire (Daniel Lemire, Streaming Maximum-Minimum Filter Using No More Than Three Comparisons Per Element (2007), available at http://arxiv.org/pdf/cs/0610046v5.pdf (last viewed January 28, 2020)). Final Act. 15.

Claims 11–13 and 15 stand rejected under 35 U.S.C. § 103(a) as obvious over the combined teachings of Sinclair, Noguchi, Kent, and Hotelling (US 8,432,371 B2; Apr. 30, 2013). Final Act. 16.

ISSUES

1. Did the Examiner err in finding that the combined teachings of Sinclair and Noguchi teach or suggest “selecting a minimum stored total capacitance measurement within a history of measurements of previously stored total capacitance measurements for said measurement electrode including total

capacitances measured during a sliding time window of a predetermined duration by identifying a smallest of the individual stored total capacitance measurements, wherein the history of measurements retain only those total capacitances measured during the sliding time window" and "equating the leakage capacitance to said selected minimum stored total capacitance measurement," as recited in claim 1?

2. Did the Examiner err in finding that the combined teachings of Sinclair and Wu teach or suggest "the predetermined duration is determined as being higher than a mean presence duration of the one or several objects of interest in a vicinity of the at least one measurement electrode," as recited in claim 3?

3. Did the Examiner err in finding that Kent teaches or suggests "gathering latest stored measurements as a time sub-window having a duration lower than the sliding time window," as recited in claim 6?

ANALYSIS

§ 103(a) Rejection of Claims 1, 4, 5, 7–15

Independent claim 1 recites the following limitations:

> selecting a minimum stored total capacitance measurement within a history of measurements of previously stored total capacitance measurements for said measurement electrode including total capacitances measured during a sliding time window of a predetermined duration ***by identifying a smallest of the individual stored total capacitance measurements***, wherein the history of measurements retain only those total capacitances measured during the sliding time window;

> equating the leakage capacitance to said determined minimum stored total capacitance measurement."

Appeal Br. 16, 18 (Claims App.) (emphasis added). The Examiner finds that the combined teachings of Sinclair and Noguchi teach or suggest these limitations. Final Act. 6–7. The Examiner determines that Sinclair teaches storing a running statistical relation of low capacitance values for each capacitive sensor, corresponding to a running relation or sliding time window of low or minimum capacitance values over time. *Id.* at 6 (citing Sinclair ¶ 33, Fig. 8, step 426). The Examiner further determines that Sinclair discloses examples of such a statistical relation as including "averages, means, modes, standard deviations and etc[.]," and that the minimum capacitance value is considered the leakage capacitance by Sinclair. *Id.* (citing Sinclair ¶¶ 31, 34, Fig. 7).

The Examiner finds that the statistical relation of Sinclair does not however specify the *smallest* minimum, and teaches "storing only one average minimum value for each electrode instead of storing a history of values for each electrode." *Id.* at 7. The Examiner determines that this missing aspect of Sinclair is taught by Noguchi, which discloses "obtain[ing] a minimum of a magnitude . . . of a sum of the touch component and the noise component in a detection signal for each of the touch detection electrodes TDL, and select[ing] one of those minimum values in which the magnitude of the sum of the touch component and the noise component is the *smallest*." *Id.* (emphasis added, underlining omitted) (citing Noguchi ¶¶ 15, 118, Fig. 13). The Examiner determines that "[i]t would have been obvious to substitute taking the average of the minimum values taught by Sinclair with taking the smallest of the minimum values taught by Noguchi," because "the method is used interchangeably in the art." *Id.* at 8.

Appellant asserts that “the statistical relation of Sinclair *does not specify the smallest minimum value* but suggests rather *an average of minimum values*.” Appeal Br. 6 (citing Final Act. 7). Appellant argues that Noguchi also is deficient because it discloses a “‘maximum value selecting circuit’ for receiving the minimum detection signal for all of the touch detection electrodes, and *generating a single value which represents the smallest of those received signals*.” Appeal Br. 6 (citing Noguchi ¶ 118, Fig. 13). Appellant asserts that “Noguchi then teaches subtracting this single value from the detection signals for each touch detection electrode,” i.e., “each of the touch detection electrodes in Noguchi will have the same value subtracted from it” and “in most cases the value subtracted from a touch detection electrode in Noguchi will *not* be the minimum detection signal *for that particular electrode*.” *Id.* at 7 (citing Noguchi, Fig. 13). Claim 1, on the other hand, Appellant argues, “requires that the leakage capacitance subtracted from each measurement electrode is the minimum stored total capacitance measurement for *that particular electrode*.” *Id.*

The Examiner responds that “Sinclair teaches a very similar operation of storing ‘a running statistical relation of low capacitance values’ for each measurement electrode . . . where ‘low’ [can be] interpreted as ‘minimum.’” Ans. 4 (citing Sinclair ¶ 33, Fig. 8). The Examiner finds that, in view of Noguchi’s teachings, a person of ordinary skill in the art “would have arrived at exchanging a ‘statistical relation’ of *low* values for a *minimum* value.” *Id.* at 5 (emphasis added). The Examiner points out that Noguchi explicitly states that

> *As an alternative embodiment,* . . . the maximum value calculating section 44B *obtains a minimum of a magnitude* (or an absolute value) of a sum of the touch component and the noise

> component in a detection signal for each of the touch detection electrodes TDL, and *selects one of those minimum values in which the magnitude of the sum of the touch component and the noise component is the smallest*.

Id. (quoting Noguchi ¶ 118).

Moreover, the Examiner determines, one of ordinary skill in the art would have understood Sinclair itself as teaching the use of a smallest minimum value rather than an average value because, given the exemplary list of "low" values or measures disclosed in Sinclair, "[i]t would have been obvious to try with the expected result that [the smallest] minimum values would have still provided useful representations of background noise." *Id.* at 6 (citing Sinclair ¶ 31).

We are not persuaded that the Examiner has erred. Contrary to Appellant's assertion (Reply Br. 2–3), Sinclair does not limit the minimum capacitance value to just an average or mean of the multiple capacitance values collected. Instead, Sinclair states that "***[e]xample*** statistical relations that can be used for . . . low capacitance values ***include*** averages, means, modes, standard deviations and ***etc.***" Sinclair ¶ 33 (emphasis added). We are not persuaded that this statement is a clear limitation on the types of values taught by Sinclair. Instead, Sinclair provides a non-exhaustive list of *examples* of measures that may be used based on the capacitance values collected from each capacitive sensor. *Id.*

We are also not persuaded of error in the Examiner's determination that "one of ordinary skill in the art would have been able to substitute the operation of taking the [lowest] minimum value [as taught by Noguchi] for the average of the minimum values [as taught by Sinclair]," that is that a person of ordinary skill in the art would have found these alternatives.

Ans. 5. Appellant alleges Noguchi's teaching is limited to generating a *single* minimum value for *all* of the touch detection electrodes, and not *each* electrode, as recited in claim 1. Appeal Br. 7 (citing Noguchi, Fig. 13). However, Appellant does not address the rejection as articulated, in which the Examiner relies on certain combined teachings of the prior art. *See In re Keller*, 642 F.2d 413, 425 (CCPA 1981) ("[T]he test [for obviousness] is what the combined teachings of the references would have suggested to those of ordinary skill in the art."); *see also In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) ("Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references."). Here, the Examiner relies on the combined teachings of Sinclair and Noguchi to teach or suggest to one of ordinary skill in the art the use of the *smallest* capacitance value collected as the minimum value. Ans. 5. Appellant does not dispute that Noguchi teaches "generating a single value which represents the *smallest* of th[e] received signals" (Appeal Br. 6), which is the teaching from Noguchi, upon which the Examiner relies. Final Act. 7–8 (citing Noguchi ¶ 118, Fig. 13). Therefore, we are not persuaded of error in the Examiner's determination that the combined teachings of Sinclair and Noguchi teach or suggest the *selecting* limitation, as recited in claim 1.

Teaching Away

Appellant further argues that "the Examiner has improperly combined Sinclair and Noguchi, because the [E]xaminer has focused on the teachings of Noguchi and has failed to consider that Sinclair explicitly *teaches away* from using a minimum capacitance value as a leakage capacitance to be subtracted from the total measured capacitance." Appeal Br. 8–9. Appellant contends that "Sinclair warns that it is 'not sufficient' to simply subtract a single minimum collected capacitance value from the averaged raw capacitance values due to possible errors introduced by nearby objects, aging or the environment." *Id.* at 9 (quoting Sinclair ¶ 32). According to Appellant, "*instead of using a* <u>*single*</u> *minimum capacitance value*, Sinclair teaches storing a running statistical relation (e.g., *an average, mean, mode, standard deviation*) of low capacitance values for each capacitive sensor, and selecting the statistical relation of low values as the minimum capacitance value." *Id.* Appellant asserts that "using *single* minimum capacitance values is not described as an alternative – it is criticized as being 'not sufficient' and prone to causing inaccuracies and errors," and "Sinclair therefore explicitly *teaches away* from subtracting a *single* minimum capacitance value from each averaged raw capacitance value." *Id.*; *see also* Reply Br. 3–4.

The Examiner responds that Sinclair "indicates that the minimum value needs to be updated due to changes in the environment, [because] 'the minimum capacitance value will drift over time due to temperature, moisture . . . .'" Ans. 7 (citing Sinclair ¶ 32). The Examiner, therefore, determines that "Sinclair teaches both using a minimum value and also updating the minimum value, but does not teach away from taking a minimum value in the first place." *Id.* The Examiner further determines that "Sinclair does not explicitly state that average minimum values cannot be replaced with minimum values as taught in the alternative by Noguchi." *Id.* at 7–8.

We are not persuaded that the Examiner has erred. A reference teaches away from a claimed invention if it criticizes, discredits, or otherwise discourages modifying the reference to arrive at the claimed invention. *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004). We will not, however, "read into a reference a teaching away from a process where no such language exists." *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co*., 464 F.3d 1356, 1364 (Fed. Cir. 2006); *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1068–70 (Fed. Cir. 2018). "Under the proper legal standard, a reference will teach away when it suggests that the developments flowing from its disclosures are unlikely to produce the objective of the applicant's invention." *Syntex (U.S.A) LLC v. Apotex, Inc.*, 407 F.3d 1371, 1380 (Fed. Cir. 2005) (citing *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994)).

Appellant's teaching away argument relies on a single statement from Sinclair read out of context. Contrary to Appellant's assertion (Appeal Br. 9), Sinclair does not criticize using a *single* minimum capacitance value as never being sufficient. Instead, Sinclair cautions against the use of *all* "capacitance values of each capacitive sensor *when the device is turned on*," i.e., in a very limited circumstance. Sinclair ¶ 32 (emphasis added). The next sentence explains the reason: "When input device 104 is turned on, there can be some conductive object in close proximity that will generate a *high* capacitance value." *Id.* (emphasis added). Thus, Sinclair's caution does not apply to a person of ordinary skill seeking to replace Sinclair's minimum value with the *lowest* value, as taught by Noguchi, because Noguchi's system already ignores such *high* capacitance values. *See* Noguchi ¶ 118. We also agree with the Examiner's determination that Sinclair's guidance that the minimum capacitance value track changes over time due to temperature, moisture, aging and other factors is not very different from Applicant's own Specification instructing that leakage capacitance assessment needs to be continuously updated to take into account changes in the environment. Ans. 7 (citing Spec, 8:30–32). Therefore, we are not persuaded that Sinclair criticizes, discredits, or otherwise discourages modifying its teachings in the manner determined by the Examiner to arrive at the claimed invention. *See Fulton*, 391 F.3d at 1201; *see also Syntex*, 407 F.3d at 1380 (explaining that "a prior art reference that does not specifically refer to one element of a combination does not, per se, teach away" because, if that were the case, "only references that anticipate could be used to support an obviousness analysis").

Thus, we agree with the Examiner that the combined teachings of Sinclair and Noguchi teach or suggest "selecting a minimum stored total capacitance measurement within a history of measurements of previously stored total capacitance measurements for said measurement electrode including total capacitances measured during a sliding time window of a predetermined duration by identifying a smallest of the individual stored total capacitance measurements, wherein the history of measurements retain only those total capacitances measured during the sliding time window," and "equating the leakage capacitance to said selected minimum stored total capacitance measurement," as recited in claim 1. Because Appellant does not separately argue the Examiner's rejections of independent claim 11, or of dependent claims 4, 5, 7–10, and 12–15 (*see* Appeal Br. 11, 13–14), we sustain the Examiner's obviousness rejections of claims 1, 4, 5, and 7–15.

§ 103(a) Rejection of Claim 3

Claim 3 depends from independent claim 1 and further recites "the predetermined duration is determined as being higher than a mean presence duration of the one or several objects of interest in a vicinity of the at least one measurement electrode." Appeal Br. 16. The Examiner finds this limitation taught by Wu because Wu discloses that

> while the touch panel is in the proximity state, the counting unit 240 executes a count of a longer time (for example, the second presetting time is 10 seconds), and while the touch panel is switched from the proximity state to the contact state, the counting unit 240 is controlled by the control signal CON3, so as to reset the count of the second presetting time to prevent the erroneous drift compensation.

Final Act. 12 (citing Wu ¶ 31, Fig. 2B). The Examiner further determines that the "duration of the sliding time window T21 – T25 is made higher than that of time window T22 which corresponds to a sensed presence duration of an object of interest in the vicinity of the measurement electrode in order to prevent erroneous drift compensation." *Id.*; *see also* Ans. 10.

Appellant argues that Wu "only describes varying the duration of the operation of a counting unit depending on whether the unit is in a proximity state or a contact state." Appeal Br. 12–13. According to Appellant, "[t]here is no discussion [in Wu] of duration being based on the duration of objects of interest in the vicinity of the measurement electrode." *Id*. at 13. Moreover, Appellant argues, "Wu is directed to compensation for measured capacitances on a touch panel when drift in those capacitances is detected," and "is completely silent as to subtracting a minimum storage total capacitance measurement (a leakage capacitance) for a particular electrode from the measurements from that electrode, as required by claim 1." *Id.* at 12.

We agree with Appellant that the Examiner has not sufficiently explained how Wu teaches or suggests this claim limitation, and specifically a "predetermined duration [being] determined as being *higher than* a *mean presence duration* of the one or several objects of interest in a vicinity of the at least one measurement electrode." Although we agree with the Examiner that Wu discloses tracking the duration when its touch panel is in the contact state and compensating the capacitance accordingly, and Wu discloses that the touch panel switches to be in different states with different time periods due to different operations (Wu ¶¶ 31–37, Fig. 2B), the Examiner fails to explain sufficiently how that disclosure teaches or suggests determining a *duration that is higher than the mean presence duration* of an object in the vicinity of Wu's touch panel. We are persuaded of error in the Examiner's finding that tracking the duration for which an object approaches the touch panel teaches or suggests determination of a mean presence duration of objects of interest. Ans. 10. Nor does Sinclair's disclosure of "a measurement duration time that is long enough to avoid unnecessary spikes due to noise" (*id.* at 9) teach or suggest determination of the claimed mean presence duration.

Thus, we agree with Appellant that the Examiner has not shown that the combined teachings of Sinclair and Wu teach or suggest a "predetermined duration is determined as being higher than a mean presence duration of the one or several objects of interest in a vicinity of the at least one measurement electrode," as recited in claim 3. The Examiner also does not rely on Noguchi or Kent to teach or suggest this claim limitation in support of the obviousness rejection based on Sinclair, Noguchi, Kent, and Wu. Accordingly, given the record before us, we do not sustain the Examiner's rejection of claim 3.

§ 103(a) Rejection of Claim 6

Claim 6 depends from independent claim 1 and further recites "gathering latest stored measurements as a time sub-window having a duration lower than the sliding time window." Appeal Br. 17. The Examiner finds this limitation taught by Kent because it discloses that "the last 10 or a different number of samples 720 may be stored," and the "number of samples 720 stored *may be limited* by the amount of storage available for storing samples 720." Final Act. 9 (citing Kent ¶ 47) (emphasis added). The Examiner determines that "if the amount of storage available is lower, then a smaller sliding time window would be used as a time sub-window." *Id.*; *see also* Ans. 8–9.

Appellant argues that Kent "only describes storing a finite number of samples in memory," and "[t]here is no discussion of sub-windows." Appeal Br. 11; Reply Br. 4.

We are persuaded that the Examiner has erred. The Examiner determines that, because claim 6 does not recite that "the sliding window can be divided into sub-windows," under the broadest reasonable interpretation, a *single* time sub-window which is smaller than the sliding time window suffices to teach the limitation. Ans. 8. The Examiner, however, fails to explain sufficiently how Kent's disclosure of storing a limited number of samples (Kent ¶ 47) teaches or suggests even a single time sub-window that is smaller than the sliding time window. We are not persuaded by the Examiner's findings that lowering the amount of storage in Kent would result in the creation of a sub-window (Final Act. 9) rather than simply reducing the size of the window disclosed in Kent's system.

Thus, we agree with Appellant that the Examiner has not shown that Kent teaches or suggests a "gathering latest stored measurements as a time sub-window having a duration lower than the sliding time window," as recited in claim 6. The Examiner also does not rely on Sinclair or Noguchi to teach or suggest this claim limitation in support of the obviousness rejection based on Sinclair, Noguchi, and Kent. Accordingly, given the record before us, we do not sustain the Examiner's rejection of claim 6.

CONCLUSION

For the reasons above, we *affirm* the Examiner's decision rejecting claims 1, 4, 5, and 7–15 under § 103(a), but *reverse* the Examiner's decision rejecting claims 3 and 6 under § 103(a).

In summary:

Claims Rejected	35 U.S.C. §	References	Affirmed	Reversed
1, 6, 8–10, 14	103(a)	Sinclair, Noguchi, Kent	1, 8–10, 14	6
3–5	103(a)	Sinclair, Noguchi, Kent, Wu	4, 5	3
7	103(a)	Sinclair, Noguchi, Kent, Lemire	7	
11–13, 15	103(a)	Sinclair, Noguchi, Kent, Hotelling	11–13, 15	
Overall Outcome			**1, 4, 5, 7–15**	**3, 6**

TIME TO RESPOND

No time for taking subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 41.50(f).

AFFIRMED-IN-PART