

Western Digital Technologies, Inc..

v.

Longitude Licensing Ltd.

U.S. Patent No. 9,207,701 B2

IPR2023-01230

Longitude's Hearing Demonstratives

October 24, 2024

IPR2023-01230
Longitude Licensing Ltd.
Ex. 2006, Page 1 of 36

Argument Roadmap

- Ground 1
 - Alleged advantages of variable output voltage and/or “configurable stage topology” are unsupported.
 - Multiple output voltages inconsistent with [1.3] and claim 2 motivation.
 - Petitioner does not dispute PO’s evidence of no reasonable expectation of success if combination involves multiple output voltages.
 - No motivation to use Zhang as base reference.
- Ground 2
 - Modifications to Javanifard’s Embodiments 1 and 3 are based on hindsight.
 - No motivation or reasonable expectation of success for limitations [1.3] or claim 2 under Petitioner’s new “multiple output voltages” theory.

Petition and expert declaration provided no detail regarding different output voltages

- Petitioner's expert identified only three paragraphs as allegedly showing the supply of ***different*** output voltages in Ex. 1003:
 - Paragraph 120
 - Paragraph 122
 - Paragraph 134

Sur-Reply at 4 (citing Ex. 2004, 25:1-9, 25:24-28:9).

Cited paragraphs all teach only a single output voltage, regardless of input voltage

Paragraph 120

120. Javanifard describes providing a variable stage charge pump to “accommodate a given output level for different charge pump power supply input levels.” EX1006, Javanifard, 2:22-24; *see also* EX1005, Zhang, FIG. 8 (providing the same output voltage level for different power supply input levels). Specifically, to “accommodate a given output level” (EX1006, Javanifard, 2:22-24) for the first input node with a lower power supply voltage, a POSITA would have configured the variable stage charge pump of FIG. 1 of Javanifard according to row 3 of Table 1 below, because row 3 of Table 1 provides a first (higher) number of serially connected booster stages to provide a higher voltage boost (e.g., by serially connecting charge pumps 110 and 120), compared to row 1 of Table 1 (by providing

only charge pump 110 in operation and thereby having a lower number of serially connected booster stages). Connecting more stages in series provide a higher voltage boost compared to using a smaller number of stages in series, as each stage in the charge pump contributes to increasing the voltage level, and the total voltage boost is the cumulative effect of all the stages.

TABLE 1			
Switch 130	Switch 131	Charge Pump 110	Charge Pump 120
OFF	OFF	ON	OFF
OFF	ON	ON	parallel-coupled to charge pump 110
ON	OFF	ON	series-coupled to charge pump 110
ON	ON	N/A	N/A

a second number of booster stages, the second number being less than first number

a first number of booster stages

EX1006, Javanifard, Table 1, annotated

Ex. 1003, ¶120

Cited paragraphs all teach only a single output voltage, regardless of input voltage

Paragraph 122

122. Javanifard describes that “[i]n this configuration [of row 3 of Table 1], charge pump 100 will provide approximately twice the output voltage at node 150 as the previous two cases [including row 1 of Table 1].” EX1006, Javanifard, 3:60-63. A POSITA would have understood that this statement of “approximately twice the output voltage at node 150” applies when the input voltage levels are the same, and in a design to accommodate “a given output level for different charge pump power supply input levels,” the configuration of row 3 with more serially-connected stages provides more voltage boost for a lower power supply input level.

Ex. 1003, ¶122

Cited paragraphs all teach only a single output voltage, regardless of input voltage

Paragraph 134

134. **Second**, Javanifard describes changing the booster circuitry from a higher number (e.g., 4) of booster stages corresponding to a lower power supply voltage to a lower number (e.g., 2) of booster stages when the power supply voltage is higher. EX1006, Javanifard, 1:8-11 (“providing a charge pump having a variable number as opposed to a fixed number of stages according to charge pump power supply input levels and desired charge pump output levels”); EX1006, Javanifard, 5:65-66 (“The control for the switches would be a function of the available power supply voltage, VPP, and the desired variable stage charge pump output voltage.”).

Specifically, as shown in Table 1 below, the number of the booster stages of the booster circuitry is changed (e.g., reduced from 4 to 2) by changing switch 130 from on (row 3) to off (row 1) to provide the same output voltage level, when the charge pump power supply input level increases.

TABLE 1

Switch 130	Switch 131	Charge Pump 110	Charge Pump 120	
OFF	OFF	ON	OFF	a second number of booster stages, the second number being less than first number
OFF	ON	ON	parallel-coupled to charge pump 110	
ON	OFF	ON	series-coupled to charge pump 110	a first number of booster stages
ON	ON	N/A	N/A	

Ex. 1003, ¶122

Petition and expert declaration provided no detail regarding different output voltages

Petition’s analysis of limitation [1.3]:

Specifically, as shown in Table 1 below, the number of the booster stages of the booster circuitry is changed (e.g., reduced from 4 to 2) by changing switch 130 from on (row 3) to off (row 1) to provide the same output voltage level, when the charge pump power supply input level increases.

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Switch 130	Switch 131	Charge Pump 110	Charge Pump 120
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a first number of booster stages

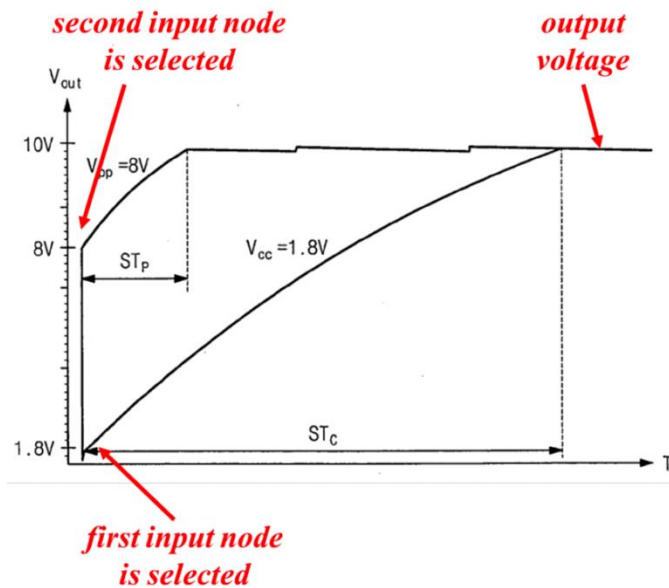
Pet. 39-40 (quoted by Sur-Reply 10)

Petition and expert declaration provided no detail regarding different output voltages

Petition's analysis of claim 2:

First, as shown in FIG. 8 below, Zhang describes that the output voltage (e.g., $V_{out} = 10V$) is the same when the first input node (e.g., $V_{CC} = 1.8V$) is selected and when the second input node (e.g., $V_{PP} = 8V$) is selected.

Fig. 8



Second, Javanifard teaches this element as well. Javanifard describes using its variable charge pump to “accommodate a given output level for different charge pump power supply input levels.” EX1006, Javanifard, 2:21-24; EX1006, Javanifard, 1:8-12 (“providing a charge pump having a variable number as opposed to a fixed number of stages according to charge pump power supply input levels and desired charge pump output levels”); EX1006, Javanifard, 5:59-65 (“the designer can provide a control to the switches that will switch stages in and out, or change the coupling of the stages to ensure the appropriate output voltage from the variable stage charge pump regardless of the input voltage.”).

As such, in the combination of Zhang and Javanifard, a given output level is provided for different charge pump power supply input levels, e.g., by changing the configuration of the variable stage charge pump based on the required output level and the different charge pump power supply levels. Specifically, the output voltage is the same when the first input node is selected (e.g., with a lower input power supply voltage corresponding to a higher number of pump stages) and when the second input node is selected (e.g., with a higher input power supply voltage corresponding to a lower number of power stages).

Not obvious to provide only a single output voltage

Dr. Stiegler merely repeats what is in the Petition about the obviousness of using different power supplies to achieve a given output level, and that such configuration was well-known; however, he fails to explain the reason why one of ordinary skill in the art would have used two power supplies to provide only one output supply voltage. Thus, his testimony is conclusory and unsupported. *See Xerox Corp. v. ByteMark, Inc.*, IPR2022-00624, Paper 9 at 15 (PTAB Aug. 24, 2022) (precedential).

Alleged “foundational advantage” of “configurability of stage topology” not mentioned in Petition and unsupported by expert testimony

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

WESTERN DIGITAL TECHNOLOGIES, INC.,
Petitioner
v.
LONGITUDE LICENSING LTD.,
Patent Owner

IPR2023-01230
U.S. Patent No. 9,207,701

PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. § 312 AND 37 C.F.R. § 42.104

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

WESTERN DIGITAL TECHNOLOGIES, INC.,
Petitioner
v.
LONGITUDE LICENSING LTD.,
Patent Owner

IPR2023-01230
U.S. Patent No. 9,207,701

DECLARATION OF DR. HAVEY J. STIEGLER
UNDER 37 C.F.R. § 1.68
IN SUPPORT OF PETITION FOR INTER PARTES REVIEW

1

EX1003 / Page 1 of 141
Western Digital Technologies, Inc.

Shifting theories highlight Petitioner's hindsight approach

5 Q. Okay. Did you use the claim language as a
6 roadmap to determine what aspects of the various
7 embodiments that you combined together?

8 A. Well, I mean, in this case yes, because --
9 yeah. Of course.

Argument Roadmap

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 - No motivation to use Zhang as base reference.
- Ground 2
 - Modifications to Javanifard’s Embodiments 1 and 3 are based on hindsight.
 - No motivation or reasonable expectation of success for limitations [1.3] or claim 2 under Petitioner’s new “multiple output voltages” theory.

No alleged motivation to arrive at limitations [1.3] or claim 2 if output voltage varies

Petition’s analysis of limitation [1.3]:

Specifically, as shown in Table 1 below, the number of the booster stages of the booster circuitry is changed (e.g., reduced from 4 to 2) by changing switch 130 from on (row 3) to off (row 1) to provide the same output voltage level, when the charge pump power supply input level increases.

TABLE 1			
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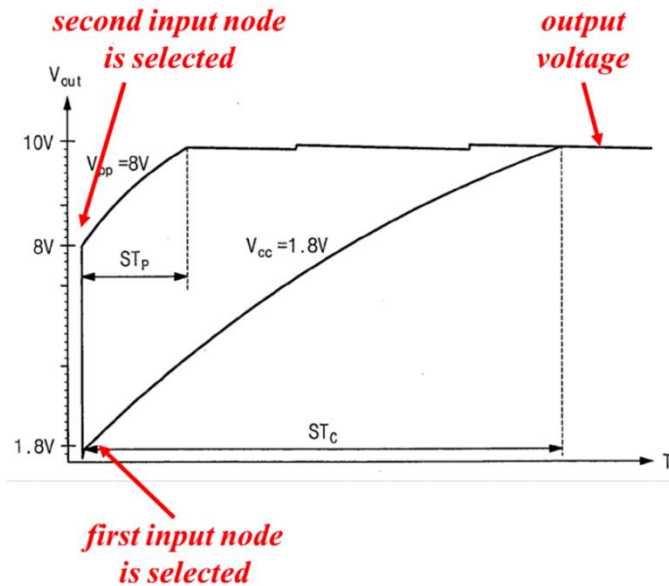
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Second, Javanifard teaches this element as well. Javanifard describes using its variable charge pump to “accommodate a given output level for different charge pump power supply input levels.” EX1006, Javanifard, 2:21-24; EX1006, Javanifard, 1:8-12 (“providing a charge pump having a variable number as opposed to a fixed number of stages according to charge pump power supply input levels and desired charge pump output levels”); EX1006, Javanifard, 5:59-65 (“the designer can provide a control to the switches that will switch stages in and out, or change the coupling of the stages to ensure the appropriate output voltage from the variable stage charge pump regardless of the input voltage.”).

As such, in the combination of Zhang and Javanifard, a given output level is provided for different charge pump power supply input levels, e.g., by changing the configuration of the variable stage charge pump based on the required output level and the different charge pump power supply levels. Specifically, the output voltage is the same when the first input node is selected (e.g., with a lower input power supply voltage corresponding to a higher number of pump stages) and when the second input node is selected (e.g., with a higher input power supply voltage corresponding to a lower number of power stages).

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 - No motivation or reasonable expectation of success for limitations [1.3] or claim 2 under Petitioner’s new “multiple output voltages” theory.

Unrebutted PO expert testimony of no reasonable expectation of success

(91) In sum, Zhang and Javanifard have significant incompatibilities with regard to the control of the proposed combined charge pump. Dr. Stiegler makes no attempt to address the incompatibilities and effectively sweeps the entire issue under the rug. To the extent Dr. Stiegler's proposed combination involves generating multiple output voltages, it is my opinion that Dr. Stiegler has not established a reasonable expectation of success. [e.g., "Charge pump, being a pure analog design, carries an inherent risk of unanticipated effects, which when overlooked can significantly reduce circuit performance or cripple the circuit operation." Pan & Samaddar 2006, *Preface*]

Ex. 2003 ¶91 (cited by POR 30, Sur-Reply 19-22).

The '701 patent provides extensive teachings regarding control that are lacking from Petitioner's prior art combination

FIG. 1 is a block diagram illustrating a supply voltage
50 generating circuit according to an exemplary embodiment of
the present invention. As shown in FIG. 1, the supply voltage
generating circuit includes the power-supply step-down unit
10, booster 20 and switch element SW1, which is of single-
pole, double-throw type. The switch element SW1 switches
55 between application of the voltage of an external power sup-
ply VDDP1 to power supply Vdd of the booster 20 directly or
as power supply VDLP following stepping down of the volt-
age of an external power supply VDDP2 by the power-supply
step-down unit 10.

60 The booster 20 includes a pre-stage booster circuit 21a, a
post-stage booster circuit 21b, and single-pole, double-throw
switch element SW2 for switching between the booster cir-
cuits 21a and 21b. The booster 20 generates a boosted voltage
from power supply Vdd by charge pumping of the capacitor
65 elements using a driving signal S0, and supplies the boosted
voltage to a load circuit, an example of which is a circuit for
driving a word line, as power supply VPP. At this time the

switch element SW2 changes over the number of booster
stages in the booster 20 to one stage, namely the booster
circuit 21b, or to two stages, namely the booster circuits 21a
and 21b.

The booster circuit 21a receives the driving signal S0 as an 5
input and outputs a signal (a first boosted signal) having an
amplitude between ground potential and a potential that is
double the potential of the external power supply VDDP1.
Further, the booster circuit 21b receives a signal (a second
boosted signal) having an amplitude between ground poten- 10
tial and the potential of power supply VDLP, or the output
signal (the first boosted signal) of the booster circuit 21a, as
an input, boosts the signal and outputs the boosted signal as
power supply VPP. The switch element SW2 is switched to
the first boosted signal when the switch element SW1 has 15
been switched to the external power supply VDDP1, and the
switch element SW2 is switched to the second boosted signal
when the switch element SW1 has been switched to the output
(VDLP) of the power-supply step-down unit 10.

E.g., Ex. 1001, 4:49-5:19 (cited by Sur-Reply 20-21); see *also*, *e.g.*, Ex. 1001
4:24-28, 6:6-7:12, 7:20-21 & FIGS. 4A-4B, 8:22-58, 9:16-16 & FIG. 5, 10:29-41.

Argument Roadmap

- Ground 1
 - Alleged advantages of variable output voltage and/or “configurable stage topology” are unsupported.
 - Multiple output voltages inconsistent with [1.3] and claim 2 motivation.
 - Petitioner does not dispute PO’s evidence of no reasonable expectation of success if combination involves multiple output voltages.
 - No motivation to use Zhang as base reference.
- Ground 2
 - Modifications to Javanifard’s Embodiments 1 and 3 are based on hindsight.
 - No motivation or reasonable expectation of success for limitations [1.3] or claim 2 under Petitioner’s new “multiple output voltages” theory.

Petitioner must justify starting point of an obviousness combination

Stated differently, Petitioner does not identify teachings from Yonghong that would have been valuable to a POSITA whose goal was to provide select-fire operation or teachings that a POSITA would have wanted to combine with Schacherer. In the absence of persuasive reasoning, we find that Petitioner's selection of Yonghong as the starting point for its obviousness combination is based on impermissible hindsight.



DynaEnergetics Europe GmbH v. SWM Int'l, LLC, IPR2022-01372, Paper 27 at 31 (PTAB Feb. 5, 2024) (quoted by POR 33, Sur-Reply 22-23).

Undisputed that Javanifard alone accomplishes all alleged benefits

(106) The only thing that Dr. Stiegler uses from Zhang is the input switch 200, but Dr. Stiegler never explains why that switch is needed — e.g., what does Javanifard lack that Zhang's input switch 200 provides? This is a critical question that must be addressed. Otherwise, there is no motivation to combine the two references, as it is clear that Javanifard by itself already accomplishes all of the design goals and benefits that Dr. Stiegler alleges his proposed combination of Zhang and Javanifard would produce.

Ex. 2003, ¶106 (cited by Sur-Reply, 22; POR 33-34)

Board's Institution Decision

Petitioner here provided sufficient fact-based evidence that one of ordinary skill would have had reason to modify Zhang with Javanifard to overcome the disadvantages of using a fixed pump stage to save space and improve flexibility (Pet. 20–21). Specifically, Zhang describes a fixed number of stages that would be unable to provide multiple output supply voltages when desired or necessary. Javanifard addressed this disadvantage by replacing the fixed booster circuitry with variable booster circuitry. Ex. 1006, 1:48–59. While it is true that Zhang describes only supplying a single voltage level, the reason to apply Javanifard to Zhang is to avoid redundancy when a device requires more than one voltage level by providing a single booster circuit capable of delivering multiple supply levels instead of requiring multiple fixed circuits that take up space and reduce flexibility. Petitioner's reasoning is therefore logical and consistent with the objectives disclosed by Javanifard.

ID, 29-30 (cited by POR, 5).

Petitioner did not provide a non-hindsight reason for using Zhang as the primary reference

5 Q. Okay. Did you use the claim language as a
6 roadmap to determine what aspects of the various
7 embodiments that you combined together?

8 A. Well, I mean, in this case yes, because --
9 yeah. Of course.

Ex. 2003, 35:5-9 (quoted by POR, 34); Sur-Reply 22-23.

Hindsight selection of primary reference is impermissible

Petitioner does not identify any persuasive reason for basing its obviousness analysis on Yonghong, when Schacherer already provides select-fire operation in an internally orienting perforating gun. Again, Petitioner's selection of Yonghong appears to be based on impermissible hindsight.



DynaEnergetics Europe GmbH v. SWM Int'l, LLC, IPR2022-01372, Paper 27 at 32 (PTAB Feb. 5, 2024) (quoted by POR 33, Sur-Reply 22-23); see Pet. 19-23.

Argument Roadmap

- Ground 1
 - Alleged advantages of variable output voltage and/or “configurable stage topology” are unsupported.
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 - Petitioner does not dispute PO’s evidence of no reasonable expectation of success if combination involves multiple output voltages.
 - No motivation to use Zhang as base reference.
- Ground 2
 - Modifications to Javanifard’s Embodiments 1 and 3 are based on hindsight.
 - No motivation or reasonable expectation of success for limitations [1.3] or claim 2 under Petitioner’s new “multiple output voltages” theory.

Petition's Proposed Combination

selecting one of a first input node...and a second input node

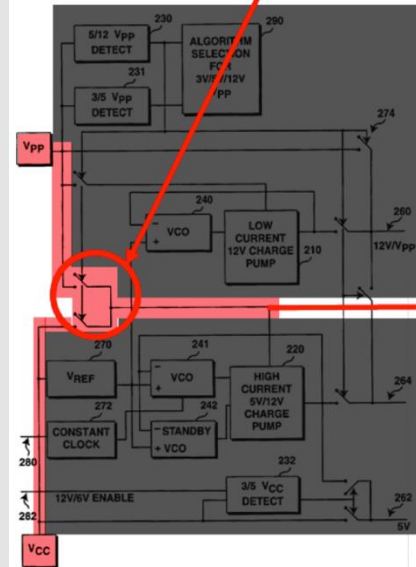


Figure 2

booster circuitry

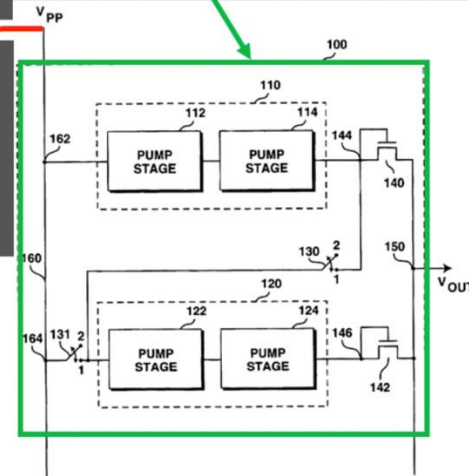


Figure 1

Example C (Embodiments 1 and 2 of Javanifard Combined)

Board's Institution Decision

Dr. Stiegler's testimony does not address Patent Owner's concern. Dr. Stiegler asserts that Javanifard "explicitly provides motivations to apply its teaching of selection from multiple power sources of Embodiment 2 [Figure 2] to the variable stage charge pump of Embodiments 1 or 3 [Figures 1 and 3], by providing the selected power supply to the variable stage charge pump." Ex. 1003 ¶ 207. However, Dr. Stiegler merely repeats what is in the Petition about the obviousness of using different power supplies to achieve a given output level, and that such configuration was well-known; however, he fails to explain the reason why one of ordinary skill in the art would have used two power supplies to provide only one output supply voltage. Thus, his testimony is conclusory and unsupported. *See Xerox Corp. v. ByteMark, Inc.*, IPR2022-00624, Paper 9 at 15 (PTAB Aug. 24, 2022) (precedential).

ID, 47 (cited by Sur-Reply, 1-2).

Board's Institution Decision

Specifically, where Figure 2 shows two different charge pumps, one of low current and the other of high current, Petitioner has not explained the reason to eliminate these two and replace them with a single charge pump as illustrated in Figures 1 and 3. For example, Petitioner has not asserted equivalency between the structures that would have led the POSITA to replace one with the other. *Compare Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 683 F.3d 1356, 1364 (Fed. Cir. 2012) (“strong case of obviousness based on the prior art references of record” because the claim “recites a combination of elements that were all known in the prior art, and all that was required to obtain that combination was to substitute one well-known . . . agent for another.”). Indeed, as indicated by Patent Owner, replacing the two charge pumps in Figure 2 with the charge pump of Figures 1 or 3 results in a circuit with only one output supply voltage, rather than three supply outputs, and therefore on the current record does not appear to be equivalent to the circuit in Figure 2 and its application for flash memory.

Board's Institution Decision

Thus, based on the evidence before us at this time, Petitioner's reason to use two different power sources to provide the same level of supply voltage appears to change the principle upon which Javanifard's circuitry in Figure 2 operates. *See Adidas AG v. Nike, Inc.*, 963 F.3d 1355, 1359 (Fed. Cir. 2020) (affirming PTAB's decision not finding obviousness where a proposed modification would "change the principles under which [the prior art] operates").



ID, 47 (cited by Sur-Reply, 1-2).

Petitioner's counterargument is based on selecting Embodiment 1 or Embodiment 3 as the “primary embodiment”

First, Petition proposes no modification, much less “extensive modification” to Javanifard’s Figure 2 as asserted by PO. Petition’s combination simply modifies Embodiments 1 and 3 (primary embodiments) by applying the power supply source selection feature of Embodiment 2 (secondary embodiment) to the input of the charge pump. Petition’s combination does not modify FIG. 2.

Petitioner must justify starting point of an obviousness combination

Stated differently, Petitioner does not identify teachings from Yonghong that would have been valuable to a POSITA whose goal was to provide select-fire operation or teachings that a POSITA would have wanted to combine with Schacherer. In the absence of persuasive reasoning, we find that Petitioner's selection of Yonghong as the starting point for its obviousness combination is based on impermissible hindsight.



DynaEnergetics Europe GmbH v. SWM Int'l, LLC, IPR2022-01372, Paper 27 at 31 (PTAB Feb. 5, 2024) (quoted by POR 33, Sur-Reply 22-23).

Unrebutted testimony that Petitioner failed to explain Javanifard's Embodiments 1 or 3 as the starting point for combination

4. Combining Javanifard With Itself Provides No Advantages Beyond Javanifard's Figure-2 Embodiment Alone

(137) The only thing that Dr. Stiegler adds is the switch from Figure 2, configured in a way that Javanifard neither illustrates nor describes, but Dr. Stiegler never explains why that switch is needed or why a person of ordinary skill would be motivated to do that. Javanifard's Figure 2 already has everything one would ever need for a system. What does Figure 2 lack that is improved by eliminating all of its functionality and then replacing it with a single charge pump circuit? This is a critical question that must be addressed. Otherwise, there is no motivation for a person of ordinary skill to produce the proposed combination, as it is clear that Javanifard's Figure 2 by itself already accomplishes all of the design goals and benefits that Dr. Stiegler alleges his proposed combination would produce.

Ex. 2003, ¶¶133-140 (cited by Sur-Reply 28-29).

Petitioner did not provide a non-hindsight reason for using Embodiments 1 or 3 as the primary embodiment

5 Q. Okay. Did you use the claim language as a
6 roadmap to determine what aspects of the various
7 embodiments that you combined together?
8 A. Well, I mean, in this case yes, because --
9 yeah. Of course.

Ex. 2003, 35:5-9 (quoted by POR, 34); Sur-Reply 22-23.

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 - Modifications to Javanifard’s Embodiments 1 and 3 are based on hindsight.
 - No motivation or reasonable expectation of success for limitations [1.3] or claim 2 under Petitioner’s new “multiple output voltages” theory.

No alleged motivation to arrive at limitations [1.3] or claim 2 if output voltage varies

Petition's analysis of limitation [1.3]:

Second, as discussed at Ground 1:[1.3], Javanifard describes changing the booster circuitry from a higher number (e.g., 4) of booster stages corresponding to a lower power supply voltage to a lower number (e.g., 2) of booster stages when the power supply voltage is higher. EX1006, Javanifard, 1:8-12, 5:65-67. Specifically, as shown in Table 1 below, the number of the booster stages of the booster circuitry is changed (e.g., reduced from 4 to 2) by changing switch 130 from on (row 3) to off (row 1) to provide the same output voltage level, when the charge pump power supply input level increases.

Pet. 79-81 (cited by Sur-Reply 30)

No alleged motivation to arrive at limitations [1.3] or claim 2 if output voltage varies

Petition's Ground 2 analysis of claim 2:

3. Claims 2-3

For reasons explained above for Ground 1:[2.0] and [3.0], Javanifard teaches these elements. EX1003, ¶¶246-252.

Petition's Ground 1 analysis of claim 2:

Second, Javanifard teaches this element as well. Javanifard describes using its variable charge pump to “accommodate a given output level for different charge pump power supply input levels.” EX1006, Javanifard, 2:21-24; EX1006, Javanifard, 1:8-12 (“providing a charge pump having a variable number as opposed to a fixed number of stages according to charge pump power supply input levels and desired charge pump output levels”); EX1006, Javanifard, 5:59-65 (“the designer can provide a control to the switches that will switch stages in and out, or change the coupling of the stages to ensure the appropriate output voltage from the variable stage charge pump regardless of the input voltage.”).

As such, in the combination of Zhang and Javanifard, a given output level is provided for different charge pump power supply input levels, e.g., by changing the configuration of the variable stage charge pump based on the required output level and the different charge pump power supply levels. Specifically, the output voltage is the same when the first input node is selected (e.g., with a lower input power supply voltage corresponding to a higher number of pump stages) and when the second input node is selected (e.g., with a higher input power supply voltage corresponding to a lower number of power stages).

No reasonable expectation of success if output voltage varies

Sur-Reply at 30-31:

Furthermore, the Reply's new Ground 2 theory is essentially indistinguishable from its new Ground 1 theory, in that it alleges numerous different output voltages with no explanation of how these output voltages would actually be switched between in practice. As explained above with respect to Ground 1, Petitioner fails to establish a reasonable expectation of success for such a proposal.⁹

Sur-Reply 30-31.