

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HISENSE USA CORPORATION,
Petitioner,

v.

BRIGHTPLUS VENTURES LLC,
Patent Owner.

IPR2023-01412
Patent 8,330,710 B2

Before STACEY G. WHITE, KEVIN C. TROCK, and
JOHN D. HAMANN, *Administrative Patent Judges*.

HAMANN, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Hisense USA Corporation (“Petitioner”) filed a petition for *inter partes* review of claims 1, 2, 5, 11–13, 16, 17, 47, and 48 (“the challenged claims”) of U.S. Patent No. 8,330,710 B2 (Ex. 1001, “the ’710 patent”). Paper 1 (“Pet.”). Brightplus Ventures LLC (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”).

Institution of an *inter partes* review is authorized by statute when “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a) (2018); *see* 37 C.F.R. § 42.108 (2023). Upon consideration of the papers, we conclude that the information presented shows that there is a reasonable likelihood that Petitioner would prevail in establishing the unpatentability of at least one challenged claim of the ’710 patent.

A. Real Parties-in-Interest

The parties identify themselves as real parties-in-interest. Pet. 1; Paper 4, 2. In addition, Petitioner states that it “is a subsidiary of Hisense Group.” Pet. 1.

B. Related Matter

The parties identify *Hisense USA Corp. v. Brightplus Ventures LLC*, No. 1:22-cv-02774 (N.D. Ga.), as a matter that may affect, or be affected by, a decision in this proceeding. Pet. 1; Paper 4, 2.

C. The Challenged Patent

The ’710 patent relates to “solid state lighting, and more particularly, controlling a solid state lighting panel.” Ex. 1001, 1:14–15. According to the ’710 patent, “solid state lighting panels including arrays of solid state lamps have been used as direct illumination sources, for example, in

architectural and/or accent lighting.” *Id.* at 1:20–23. “Solid state lighting panels [also] are commonly used as backlights for small [liquid crystal display (LCD)] display screens.” *Id.* at 1:32–33.

“A solid state lamp may include, for example, a packaged light emitting device including one or more light emitting diodes (LEDs).” *Id.* at 1:23–25. “Solid state lamps . . . are current-controlled devices in the sense that the intensity of the light emitted from an LED is related to the amount of current driven through the LED.” *Id.* at 2:8–11. “One common method for controlling the current driven through the solid state lamps to achieve desired intensity and color mixing is a Pulse Width Modulation (PWM) scheme,” which “pulse[s] the solid state lamps alternately to a full current ‘ON’ state followed by a zero current ‘OFF’ state.” *Id.* at 2:11–15.

The ’710 patent explains, “[h]owever, [that] firing all of the solid state lamps simultaneously may result in undesirable electrical power system performance due, for example, to power factor spikes and/or electromagnetic interference due to the associated current rush.” *Id.* at 2:16–19. But “[s]equentially firing the strings independently and/or in combinations without regard to relative string location within the display, . . . can produce undesirable display characteristics.” *Id.* at 2:20–23.

To address these concerns, the ’710 patent provides embodiments having a control system that “include[s] firing logic that may determine a firing order of the multiple strings.” *Id.* at 2:27–29. For example, “the control system may be configured to drive the multiple strings or portions thereof in a spatially non-adjacent, non-sequential or spatially random firing order.” *Id.* at 2:29–32. Alternatively, “the control system may be configured to drive the multiple strings or portions thereof at different times and/or phases” or “at least partially based on the spatial relationship between

the multiple strings or portions thereof.” *Id.* at 2:32–35. In addition, a control system’s firing logic may be “rule-based logic that may operate to generate a non-spatially sequential firing order.” *Id.* at 2:40–42.

D. The Challenged Claims

Petitioner challenges claims 1, 2, 5, 11–13, 16, 17, 47, and 48 in this proceeding. Claims 1, 17, and 47 are independent claims. Claim 1 is illustrative of the challenged claims and is reproduced below:

1. A lighting system, comprising:
 - a plurality of strings of solid state lighting devices arranged in a first direction and positioned at intervals in at least one second direction;
 - a current supply circuit configured to selectively supply a plurality of on-state drive currents to the plurality of strings responsive to a plurality of control signals; and
 - a control system configured to receive a user input and to selectively provide control signals to the current supply circuit responsive to the user input to selectively drive the plurality of strings, the control system further including firing logic configured to determine a firing order of the plurality of strings.

Ex. 1001, 17:52–64.

E. Asserted Grounds of Unpatentability

Petitioner asserts that the challenged claims of the ’710 patent are unpatentable based on the following grounds:

Claim(s) Challenged	35 U.S.C. § ¹	Reference(s)/Basis ²
1, 2, 5, 12, 16, 17	103(a)	Shteynberg, ³ Arai, ⁴ Zhang ⁵
11	103(a)	Shteynberg, Arai, Zhang, Kobori ⁶
47, 48	103(a)	Shteynberg, Arai, ⁷ Lee ⁸
1, 2, 5, 12, 16, 17	103(a)	Shteynberg, Arai, Kawabata ⁹
11	103(a)	Shteynberg, Arai, Kawabata, Kobori
13	103(a)	Shteynberg, Arai, Kawabata, Lee

Pet. 4–5, 22–81. Petitioner submits in support of its arguments the Declaration of Rafael Betancourt (Ex. 1005). Patent Owner submits in support of its arguments the Declaration of William Bohannon (Ex. 2001).

II. LEVEL OF ORDINARY SKILL IN THE ART

To determine whether an invention would have been obvious at the time it was made, we consider the level of ordinary skill in the pertinent art at the time of the invention. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). In assessing the level of ordinary skill in the art, various factors

¹ The Leahy-Smith America Invents Act (“AIA”) included revisions to 35 U.S.C. § 103 that became effective on March 16, 2013. Because the ’710 patent issued from an application filed before March 16, 2013, we apply the pre-AIA version of the statutory basis for unpatentability.

² Petitioner also lists for each asserted ground the knowledge of one of ordinary skill in the art. Pet. 4–5. Such listing is unnecessary as we already consider such knowledge as part of our obviousness analysis. *See Randall Mfg. v. Rea*, 733 F.3d 1355, 1362–63 (Fed. Cir. 2013).

³ US 2008/0116818 A1, published May 22, 2008 (Ex. 1007, “Shteynberg”).

⁴ US 2007/0121320 A1, published May 31, 2007 (Ex. 1008, “Arai”).

⁵ CN 1750732A, published Mar. 22, 2006 (original (Ex. 1009) and English translation (Ex. 1010, “Zhang”)).

⁶ US 2006/0139954 A1, published June 29, 2006 (Ex. 1011, “Kobori”).

⁷ Petitioner’s list of grounds omits Arai, but Petitioner clearly identifies Arai as part of this ground in its showing for claims 47 and 48. *See* Pet. 4, 52–60.

⁸ US 2007/0013647 A1, published Jan. 8, 2007 (Ex. 1013, “Lee”).

⁹ US 2003/0016205 A1, published Jan. 23, 2003 (Ex. 1012, “Kawabata”).

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) (citing *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962–63 (Fed. Cir. 1986)). “[O]ne or more factors may predominate.” *Id.*

Petitioner argues that one of ordinary skill in the art for the ’710 patent “would have had at least a graduate degree in mechanical engineering, physics, materials science, electrical engineering, or a related discipline, coupled with at least four years’ experience in designing backlighting systems for displays; the level of ordinary skill in the art is approximate and additional education could make up for a lack of experience or vice-versa.” Pet. 10; Ex. 1005 ¶ 21.

Patent Owner argues that one of ordinary skill in the art for the ’710 patent “would have (a) a Bachelor’s of Science degree in a technical field and at least four years of experience in the field of design and/or manufacture of display systems; (b) a Master’s of Science degree in a technical field and at least two years of experience in the field of design and/or manufacture of display systems; or (c) a Ph.D in a technical field relating to the design and/or manufacture of display systems.” Prelim. Resp. 4; Ex. 2001 ¶ 33. Patent Owner adds that “[a]dditional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education.” Prelim. Resp. 4; Ex. 2001 ¶ 33.

The parties’ dispute regarding the level of ordinary skill in the art does not substantively impact our analysis for purposes of institution. Rather, we find in applying either parties’ definition for what comprises the level of ordinary skill in the art that Petitioner shows that there is a reasonable

likelihood that it would prevail in proving the unpatentability of the challenged claims. At this stage of the proceeding, however, we adopt Petitioner's proposed definition of the level of skill for one of ordinary skill in the art. Pet. 10. This definition for the level of ordinary skill is consistent with the '710 patent and the asserted prior art, and we apply it in our analysis below.

During trial, and in accordance with our Rules, the parties should address what substantive effect, if any, different proposed definitions for the level of ordinary skill in the art have on analyzing what the prior art teaches or in otherwise evaluating unpatentability of the challenged claims.

III. CLAIM CONSTRUCTION

Because the Petition was filed after November 13, 2018, we apply the same claim construction standard that would be used in a civil action under 35 U.S.C. § 282(b), following the standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). 37 C.F.R. § 42.100(b); 83 Fed. Reg. 51,340, 51,340–41, 51,343 (Oct. 11, 2018). In applying such standard, claim terms generally are given their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art, at the time of the invention and in the context of the entire patent disclosure. *Phillips*, 415 F.3d at 1312–13. “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Here, the parties do not submit any claim terms for construction. Pet. 10; *see generally* Prelim. Resp. Thus, for purposes of our Decision on

Institution, we see no need to provide an express construction of any term. *See, e.g., Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’”).

IV. PRINCIPLES OF LAW

A 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 of the invention to a person having ordinary skill in the art. *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 non-obviousness, if present.¹⁰ *See Graham*, 383 U.S. at 17–18. When evaluating a claim for obviousness, we also must “determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

V. ALLEGED OBVIOUSNESS OVER SHTEYNBERG, ARAI, AND ZHANG

Petitioner argues that the combination of Shteynberg, Arai, Zhang renders claims 1, 2, 5, 12, 16, and 17 obvious. Pet. 22–49. For the reasons that follow, we determine that Petitioner establishes a reasonable likelihood

¹⁰ Patent Owner does not present arguments or evidence of such objective evidence of non-obviousness. *See generally* Prelim. Resp.

that it would prevail in showing that this combination renders at least one of these challenged claims obvious.

A. Summary of Shteynberg

Shteynberg “relate[s] to converters and regulators used for driving and controlling arrays of light emitting diodes and, in particular, is related to . . . time division modulation with average current regulation for independent control of arrays of light emitting diodes.” Ex. 1007 ¶ 1. More specifically, Shteynberg teaches “separately and independently sourcing current to a series of light-emitting diodes of a plurality of series of light-emitting diodes.” *Id.* at code (57). “An exemplary apparatus comprises a power converter which generates a current, a first multiplexer, and a controller.” *Id.* “The controller provides for sequential and separate switching of the current through the first multiplexer to each of the series of light-emitting diodes for a corresponding period of time.” *Id.*

B. Summary of Arai

Arai relates to a backlight device for an LCD. Ex. 1008 ¶ 1. In relevant part, Arai teaches providing LEDs in a backlight unit in two-dimensional arrangements. *Id.* ¶ 6.

C. Summary of Zhang

Zhang relates to “adjusting or driving the backlight of flat panel displays, particularly, by changing the light emission sequence of backlight modules to improve the phenomenon of uneven brightness of the picture.” Ex. 1010, 1:6–8. In relevant part, Zhang teaches illumination sequences for turning on backlight modules of the display screen in different orders, and processes for generating the illumination sequences. *Id.* at 5:8–23, 7:1–33.

D. Challenged Claim 1

1. Lighting System

Claim 1’s preamble recites “[a] lighting system.” Ex. 1001, 17:52. At this stage, we agree with Petitioner and find that Shteynberg teaches claim 1’s preamble. Pet. 25. More specifically, we find that Shteynberg teaches a lighting system, which “comprises a plurality of series of light-emitting diodes, a power converter, a first multiplexer, and a controller.” Ex. 1007 ¶ 21.

After reviewing Petitioner’s arguments and evidence, which are not addressed by Patent Owner at this stage of the proceeding, we are persuaded that Petitioner demonstrates, for purposes of this institution decision, that Shteynberg teaches claim 1’s preamble. In light of our finding, we need not, and thus do not, reach whether claim 1’s preamble is limiting.

2. Plurality of Strings of Solid State Lighting Devices

Claim 1 further recites “a plurality of strings of solid state lighting devices arranged in a first direction and positioned at intervals in at least one second direction.” Ex. 1001, 17:53–55. At this stage, we agree with Petitioner and find that Shteynberg and Arai each teach this limitation. Pet. 25–27.

In particular, we agree with Petitioner and find that Shteynberg teaches a lighting system having a parallel array of LEDs. Pet. 25. Such an array is illustrated in Shteynberg’s Figure 3, shown below.

FIG. 3

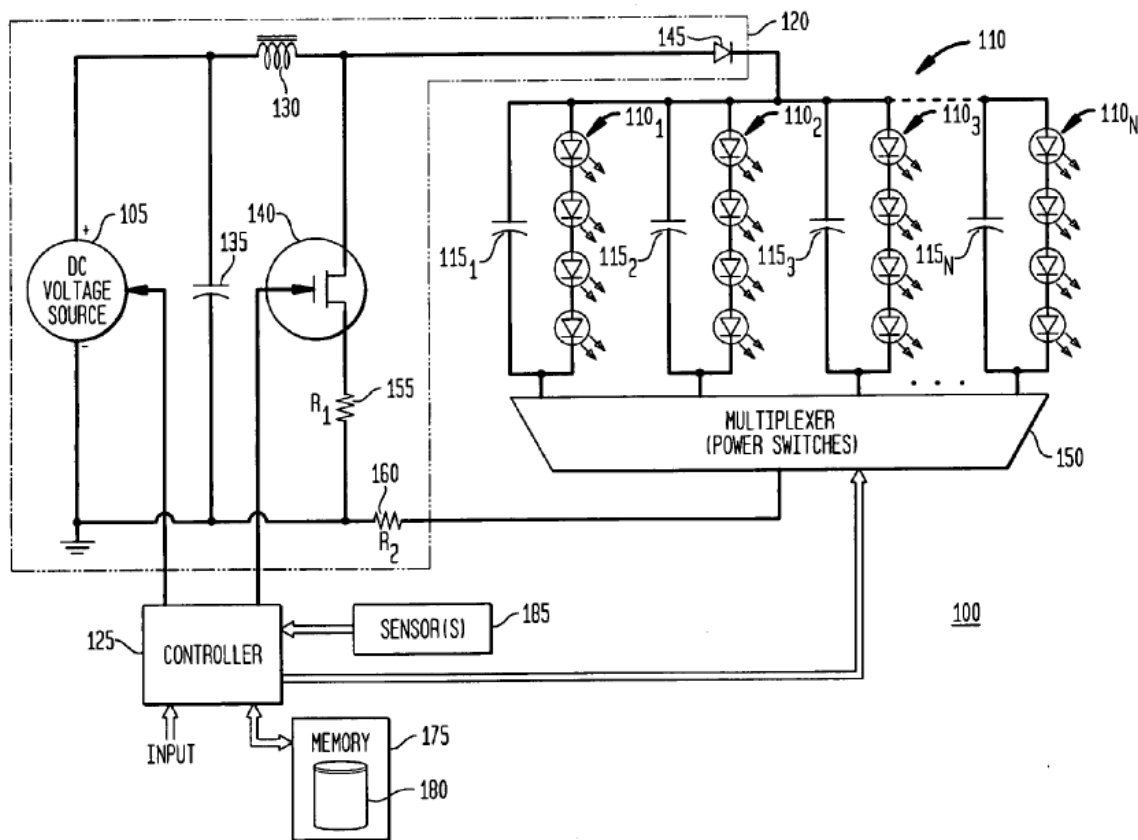


Figure 3 “is a circuit and block diagram illustrating a first exemplary LED array driver circuit in accordance with” Shteynberg’s teachings. Ex. 1007 ¶ 30. As illustrated, Shteynberg teaches having a “parallel array of LEDs 110[, which] comprises a plurality of series-connected LEDs, i.e., independent series or ‘strings’ of LEDs, illustrated as ‘N’ individual series of LEDs 110₁, 110₂, 110₃, through 110_N.” *Id.* ¶ 44, Fig. 3.

At this stage, we agree with Petitioner that the “LEDs in each LED string are arranged in a first direction (from top to bottom, as shown in Fig. 3), and these strings of LEDs are positioned at intervals in a second direction (from left to right, as shown in Fig. 3).” *Id.*; Pet. 25. Notably, Shteynberg describes the LEDs as being arranged in a “parallel array,” which on this record, we view as teaching that the LEDs are organized in columns and

rows. Ex. 1007 ¶ 44, Fig. 3. In addition, we find persuasive for purposes of institution Mr. Betancourt’s testimony that because “the LEDs are organized in an ‘array,’ the LEDs are organized in columns (each column corresponding to one LED string) and rows (multiple LED strings are distributed to form a row, i.e., positioned at intervals).” Ex. 1005 ¶ 60. This testimony is consistent with Shteynberg’s teachings. *Compare id.*, with Ex. 1007 ¶¶ 43–44, Fig. 3.

At this stage, we find unavailing Patent Owner’s argument that “Shteynberg does not disclose the physical orientation of the LED strings,” and instead “explicit[ly teaches] that Fig[ure] 3 is a circuit/block diagram.” Prelim. Resp. 15 (citing Ex. 1007 ¶¶ 30, 43). This argument ignores that Shteynberg describes the arrangement of LEDs as comprising a “parallel array.” Ex. 1007 ¶¶ 43–44. Moreover, although we agree that Figure 3 “is a circuit and block diagram,” we find the illustrated arrangement of LEDs is at least probative of the LEDs’ physical orientation, especially when viewed in the context of Shteynberg’s “parallel array” teaching. *See id.* ¶¶ 30, 43–44, Fig. 3; Ex. 1005 ¶ 60; *In re Aslanian*, 590 F.2d 911, 914 (CCPA 1979) (considering drawings for what they reasonably disclose to one of ordinary skill in the art).

In addition, at this stage, we agree with Petitioner’s alternative arguments and find that Arai also teaches this limitation. Pet. 26–27. More specifically, Arai teaches that backlight units comprise LEDs that are two “two dimensionally arranged.” Ex. 1008 ¶ 6. Arai’s Figure 5, shown below, illustrates such a backlight unit.

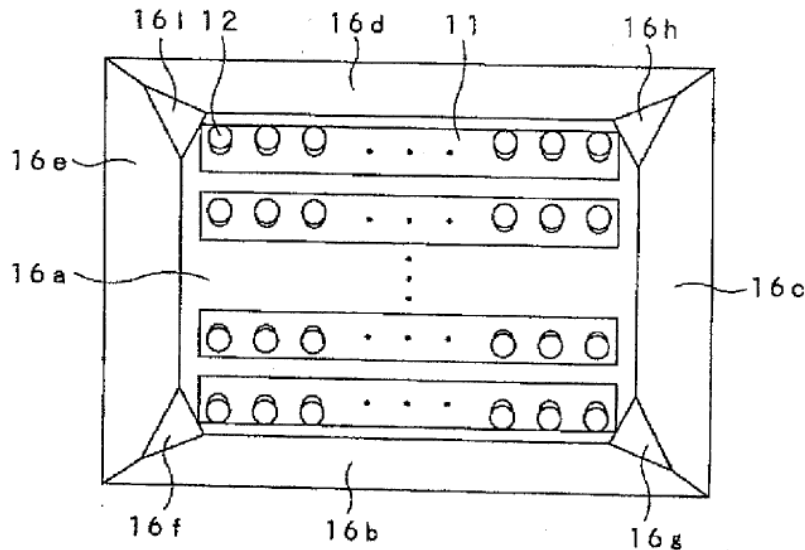


FIG.5

Figure 5 “is a plan view showing a first example of [a] reflection sheet” for a backlight device in accordance with Arai’s teachings. *Id.* ¶ 19. As illustrated, LEDs 12 are two dimensionally arranged. *See id.* at Fig. 5, ¶ 29; *In re Aslanian*, 590 F.2d at 914. Put differently, LEDs 12 are arranged in a first direction (from left to right) to form LED strings and positioned at intervals in a second direction (from top to bottom). *Id.* at Fig. 5; Ex. 1005 ¶ 61.

At this stage, we find unavailing Patent Owner’s argument that “Arai does not describe the lighting strings being positioned at ‘intervals’ in a second direction.” Prelim. Resp. 16. As we discuss above, Arai teaches that the LEDs are two dimensionally arranged, which meets the limitation. There is no need for Arai to use the word “interval.” *See In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009) (a reference does not have to satisfy an *ipsis verbis* test to disclose a claimed element).

In sum, on the current record, we find that Shteynberg and Arai each teach this limitation.

3. *Current Supply Circuit*

Claim 1 further recites “a current supply circuit configured to selectively supply a plurality of on-state drive currents to the plurality of strings responsive to a plurality of control signals.” Ex. 1001, 17:56–58. At this stage, we agree with Petitioner and find that Shteynberg teaches this limitation. Pet. 27–29.

In particular, we find that Shteynberg teaches that LED array driver circuit 100 includes power converter 120 and multiplexer 150 (collectively, a current supply circuit), as well as controller 125. Ex. 1007 ¶ 43; *see supra* Section V.D.2 (providing Figure 3 which illustrates LED array driver circuit 100).

Shteynberg teaches that power converter 120 includes DC voltage source 105, and “is capable of or adapted to deliver a controlled current level [(i.e., an on-state drive current)] to a load” (i.e., any selected series of LEDs 110₁, 110₂, 110₃, through 110_N). Ex. 1007 ¶¶ 47–48. Shteynberg teaches that multiplexer 150 “provides for individually and selectively allowing current to flow through each of the series of LEDs 110₁, 110₂, 110₃, through 110_N, i.e., turning on or off any selected series of LEDs 110₁, 110₂, 110₃, through 110_N.” *Id.* ¶ 47. More specifically, “[u]nder the control of the controller 125, the multiplexer 150 is configured to allow current through one or more of the series of LEDs 110₁, 110₂, 110₃, through 110_N in any combination, and for any selected duration (time period or time slot).” *Id.* This varying time duration supplies pulses of current to the strings. *Id.*

In addition, we agree with Petitioner and find that Shteynberg teaches that multiplexer 150 may be implemented as multiple power switches. *Id.*

¶ 43. Shteynberg also teaches that controller 125 “may be embodied as one or more controllers 125, adapted to perform the [disclosed] functionality.”

Id. ¶ 51. In light of these explicit teachings, we find persuasive Mr. Betancourt’s testimony that one of ordinary skill in the art would have appreciated that multiple control signals could be used “to control the multiple power switches to achieve individual and selective control over the LED strings.” Ex. 1005 ¶ 64.

Accordingly, on this record, we agree with Petitioner and find that Shteynberg teaches that “the ‘controlled current level’ generated by the power converter 120 is selectively supplied to, with the help of the multiplexer 150, the LED strings responsive to the control signals generated by the controller 125.” Pet. 29. Put differently, Shteynberg teaches selectively supplying on-state drive currents to the LED strings 110₁, 110₂, 110₃, through 110_N. Ex. 1007 ¶¶ 44, 47–48.

At this stage, we find unavailing Patent Owner’s argument that “the power converter 120 only supplies one current to all the LED strings,” “as opposed to an individually determined current for each string.” Prelim. Resp. 18 (citing Ex. 2001 ¶¶ 59–62). Simply put, there is nothing in the claim language that requires different current values for the plurality of currents, or making individual determinations. Ex. 1001, 17:56–58. Rather, the limitation recites “supply[ing] a plurality of on-state drive currents to the plurality of strings,” which refers to having an on-state drive current for each of the strings. *Id.*; *In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998) (stating “the name of the game is the claim”). To the extent that Patent Owner believes that this limitation should be construed to have the requirements Patent Owner lists, Patent Owner should provide detailed factual and legal support for such during trial, in accordance with our Rules.

We also find unavailing Patent Owner’s argument that “multiplexer 150 doesn’t ‘drive’ the strings but allows current to flow through the strings for a certain amount of time,” with multiplexer 150 acting “as a switch, which activates each string for a selected duration.” Prelim. Resp. 18 (citing Ex. 2001 ¶¶ 59–62). Patent Owner fails to explain what meaning it ascribes to “drive” and what Patent Owner contends is the technical difference between drive and current flow in this context. *Id.* Nor does the cited testimony of Mr. Bohannon provide an explanation. Ex. 2001 ¶¶ 59–62.

In sum, at this stage, we find that Shteynberg teaches this limitation.

4. Control System

Claim 1 further recites “a control system configured to receive a user input and to selectively provide control signals to the current supply circuit responsive to the user input to selectively drive the plurality of strings.” Ex. 1001, 17:59–62. At this stage, we agree with Petitioner and find that Shteynberg teaches this limitation. Pet. 29–31.

In particular, we agree with Petitioner and find that Shteynberg teaches that “[u]nder the control of the controller 125, the multiplexer 150 is configured to allow current through one or more of the series of LEDs 110₁, 110₂, 110₃, through 110_N in any combination, and for any selected duration (time period or time slot).” Ex. 1007 ¶ 47. Shteynberg also teaches that controller 125 “may be embodied as one or more controllers 125, adapted to perform the [disclosed] functionality.” *Id.* ¶ 51. In addition, Shteynberg teaches that “[t]he controller 125 may receive input from a wide variety of sources,” and “may be coupled within a larger system, such as a computer-controlled lighting system in a building, and may interface with other computing elements.” *Id.* ¶ 49.

Furthermore, we find persuasive for institution Mr. Betancourt’s testimony that “Shteynberg describes a variety of sources where the input for the controller 125 comes from,” such as “a larger system,” and that one of ordinary skill in the art would have understood that “*user input* is one possible input coming from a larger system.” Ex. 1005 ¶ 65. We find that this testimony is consistent with Shteynberg broadly teaching that “[t]he controller 125 may receive input from a wide variety of sources.” *Compare id.*, with Ex. 1007 ¶ 49.

At this stage, we find unavailing Patent Owner’s argument that “Shteynberg relates to providing ambient lighting for a building, not backlighting an LCD panel.” Prelim. Resp. 20. The ’710 patent broadly relates to “solid state lighting panel[s],” including for “use[] as direct illumination sources . . . in architectural and/or accent lighting.” Ex. 1001, 1:14–15, 1:19–23. Moreover, we agree with Mr. Betancourt’s testimony that “[i]t is the user who ultimately decides on various operating settings such as brightness or color temperature of an LED array,” including for a larger system as taught in Shteynberg. Ex. 1005 ¶ 65.

We also find unavailing Patent Owner’s argument that Shteynberg’s “larger system” “receives input from ‘open or closed-loop feedback of various signals and measurements,’” and that “these signals may be transmitted over ‘a wide variety of data transmission protocols.’” Prelim. Resp. 21 (quoting Ex. 1007 ¶ 49); *see also id.* (citing Ex. 1007 ¶ 79) (arguing that system sensors are used for feedback). Patent Owner adds that “nothing in [Shteynberg’s] limited disclosure describes user input or feedback.” *Id.* These arguments fail to account for Shteynberg’s broad teaching that “[t]he controller 125 may receive input from a wide variety of sources.” Ex. 1007 ¶ 49.

In sum, at this stage, we find that Shteynberg teaches this limitation.

5. Firing Logic

Claim 1 further recites “the control system further including firing logic configured to determine a firing order of the plurality of strings.”

Ex. 1001, 17:62–64. At this stage, we agree with Petitioner and find that Shteynberg and Zhang each teach this limitation. Pet. 31–35.

Shteynberg teaches that “[u]nder the control of the controller 125, the multiplexer 150 is configured to allow current through one or more of the series of LEDs 110₁, 110₂, 110₃, through 110_N in any combination, and for any selected duration (time period or time slot),” as we discuss above.

Ex. 1007 ¶ 47; *supra* Section V.D.4 (addressing control system).

In addition, Shteynberg teaches that “each series of LEDs 110₁, 110₂, 110₃, through 110_N will be provided with a selected and independent current level, through control (by controller 125) of the switching state of each channel (via multiplexer 150), for a selected time period (or duration).”

Ex. 1007 ¶ 54. Figure 4, shown below, illustrates exemplary timing.

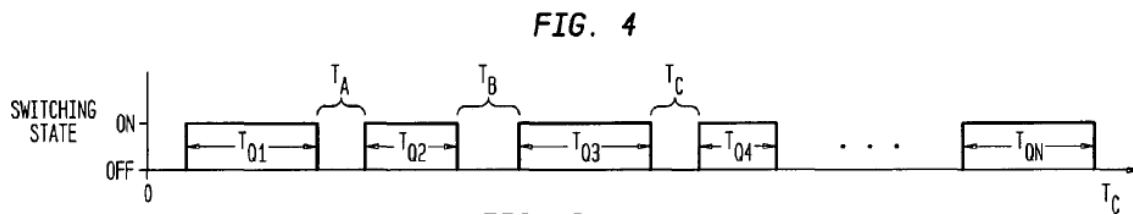


Figure 4 “is a timing diagram for a first exemplary LED array driver circuit 100, and illustrates the time division modulation for current regulation in accordance with” Shteynberg’s teachings. *Id.* ¶ 54. Figure 4 illustrates a “first time period T_{Q1} for series of LEDs 110₁, second time period T_{Q2} for series of LEDs 110₂, third time period T_{Q3} for series of LEDs 110₃, fourth time period T_{Q4} for series of LEDs 110₄, through ‘Nth’ time period T_{QN} for series of LEDs 110_N.” *Id.* Shteynberg explains that “[e]ach of these time

periods may be selected and varied during operation of the LED array driver circuit 100,” and that “[e]ach energizing time period may be provided in any order or combination.” *Id.* In addition, this also teaches that the energizing time periods may be non-spatially sequential. *Id.* “The intervals or time periods (illustrated as T_A , T_B , and T_C) between successive energizing time periods T_{Q1} , T_{Q2} through T_{QN} may also be selected and varied.” *Id.*

Accordingly, we agree with Petitioner and find that controller 125 determines the order of the energizing time periods, which teaches the strings’ firing order (i.e., order in which individual strings are supplied current). Pet. 32. In addition, we agree with Petitioner and find that Shteynberg teaches that controller 125 includes firing logic because controller 125 controls the switching state of each of the strings of LEDs. *Id.*; Ex. 1007 ¶¶ 44, 54. We also find persuasive Mr. Betancourt’s testimony that one of ordinary skill in the art would have understood that the control system includes firing logic configured to determine the firing order. Ex. 1005 ¶ 73. This testimony is consistent with Shteynberg’s teaching that “the controller 125 may be implemented as an arrangement of controllers, microprocessors, DSPs and/or ASICs, collectively referred to as a ‘controller’, which are respectively programmed, designed, adapted or configured to implement the methodology of [Shteynberg’s] invention.” Ex. 1007 ¶ 51.

At this stage, we find unavailing Patent Owner’s arguments concerning Shteynberg’s “energizing time periods are not equivalent to the firing logic as described in the [’]710 [p]atent.” Prelim. Resp. 22; *see also id.* 22–23 (discussing embodiments of firing logic from the ’710 patent). Patent Owner does not provide a principled basis to limit “firing logic” to the specific embodiments of the ’710 patent, and thus we decline to do so.

See Williamson v. Citrix Online, LLC, 792 F.3d 1339, 1346–47 (Fed. Cir. 2015) (quoting *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1328 (Fed. Cir. 2002)) (cautioning “against limiting the claimed invention to preferred embodiments or specific examples in the specification”).

Moreover, Patent Owner incorrectly conflates Shteynberg’s energizing time periods with firing logic. Prelim. Resp. 22–23. The claim language clearly provides that firing logic determines a firing order (i.e., order in which individual strings are supplied current). Ex. 1001, 17:62–64. In contrast, the energizing time periods relate to the controller’s firing logic’s result of when and for how long current is supplied to which strings. Ex. 1007 ¶ 54, Fig. 4. We also find unavailing Patent Owner’s arguments concerning Shteynberg not teaching “a plurality of currents being supplied to strings,” for the reasons we discuss above. Prelim. Resp. 22–23; *supra* Section V.D.3.

In addition, at this stage, we agree with Petitioner’s alternative arguments and find that Zhang also teaches this limitation. Pet. 33–35. More specifically, Zhang teaches a display panel having separate backlight modules. Ex. 1010, Fig. 1A, 5:8–23. And Zhang teaches a sequence to light the backlight modules. *Id.* at Fig. 1B, 5:14–23. We agree with Petitioner and find that Zhang teaches a firing order (i.e., the lighting sequence) for these modules. Pet. 35. Zhang also teaches processes by which a lighting sequence can be determined. Ex. 1010, Figs. 5–6, 7:1–33. And we agree with Petitioner and find that Zhang thus teaches firing logic (a component that executes the processes) that determines the firing order. Pet. 35; Ex. 1005 ¶ 77.

At this stage, we find unavailing Patent Owner’s argument that “Zhang only contemplates one backlight module being activated at a time,”

and not “a firing order to supply a plurality of currents to [a] plurality of LED strings.” Prelim. Resp. 24–25 (citing Ex.1010, 5:16–23, Figs. 1B, 2B, 4A–4F, 5–6). The claim language does not require that a plurality of strings be supplied on-state drive current at the same time, or for the current to have different values. *See In re Hiniker*, 150 F.3d at 1369. We also find unavailing Patent Owner’s argument that “Zhang’s method of only activating one lighting module at a time is not the same as the firing logic or firing order contemplated by the [’]710 [p]atent.” Prelim. Resp. 24–25. The proper focus is on the language of the claim. *Williamson*, 792 F.3d at 1346–47.

In sum, on the record before us, we find that Shteynberg and Zhang each teach this limitation.

6. *Combining Shteynberg, Arai, and Zhang*

We find above that Shteynberg teaches all of claim 1’s limitations. Thus, institution does not rest on Petitioner’s alternative arguments that rely on Arai and Zhang’s teachings, nor on Petitioner’s arguments to combine these teachings. However, to provide guidance to the parties—as we do above regarding what Arai and Zhang teach—we address the parties’ arguments concerning motivation to combine Shteynberg, Arai, and Zhang in the manner Petitioner proposes.

We find Petitioner’s reasoning for combining Shteynberg, Arai, and Zhang’s teachings sufficient for institution. Pet. 23–24. More specifically, we agree with Petitioner and find that one of ordinary skill in the art would have been motivated to modify Shteynberg’s lighting system to employ Arai’s LED series arrangement and Zhang’s non-spatially-sequential firing order. Pet. 23; Ex. 1005 ¶ 103. In particular, we find sufficient Petitioner’s argument that one of ordinary skill in the art would have made the

modifications to achieve high luminance for large-sized LED arrays and to improve brightness uniformity. Pet. 24; Ex. 1005 ¶ 105.

Arai teaches that having a large number of LEDs of the primary colors two-dimensionally arranged obtains white light and permits high luminance on large-sized displays. Ex. 1008 ¶ 6. Arranging Shteynberg's parallel array of LED strings two-dimensionally (e.g., rows and columns) would likewise allow for high luminance for larger arrays. Ex. 1005 ¶ 105.

Moreover, there are a finite number of ways to design a plurality of LED series to cover a large area, such as employing columns and rows. Thus, one of ordinary skill in the art would have found it obvious to combine Shteynberg and Arai's teachings. *See KSR*, 550 U.S. at 421 ("When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp.").

In addition, Zhang teaches "solv[ing] display delay and improv[ing] the phenomenon of uneven brightness of the picture" by changing the lighting sequence of backlight modules (e.g., by using Zhang's non-spatially-sequential firing order). Ex. 1010, 2:8–12. At this stage, we find that addressing uneven brightness is a technological improvement for lighting LED arrays that would have motivated one of ordinary skill in the art. *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1379 (Fed. Cir. 2023) ("'[U]niversal' motivations known in a particular field to improve technology provide 'a motivation to combine prior art references even absent any hint of suggestion in the references themselves.'").

Accordingly, at this stage, we find that Petitioner has provided sufficiently articulated reasoning with rational underpinning to support combining Shteynberg, Arai, and Zhang in the manner Petitioner proposes.

See In re Kahn, 441 F.3d at 988; *see also Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1374 (Fed. Cir. 2019) (“A motivation to combine may be found ‘explicitly or implicitly in market forces; design incentives; . . . and the background knowledge, creativity, and common sense of the person of ordinary skill.’”) (quoting *ZUP, LLC v. Nash Mfg., Inc.*, 896 F.3d 1365, 1371 (Fed. Cir. 2018)).

At this stage, we find unavailing Patent Owner’s argument that “Shteynberg relates to providing ambient lighting for a building and the like, not providing backlighting for an LCD panel as in Arai or Zhang,” and “Petitioner does not substantiate how such a system would be adapted to a backlight for an LCD panel as the power, switching and output demands for the two applications are very different.” Prelim. Resp. 10 (citing Pet. 52). Patent Owner also argues that “Zhang would not be a suitable option for combination with Arai as the combination would lead to an unevenly distributed optical layers.” *Id.* at 11. Patent Owner also argues that “in examining the preferred embodiments of Shteynberg and Zh[a]ng, such a combination would not be functional.” *Id.* at 12 (citing Ex. 2001 ¶ 55); *see also id.* at 13–14 (discussing Shteynberg and Zhang’s embodiments).

These arguments are akin to arguing that the teachings cannot be physically combined, which is an improper focus for determining whether the claim would have been rendered obvious by the prior art as a whole. *See Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016) (quoting *In re Sneed*, 710 F.2d 1544, 1550 (Fed. Cir. 1983)); *see also id.* (quoting *In re Etter*, 756 F.2d 852, 859 (Fed. Cir. 1985) (en banc)) (“Etter’s assertions that Azure cannot be incorporated in Ambrosio are basically irrelevant, the criterion being not whether the references could be physically combined but whether the claimed inventions

are rendered obvious by the teachings of the prior art as a whole.”). Rather, at this stage, we find that one of ordinary skill in the art would have “be[en] able to fit the teachings of [Shteynberg, Arai, and Zhang] . . . together like pieces of a puzzle” because the skilled artisan is “a person of ordinary creativity, not an automaton.” *KSR*, 550 U.S. at 420–21.

We also find unavailing Patent Owner’s argument that “Arai already discloses a method of brightness uniformity,” and “[t]hus, it is not apparent how Zhang would improve the brightness uniformity when combined with Arai.” Prelim. Resp. 11. The proper focus is whether the combination provides a suitable option. *See Intel Corp.*, 61 F.4th at 1380 (holding the Board erred by concluding there was no reason to combine in part because the base reference “already addresses” a problem); *id.* at 1381 (finding that a petitioner is not required to show that the combination would be an improvement, but only that it was a suitable option).

7. *Summary*

In summary, we determine that Petitioner shows a reasonable likelihood that it would prevail in showing that claim 1 would have been obvious in view of Shteynberg, Arai, and Zhang.

E. Challenged Claims 2, 5, 16, and 17

At this stage, Patent Owner does not provide separate, additional arguments addressing Petitioner’s arguments and evidence as to how Shteynberg, Arai, and Zhang teach claims 2, 5, 16, and 17.¹¹ *See* Prelim. Resp. 25–26, 29–31. We find Petitioner’s showing for these claims sufficient for institution. Pet. 35–49.

¹¹ We address claim 17’s “pulsed drive currents” and “a non-spatially-sequential firing order” in the context of claim 1. *See supra* Section V.D.3, 5.

F. Challenged Claim 12

Claim 12 recites “[t]he system of claim 1, further comprising a means for generating a feedback signal configured to provide display performance information to the control system.” Ex. 1001, 19:1–3. At this stage, we find Petitioner’s showing for claim 12 sufficient for institution. Pet. 40–41.

Shteynberg teaches that “controller 125 may receive input from a wide variety of sources, including open or closed-loop feedback of various signals and measurements from within the LED array driver circuit 100.” Ex. 1007 ¶ 49. In particular, Shteynberg teaches that a sensor can be used to measure “the actual output voltage across each series of LEDs 110₁, 110₂, 110₃, through 110_N.” *Id.* ¶ 72. Moreover, Shteynberg teaches that “[c]orresponding to such measurements, compensation coefficients are introduced, stored in memory 175, and utilized for subsequent output voltage prediction by the controller 125, for use in successive iterations (i.e. successive time periods ‘T_C.’” *Id.*

Accordingly, on the current record, we agree with Petitioner and find that Shteynberg teaches a means (e.g., the sensor 185) for generating a feedback signal (open or closed-loop feedback) configured to provide display performance information (the actual output voltage across each LED string) to the control system (the controller 125). Pet. 41.

At this stage, we find unavailing Patent Owner’s argument that Shteynberg teaches “a system for providing ambient lighting to a building, it does not disclose a display,” and that “[t]he ‘feedback of various signals’ as disclosed in . . . Shteynberg is not equivalent to the ‘feedback signal configured to provide display performance information to the control system.’” Prelim. Resp. 26–27. Patent Owner adds that the ’710 patent teaches that performance feedback sensors receive information from a

lighting panel and transmit it to a color management unit and a controller to regulate the display. *See id.* at 27–28 (citing Ex. 1001, 8:28–32, 11:30–34, Fig. 1). The proper focus, however, is on the language of the claim.

Williamson, 792 F.3d at 1346–47. And we note that claim 1 recites a “lighting system” and not a display. Ex. 1001, 17:52–64. Thus, on this record, we view “display performance information” as relating to a “lighting system,” which includes “strings of solid state lighting devices,” and their performance. *Id.*

To the extent that Patent Owner believes that “display performance information” should be construed to connote having an LCD display and that the information is related thereto, Patent Owner should provide detailed factual and legal support for such during trial, in accordance with our Rules.

In sum, at this stage, we find Petitioner’s showing for claim 12 sufficient.

VI. ALLEGED OBVIOUSNESS OVER SHTEYNBERG, ARAI, ZHANG, AND KOBORI

Petitioner argues that the combination of Shteynberg, Arai, Zhang, and Kobori renders claim 11 obvious. Pet. 49–52. Petitioner already has demonstrated a reasonable likelihood of success in proving that at least one claim of the ’710 patent would have been obvious. In order to provide guidance to the parties, however, we address issues in dispute for this ground. *See Consolidated Trial Practice Guide November 2019*¹² (“CTPG”) 6 (“If a trial is instituted, the Board generally will provide analysis of the strengths and weaknesses of all challenges in the petition in order to provide guidance to the parties for the upcoming trial.”).

¹² Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

A. Summary of Kobori

Kobori relates to a display system having light emission diode arrays driven by pulses with different phases. Ex. 1011, code (12), code (57). Kobori teaches that while an array driven with a different phase is OFF, a processing circuit acquires the luminiferous level of each of the other arrays. *Id.* at code (57). In relevant part, Kobori teaches arbitrarily changing which arrays are ON and OFF allows for detecting the luminiferous state of an LED at a particular position and obtaining uniform luminiferous characteristics at a low cost. *Id.* ¶¶ 7, 35

B. Combining Shteynberg, Arai, Zhang, and Kobori

The parties dispute whether one of skill in the art would have combined the teachings of Shteynberg, Arai, Zhang, and Kobori to render claim 11 obvious. Pet. 49–52; Prelim. Resp. 31–32. We find that Petitioner’s rationale for combining these references is sufficient for institution.

Claim 11 recites “[t]he system of claim 1, wherein the firing logic comprises random logic operative to generate the firing order.” Ex. 1001, 18:66–67. We agree with Petitioner and find that one of ordinary skill in the art “would have been motivated to modify the lighting system disclosed in the Shteynberg-Arai-Zhang combination to introduce the random logic that randomizes the firing order described in Kobori.” Pet. 49 (citing Ex. 1005 ¶ 108); *see also* Pet. 50–52 (citing Ex. 1011 ¶¶ 7–8, 35) (arguing that Kobori teaches random logic for a firing order). In particular, we find persuasive for institution Petitioner’s argument that “one of ordinary skill in the art would have been [motivated] to *improve uniformity in the luminiferous characteristic*, as described in Kobori.” Pet. 50 (citing Ex. 1005 ¶ 110).

At this stage, we find unavailing Patent Owner’s arguments that one of ordinary skill in the art “would not be motivated to combine Kobori with Zhang because different LEDs being turned on or off in a display would not lead to better light uniformity,” and that “Zhang is directed to [cold cathode fluorescent lamps (CCFLs)] and Kobori is directed to LEDs,” and thus, “[t]he electrical requirements of the two systems are entirely different.” Prelim. Resp. 31. We view these arguments as arguing that Kobori and Zhang’s teachings cannot be physically combined, which is the incorrect focus. *See Allied Erecting*, 825 F.3d at 1381; *KSR*, 550 U.S. at 420–21. Our reasoning above regarding combining Shteynberg, Arai, and Zhang also applies to Patent Owner’s remaining arguments about making this combination. *See supra* Section V.D.6.

VII. ALLEGED OBVIOUSNESS OVER SHTEYNBERG, ARAI, AND LEE

Petitioner argues that the combination of Shteynberg, Arai, and Lee renders claims 47 and 48 obvious. Pet. 52–60. In order to provide guidance to the parties, we address disputed issues for this ground. CTPG 6.

A. *Summary of Lee*

Lee relates to “a surface light source that can solve the problems, which may be caused by the increase of a driving voltage and current, by electrically interconnecting a plurality of LEDs using the combination of a series connection and a parallel connection and a backlight unit for a liquid crystal display (LCD), which has the surface light source.” Ex. 1013 ¶ 3.

B. *Combining Shteynberg, Arai, and Lee*

The parties dispute whether one of skill in the art would have combined the teachings of Shteynberg, Arai, and Lee. Pet. 52–54; Prelim.

Resp. 32–35. We find that Petitioner’s rationale for combining these references is sufficient for institution.

We agree with Petitioner and find that one of ordinary skill in the art “would have been motivated to modify the lighting system disclosed in the Shteynberg-Arai combination to introduce the string groups described in Lee.” Pet. 53 (citing Ex. 1005 ¶ 113). In particular, we agree with Petitioner and find that one of ordinary skill in the art would have been motivated “to ***achieve uniform white light and avoid excessive driving voltage or current***, as described in Lee.” Pet. 54 (citing Ex. 1005 ¶ 115)

At this stage, we find unavailing Patent Owner’s arguments that “Shteynberg teaches away from the invention of Lee.” Prelim. Resp. 32–34. More specifically, Patent Owner argues that Shteynberg teaches advantages of using a single power converter and controller for an entire LED array, but Lee uses three separate LED driving circuits. *Id.* (citing Ex. 1007 ¶ 11; Ex. 1013 ¶ 34, Fig. 3). But, Petitioner relies on Lee’s teachings of string groups, not Lee’s driving circuits. *See, e.g.*, Pet. 53, 58; *Lear Siegler, Inc. v. Aeroquip Corp.*, 733 F.2d 881, 889 (Fed. Cir. 1984) (finding that one of ordinary skill in the art in reading a reference’s disclosure is not “compelled to adopt every single aspect of its teaching without the exercise of independent judgment”). Hence, these arguments are unavailing.

We also find unavailing Patent Owner’s argument that Shteynberg is an improvement to Lee. Prelim. Resp. 34–35. The proper focus is whether the combination provides a suitable option. *See Intel Corp.*, 61 F.4th at 1381 (finding that a petitioner is not required to show that the combination would be an improvement, but only that it was a suitable option).

VIII. ALLEGED OBVIOUSNESS OVER SHTEYNBERG,
ARAI, AND KAWABATA

Petitioner argues that the combination of Shteynberg, Arai, and Kawabata renders claims 1, 2, 5, 12, 16, and 17 obvious. Pet. 61–72. In order to provide guidance to the parties, we address disputed issues for this ground. CTPG 6.

A. Summary of Kawabata

Kawabata “relates to a lighting unit for use as a backlight in a liquid crystal display device.” Ex. 1012 ¶ 2. In relevant part, Kawabata teaches that each of its light-emitting elements may be turned ON for half a time period and the drive signal supplied to a light-emitting elements should have its phase shifted from that of the drive signal supplied to an adjacent light-emitting element. *Id.* ¶ 70.

B. Combining Shteynberg, Arai, and Kawabata

The parties dispute whether one of skill in the art would have combined the teachings of Shteynberg, Arai, and Kawabata. Pet. 61–62; Prelim. Resp. 38–42. We find that Petitioner’s rationale for combining these references is sufficient for institution.

We agree with Petitioner and find that one of ordinary skill in the art “would have been motivated to modify the display system in the Shteynberg-Arai combination to introduce the non-spatially-sequential firing order described in Kawabata.” Pet. 61 (citing Ex. 1005 ¶ 118). More specifically, Kawabata teaches that “some of the light-emitting elements 2 for some of the light-emitting regions 4 may be turned ON in a different percentage of one vertical scanning period” to reduce a variation in luminance. Ex. 1012 ¶ 73. At this stage, we find that one of ordinary skill

in the art would have been motivated to reduce a variation in luminance, as described in Kawabata. Ex. 1005 ¶ 120; Ex. 1012 ¶ 73.

At this stage, we find unavailing Patent Owner’s arguments that Petitioner does not explain how to combine Shteynberg and Kawabata, and “in examining the preferred embodiments of Shteynberg and Kawabata, such a combination would not be functional.” Prelim. Resp. 40; *see also id.* at 40–42 (addressing Shteynberg and Kawabata’s embodiments). We view these arguments as arguing that Shteynberg and Kawabata’s teachings cannot be physically combined, which is the incorrect focus. *See Allied Erecting*, 825 F.3d at 1381; *KSR*, 550 U.S. at 420–21. Our reasoning above regarding combining Shteynberg and Arai with the other references also applies to Patent Owner’s remaining arguments about making this combination. *See supra* Sections V.D.6, VI.B, VII.B.

C. Claim 1’s Firing Logic Configured to Determine Firing Order

The parties dispute whether the Shteynberg, Arai, and Kawabata combination teaches the following limitation of claim 1: “the control system further including firing logic configured to determine a firing order of the plurality of strings.” Pet. 64–67; Prelim. Resp. 43–50.

As we discuss above, we already find that Shteynberg teaches this limitation. *See supra* Section V.D.5. Our reasoning above also applies to the arguments the parties make here about what Shteynberg teaches. *See supra* Section V.D.5; Pet. 31–33; Prelim. Resp. 43–46.

However, the parties also dispute whether Kawabata teaches this limitation. Pet. 65–67; Prelim. Resp. 46–50. At this stage, we agree with Petitioner and find that Kawabata teaches this limitation. In particular, Kawabata teaches “scan lighting” in that “the drive signal supplied to one

of the light-emitting elements 2 should have its phase shifted from that of the drive signal supplied to adjacent one of the light-emitting elements 2.”

Ex. 1012 ¶¶ 33, 70, Fig. 5 (illustrating a timing diagram of when the respective light-emitting elements may be turned ON and OFF). As illustrated in Figure 5, each of six light emitting elements 2 are turned on at different times, with the “adjacent one” of the light emitting elements 2 being turned next. *Id.* At this stage, we agree with Petitioner that Kawabata thus teaches a timing rule, which constitutes firing logic. Pet. 66.

We find unavailing Patent Owner’s argument that “Kawabata only supplies a single current to each light emitting element,” and thus “does not supply a plurality of on-state drive currents in a certain firing order.” Prelim. Resp. 46 (citing Ex. 1012 ¶ 70; Ex. 2001 ¶ 96). As we discuss above, supplying a plurality of on-state drive currents refers to supplying an on-state drive current for each of the strings. *See supra* Section V.D.3.

We also find unavailing Patent Owner’s arguments that Kawabata relates to CCFLs and Shteynberg relates to LEDs. Prelim. Resp. 46–48. In particular, Patent Owner argues that Kawabata “provide[s] adequate display brightness while reducing power consumption,” which “is not relevant to LED light strips which can be run at higher brightness levels without interruption and drawing far less power than a comparable CCFL.” *Id.* at 48. We do not view Kawabata’s teachings as being so limited. *KSR*, 550 U.S. at 420 (explaining that the ordinary artisan recognizes “that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle”).

We also find unavailing Patent Owner’s argument that “Kawabata does not use the words ‘rule’ or ‘logic’ anywhere in its specification,” and

that “[t]he ‘timing rule’ that Petitioner describes [is] not disclosed in the references at all.” Prelim. Resp. 48. A reference does not have to satisfy an *ipsis verbis* test to disclose a claimed element. *See In re Gleave*, 560 F.3d at 1334.

In addition, Patent Owner disputes that Kawabata’s “timing rule,” constitutes firing logic in accordance with the ’710 patent. Prelim. Resp. 48. The parties should consider addressing the construction of “firing logic” during trial, in accordance with our Rules.

IX. ALLEGED OBVIOUSNESS OVER SHTEYNBERG, ARAI, KAWABATA, AND KOBORI

Petitioner argues that the combination of Shteynberg, Arai, Kawabata, and Kobori renders claim 11 obvious. Pet. 72–74. The parties’ arguments are substantively the same as their arguments for the grounds asserting (i) the Shteynberg, Arai, and Kobori combination and (ii) the Shteynberg, Arai, Zhang, and Kobori combination. Accordingly, our reasoning for these grounds also applies here.

X. ALLEGED OBVIOUSNESS OVER SHTEYNBERG, ARAI, KAWABATA, AND LEE

Petitioner argues that the combination of Shteynberg, Arai, Kawabata, and Lee renders claim 13 obvious. Pet. 74–81. In order to provide guidance to the parties, we address disputed issues for this ground. CTPG 6.

A. Combining Shteynberg, Arai, Kawabata, and Lee

We above address the parties’ arguments concerning combining Shteynberg, Arai, and Kawabata. *See supra* Section VIII.B. The parties also dispute whether Lee is properly combined with these references. Pet. 74–76; Prelim. Resp. 52–58.

Petitioner argues that one of ordinary skill in the art “would have been motivated to modify the lighting system disclosed in the Shteynberg-Arai-Kawabata combination to introduce the multiple driving circuits described in Lee.” Pet. 75 (citing Ex. 1005 ¶ 128). Petitioner argues that “a primary motivation of one of ordinary skill in the art would have been to **reduce excessive driving voltage or current**, as described in Lee.” *Id.* (citing Ex. 1005 ¶ 130); *see also id.* (citing Ex. 1013 ¶¶ 36 (arguing that Lee solves “the problems of the conventional LED connection structure requiring an excessive driving voltage or current”), 40).

Patent Owner argues that Shteynberg teaches away from having multiple driving circuits, as described in Lee. Prelim. Resp. 53–54. More specifically, Patent Owner argues that Shteynberg teaches that the “prior art with multi-output or separate power converters and controllers for each LED string of an LED array increases the cost and size of the LED driver, and reduces the functionality and efficiency of the driver.” *Id.* at 53 (quoting Ex. 1007 ¶ 10). Patent Owner adds that Shteynberg teaches that its “various embodiments of the invention provide innumerable advantages for energizing a plurality of series (strings) of LEDs, using a single power converter and controller for an entire LED array, and does not utilize multiple, separate power converters and controllers for each LED string.” *Id.* at 54 (quoting Ex. 1007 ¶ 11).

At this stage, we question whether Shteynberg sufficiently criticizes, discredits, or otherwise discourages the combination Petitioner proposes. *See In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004). Although Shteynberg teaches using a single controller, Shteynberg also teaches that its controller “may be embodied as one or more controllers 125, adapted to perform the functionality” Shteynberg teaches. *Compare* Ex. 1007 ¶¶ 10–

11, *with id.* ¶ 51; *Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013) (“A reference does not teach away . . . if it merely expresses a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into the invention claimed.”) (citation omitted). Moreover, Patent Owner does not identify Lee as also employing multiple power converters. *See* Prelim. Resp. 54.

The parties should consider addressing this issue further during trial, in accordance with our Rules.

B. Claim 13’s Current Supply Circuit

The parties dispute whether the combination of Lee and Kawabata teaches the following limitation of claim 13: “the current supply circuit comprises a plurality of phase drivers configured to supply a plurality of on-state drive currents at a plurality of times.” Pet. 76–79; Prelim. Resp. 59–63.

The parties’ dispute centers on whether Kawabata, in combination with Lee, teaches “phase drivers.” In particular, Kawabata teaches the following:

[T]he controller 30 may supply a drive signal, which has a first signal intensity high enough to turn each of the light-emitting elements 2 ON in 50% of one period thereof and a second signal intensity low enough to turn the light-emitting element 2 OFF in the remaining 50% of the one period, to one of the light-emitting elements 2 after another at different points of times. In this case, the drive signal supplied to one of the light-emitting elements 2 *should have its phase shifted from that of the drive signal supplied to adjacent one of the light-emitting elements 2.*

Ex. 1012 ¶ 70 (emphasis added).

Petitioner argues that “[p]hase-shifting is equivalent to having the current signals starting at different times in a firing cycle.” Pet. 79 (citing

Ex. 1005 ¶ 97). Petitioner argues that thus the combination of Lee and Kawabata teaches phase drivers. *Id.* In contrast, Patent Owner argues that “Kawabata in describing ‘phase shifting’ is describing turning one light on and then turning on another in a pre-programmed sequence.” Prelim. Resp. 61 (citing Ex. 2001 ¶¶ 114–115).

At this stage, we agree with Petitioner and find that Kawabata’s teaching means that the currents for adjacent light-emitting elements are phase shifted. Ex. 1012 ¶ 70. We find persuasive Mr. Betancourt’s testimony that “a person of ordinary skill in the art would understand that in the time-domain, phase-shifting is a synonym for applying a time-offset, therefore, it is equivalent to having the current signals starting at different times in a firing cycle.” Ex. 1005 ¶ 97. We find that this testimony is consistent with Kawabata’s teachings which contrast the phase of two drive signals (i.e., “the drive signal supplied to one of the light-emitting elements 2 should have its phase shifted from that of the drive signal supplied to adjacent one of the light-emitting elements 2”). Ex. 1012 ¶ 70.

In addition, we find unavailing Patent Owner’s arguments comparing Kawabata and Lee’s teachings to a specific embodiment of a phase driver in the ’710 patent. *See* Prelim. Resp. 61–63. Patent Owner provides an insufficient basis to limit the claim to the specific embodiment. *See Williamson*, 792 F.3d at 1347. Patent Owner can address this as an issue of claim construction during trial, in accordance with our Rules, if Patent Owner believes that the claim should be so narrowed.

In sum, at this stage, we find Petitioner’s showing for claim 13 sufficient for institution.

XI. CONCLUSION

For the foregoing reasons, we determine that Petitioner has demonstrated that there is a reasonable likelihood that it would prevail in proving the unpatentability of at least one of the challenged claims of the '710 patent. We thus institute an *inter partes* review of all of the challenged claims of the '710 patent on all grounds asserted in the Petition. *See* 37 C.F.R. § 42.108(a).

Any findings or conclusions in this Decision are made only for the purposes of institution and are not dispositive of any issue. We have not made a final determination with respect to the patentability of any challenged claim. Our final determination will be based on the record as fully developed during trial, including any evidence or argument timely presented by the parties under our Rules.

XII. ORDER

In consideration of the foregoing, it is hereby

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of the '710 patent is instituted on all of the challenged claims and all grounds asserted in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial commences on the entry date of this Decision.

IPR2023-01412
Patent 8,330,710 B2

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