

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.

Case No. IPR2024-00984
U.S. Patent No. 10,015,413

PATENT OWNER'S SURREPLY

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EXHIBIT LIST

No.	Exhibit
2001	Declaration of Hassan Foroosh, Ph.D.
2002	<i>Curriculum vitae</i> of Hassan Foroosh, Ph.D.
2003	“What is GoPro SuperView?”, available at https://actioncamphotographer.com/gopro-superview/
2004	U.S. Pat. No. 7,893,985
2005	U.S. Pat. App. Pub. 2011/0187903 A1
2006	Complaint, <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2007	E-mail from Alex S. Yap on October 9, 2024
2008	“Hands-on with the GoPro Hero 3+ Black Edition,” February 20, 2014, available at https://www.dpreview.com/reviews/hands-on-with-the-gopro-hero-3-black-edition
2009	“Stabilization,” available at https://onlinemanual.insta360.com/x4/en-us/faq/feature/stabilization
2010	“What Is SuperView?,” produced as GOPRO_00009577 in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2011	“Niek / superview,” available at https://github.com/Niek/superview
2012	“meekaah / SuperViou” available at https://github.com/meekaah/SuperViou
2013	“GoPro Hero4 vs. GoPro Hero3+”, October 5, 2014, available at https://newatlas.com/gopro-hero4-vs-gopro-hero3plus/34090/
2014	“About New Atlas,” available at https://newatlas.com/about

2015	“Here it is – the GoPro Hero 3+ Review from our #GoProAdventures,” available at https://www.littlestuff.co.uk/here-it-is-the-gopro-hero-3-review-from-our-goproadventures/
2016	“Superview-like mode,” available at https://forum.dji.com/thread-198395-1-1.html
2017	“Next Firmware what would you like to see corrected added,” available at https://forum.dji.com/forum.php?mod=viewthread&tid=196725
2018	“Hardware Segmentation Consumer Insights,” produced as GOPRO_00019926 in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2019	“Q4 2022 QBR Insights,” produced as GOPRO_00063381 in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2020	“Digital Camera D5200 Reference Manual,” produced as INSTA360_1400-PA00001186 in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2021	“RAW POV SURFING GLASSY BARRELS OVER SHALLOW REEF!! (MINI SLAB),” available at https://www.youtube.com/watch?app=desktop&v=yz3-tlL4dvo
2022	Statutory Disclaimer for U.S. Pat. No. 10,015,413, dated November 5, 2024
2023	Declaration of Patrick T. Schmidt in support of Patent Owner's Motion for <i>pro hac vice</i> admission
2024	Declaration of Pablo Lema
2025	Joint Stipulation Regarding Representative Domestic Industry Products, filed in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400

2026	Transcript of the Deposition of Dr. Aggelos K. Katsaggelos, taken March 28, 2025
2027	"HERO 7 Black," entered as CX-0522 in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2028	"Photos Taken with a GoPro HERO7 Black," entered as CX-0526 in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2029	"HERO7 Black: HyperSmooth," entered as CX-0613C in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2030	Excerpts of source code file produced as GOPRO_SC0231 in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2031	Excerpts of source code file produced as GOPRO_SC0168-190 in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2032	"IAC1-Competitor Analysis (software part)," entered as CX-0939C in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400, with certified translation
2033	Pages 856-873 of January 15, 2025 transcript of hearing in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2034	"IAC1 in-camera anti-shake key issues and decisions," entered as CX-0846C in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400, with certified translation
2035	Photo of CES Innovation Award 2019, produced as GOPRO_00000004 in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400

2036	"Believe the Hype: GoPro Showcases Award-Winning HERO7 Cameras at CES 2019," entered as CX-0618 in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2037	Photo of LUCIE Technical Award 2019, entered as CX-0026 in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2038	Photo of Emmy, entered as CX-0020 in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2039	"Hardware Segmentation Consumer Insights May 2022," entered as CX-0590C in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2040	GoPro Wins Second Emmy Award for Groundbreaking Digital Imaging Technology, entered as CX-0636 in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2041	"HERO 7 Black," entered as CX-0522 in <i>In the Matter of Certain Cameras, Camera Systems, and Accessories Used Therewith</i> , Inv. No. 337-TA-1400
2042	Transcript of the Deposition of Dr. Aggelos K. Katsaggelos, taken August 7, 2025

Petitioner seeks to walk back its expert's testimony, and introduces new and improper theories of invalidity. The Board should find the challenged claims patentable.

I. CLAIM CONSTRUCTION

A. "non-uniformly shifts"

The intrinsic evidence and both parties' experts agree that a transformation that "non-uniformly shifts" pixels requires a **non-linear** transformation. POR 23-24. The recited transformation "non-uniformly shifts the pixels from the input positions to the output positions **based on** (1) the input positions along the first axis, and (2) the input positions along the second axis." The claim plainly requires each individual pixel to shift based on its unique horizontal and vertical coordinate—the claim is **not** satisfied by multiple **uniform** transformations that shift pixels having different coordinates by the same amount.

Dependent claim 3 recites the distinction between a uniform and non-uniform transformation as one that is linear or non-linear. It describes a linear "scaling function" as one that "**uniformly** stretch[es] or compress[es] the input image." By contrast, a non-linear "warping function" "**non-uniformly** warp[s] the input image." See EX1001, 9:56-61. Petitioner's expert Dr.

Katsaggelos agreed. EX2026, 83:19-84:15 (“So in [Claim] 3 the scaling might include shifting, warping. It says non-uniformly warp the input image. So it seems to imply ***a non-linear transformation*** applied to the image.”).

As Petitioner acknowledges, the specification never uses the word “non-uniform” but instead describes the claimed transformation as a “non-linear” warping function. EX1001, Abstract (“[T]he output image is non-linearly warped relative to the input image”), 1:36-40 (“[A] non-linear warped image converted to the target aspect ratio using a non-linear warping technique”), 2:15-18 (“In one embodiment, the output image is non-linearly warped relative to the input image”), 3:42-45 (“[T]he conversion is achieved using a resolution remapping that applies a non-linear function across the image”); *GPNE Corp. v. Apple Inc.*, 830 F.3d 1365, 1370 (Fed. Cir. 2016) (“[W]hen a patent repeatedly and consistently characterizes a claim term in a particular way, it is proper to construe the claim term in accordance with that characterization.”).

Petitioner argues that because the specification discloses a transformation that uses both “a linear scaling function” and “non-linear warping,” then “‘non-uniform’ *cannot* be ‘non-linear’ because, it may *also* involve a *linear* scaling.” Reply 1 (quoting EX1001, 3:61-4:2) (emphasis in

original). This, in fact, supports that the plain meaning of non-uniform includes a non-linear transformation. That a linear scaling can additionally be applied is of no moment. *Amgen Inc. v. Amneal Pharmaceuticals LLC*, 945 F.3d 1368, 1379 (Fed. Cir. 2020) (“The term “comprising” is the standard transition term used to make clear that the claim does not preclude the presence of components or steps that are in addition to, though not inconsistent with, those recited in the limitations that follow.”).

Petitioner also argues that pixels in the center in Figure 2B have “zero shift.” Reply, 2. Petitioner ignores that the center circle in Figure 2B only appears non-distorted because the image is first linearly scaled (resulting in Figure 2A) and then **non-linearly** warped. EX1001, 4:1 (“[A] non-linear warping is then applied”). Petitioner’s suggestion that pixels of the center circle are not shifted is therefore untrue. Additionally, to the extent Petitioner’s argument relies solely on figures, as opposed to the technical description in the specification, it should be rejected. *Hockerson-Halberstadt, Inc. v. Avia Group Int’l*, 222 F.3d 951, 956 (Fed. Cir. 2000) (“[P]atent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.”)

Petitioner also argues Figure 2B contradicts PO's position that "[n]o two pixels will have the same amount of shift." Reply 2 (quoting POR 27). Petitioner completely mischaracterizes PO's position, which was that the non-linear equations described in the patent result in no two pixels having the same amount of shift, not that a non-linear transformation must shift every pixel in the entire image. POR 26-27 (citing EX1001, 6:65-7:5). For example, a non-linear transformation applied to a part of the image would still meet the claims.

There is no real dispute about what the plain claim language requires—Petitioner's expert consistently agreed with PO's position that non-uniform shifting required a non-linear transformation.¹ EX2026, 34:7-13 (“[W]ould you agree that in order to accomplish a non-uniform shifting, you need to apply a non-linear transformation? A. **Yeah**, the application of a non-linear transformation results in the non-vertical shifting of the pixels.”), 29:9-30:1 (“Q. Is it technically possible to have a system that **non-uniformly** shifts the

¹ Petitioner faults PO's expert for not “consider[ing] any dictionary definitions” (POR 2), but dictionary evidence is unnecessary when the intrinsic evidence and the experts' testimony are in alignment. *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996).

pixels, as were cited by the '413 patent, without determining a portion? ... A. It is possible to determine a **non-linear** transformation ... [T]he transformation shifts **non-uniformly** ... The **non-linear** transformation results in non-vertical shift.”), 77:13-78:11 (“Q. How does scaling the foreground and background elements differently in Chao disclose **non-uniform scaling**? A. ... [Chao] discloses the shifting as well, which that introduces **non-linearity**.”), 83:19-84:15.

Petitioner now attempts to walk back Dr. Katsaggelos's testimony, arguing in a footnote that he merely testified that non-linear transformation is an example of non-uniform shifting. POR 11, n.4. Simply not true, as multiple transcript citations show. EX2026, 34:7-13, 29:9-30:1, 77:13-78:11. Petitioner did not seek clarification of his testimony on redirect, nor submit an errata. Instead, Petitioner submitted a new declaration from Dr. Katsaggelos directly contradicting his deposition testimony. EX1014, ¶8. This speaks volumes about the credibility of Dr. Katsaggelos—not just on this issue, but for every issue on which he has opined across all related proceedings. Indeed, at his second deposition, Dr. Katsaggelos expressed confusion, testifying that “I’m not sure if I know exactly what a non-uniform

transformation is.”² EX2042, 11:14-12:2. This is a stark contrast to his clear-eyed testimony from his first deposition.

Finally, Petitioner’s argument that non-uniform shifting can be accomplished by linear scaling alone improperly nullifies the inventive aspect of the claims as described in the specification. The ’413 Patent sought to improve on “[c]onventional conversion techniques such as cropping, **linearly scaling**, and padding,” since they “result in a perceivable reduction in the quality of the image or video”—in the case of linear scaling, it “introduces perceivable distortion into the image.” EX1001, 1:12-18. Dr. Katsaggelos acknowledged this distinction, testifying “[i]n some instances, a POSITA would not have preferred cropping, padding, or linear scaling **over non-uniform shifting**” because linear scaling “add[s] noticeable distortion.” EX1014, ¶39 (citing EX1001, 1:6-7); Reply 21 (“[L]inear scaling ... was a problem back in 2013.”). Because Petitioner’s position improperly seeks to eviscerate the very purpose of the invention, which both parties agree was to improve on linear scaling, it should be rejected. *Retractable Tech. v. Becton, Dickinson and Co.*, 653 F.3d 1296, 1305 (Fed. Cir. 2011) (“[A] construction

² Petitioner again did not seek to clarify his testimony on redirect.

... is required to tether the claims to what the specifications indicate the inventor actually invented.”).

B. “determine a portion”

Petitioner fails to meaningfully address PO’s argument that the separately recited “determine a portion” operation must be distinct from the “transformation” operation of the claim. *Bicon, Inc. v. The Straumann Company*, 441 F.3d 945, 950 (Fed. Cir. 2006) (“[C]laims are interpreted with an eye toward giving effect to all terms in the claim.”). Put differently, a “portion” that arises as a mere result of a single, fixed transformation would not satisfy the limitation. *Wasica Fin. GmbH v. Cont’l Automotive Systems, Inc.*, 853 F.3d 1272, 1288 n.10 (Fed. Cir. 2017) (“It is highly disfavored to construe terms in a way that renders them void, meaningless, or superfluous.”). There is no real dispute amongst the experts regarding this fundamental requirement. EX2026 at 26:21-23.

That the claim implies an order (*i.e.* “determine a portion” of the image after the image is obtained) is indeed further support for what the plain claim language requires. POR 17-18. But, the situation here is nothing like that in the *Interactive Gift* case inaptly cited by Petitioner, where a party sought to impose an order of operations where none was actually recited.

Petitioner cites a “vertical warp” embodiment in an attempt to suggest the “portion” can be based on equations that are “predetermined.” Reply 3. As explained in the POR, however, a system programmed with predefined warp functions can meet the claims so long as there is a mechanism to select amongst warp functions and determine which one is applied to a particular input image. POR 20 (“[A] device may be configured by a user-selected mode that configures a warping function so that less distortion occurs in the center portion”); *see also* EX1001, 6:46-48 (“[T]unable parameters can be controlled to adjust the vertical distortion”), 7:64-8:2 (“The equations may change dynamically in different frames of a video.”). That a particular option for a warp function is pre-programmed does not contradict PO’s interpretation.

Petitioner also misinterprets the prosecution history. Reply 3-4. While Oosawa did involve comparing two images of the same object, the applicant acknowledged that Oosawa “shows the amount of shift to be applied to the center of the image is smaller than the peripheral of the image.” EX1003, 39. Thus, PO added the further step of “determin[ing]” the portion to distinguish Oosawa’s shifts occurring as happenstance of the transformation itself. EX1003, 39. Indeed, the original claim already required an image with a “portion” and a “transformation” that resulted in less shift within the portion.

EX1003, 32. The effect of the amendment was to require a distinct operation, requiring the portion to be determined independently of a single, fixed transformation function. EX1003, 32.

II. GROUND 4: MEULEN-CHAO

A. “Input Image”

Petitioner does not dispute that claim 1 requires applying the transformation by the *same* apparatus used to capture the image. Petitioner suggests that claim 6 does not require the same because claim 2 does not require a “image sensor” and recites that the input image is “obtain[ed]” rather than “captur[ed].” Reply 4. Claim 6 requires the “physical processors” that obtain the input image and apply the transformation be “*included within a camera*.” Thus, claim 6 requires the transformation be performed by the same camera that captured the image.

Meulen fails to disclose this because it transforms “media source content” from external sources. POR 13-17. Although Meulen’s device includes an embedded camera, Meulen never describes processing images from or by that camera. Meulen only processes “media source content” where a media source “deliver[s] media source content to the *wireless device*.” EX1007, 3:51-53.

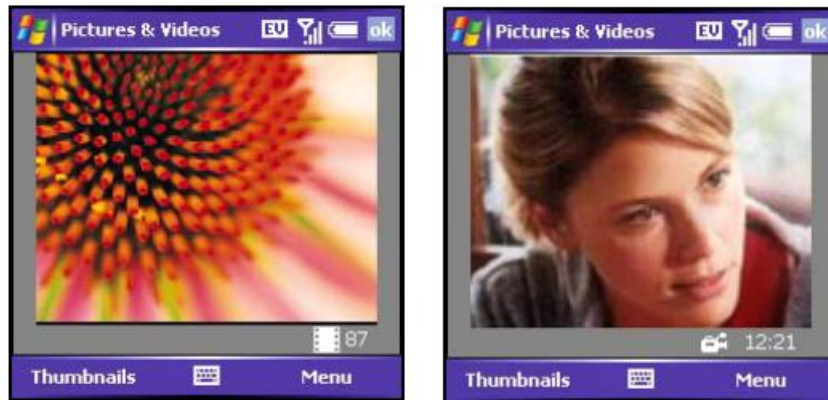
Petitioner cannot covert Meulen's express "media source content" into something broader. Petitioner surmises that the frame buffer "stores content from other (internal) media source" because it is not directly connected to the communications interface, and therefore the processed "media source content" can include images from the embedded camera. Reply 4-5. Yet Petitioner cites nothing in Meulen that even remotely suggests the frame buffer stores images from the embedded camera, much less that Meulen processes such images.

Nor can Petitioner argue that the presence of the frame buffer inherently discloses storing and processing internal images. *Par Pharmaceutical Inc. v. Twi Pharmaceuticals Inc.*, 773 F.3d 1186, 1195 (Fed. Cir. 2014). As Dr. Katsaggelos acknowledged, the frame buffer can store "both internal and external media source data," meaning it does not necessarily store internal images. And Meulen makes clear that it stores only external images. EX1007, 11:44-46 ("[T]he frame buffer 506 may be arranged to store media source content"), 13:6-17 ("[T]he processor 510 may be arranged to receive ... **media source content**[]" through a communications interface 512.").

Left without express or inherent disclosures, Petitioner shifts to a completely new theory: that it would have been obvious to apply Meulen to a

Palm Treo device, and that newly cited evidence suggests that the Palm Treo device displayed images captured by the embedded camera. Reply 6-7. Meulen does not describe such properties of the Palm Treo, and Petitioner does not (and cannot) argue the Palm Treo documentation was incorporated by reference. *Paice LLC v. Ford Motor Co.*, 881 F.3d 894, 906 (Fed. Cir. 2018) (standard for incorporation by reference). Indeed, Petitioner cannot even claim that the Palm Treo was part of the overall knowledge of a POSITA in view of Meulen and Chao, as Dr. Katsaggelos admitted that he could not “define what the state of the art [wa]s” at the time of the ’413 patent. EX2042, 47:1-47:19.

Putting aside the impropriety of introducing a completely new combination, especially one involving system art, Petitioner’s motivation to combine the Palm Treo with Meulen is half-baked and driven by hindsight. The newly cited Palm Treo documentation does not disclose that it performs the aspect ratio conversion techniques of Meulen—to the contrary, the cited evidence suggests that photos are displayed in their original aspect ratio embedded within a user interface occupying less than the entire display. EX1021, 118-119.



Petitioner provides no motivation to modify this behavior. Reply 6-7. Nor does Petitioner argue a POSITA would have had a reasonable expectation of success.

B. “Determine a Portion”

The claims require that a portion be determined by an operation that is more than just the result of a fixed transformation. Petitioner argues this is met by Meulen because “[i]t 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.” Reply 8. But the regions for the embodiment shown in Table 4, for example, were determined prior to any obtaining of the image. Dr. Katsaggelos confirmed this, testifying that the determined portions are “those ones that show the source pixels there of 28, 32, 32, and so on,” which were pre-defined in the reference. EX2042, 40:24-41:3.

TABLE 4

	Region									Total
	1	2	3	4	5	6	7	8	9	
Pixels/Region	2	4	8	16	230	32	16	8	4	320
Compression Ratio	14:1	8:1	4:1	3:1	none	3:2	2:1	4:1	7:1	
Source Pixels	28	32	32	48	230	48	32	32	28	480

Merely applying different compression ratios to different regions in a fixed, predetermined manner does not satisfy the claims as written.

Petitioner also introduces two new theories for this limitation. First, Petitioner relies on Meulen's disclosure that the user can control "the center of linearity and/or center of compression ... shifted to the left and/or to the right." Reply 8 (quoting EX1007, 9:1-10:6). Yet Meulen never describes such control as occurring after an image is obtained—Petitioner simply reads this into the reference despite no express or inherent disclosure, or any argument it would be obvious. Reply 8. More importantly, while this embodiment outputs an asymmetrically compressed image, this effect is not the result of "determin[ing] a portion ***within the input image***" as claimed. This is evident from a comparison of the compression tables for one of the default embodiments (Table 2) and the left-shifted embodiment upon which

Petitioner relies (Table 4). As shown below, the allocation of “source pixels” from the input images to the respective display regions is the same:³

TABLE 2										
	Region									
	1	2	3	4	5	6	7	8	9	Total
Pixels/Region	4	8	16	32	200	32	16	8	4	320
Compression Ratio	7:1	4:1	2:1	3:2	none	3:2	2:1	4:1	7:1	
Source Pixels	28	32	32	48	200	48	32	32	28	480

TABLE 4										
	Region									
	1	2	3	4	5	6	7	8	9	Total
Pixels/Region	2	4	8	16	230	32	16	8	4	320
Compression Ratio	14:1	8:1	4:1	3:1	none	3:2	2:1	4:1	7:1	
Source Pixels	28	32	32	48	230	48	32	32	28	480

³ Although the center regions (region 5) of the two tables have a different number of source pixels (200 and 230), this is a typo in Table 4. As Petitioner's expert confirmed, Region 5 must be 200 pixels as the total number of pixels would not otherwise add up to 480 pixels. EX2042, 38:3-12 (“[I]f the number of pixels, source pixels do not add up to 480, there's probably a typo”).

Thus, there is no change in “portions” even if a user could dynamically select between the approach Table 2 and Table 4. The only reason why Table 4 results in an output having a left-shifted center of compressions is because compression ratios are applied asymmetrically to the fixed, ***predetermined*** portions of the input image. EX1007, 9:1-3 (“[I]mage compression and/or scaling may be applied to the left lateral display regions 202-1-5 and the right lateral display regions 202-9-6 asymmetrically.”). In other words, the asymmetry arises entirely as a result of different transformations applied to the portions that are predefined identically in the two embodiments—it does ***not*** arise as a result of a new or different determination of the portions.

Second, Petitioner also newly argues that Meulen describes the “display controller” as performing the “obtain,” “determine,” and “apply” steps in the recited order. Reply 9. But, Meulen discloses no such thing. Petitioner cites to disparate disclosures of Meulen’s “display controller 504” and artificially maps these disclosures to the “determine” and “apply” steps of the claim without any explanation of how they suggest distinct operations. Reply 9. Indeed, for Meulen’s purported “determine” step, Petitioner merely cites a disclosure regarding how the transformation is applied in one particular embodiment. EX1007, 11:66-12:25 (describing various “implementations” of

how the transformation is applied to the pre-defined regions); Reply 9. Contrary to Petitioner's suggestion, Meulen's description of display controller 504 creating a "magnified effect," EX1007, 11:23-25, does not relate to any distinct "determine a portion" operation; it is merely an effect that arises from a compression scheme that may be applied to Meulen's predefined regions.

Lest there be any doubt, Dr. Katsaggelos testified that the size of Meulen's display regions is a choice made by the "designer"—*i.e.*, "the person who **implement[s]** ... these choices" into the system prior to obtaining any image. EX2026, 23:12-17; POR 21. PO did not mischaracterize Dr. Katsaggelos's testimony as Petitioner claims. Reply 9 n.3. Dr. Katsaggelos made clear that it is the system **designer**, not the **user**, who makes this choice in advance. Thus, Meulen does not "determine a portion" as claimed.

C. Non-Uniform Transformation

As discussed above, non-uniform shifting requires non-linear transformation.

Citing no evidence or expert testimony, Petitioner argues that Meulen's piecewise linear transformation constitutes a "non-linear" transformation. Reply 11. Petitioner's suggestion that PO "concede[d]" piecewise linear transformation is a non-linear transformation, Reply 11, is a gross

mischaracterization, POR 24, *citing* EX2027, ¶¶71. Petitioner's argument that a piecewise linear transformation has "multiple transformations with different shifts" does not establish non-linearity—it merely parrots Petitioner's flawed and overbroad construction for non-uniform shifting. Finally, Petitioner fails to address PO's and Dr. Foroosh's explanation highlighting the differences between piecewise linear transformation and non-linear transformation. POR 24-28; EX2027, ¶¶70-76. It is only an **approximation**, which Petitioner acknowledges. Reply 11.

Petitioner's reliance on Figures 4A-4C of Meulen fares no better. Reply 12. These embodiments use a piecewise linear approach—but with "more display regions." EX1007, 10:44-48. While this **approximates** a "smooth ... visual transition[]," it is not non-linear. EX1007, 10:32-33. Indeed, increasing the number of display regions can only be an approximation. If each display region were only two pixels wide, only a 2:1 compression ratio would be possible. If each display region were only 1 pixel wide, no compression would be possible.

Petitioner's attempt to characterize Figures 4A-4C as themselves depicting "non-linear" curves cannot contradict the specification's disclosure they are piecewise linear. *Hockerson-Halberstadt*, 222 F.3d at 956. In fact,

the Figures plot compression factor against ***display regions***, making clear that a uniform compression factor is applied to regions, not individual pixels. EX2042, 51:11-54:6.

D. Shifting

As PO's Response explained, Meulen only describes compression using "polyphase filtering." Polyphase filtering is "shift invariant," *i.e.* no need for pixel shifting, see EX1015, 119:2-130:1-12, which Petitioner does not dispute. Reply 13.

Instead, Petitioner relies on an entirely different compression technique—"sub-sampling"—which was introduced by Petitioner's expert for the first time in his Reply Declaration. Reply 13-14. Petitioner does not cite any express disclose for sub-sampling in Meulen, or claim that sub-sampling is inherent in the concept of compression. EX2042, 58:10-16 ("[T]his is one of the many ways to perform the sample rate conversion"). Petitioner does not even argue that it would be obvious to use sub-sampling to implement Meulen.

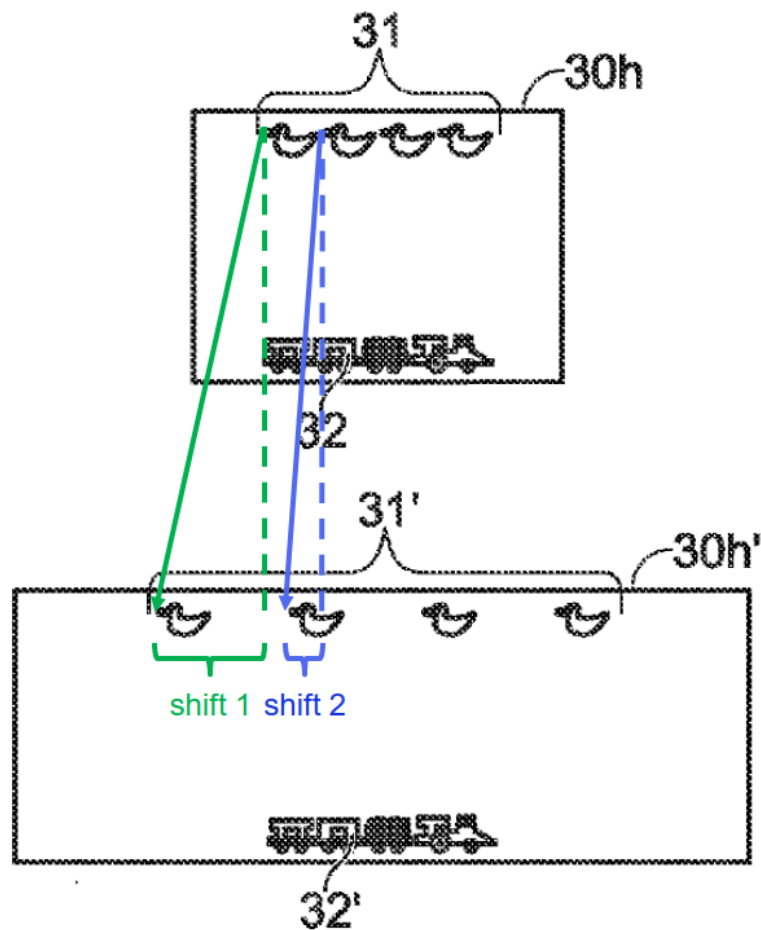
Petitioner also argues that since Meulen and the '413 Patent use the word "compression," they must both involve pixel shifting. Reply 14. Petitioner cites to no authority that would permit such a hindsight-driven

argument. Moreover, it is black letter law that claims can be narrower than the specification. *See August Tech. Corp. v. Camtek, Ltd.*, 655 F.3d 1278, 1285 (Fed. Cir. 2011) (“The mere fact that there is an alternative embodiment disclosed ... that is not encompassed by our claim construction does not outweigh the language of the claim”). And the use of a broader term in the prior art does not anticipate a claimed narrower term. *Sanofi-Synthelabo v. Apotex, Inc.*, 550 F. 3d 1075, 1084 (Fed. Cir. 2008) (“It is well established that the disclosure of a genus in the prior art is not necessarily a disclosure of every species that is a member of that genus.”). The use of the term “compression” in the prior art does not necessarily imply or even naturally suggest pixel shifting, particularly given Meulen only discloses a shift-invariant compression.

E. Chao Does Not Disclose “Non-Uniform[] Shift”

Petitioner first argues that “shifting an object means shifting the pixels.” Reply 14-15. But Chao does not describe pixel shifting, and shifting an object does not inherently require shifting of pixels, as objects could instead be shifted using an interpolation or compression process. EX2027, ¶¶84-85. Petitioner does not address this point.

Regardless, Chao does not disclose non-uniform shifting, which requires a non-linear transformation. Petitioner points to the shifting of the ducks in Figure 14, which is the result of preserving each duck's aspect ratio while changing the aspect ratio of the background. Reply 15-16 (“This difference in change in aspect ratio satisfies ‘non-uniform.’”).



But the shifting of the ducks is equivalent to linear scaling, which as discussed above cannot meet the claimed non-uniform shifting. Indeed, Chao

states the ducks are modified using “a *uniform scaling factor* along both the horizontal and vertical direction.” EX1008, ¶93.

In addition, Petitioner never explains how Chao's differing treatment of foreground and background elements would be combined with Meulen. Petitioner merely asserted that in view of Chao's disclosure of “stretching or shrinking” the background element, “[a] POSITA would understand that stretching/shrinking means shifting the pixels' positions.” Pet. 92 (quoting EX1008, ¶28). Yet there is no dispute that Chao's stretching and shrinking of the background element is a linear scaling and does not involve non-uniform shifting.

F. No Motivation to Combine

The Petition's rationale to combine Meulen and Chao was facially deficient as it did not provide any reason to combine the references and did not explain how the combination would have a reasonable expectation of success. POR 35-36. Petitioner's Reply does not attempt to cure these deficiencies, instead resting its laurels on the false contention that “[n]either PO nor its expert disputes Petitioner's motivation.” Reply 17. Petitioner's motivation is simply that a POSITA would look to Chao for details on “scaling.” Reply 17. But Meulen already describes how to perform scaling:

via polyphase filtering. And Chao itself provides no details regarding scaling—it certainly does not describe the sub-sampling that Petitioner now relies on.

PO's Response also explained why a POSITA would **not** look to Chao given its cross-purposes with Meulen. POR 36-38. Petitioner claims both references “address the same problems from cropping, padding, and linear scaling.” Reply 17. But the problem in Chao (distortion to foreground graphic elements at the border) is not the same problem in Meulen (distortion in the center of a photo), which is why they propose completely different solutions.

Petitioner falsely claims that PO “ignor[es] disclosures in the references” because PO's Response argues that “Chao is directed to printed documents.” Reply 18. Chao **is** directed to “document intended for **printing**” (POR 36), and none of Petitioner's citations say otherwise. That the document may be first displayed on a screen prior to printing does not change the fact that Chao's printed documents (which contain graphic design elements) are fundamentally different than Meulen's digital display of “media source content.”

Finally, Petitioner argues that obviousness does not require bodily incorporation. Reply 18. The issue is not whether it is possible to physically

combine Meulen and Chao's systems. The issue is that Petitioner failed to provide "some articulated reasoning with some rational underpinning" for its combination. *KSR Intern. Co. v. Teleflex Inc.*, 550 U.S. 3938, 418 (2007). Chao and Meulen involve very different methods and Petitioner does not explain *how* and *why* a POSITA would combine the two. POR 37-38.

Petitioner's argument that "PO fails to explain why identifying foreground objects in an image would be limited to 'graphic design'" highlights the deficiency in Petitioner's combination—Petitioner does not suggest that the Meulen-Chao combination would even involve identifying foreground objects, nor explain why a POSITA would want to do so.

G. Non-Uniform Shifting Along Both Axes

The claims require "non-uniformly shift[ing] the pixels ... based on" the input positions of both axes. For example, if pixels are non-uniformly shifted along the horizontal axis but not the vertical axis, then the vertical position has no role in the shift.

Petitioner cites '413 embodiments that "shift along the horizontal axis only." Reply 19. But shifting still occurs along both axes and is performed in succession rather than at the same time. EX1001, 5:29-32. Moreover, even if the embodiment only performed horizontal shifting (it does not), it is "a

function of the horizontal position **only**,” and not embodied by the limitation. EX1001, 6:65-66.

Petitioner also relies on Meulen's disclosure of “image compression and/or scaling” along both axes. Reply 19, EX1007, 10:19-26. Petitioner assumes that “image compression and/or scaling” **only** refers to non-uniform compression/scaling. But Meulen describes that “image compression and/or scaling may be applied to the media source ... in **one** ... of the display regions,” *i.e.* a uniform compression. EX1007, 5:67-6:3; *see also* 8:15-18.

III. OBJECTIVE INDICIA

A. Nexus

Petitioner argues no nexus because GoPro devices had other desirable features. Reply 29-30. But, Dr. Foorsh established that GoPro's “SuperView” algorithm directly practiced and was coextensive with the '413 Patent, EX2027, ¶¶130-154, establishing a presumptive nexus for SuperView. *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019).

Petitioner does not rebut Mr. Lema's testimony, supported by consumer surveys, establishing that SuperView directly led to success of GoPro's embodying HERO cameras. EX2024 ¶16 (SuperView “**key driver[] of customer demand**”), ¶19 (SuperView “among the **most important and valued**

features driving customer demand”), ¶21 (patented lens technologies were “*directly responsible for GoPro’s commercial success*”), ¶24 (SuperView played a “*pivotal role*” in commercial success).

Mr. Lema provided unrebutted testimony linking the features tested in the customer surveys to SuperView. EX2024 ¶¶17-18, 20. Nexus does not require patented features be the sole reason for commercial success. *Cont’l Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1273 (Fed. Cir. 1991).

B. Copying

Petitioner claims GoPro “fails to establish a predicate for copying” with a citation to out-of-date precedent. Reply 30. Indeed, the Federal Circuit has clarified the *Tokia* line of cases, holding that “where there is evidence of actual copying efforts, that evidence is always relevant.” *Liqwd, Inc. v. L’Oreal USA, Inc.*, 941 F.3d 1133, 1138 (Fed. Cir. 2019). Nor is an element-by-element analysis of Petitioner’s products necessary—it is the acts of copying that are probative of non-obviousness, **not** subsequent acts of infringement. *See Medtronic, Inc. v. Teleflex Innovations S.a.r.l.*, 70 F.4th 1331, 1340 (Fed. Cir. 2023) (“[T]he copying inquiry involves a comparison of the competitor’s product with the allegedly copied patented product, rather than the patent’s claims”). The evidence shows that Petitioner sought to copy

SuperView, not just benchmark it. EX2033, 1, 5-7, 25-26; EX2034, EX2035, 4.

C. Industry Praise

Petitioner argues that the industry praise concerns older HERO models. Reply 31. But, SuperView has been available since the HERO3+ in 2013, EX2024 ¶6, and the parties stipulated in the ITC that HERO7 was representative of all these older generations. EX2025.

D. Commercial Success

Petitioner does not dispute that GoPro's devices had significant commercial success. Mr. Lema and the survey data establish nexus.

E. Long-felt need

PO did not cite to just the patent for support, but also both parties' experts, the Nikon Camera, and GoPro documentation. In addition, none of the new camera evidence introduced by Petitioner used non-uniform transformations, further cementing a long-felt need and failure of others.

Petitioner argues that prior art used "distortion in the same manner and highlighted the benefits of doing so." Reply 32 (citing Fleming, Obara, and Meulen). None of these references address the long-felt need of using distortion to create a more immersive feel for body-mounted cameras. POR 57-58.

IV. GROUND 1: FLEMING

A. No Motivation

The Petition proposed modifying “a camera” to include “Fleming’s data processing system.” Pet. 28. PO’s Response pointed out numerous issues with the Petition’s scant analysis and evidence. POR 61-69.

Petitioner now argues a motivation to avoid “applying non-uniform shifting by a separate device.” Reply 20-21. Yet this is not a motivation directed to the Petition’s combination: modifying a camera to include Fleming’s system to present a camera’s captured image onto its display. Pet. 28; Reply 25. Conventional cameras could already present images on an embedded display using conventional techniques which were deemed adequate. Petitioner’s motivation is really about presenting a camera’s captured image *processed according to the ’413 Patent* on the camera’s display without a separate device. It is a motivation to improve a nonsensical hypothetical of performing non-linear aspect ratio conversion in a separate device, and then re-uploading the image back to the camera for display. The hindsight in this theory is evident.

Petitioner shifts to new evidence and theories. *First*, Petitioner now asserts a combination of the Canon PowerShot G15⁴ (or other cameras) and Fleming, arguing that the former device(s) performed conventional aspect ratio conversion that could have been improved by Fleming. Reply 22; EX1014, ¶83. Petitioner cannot claim these devices were simply part of the state of the art, which Dr. Katsaggelos admittedly could not define. EX2042, 47:1-19. Regardless, Petitioner points to a feature for changing aspect ratio *prior* to image capture. Reply 22; EX1028, 80 (referring to page 47 of the manual), 47 (“Configure commonly used *shooting functions*”).

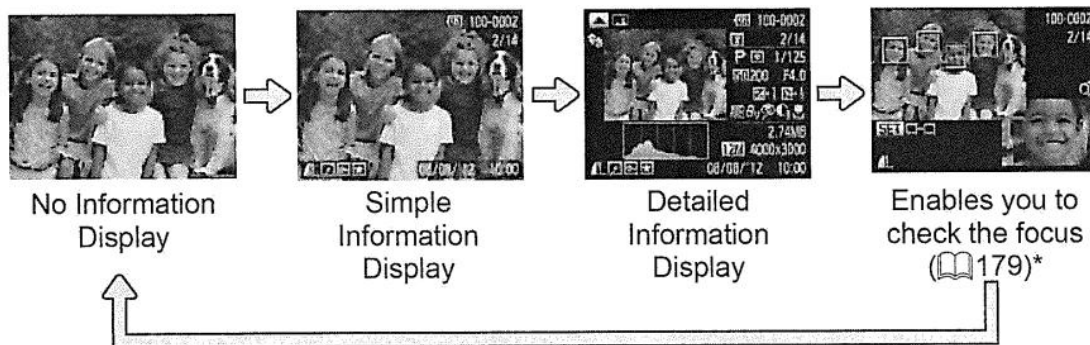
Second, Petitioner argues the aspect ratio difference between the Canon’s image sensor and screen intrinsically “resulted in a need for aspect ratio conversion and a reason to apply Fleming’s method.” Reply 22. But conventional “cropping, linear scaling, or padding” provided more desirable aspect ratio conversions, as distortion was considered undesirable. POR 64-

⁴ Petitioner relies on a 317-page manual without evidence it was publicly available before August 22, 2013. EX2018. The Internet Archive declaration is directed to a copy of the manual available in **2014**. EX1035, 79.

69. No motivation was provided to use Fleming over these more efficient alternatives.

Third, Petitioner ignores that the prior art cautioned against distortion, especially in typical photographic shots, instead disclosing the benefits of removing it. Reply 22; POR 67-68.

Fourth, Petitioner argues that the undisputed benefits of avoiding aspect ratio conversion “ignores the applications where aspect ratio conversion is needed,” such as the Canon camera. Reply 22-23. But aspect ratio conversion is not needed for the Canon, which displays the image just fine using its original aspect ratio:



EX1028, 176. Petitioner relies on “non-linear distortions [being] useful for ... body- and gear-mounted shots.” Reply 23; POR 67 (quoting a review of GoPro’s SuperView). But the utility of such distortion was what PO discovered and implemented in its products.

Fifth, Petitioner admits that the known alternatives had less “required processing and more battery life” over Fleming, but newly argues Fleming “avoid[s] image loss, black bars, or perceivable distortion.” Reply 23. Petitioner provides no evidence of a desire to avoid such things on a tiny on-camera display. EX1029, 2 (3” display). Moreover, a POSITA would have been discouraged from modifying images on a camera, as the user would want to view and download images in their unmodified state.

Sixth, Petitioner argues Fleming’s non-linear scaling could be performed using lookup tables, citing Meulen and Obara. But Petitioner provides no evidence that the Canon device had the requisite memory and registers. Meulen’s smartphone and Obara’s PC had greater memory capabilities than digital cameras.

Seventh, Petitioner claims its rationale “came from POSITA knowledge and the prior art,” citing to GoPro’s expert that it was desirable to process images directly on-camera. Reply 24. But as discussed above, impermissible hindsight drives Petitioner’s argument of using non-uniform transformation on a camera for mere display of an image. POR 64. The Petition again provided no reason to do this.

Eighth, Petitioner newly asserts a reasonable expectation of success because Fleming's method involves "a simple math equation" or could be implemented using "lookup tables." Reply 25. Petitioner provides no evidence that the Canon device (or any other digital camera) had a processor capable of performing such operations on **every** pixel without perceptible delay, which would be necessary for photo browsing on a camera.

B. "Determine a Portion"

Having failed to establish that Fleming discloses a separate step of "determin[ing] a portion" after obtaining an image, Petitioner newly cites to other disclosures in Fleming. Reply 25-26. But none of these disclosures indicate that the determination occurs **after** obtaining an image. Although Fleming describes dividing the frame into regions, the division is determined by the **designer**, *i.e.* whoever implemented the algorithm. EX2026, 22:24-23:17.

V. GROUND 3: OBARA-LIU

Petitioner's arguments fail for the same reasons for Ground 2.

Petitioner relies on Fleming's Figure 10, though claims it is from Obara. Reply 27. Fleming's Figure 10 uses piecewise linear scaling. EX1006, 8:46-56 ("piecewisely scale video images"). Piecewise linear scaling is not a non-

linear transformation. And Petitioner improperly combines disparate embodiments without providing a reason to do so. *NetMoneyIN, Inc. v. Verisign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008).

VI. DR. FOROOSH'S TESTIMONY

Dr. Foroosh was not "evasive throughout his deposition." Reply 28-29. He simply declined opine on issues not discussed in his declaration. Petitioner's own expert Dr. Katsaggelos did the same. EX2026, 32:21-34:6. Moreover, Dr. Katsaggelos frequently refused to answer questions directly related to his opinions. EX2042, 23:9-25:17, 33:17-37:19.

Date: August 22, 2025

By: /s/ James Glass

James M. Glass (Reg. No. 46,729)
QUINN EMANUEL URQUHART &
SULLIVAN LLP
295 5th Avenue, 9th Floor
New York, New York 10016
Email: jimglass@quinnemanuel.com
Phone: 212-849-7142
Fax: 212-849-7100

*Counsel for Patent Owner
GoPro, Inc.*

CERTIFICATE OF LENGTH (37 C.F.R. §§ 42.24)

The undersigned hereby certifies that, according to the word-processing system used to prepare the foregoing document, this document has 5,587 words and thus complies with the applicable word limit.

Date: August 22, 2025

By: /s/ James Glass
James M. Glass (Reg. No. 46,729)
QUINN EMANUEL URQUHART &
SULLIVAN LLP
295 5th Avenue, 9th Floor
New York, New York 10016
Email: jimglass@quinnemanuel.com
Phone: 212-849-7142
Fax: 212-849-7100

*Counsel for Patent Owner
GoPro, Inc.*

CERTIFICATE OF SERVICE (37 C.F.R. §§ 42.6(E), 42.105(A))

The undersigned hereby certifies that the foregoing document was served in its entirety on August 22, 2025 upon the following parties via Electronic Mail:

ayap@mofo.com
marjomand@mofo.com
jnguyen@mofo.com
mofo_insta360-IPRs@mofo.com
AYuan@mofo.com
SMao@mofo.com

Date: August 22, 2025

By: /s/ James Glass
James M. Glass (Reg. No. 46,729)
QUINN EMANUEL URQUHART &
SULLIVAN LLP
295 5th Avenue, 9th Floor
New York, New York 10016
Email: jimglass@quinnemanuel.com
Phone: 212-849-7142
Fax: 212-849-7100

Counsel for Patent Owner
GoPro, Inc.