

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ARASHI VISION (U.S.) LLC (D/B/A INSTA360),
Petitioner,

v.

GOPRO, INC.,
Patent Owner.

Patent No. 10,015,413

Inter Partes Review No. IPR2024-00984

PETITIONER'S REPLY TO PATENT OWNER RESPONSE

TABLE OF CONTENTS

	Page
I. CLAIM CONSTRUCTION	1
A. “non-uniform” Does Not Mean “non-linear”	1
B. No “determin[ing] a portion within the input image” (1[e]/2[c]) After “obtain[ing] the input image” (1[d]/2[b]) Requirement	3
II. GROUND 4: MEULEN-CHAO	4
A. Meulen Teaches “apply[ing] a transformation to the input image” (1[f]/2[d]) “capture[d]” By An “image sensor” (1[a]) And Obtained By “one or more [] processors [] included within a camera” (Claim 6)	4
1. Meulen’s media sources include internal media sources	4
2. Meulen applies non-uniform shifting to images captured by its built-in camera	6
3. Meulen performs aspect ratio conversion	7
B. Meulen Teaches “determin[ing] a portion within the input image” (1[e]/2[c])	7
C. Meulen Teaches “the transformation non-uniformly shifts the pixels” (1[g]/2[e])	10
1. “non-uniform”	10
2. “shift[ing]”	13
D. Chao Teaches “non-uniformly shift[ing] the pixels” (1[g]/2[e])	14
E. Motivation To Combine Meulen And Chao	17
F. Meulen Teaches Non-Uniform Shifting “based on (1) the input positions along the first axis, and (2) the input positions along the second axis” (1[g]/2[e])	18
G. PO Does Not Dispute Meulen-Chao’s Other Teachings	20
III. GROUND 1: FLEMING	20

TABLE OF CONTENTS

(continued)

	Page
A. A POSITA Would Have Been Motivated To Apply Fleming’s Non-Uniform Shifting By “one or more [] processors [] included within a camera” (Claim 6)	20
B. Fleming Teaches “determin[ing] a portion within the input image” (1[e]/2[c]).....	25
C. PO Does Not Dispute Fleming’s Other Teachings	26
IV. GROUND 3: OBARA-LIU	26
A. A POSITA Would Have Been Motivated To Perform Obara’s Non-Uniform Shifting By “one or more [] processors [] included within a camera” (Claim 6)	26
B. Obara Teaches “determin[ing] a portion within the input image” (1[e]/2[c])	27
C. PO Does Not Dispute Obara-Liu’s Other Teachings.....	28
V. THE BOARD SHOULD GIVE LITTLE/NO WEIGHT TO DR. FOROOSH’S OPINIONS	28
VI. THE OBJECTIVE EVIDENCE DOES NOT SUPPORT A FINDING OF NON-OBVIOUSNESS.....	29
A. There Is No Nexus.....	29
B. The Objective Evidence Falls Short.....	30
1. No copying.....	30
2. No “industry praise” of SuperView	31
3. No commercial success tied to SuperView.....	31
4. Long-felt need	31
VII. CONCLUSION.....	32

TABLE OF AUTHORITIES**Page(s)****Cases**

<i>Application of McLaughlin</i> , 558 C.C.P.A. 1310 (1971)	24
<i>E.I. du Pont de Nemours v. MacDermid Printing Sols., LLC</i> , 657 F. App’x 1004, 1014 (Fed. Cir. 2016)	23
<i>Fox Factory, Inc. v. SRAM, LLC</i> , 944 F.3d 1366 (Fed. Cir. 2019)	29
<i>Interactive Gift Express, Inc. v. CompuServe Inc.</i> , 256 F.3d 1323 (Fed. Cir. 2001)	3
<i>In re Keller</i> , 642 F.2d 413 (C.C.P.A. 1981)	18
<i>Phillips v. AWH Corp.</i> , 415 F.3d 1303 (Fed. Cir. 2005) (en banc)	1
<i>Tokai Corp. v. Easton Enterprises, Inc.</i> , 632 F.3d 1358 (Fed. Cir. 2011)	30

Petitioner's Exhibit List for *Inter Partes* Review of U.S. Patent No. 10,015,413

Exhibit Description	Exhibit #
U.S. Patent No. 10,015,413 to Woodman <i>et al.</i>	1001
Expert Declaration of Aggelos Katsaggelos	1002
File History of U.S. Patent No. 10,015,413	1003
U.S. Patent No. 7,158,158 to Fleming <i>et al.</i>	1004
U.S. Patent No. 8,649,635 to Liu <i>et al.</i>	1005
U.S. Pub. No. 2006/0279583 to Obara <i>et al.</i>	1006
U.S. Patent No. 7,693,500 to Meulen <i>et al.</i>	1007
U.S. Pub. No. 2008/0095470 to Chao <i>et al.</i>	1008
U.S. Patent No. 8,218,895 to Gleicher <i>et al.</i>	1009
U.S. Patent No. 7,496,243 to Oosawa	1010
Complaint, <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400, March 29, 2024	1011
Exemplary Infringement Claim Chart for U.S. Patent No. 10,015,413, <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400, March 29, 2024	1012
Declaration of W. Stella Mao “Mao Decl.”	1013
Reply Declaration of Dr. Aggelos Katsaggelos	1014 [NEW]
Transcript of June 24, 2025 Deposition of Dr. Hassan Foroosh	1015 [NEW]
Cambridge Online Dictionary Definition of “non-uniform”	1016 [NEW]

Exhibit Description	Exhibit #
Merriam-Webster Online Dictionary Definition of “deliver”	1017 [NEW]
PalmOne, Inc., “Using Your Treo™ 600 Smartphone” (2004)	1018 [NEW]
Brandon King, “Palm Treo 650 Review,” https://www.digitaltrends.com/mobile/palm-treo-650-review/ , (Aug. 23, 2019)	1019 [NEW]
PalmOne, Inc., “Using Your Treo™ 650 Smartphone” (2004)	1020 [NEW]
PalmOne, Inc., “Using Your Palm® Treo™ 700w Smartphone” (2005-2006)	1021 [NEW]
GSMarena, “Palm Treo 600,” https://web.archive.org/web/20121225073649/https://www.gsmarena.com/palm_treo_600-622.php , (Dec. 25, 2012)	1022 [NEW]
Leann McCallum, “Palm Treo 650 GSM/GPRS Review,” https://web.archive.org/web/20120724073445/https://www.geekzone.co.nz/content.asp?contentid=5639 , (Dec. 22, 2005)	1023 [NEW]
Ryan Kairer, “Treo 700wx Review,” https://web.archive.org/web/20120602112120/http://www.palminfocenter.com/news/9058/palm-treo-700wx-review/ , (Oct. 24, 2006)	1024 [NEW]
Charles Poynton, “Chroma subsampling notation,” (Jun. 24, 2008)	1025 [NEW]
Carl Garrard, “Canon G15 Review,” https://web.archive.org/web/20130601141708/https://photographic-central.blogspot.com/2013/01/canon-g15-review.html , (Oct. 2012)	1026 [NEW]

Exhibit Description	Exhibit #
Digital Photography Review, “Product timeline,” https://web.archive.org/web/20130516134834/http://www.dpreview.com/products/timeline?year=2012 (May 16, 2013).	1027 [NEW]
Canon, “PowerShot G15 Camera User Guide,” https://web.archive.org/web/20141219082714/https://gdlp01.c-wss.com/gds/2/0300008682/01/psg15-cug-en.pdf , (2012)	1028 [NEW]
Imaging Resource, “Canon PowerShot G15,” https://web.archive.org/web/20130116113308/https://www.imaging-resource.com/PRODS/canon-g15/canon-g15DAT.HTM , (Jan. 16, 2013)	1029 [NEW]
Ming Thein, “The Olympus E-PL5 PEN Lite review: a mini-OM-D,” https://web.archive.org/web/20120928082810/https://blog.mingthein.com/2012/09/26/olympus-e-pl5/ , (Sept. 26, 2012)	1030 [NEW]
ePhotozine, “Casio Exilim ZR1000 Hands-On Preview,” https://web.archive.org/web/20130612020408/https://www.ephotozine.com/article/casio-exilim-zr1000-hands-on-preview-20264 (Sept. 23, 2012)	EX1031 [NEW]
Trial Transcript of Dr. Villaseñor	EX1032 [NEW]
Imaging Resource, “Fujifilm XF1,” https://web.archive.org/web/20120921021110/https://www.imaging-resource.com/PRODS/fuji-xf1/fuji-xf1DAT.HTM , (Sept. 21, 2012)	EX1033 [NEW]
Backscatter, “Olympus PEN E-PL5 Camera with 14-42mm Lens,” https://web.archive.org/web/20200811032602/https://www.backscatter.com/Olympus-E-PL5-Black-Camera-with-14-42mm-Lens , (Aug. 11, 2020)	EX1034 [NEW]
Declaration of Mina Ching	EX1035 [NEW]

Exhibit Description	Exhibit #
Palm Products, https://web.archive.org/web/20050930222631/http://www.palm.com/us/products/ , (September 30, 2005)	EX1036 [NEW]
Palm, “Treo 650,” https://web.archive.org/web/20050721013704/http://www.palm.com/us/products/smartphones/treo650/multimedia.epl . (July 21, 2005)	EX1037 [NEW]
Trial Transcript of Rich Goodin	EX1038 [NEW]
Trial Transcript of Pablo Lema	EX1039 [NEW]
Simon Crisp, “GoPro Hero4 vs. GoPro Hero3+,” https://newatlas.com/gopro-hero4-vs-gopro-hero3plus/34090/ , (Oct. 5, 2014)	EX1040 [NEW]
Laura, “Here it is – the GoPro Hero 3+ review from our #GoProAdventures,” https://www.littlestuff.co.uk/here-it-is-the-gopro-hero-3-review-from-our-goproadventures/ , (Sept. 25, 2014)	EX1041 [NEW]

The challenged claims are unpatentable for the reasons set forth below.

I. CLAIM CONSTRUCTION

PO does not formally propose terms for construction, but its POR arguments (Paper 25) effectively ask the Board to narrow “non-uniform” and impose a certain order between limitations 1[e]/2[c] and 1[d]/2[b]. (EX1014, ¶7.)

A. “non-uniform” Does Not Mean “non-linear”

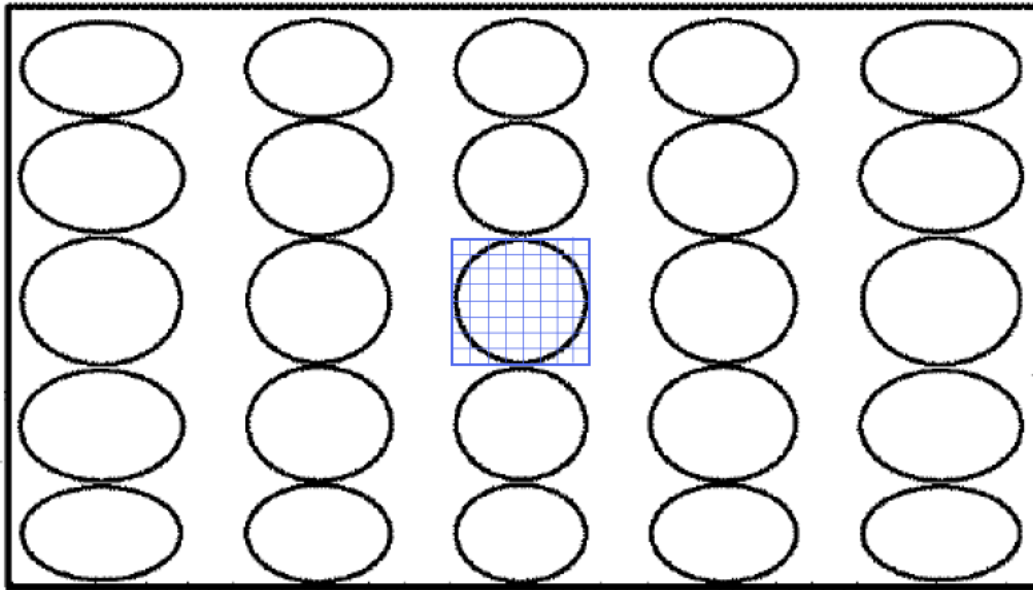
Consistent with the ordinary meaning (confirmed by intrinsic and extrinsic evidence), a POSITA would have understood “non-uniform” means not the same in all parts or areas. (EX1016.) PO fails to show otherwise.

PO argues that “non-uniform” should be limited to “non-linear”—*i.e.*, “[n]o two pixels will have the same amount of shift.” (POR, 6, 28.) But PO’s definition is inconsistent with the specification. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005) (en banc). The specification discloses non-uniform shifting as “using a linear scaling function” and then applying “non-linear warping.” (EX1001, 3:61-4:2; POR, 24 (PO agreeing that the ’413 claims encompass this embodiment).) Thus, “non-uniform” *cannot* be “non-linear” because, it may *also* involve a *linear* scaling. (EX1014, ¶¶8-11.)

The specification’s Figure 2B¹ (below) also shows that “non-uniform” is not non-linear. Image 216 contains a center circle formed from multiple pixels; each

¹ All annotations in color and emphasis added unless otherwise stated.

pixel of the center circle has the same zero shift (“center circle is fully corrected so that it maintains the original circular shape of the corresponding circle in the input image 212”). (EX1001, 4:22-25.) Thus, PO’s “[n]o two pixels will have the same amount of shift” fails. (EX1014, ¶¶10-11.)



216

(EX1001, Fig. 2B.)

PO’s support also fails. It points to passages that do not even use the term “non-uniform.” (POR, 6.) And it gestures at equations that its own expert admits are non-limiting. (EX1015, 41:13-25 (“It’s examples. ... the patent is not limited to only these equations.”).) Further, its expert did not consider any dictionary definitions nor did he know of such a requirement. (EX1015, 14:14-22.)

**B. No “determin[ing] a portion within the input image” (1[e]/2[c])
After “obtain[ing] the input image” (1[d]/2[b]) Requirement**

PO insists that “determin[ing]” must be after “obtain[ing].” According to PO, because “obtain[ing]” refers to “*an* input image” and “determin[ing]” refers to “*the* input image,” the two steps must be performed in a certain order. (POR, 17.) But because the ’413 specification does not “directly or implicitly require[] such a narrow construction,” the Board should reject PO’s interpretation. *Interactive Gift Express, Inc. v. CompuServe Inc.*, 256 F.3d 1323, 1342 (Fed. Cir. 2001) (“[u]nless the steps of a method actually recite an order, the steps are not ordinary construed to require one”).

For example, “vertical warp distortion” involves equations that pre-determine the portions corresponding to the percent of horizontal coordinates within the input image, *i.e.*, “determin[ing]” *before* “obtain[ing].” PO’s interpretation improperly excludes this embodiment, which its expert argues is encompassed by the ’413 claims. (EX2027, ¶¶37-38.) (EX1014, ¶¶12-15.)

Finally, PO misinterprets the prosecution history. It argues that during prosecution, “determin[ing]” was added to distinguish over art that “merely disclosed an image containing such a portion after a transformation was complete”—that is, the art did not actively “determine” the portion. (POR, 17-18.) However, the applicant distinguishing argument pertained to determined portions of *two* images—the art did not “determine a portion *within* the [same] input

image.” (EX1002, ¶24; EX1003, 39 (“[Osawa] is merely the result of the visuals captured within two images being compared and is not result of a transformation ... of other pixels in the input image.”); EX1014, ¶6.)

II. GROUND 4: MEULEN-CHAO

A. Meulen Teaches “apply[ing] a transformation to the input image” (1[f]/2[d]) “capture[d]” By An “image sensor” (1[a]) And Obtained By “one or more [] processors [] included within a camera” (Claim 6)

PO argues that Meulen’s wireless device does not apply a transformation to media source content (“input image”) captured by the built-in camera’s image sensor. (POR, 3, 10.) Claims 2 and 6, however, do not require the “input image” be captured by an image sensor of the claimed “system”—they require the *processor(s)* “*obtain* the input image” and “apply a transformation” to it, which Meulen does. (EX1014, ¶¶16-18.)

1. Meulen’s media sources include internal media sources

Even then, a “media source” is any source of media—not limited to an external source—and Meulen does not place such limits. (POR, 13, 16.) Contrary to PO’s arguments, a POSITA would understand “deliver” as send, provide, or make accessible electronically. (POR, 15; EX1017) Meulen confirms, describing media source content from an internal source and “stored in the frame buffer 506.” (EX1007, 11:66-12:5.) As Dr. Katsaggelos explains, *external* media source comes from *communications interface 512* (Figure 5 (below)), which is not directly

connected to *frame buffer 506*. This lack of a direct connection is because frame buffer 506 stores content from other (internal) media sources. Meulen's camera application also shows that images previewed on the display 502 are captured by its built-in camera (internal media source). (EX1007, 12:66-13:4; EX1015, 93:3-94:21; EX1014, ¶¶23-29.)

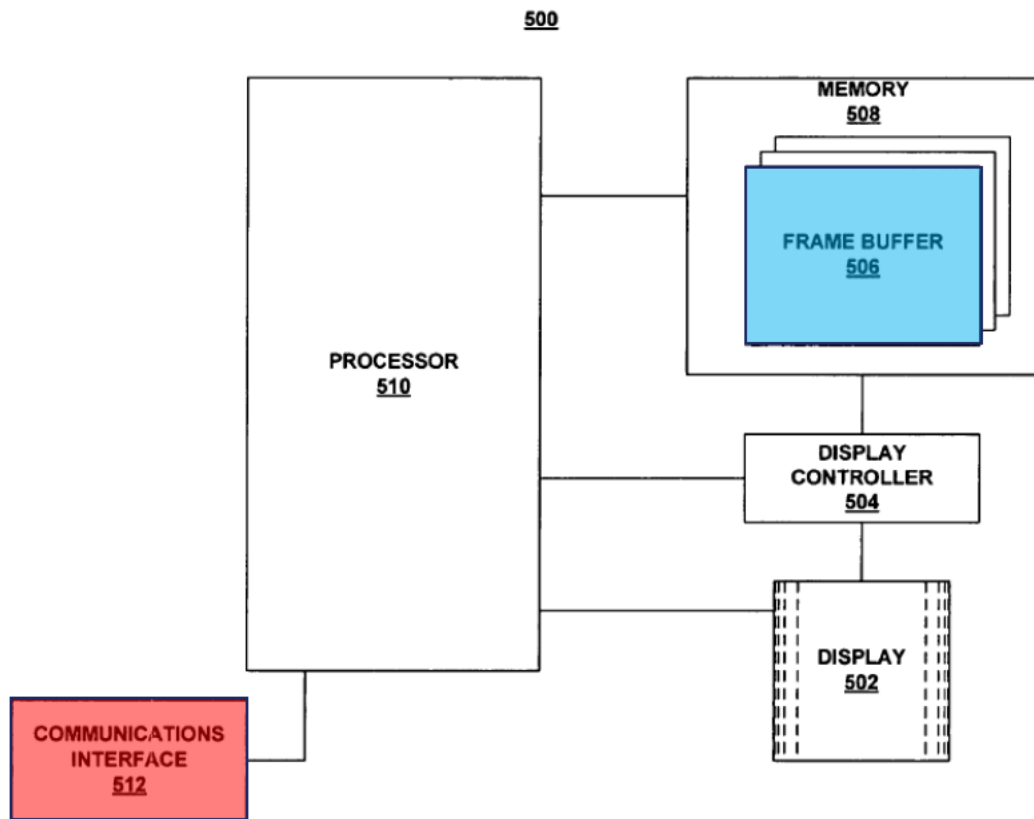


FIG. 5

(EX1007, Fig. 5.)

2. Meulen applies non-uniform shifting to images captured by its built-in camera

PO then tries to save its claims by arguing that it would not have been obvious for Meulen's device to apply non-uniform shifting to the images captured by its built-in camera. (POR, 15.) Meulen own disclosures show that PO is wrong. It discloses the device's processors applying its method to internal media source content: "display controller 504" is a processor that "appl[ies] image compression and/or scaling to the media source content stored in the frame buffer 506." (EX1007, 4:55-60, 11:66-12:5, 12:66-13:1; EX1014, ¶¶30-31.)

Also, Meulen's device is a Palm® Treo™. (EX1007, 2:12.) Palm Treos at that time displayed images captured by its built-in camera. (*See, e.g.*, EX1018, 63 ("[y]our Treo comes with an easy-to-use built-in camera, which allows you to instantly take, view, and share pictures"); EX1014, ¶32.)

And there is nothing about Meulen that requires off-camera specialized post-processing devices/software (POR, 15), especially since its "device 100 ... [is] a combination handheld *computer* and mobile telephone or smartphone." (EX1007, 2:9-11.) In fact, Meulen teaches "reduc[ing] [the] processing expense," so that its non-uniform shifting can be applied by the device's processors. (EX1007, 10:48-54 ("When performed by software, the sample-rate conversion may be implemented in registers ... *to minimize the number of accesses or taps and to reduce processing expense.*"); EX1014, ¶¶33-35.)

3. Meulen performs aspect ratio conversion

With no viable arguments on the merits, PO resorts to mischaracterizing Meulen. It argues that there is no need for Meulen to perform aspect ratio conversion. (POR, 16.) Again, that is not what Meulen discloses. (EX1007, 4:13-19 (“the media source content may comprise an aspect ratio and/or a resolution that differs from the aspect ratio and/or the resolution of the display ... for example, the media source content may have an aspect ratio of 3:2 ..., and the display may have an aspect ratio of 1:1”).) Palm Treos’ aspect ratios also do not match. (EX1022 (4:3 (640×480) and 1:1 (160×160, 320×320) aspect ratios for image sensor and display, respectively); EX1023 (same)); EX1024, (5:4 (1280×1024) and 1:1 (240×240) aspect ratios for image sensor and display, respectively).) Further, PO’s argument that other prior art used cropping, padding, and linear scaling is beside the point (POR, 16-17)—Meulen does not use cropping, padding, or linear scaling. (EX1014, ¶¶36-40.)

B. Meulen Teaches “determin[ing] a portion within the input image” (1[e]/2[c])

PO disputes limitations 1[e]/2[e] because of its proposed requirement of “determin[ing]” *after* “obtain[ing]” and *before* “apply[ing] a transformation,” which is wrong. (*Supra* I.B.) Yet even under the correct construction, Meulen teaches 1[e]/2[c] including “determin[ing]” and “apply[ing] a transformation” as separate steps. (POR, 4, 10; EX1014, ¶¶41-50.)

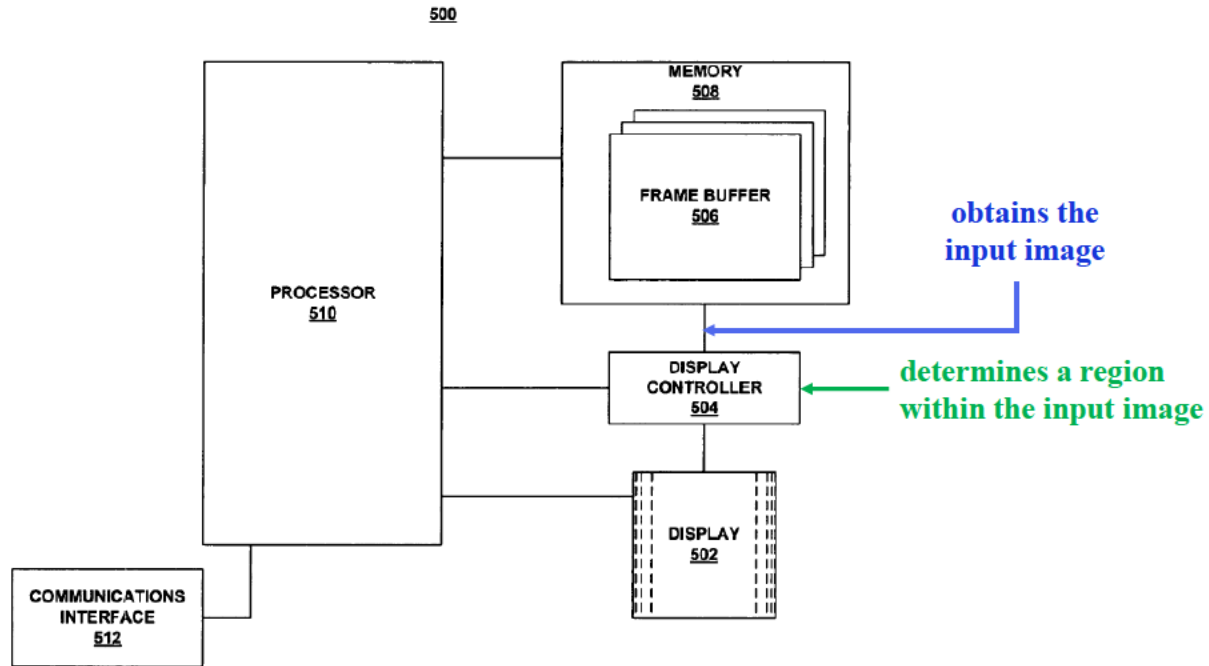
As the Board correctly found, Meulen teaches “determin[ing] a portion within the input image.” (Paper 13, 16.) Meulen divides media source content into regions. (EX1007, 6:2-31; *also* 4:24-39, 5:67-6:7.) It applies different compression ratios to different regions, which would require the regions be determined (after obtaining) in order for the correct compression ratios to be applied to the correct regions. (EX1007, 4:24-39, 6:4-6, 6:27-31.) After all, without determining the regions, the pixels of the central region may not “undergo no image compression” and then “image compression and/or scaling” may not “be applied progressively.” (EX1007, 6:7-8, 6:37-51; EX1014, ¶¶42-47.)

Meulen also teaches “determin[ing]” in at least two other ways. First, it discloses “the center of linearity and/or center of compression ... shifted to the left and/or to the right under user-control (e.g., navigation button 122)”². (EX1007, 9:1-10:6.) Because the user would need to see—obtain first—the input image in order to control the center of linearity/compression, the portion is determined after. Further, the user-control is “*to provide* a shifted or magnified effect.” Thus, Meulen teaches PO’s required order. (EX1014, ¶47.)

² Meulen’s user control of the center of compression/linearity is like the ’413’s user-configured warping function with less distortion at the center, which Dr. Foroosh argues is encompassed by the ’413 claims. (EX2027, ¶63; EX1014, ¶**.)

Second, Figure 5 (below) shows “obtain,” “determine,” and “apply” in that order. The display controller 504 first *obtains the input image* from the frame buffer 506 (“frame buffer 506 ... store[s] media source content”). (EX1007, 11:45-46.) After, Meulen *determines a region within the input image*: “display controller ... expand[s] one or more display regions.” (EX1007, 12:23-25.) This expansion shows the regions are not predetermined³ as PO argues. (POR, 32.) Then, “the display controller 504 ... appl[ies] image compression and/or scaling [(a transformation)] to the media source content stored in the frame buffer 506.” (EX1007, 11:66-12:1.) A POSITA would have understood that the regions would need to be expanded (determined) before applying the transformation. Otherwise, “apply[ing] image compression and/or scaling progressively to the media source content *based on the proximity of a display region* to the edge of the display 502” would not be correct. (EX1007, 12:9-12; EX1014, ¶¶48-50.)

³ PO mischaracterizes Dr. Katsaggelos’ testimony, clarified that “[b]y designer, I meant the person who implement[s] ... these choices [which] can change based on the content. It is not a static choice that’s done once ... Depending on ... content ... , one has a choice -- many choices and has to pick one.” (POR, 21; EX2026, 23:12-17; EX1014, ¶45.)

**FIG. 5**

(EX1007, Fig. 5.)

C. Meulen Teaches “the transformation non-uniformly shifts the pixels” (1[g]/2[e])

PO’s two arguments are wrong on both counts.

1. “non-uniform”

Consistent with its ordinary meaning, “non-uniform shifting” means shifting that is not the same in all parts or areas. (*Supra* I.A.) Meulen’s Table 1 example (below) shows compression ratios of 4:1, 2:1, and 0:0 in the display regions 140-1/140-5, 140-2/140-4, and 140-3, respectively. Thus, Meulen’s image compression and/or scaling is not the same in all parts or areas. PO’s expert agreed. (EX1015, 99:5-15.) PO disputes 1[g]/2[e] solely on its meaning of “non-

uniform,” which is wrong. (*Supra* I.A.) “[N]on-uniform” does not mean “non-linear.”⁴ (POR, 23; EX1014, ¶51.)

TABLE 1

	Region					Total
	1	2	3	4	5	
Pixels/Region	10	50	200	50	10	320
Compression Ratio	4:1	2:1	none	2:1	4:1	
Source Pixels	40	100	200	100	40	480

(EX1007, 5:50-60.)

Yet even if the ’413 claims require a non-linear transformation, Meulen still teaches it. It discloses a type of non-linear transformation (piecewise linear transformation) having multiple transformations with different shifts. The overall transformation of the entire image with different shifts is a non-linear transformation. Even PO concedes that piecewise linear transformation is a non-linear transformation (albeit involving approximations). (POR, 24.) And its

⁴ PO once again mischaracterizes Dr. Katsaggelos’ testimony. (POR, 23.) He testified that “the application of a non-linear transformation *results* in the non-[uniform] shifting of the pixels” (EX2026, 34:7-13)—*i.e.*, a non-linear transformation is one, but not the only, example of non-uniform shifting.

expert concedes the '413 claims are not limited to the specification's non-linear calculations. (EX1015, 41:13-25; EX1014, ¶¶51-52, 54-55.)

Meulen's Figures 4A-4C (below) also show non-linear curves (*e.g.*, compare to Figure 3). The "image compression and/or scaling [is] applied *progressively*" by "employing *significantly more display regions (e.g., >30)* and hardware-based sample-rate converters to *smooth the visual transitions* from one display region to another." (EX1007, 10:32-33, 10:44-48.) PO's arguments fail. (EX1014, ¶53.)

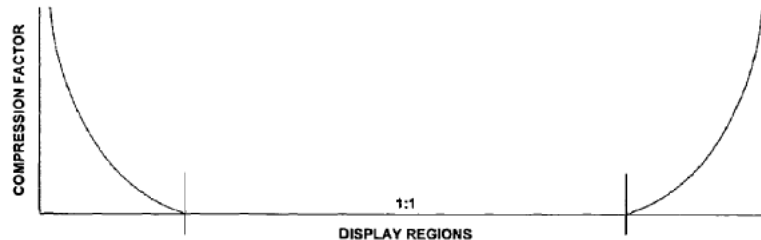


FIG. 4A

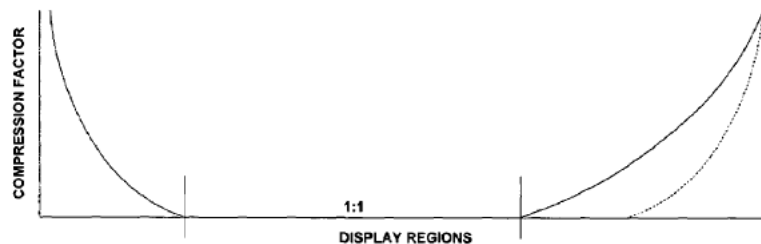


FIG. 4B

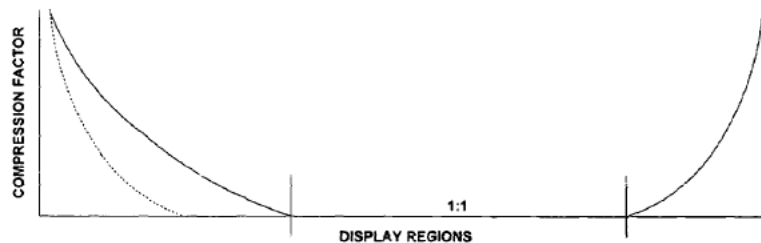


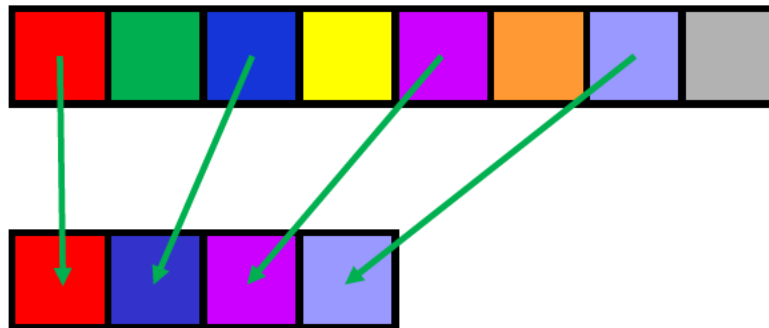
FIG. 4C

(EX1007, Figs. 4A-4C.)

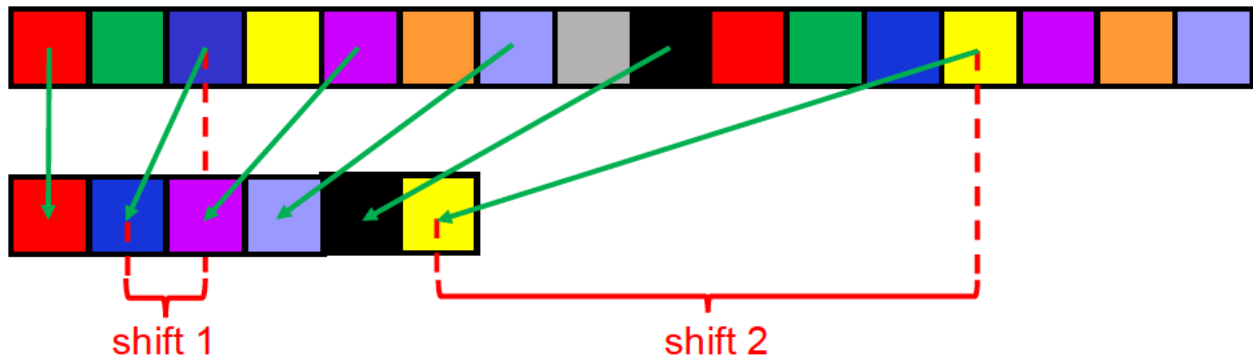
2. “shift[ing]”

PO argues that Meulen’s compression is performed only using polyphase filters which does not involve shifting. (POR, 11, 30.) That is incorrect.

Polyphase filtering is *one* example type of sample-rate conversion that Meulen’s “embodiments are not limited in this context” to. (EX1007, 5:23-29 (“perform sample-rate conversion, *such as* polyphase filtering”).) Sub-sampling is a type of sample-rate conversion that shifts pixels by sampling less than all the pixels. For example, sub-sampling with a 2:1 compression ratio samples every other pixel, thereby shifting the center position of the pixels (green arrows below). (EX1014, ¶56.)



The shifts differ for different compression ratios, such as “shift 1” and “shift 2” for 2:1 and 4:1 compression ratios, respectively (below). (EX1014, ¶57.)



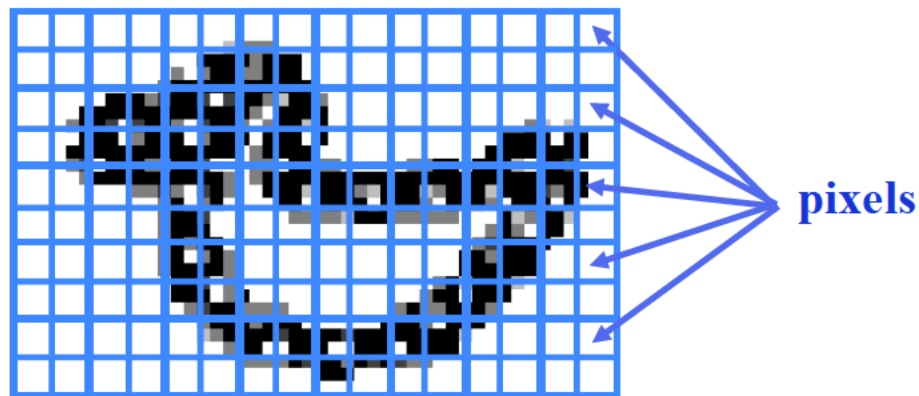
Because the '413 claims do not require the number of pixels in the input and output images stay the same (EX1015, 35:9-23 (PO's expert agreeing)), Meulen's sample-rate conversion moving pixel positions (shifting) differently in different regions shows that its compression satisfies "non-uniform shifting." (EX1014, ¶58; EX2027, ¶79 (PO's expert arguing that "pixel shifting [may] reduce the number of pixels in an image").)

The '413 specification confirms. It describes pixel shifting in the context of "compression." (EX1001, 4:9-13 ("a *non-linear warping* is applied which results in the circles being stretched/*compressed* by different amounts").) And as PO's expert testified, the terms used in the '413 and Meulen should have the same ordinary meaning. (EX1015, 99:19-100:1.) Thus, Meulen's "compression" has the same meaning as the '413's "compression." (EX1014, ¶59.)

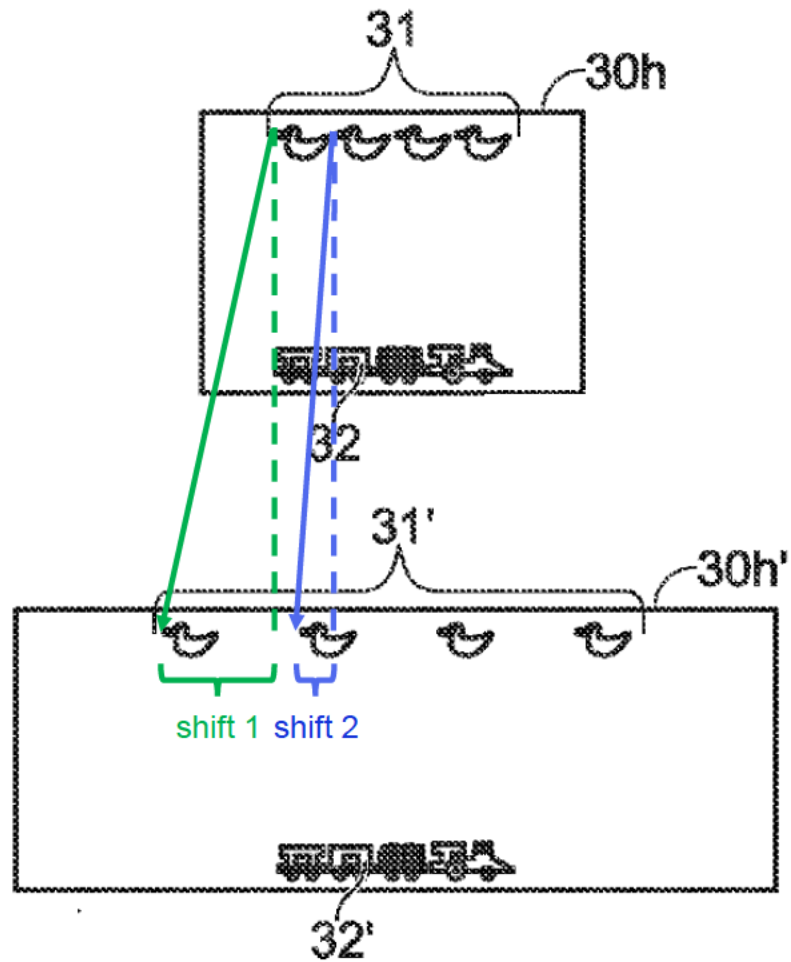
D. Chao Teaches "non-uniformly shift[ing] the pixels" (1[g]/2[e])

PO's arguments that Chao does not teach "non-uniformly shift[ing] the pixels" fail. First, PO and its expert admit that Chao teaches shifting, but argues

that it shifts objects not pixels. (POR, 32.) Wrong. An image of an object is formed collectively from pixels (below), thus shifting an object means shifting the pixels. Moreover, just like how “compression” has the same meaning in the ’413 and the references, so does “stretching.” (EX1001, 4:9-13; EX1015, 114:9-14.) (EX1014, ¶¶60, 64.)



Second, PO is wrong that Chao’s shifting is not “non-uniform.” (POR, 34.) As shown in Figure 14 (below) Chao’s shift of foreground objects are not the same in all parts or areas. This is because although the aspect ratio of a single duck may be preserved, the ducks “have been spread out.” (EX1008, [0091].) That is, the spacing between adjacent ducks (*i.e.*, the aspect ratio of the pixels showing white space between adjacent ducks) is not preserved. A POSITA would understand that preserving the aspect ratio in one portion of the image and not preserving the aspect ratio in another portion is “non-uniform.” (EX1014, ¶¶61-62.)



(EX1008, Fig. 14.)

And PO cannot selectively focus only on the foreground and ignore the background—both foreground and background objects are part of the image. Chao preserves the aspect ratio of each foreground object, while changing the aspect ratio of the background objects. (EX1008, [0028], [0090].) This difference in change in aspect ratio satisfies “non-uniform.” (EX1014, ¶63.)

E. Motivation To Combine Meulen And Chao

PO next argues that a POSITA would not have been motivated to combine Meulen and Chao. (POR, 28.) PO is wrong. The '413 claims encompass “compression,” and Meulen and Chao each teaches pixel shifting. (*Supra* II.C.)

And Petitioner did not concede that Meulen does not teach pixel shifting. (POR, 28, 31.) Instead, the Petition explained that Meulen mentions scaling, but does not disclose the details of how to perform scaling. (Petition, 91.) Because Meulen lacks such details, a POSITA would have been motivated to look to another reference such as Chao for such details. Neither PO nor its expert disputes Petitioner’s motivation. (EX1014, ¶64.)

PO only argues that Chao is directed to something completely different than Meulen. (POR, 4, 36.) Not so. For starters, both references address the same problems from cropping, padding, and linear scaling. (EX1007, 1:26-31, 2:2-6; EX1008, [0002]; EX1015, 96:3-97:12 (PO’s expert agreeing that Meulen’s method is without cropping or padding).) And both involve aspect ratio conversion that preserves the aspect ratio (minimize distortions) where objects of interest are located. (EX1007, 6:27-31; EX1008, [0090].) Given the existing overlap between Meulen and Chao, a POSITA would have reasonably expected to succeed in applying Chao’s teachings to Meulen. (EX1014, ¶¶64-65.)

As for PO's argument that Chao is directed to printed documents, PO just retreats—again—to ignoring disclosures in the references. (POR, 36; EX1008, [0023], [0032] (“[t]he image may be output by displaying the image on or as part of: a display screen such as a computer monitor, [or] camera screen”).) A POSITA would understand that “resizing documents ... to be printed” (POR, 11) involves viewing/modifying the content on a display screen, just like Meulen. (EX1014, ¶66.)

And since “[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into [another],” it makes no difference whether Meulen itself preserves spacing between elements while imposing distortions on others. *In re Keller*, 642 F.2d 413, 425 (C.C.P.A. 1981); (POR, 38). PO fails to explain why identifying foreground objects in an image would be limited to “graphic design” when Chao involves digital images, and—as its own expert admits—identifying objects in a digital image was known at the time of the '413. (EX1015, 110:12-113:8; EX1014, ¶¶67-69.)

F. Meulen Teaches Non-Uniform Shifting “based on (1) the input positions along the first axis, and (2) the input positions along the second axis” (1[g]/2[e])

PO argues that Meulen does not teach $1[g]/2[e]$ according to its interpretation of the limitations. But its interpretation is wrong and, regardless, Meulen does so.

Limitations 1[g]/2[e] require the pixels shifts be based on the input positions—not that the pixels must shift along both horizontal and vertical axes. (POR, 38-39.) This interpretation is consistent with the ’413 embodiments that shift along the horizontal axis only. (EX1001, 5:49-51 (“the horizontal warp is [a] function of the *horizontal coordinate only and is independent of [the] vertical position*”), 6:65-66 (“the horizontal warp distortion ... is *a function of the horizontal position only*”); EX1014, ¶¶70-71.)

Meulen teaches non-uniform shifting in both directions. (Petition, 90-91.) Its phrase “image compression and/or scaling” refers to its non-uniform shifting method. Meulen uses this same phrase in connection with describing its method being “applied in a horizontal direction *and/or* a vertical direction.” (EX1007, 10:19-26; *also* claim 8 (narrowing claim 1’s compression to “at least one of a horizontal direction [and] a vertical direction”); EX1014, ¶¶72-74.)

Further, its method “applied in both the horizontal and vertical direction” “allow[s] expansion of the lateral display regions 202-1-2 and 202-6-9 to create a magnified effect.” (EX1007, 10:21-26.) As Dr. Katsaggelos explained, creating a magnified effect in both horizontal and vertical directions requires enlarging some pixels both horizontally and vertically. (EX1014, ¶72.) Because the horizontal and vertical dimensions of Meulen’s display do not change, enlarging some pixels would require compressing other pixels. PO is incorrect, Meulen teaches

non-uniform shifting in *both* directions. (POR, 39-40; EX1014, ¶¶70-74.) Thus, even if the Board adopts PO’s interpretation of 1[g]/2[e], Meulen satisfies it.

Finally, PO’s mischaracterization of Dr. Katsaggelos’ testimony fails. His testimony was specifically discussing Meulen’s Table 1 embodiment, not its magnified effect embodiment. (POR, 39 (citing EX2026, 47:14-22 (“in this particular embodiment the compression ratio changes horizontally as we see in *table 1*. And if we stay within one region and move vertically, the compression ratio will – would stay the same. *But this is just one embodiment of Meulen*”)); EX1014, ¶74.)

G. PO Does Not Dispute Meulen-Chao’s Other Teachings

PO does not dispute Petitioner’s showing that Meulen teaches 1[pre], 1[b]-1[d], 1[h], 1[i], 2[pre]-2[b], 2[f], and claim 7, or that Chao teaches 6 and 7. (EX1014, ¶¶75-76.)

III. GROUND 1: FLEMING

A. A POSITA Would Have Been Motivated To Apply Fleming’s Non-Uniform Shifting By “one or more [] processors [] included within a camera” (Claim 6)⁵

As the Petition and Dr. Katsaggelos explained, a POSITA would have been motivated to apply Fleming’s non-uniform shifting by processor(s) included within

⁵ Contrary to PO’s arguments, none of claims 2, 6, or 7 requires the input image be captured by the claimed “system.” (POR, 61; *supra* **.)

a camera because of the benefits of being less burdensome, cheaper, and saving time compared to applying non-uniform shifting by a separate device. (Petition, 28-29; EX1002, ¶¶99-100; EX1014, ¶¶77-79.)

Applying non-uniform shifting by the camera's processor(s) reduces the need for a separate device and associated connectors (e.g., cable), eliminates the need to transfer data between the camera and separate device, eliminates the need to wait for connecting the camera to the separate device (and associated burden) and operating the separate device. Neither PO nor its expert disputes these benefits. (EX1014, ¶¶80.)

Both experts agree that cameras at the time had image sensors, built-in displays, and processor(s) that performed aspect ratio conversion. (EX1014, ¶¶81-82; EX1015, 77:9-21.) And as PO's expert testified cropping, linear scaling, and padding "was a problem back in 2013." (EX1015, 60:23-62:9; EX1014, ¶39.) Further, PO does not dispute that Fleming teaches non-uniform shifting. Instead, PO disputes whether it would have been obvious to apply Fleming's method by a camera's processor(s). But none of PO's grab-bag of arguments moves the needle.

First, PO's argument that camera designers in 2013 did not contemplate performing aspect ratio conversion by the camera's processor(s) is wrong. (POR, 62.) The record evidence shows that there were digital cameras at the time that captured images with one aspect ratio and displayed or stored the captured images

with another aspect ratio. This difference in aspect ratios resulted in a need for aspect ratio conversion and a reason to apply Fleming's method by the camera's processor(s). The Canon PowerShot G15 was one example camera (of the many) available at the time of the '413. (EX1027; *see also* EX1030 (Olympus E-PL5 PEN camera available in 2012, 4:3 and 16:9 image sensor and display aspect ratios).) The PowerShot G15 image sensor had a 4:3 aspect ratio, and it allowed the user to select among 16:9, 3:2, 4:3, 1:1, or 4:5 aspect ratios for displaying the captured image. (EX1028, 80.) "Once the setting is complete, the screen aspect ratio is updated." (*Id.*) Thus, user selection of a 4:5 aspect ratio means aspect ratio conversion from 4:3 (of the captured image) by the camera's processor(s). This shows that PO's expert was wrong that none of the cameras in 2013 had an image sensor and a display with different aspect ratios. (EX1015, 88:9-89:2; EX1014, ¶¶82-83.)

Second, PO's argument that the prior art taught removing distortions is a red herring—that was never Petitioner's argument. (POR, 67-68.) Petitioner's argument is that it would have been obvious to apply Fleming's non-uniform shifting by the camera's processor(s). (Petition, 28-29.) Removing distortions does not concern the '413 or the prior art of the Grounds. (EX1015, 64:23-65:3 (PO's expert admitting that the '413 "introduc[es] distortions"); EX1014, ¶86.)

And PO's argument that avoiding aspect ratio conversion entirely is less burdensome, cheaper, saves more time, and is adequate does not rebut Petitioner's motivation. (POR, 63-65.) PO ignores the applications where aspect ratio conversion is needed (e.g., with cameras available at the time such as Canon PowerShot G15 and Olympus PEN E-PL5). And even PO admits that non-linear distortions are useful for applications such as "body- and gear-mounted shots." (POR, 67; EX1014, ¶¶84-85, 88.)

A POSITA had reasons (avoiding image loss, black bars, or perceivable distortion) for applying non-uniform shifting, even if it meant potentially foregoing some benefits (more required processing and longer battery life). For example, a user may want to capture high-quality panoramic images that requires non-uniform shifting, but may only need a few shots. In such instances, a large amount of processing and longer battery life may not be necessary, and thus, a POSITA would have been motivated because the benefits outweigh the small costs. "[T]he legally proper question is whether the [prior art's teachings] would be a suitable option in *some* respect, not necessarily in *every* respect." *E.I. du Pont de Nemours & Co. v. MacDermid Printing Sols., LLC*, 657 F. App'x 1004, 1014 (Fed. Cir. 2016) (emphasis in original). (EX1014, ¶87.)

Further, PO is wrong that non-uniform shifting is too expensive to implement on wireless devices/cameras. (POR, 63.) Fleming's nonlinear scaling

equation is simpler than other image processing already performed by the processors included within the cameras at the time. Additionally, as Dr. Katsaggelos explains, there are ways, *e.g.*, lookup tables, known by a POSITA to reduce the required processing resources, further giving the camera's processor(s) the ability to apply non-uniform shifting. The prior art confirms. For example, Meulen uses "registers rather than random access memory ... to reduce processing expense." (EX1007, 10:48-54.) Obara uses "an arithmetic process with a relatively light load, ... including bit shift and multiplication of integers, and the load on the CPU 111, ... can greatly be reduced." (EX1006, [0047]; EX1014, ¶¶89-90.)

Third, PO's vague accusation of "impermissible hindsight" fails. (POR, 64.) Petitioner's rationale properly came from POSITA knowledge and the prior art, not the '413 patent. (EX1032, 1453:17-23 (GoPro's ITC expert testifying that a POSITA "understood that it was a desirable thing to [process images directly on-camera], although they also knew that there were computational and other battery life challenges to doing that, but they understood it was a good goal to have.")); *Application of McLaughlin*, 558 C.C.P.A. 1310, 1313-14 (1971) (so long as motivation to combine is not "gleaned **only** from applicant's disclosure, such a reconstruction is proper").

Fourth, with no viable substantive arguments, PO resorts to accusing Petitioner for failing to establish motivation to combine. (POR, 64.) Wrong. The Petition and expert declaration adequately presented explanation of why a POSITA would have been motivated to apply Fleming’s non-linear scaling method by processor(s) included within a camera. (Petition, 28-29; EX1002, ¶100.)

Finally, a POSITA would have adapted Fleming’s method to be applied by the camera’s processor(s) with a reasonable expectation of success. Fleming method’s involves a simple math equation: $Y=y(A+(B-A)\times(y/H)^2$ that a processor already included within a camera at the time would have been able to perform. (EX1004, 6:18-27.) Alternatively, Fleming’s equation may be implemented using known simplifying techniques such as a lookup table stored in memory to map the input positions to the output positions. Given that cameras at the time already included processors that performed calculations more complex than Fleming’s equation, a POSITA would have reasonably expected to succeed with the proposed modification of Fleming. (EX1014, ¶91.)

B. Fleming Teaches “determin[ing] a portion within the input image” (1[e]/2[c])

Fleming satisfies limitations 1[e]/2[c] at multiple disclosures including its determination of a target “area of interest (e.g., at the center of the image)” to “maintain the original aspect ratio in an area of interest ... and gradually stretch the image in other areas.” (EX1004, 4:38-45.) Although not required by the ’413

(*supra* I.B), other passages in Fleming show “determine” after “obtain” and prior to “apply” as separate steps—and do not describe PO’s alleged effect of the transformation. (EX1004, 2:15-18 (regions determined according to user input), 7:5-16 (dividing frame into regions), 8:45-9:9 and Figs. 10-11 (describing receiving video stream, dividing a frame of video stream into regions, and scaling the regions in that order); POR, 70.) And just as the ’413’s “resolution remapping” satisfies the claims, so does Fleming’s “nonlinear mapping[s].” (*See, e.g.*, EX1004, 4:51-5:4; EX1014, ¶¶92-102.) The Board already rejected PO’s arguments at institution and should do so again. (Paper 13, 33.)

C. PO Does Not Dispute Fleming’s Other Teachings

PO does not dispute Petitioner’s showing that Fleming teaches 1[pre]-[1d], 1[f]-1[i], 2[pre]-2[b], 2[d]-2[i], and claim 7. (EX1014, ¶103.)

IV. GROUND 3: OBARA-LIU

A. A POSITA Would Have Been Motivated To Perform Obara’s Non-Uniform Shifting By “one or more [] processors [] included within a camera” (Claim 6)

For claim 6 and Ground 3, PO recycles its earlier arguments from Ground 1 (Fleming). (POR, 71-72.) PO does not dispute that Obara teaches non-uniform shifting. Thus, PO’s argument fails for the same reasons as before. (*Supra* III.)

Moreover, a POSITA would have adapted Obara’s method to be applied by processor(s) included with a camera with a reasonable expectation of success. Obara’s method involves simple computational operations that could be easily

performed by the processor(s) included within the cameras in 2013. (EX1014, ¶¶104-112.)

B. Obara Teaches “determin[ing] a portion within the input image” (1[e]/2[c])

For limitations 1[e]/2[c], PO’s arguments for Obara are similar to the ones it made for Fleming. (POR, 72-73.) Moreover, Obara’s disclosures at [0053], [0082], and Figure 10 (annotated below) show that it teaches limitations 1[e]/2[c]. (EX1014, ¶¶113-115.)

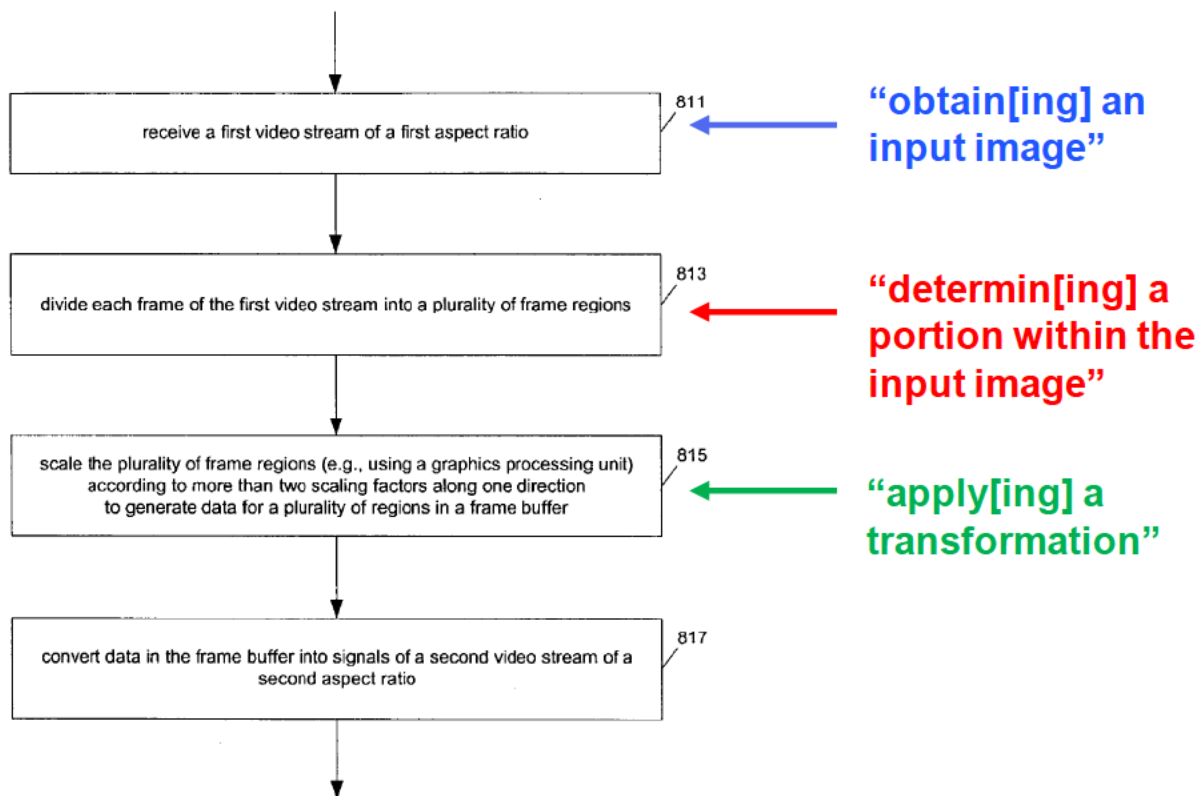


Fig. 10

(EX1006, Fig. 10.)

And rather than address these disclosures—much less the ones that the Board highlighted (Paper 13, 33)—PO just accuses Petitioner of failing to explain how Obara teaches these limitations. But the Petition adequately presented that Obara divides (“determine[s]”) the original image data into blocks (“portion”). (Petition, 55-58; EX1002, ¶¶163-165.)

C. PO Does Not Dispute Obara-Liu’s Other Teachings

PO does not dispute Petitioner’s showing that Obara-Liu teaches 1[pre]-[1d], 1[f]-1[i], 2[pre]-2[b], 2[d]-2[i], and claim 7. (EX1014, ¶116.)

V. THE BOARD SHOULD GIVE LITTLE/NO WEIGHT TO DR. FOROOSH’S OPINIONS

The Board should assign little-to-no weight to Dr. Foroosh’s testimony because he was evasive throughout his deposition, repeatedly refusing to answer simple questions (*e.g.*, whether he understood Dr. Katsaggelos’ meaning of “non-uniform”) or questions about the prior art (“[Q.] Do you think bit shifts involve complex calculations? ... A. Well, that’s my answer. I have not expressed any opinion on that.”). (*See, e.g.*, EX1015, 128:1-12, 56:23-57:10, 57:23-59:7 (“A. I did not offer an opinion. That’s my answer.”), 91:20-92:15.) He also provided non-responsive answers (“I neither agree or disagree”) to questions about the ’413 and POSITA knowledge. (EX1015, 60:23-61:16.)

Dr. Foroosh’s refusal to answer simple questions, or explain his understanding of the art, the patent at issue, or POSITA knowledge undermines his credibility and does not allow Petitioner or the Board to assess the reliability of his opinions or whether he qualifies as a POSITA.

VI. THE OBJECTIVE EVIDENCE DOES NOT SUPPORT A FINDING OF NON-OBVIOUSNESS

A. There Is No Nexus

GoPro does not argue presumption of nexus. It makes no attempt to show that the alleged practicing product HERO7—which includes many features unrelated to the ’413—is “coextensive with” the challenged claims. (Paper 13, 24; *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019).

Nor does GoPro show that any purported objective indicia is the “*direct result of the unique characteristics of the claimed invention.*” *Fox Factory*, 944 F.3d at 1374. GoPro’s witness Mr. Lema conceded that HERO7 had *many* features, including the alleged practicing feature SuperView. (EX2024, ¶24; Paper 25, 42.) Indeed, he refers to a study that focused on [REDACTED]

(EX2024, ¶16.) [REDACTED]

[REDACTED]

Mr. Lema’s declaration also undercuts GoPro’s argument that the objective evidence is a “direct result” of SuperView. The single declaration covers *four* different patents directed to *three* different features: SuperView, HyperSmooth, and Horizon Leveling. (EX2024, ¶24.) Per Mr. Lema, [REDACTED] [REDACTED]. (*Id.*, ¶¶ 14-20.)

B. The Objective Evidence Falls Short

1. No copying

GoPro fails to establish a predicate for copying, which requires evidence of efforts to replicate a product based on access to that product. *Tokai Corp. v. Easton Enters., Inc.*, 632 F.3d 1358, 1370 (Fed. Cir. 2011). GoPro identifies no such evidence. And it never provides an element-by-element comparison of its product to Petitioner’s product. Its own exhibits state that Petitioner’s products are “not a 1-1 copy of the GoPro algorithm[.]” (EX2011, 2; EX2012, 2; Paper 13, 26.)

⁶ [REDACTED]

[REDACTED]

[REDACTED]

Petitioner’s purported “extensive research” on GoPro’s products is not copying. (POR, 51-52.) As Mr. Lema concedes, benchmarking is standard industry practice, not copying. (EX1039, 386:9-14, 160:22-161:6.) He confirmed that GoPro regularly tears down Insta360 products. (*Id.*, 388:24-389:2, 390:3-391:24.)

2. No “industry praise” of SuperView

GoPro makes no attempt to show how the purported CES, Emmy, or “Lucie” awards were linked to SuperView. Nor does GoPro’s other evidence show praise. The cited articles concern HERO4 and HERO3+, not HERO7. (EX2013; EX2015.) And the cited anonymous “consumer” inquiries of one competitor (not associated with Petitioner) do not constitute industry praise. (EX2016.)

3. No commercial success tied to SuperView

GoPro’s cited survey data [REDACTED]
[REDACTED]. (EX2018, 23; EX2040, 10; EX2019, 14.) Indeed, GoPro’s evidence shows that the purported commercial success is attributed to many factors unrelated to the claimed ’413. (EX2018, 23; EX2024, Ex. A, 0007.)

4. Long-felt need

GoPro identifies no sources—other than the patent—discussing concerns with traditional method or a need for new approaches to aspect ratio conversion.

GoPro argues that there was a long-felt need and unexpected results because traditional methods shied away from controlling distortion in the way that SuperView and the '413 patent do—that is, “distort[ing] the edges while eliminating distortion in the center.” (Paper 25, 58.) Not so. Multiple prior art references disclosed techniques controlling distortion in the same manner and highlighted the benefits of doing so. (EX1004, 1:41-45; EX1006, [0007]-[0008]; EX1007, 1:62-65.) The long-known aspect ratio conversion technique used by SuperView is hardly the unique “180-degree approach” that GoPro asserts.

That the claimed '413 was known years before the patent's priority date confirms the lack of long-felt need and unexpected results.

VII. CONCLUSION

For the foregoing reasons, as well as those set forth in its Petition, Petitioner respectfully requests cancellation of claims 1-20 of the '413 patent.

IPR2024-00984

Dated: July 14, 2025

Respectfully submitted,

By: /s/ Alex S. Yap

Alex S. Yap

Reg. No.: 60,609

MORRISON & FOERSTER LLP

707 Wilshire Blvd., Suite 6000

Los Angeles, CA 90017

Email: AYap@mofo.com

Tel: 213-892-5200

Counsel for Petitioner

Certification of Word Count (37 C.F.R. § 42.24)

I hereby certify that this PETITIONER’S REPLY TO PATENT OWNER RESPONSE has 5,576 words (as counted by the “Word Count” feature of the Microsoft Word™ word-processing system), exclusive of “a table of contents, a table of authorities, a listing of facts which are admitted, denied, or cannot be admitted or denied, a certificate of service or word count, or appendix of exhibits.”

Dated: July 14, 2025

By /s/ Alex S. Yap

Alex S. Yap

Certificate of Service (37 C.F.R. § 42.6(e)(4))

I hereby certify that the attached PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE was served as of the below date on the Patent Owner via e-mail (by agreement) to the following counsel of record:

James M. Glass, Registration No. 46,729
John T. McKee, Registration No. 65,926
Quincy Lu, Registration No. 76,954
Patrick Schmidt (*pro hac vice*)
Nathaniel A. Hamstra, Registration No. 65,680
Quinn Emanuel Urquhart & Sullivan LLP
Email: jimglass@quinnemanuel.com
Email: johnmckee@quinnemanuel.com
Email: quincylu@quinnemanuel.com
Email: patrickschmidt@quinnemanuel.com
Email: nathanhamstra@quinnemanuel.com

Dated: July 14, 2025

/s/ Alex S. Yap
Alex S. Yap