UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., AND
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,

v.

CELLECT, LLC,
Patent Owner.

Case IPR2020-00512
U.S. Patent No. 9,186,052

PATENT OWNER'S PRELIMINARY RESPONSE

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On February 17, 2020, Samsung Electronics Co., Ltd., and Samsung Electronics America, Inc., ("Samsung" or "Petitioner") submitted a Petition to institute *inter partes* review ("IPR") of U.S. Patent No. 9,186,052 (Ex. 1001, "the '052 Patent"), challenging claim 2 ("the Challenged Claim). Cellect, LLC, ("Cellect" or "Patent Owner") requests that the Board deny institution of *inter partes* review under 35 U.S.C. § 325(d) because the same or similar arguments were previously presented to the Office, under 35 U.S.C. § 314(a) based on the advanced stage of the co-pending litigation, and on the merits because the cited references fail to disclose all elements of the challenged claims and Petitioner's motivation to combine certain references ignores explicit teaching away from Petitioner's proposed combinations.

I. INTRODUCTION

Petitioner requests that the Board revisit twenty-years' worth of prosecution history surrounding this family of patents, in which time the USPTO considered references cumulative to that cited herein. Time and again, the USPTO confirmed that patentability of the core concept of the claimed invention: to "take advantage of 'camera on a chip' technology, but rearrange the circuitry in a stacked relationship so that there is a minimum profile presented when used within a surgical instrument or other investigative device." Ex. 1001 ('052 Patent) at 3:32-37.

The primary reference cited against the single challenged claim in this proceeding, Swift, represent early attempts to simply plug the newly-developed CMOS image sensors into the old CCD camera architectures, characterized by large, bulky circuit boards that limit their applicability in size-critical applications, such as the endoscopes disclosed in the '052 Patent. But the CMOS imager of Swift could not simply be plugged directly into a CCD system given CMOS' *on chip* integration of circuitry required to be *off chip* in CCD cameras, such as the "circuitry … to convert said pre-video signal to a post-video signal," recited in independent claim 2.

Swift fails to disclose or contemplate modifying the CMOS imagers referenced therein to meet the challenged claims, and Petitioner's arguments fail to address, let alone wrangle with, the fundamental difference between these early attempts to plug a CMOS camera on a chip into an old, large, bulky and expensive CCD system and modifying the camera on a chip to achieve an even smaller imager than was possible with the state of the art CMOS architecture alone. The modifications to the CMOS "camera on a chip" disclosed and claimed in the '052 Patent bucked the conventional wisdom at the time, which was to reduce the imager size by integrating as much functionality *on chip* as possible. *See generally* Ex. 1060.

The Board should deny this Petition pursuant to 35 U.S.C. § 325(d) because Petitioner's grounds are substantially similar to grounds already considered and dismissed by the Office. The Office has already considered references that purport to implement a CMOS "camera on a chip" imager in the system architecture of a CCD camera. Furthermore, Petitioner fails to address the prosecution history of the '052 Patent, where the Applicant overcame such cumulative art and arguments, as required under the Board's precedential decision in *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH,* IPR 2019-01469, Paper 6 at 8-9, (PTAB Feb. 13, 2020) (precedential).

The Petition should also be denied under 35 U.S.C. § 314(a) because by waiting until the very end of the period prescribed by 35 U.S.C. § 315(b), Samsung has allowed the co-pending litigation to reach an advanced stage. The District Court has yet to rule on Samsung's Motion to Stay, which was filed in February, and the Scheduling Order demonstrates that by the time the Board determines whether to institute trial in this case fact discovery will have concluded, and the court will have held the pre-trial conference. In contrast, any trial instituted based on this Petition would not conclude until September 2021. Furthermore, the grounds raised in this Petition are cumulative to those raised in the co-pending district court case, so instituting IPR would duplicate those efforts.

Finally, the Board should also deny this Petition on the merits. Petitioner's carefree mixing between charge-coupled device (CCD) technology and complementary metal–oxide–semiconductor (CMOS) technology used in imaging devices fails to establish by a preponderance of the evidence that it would have been obvious to modify the cited references to yield the invention of the challenged claims.

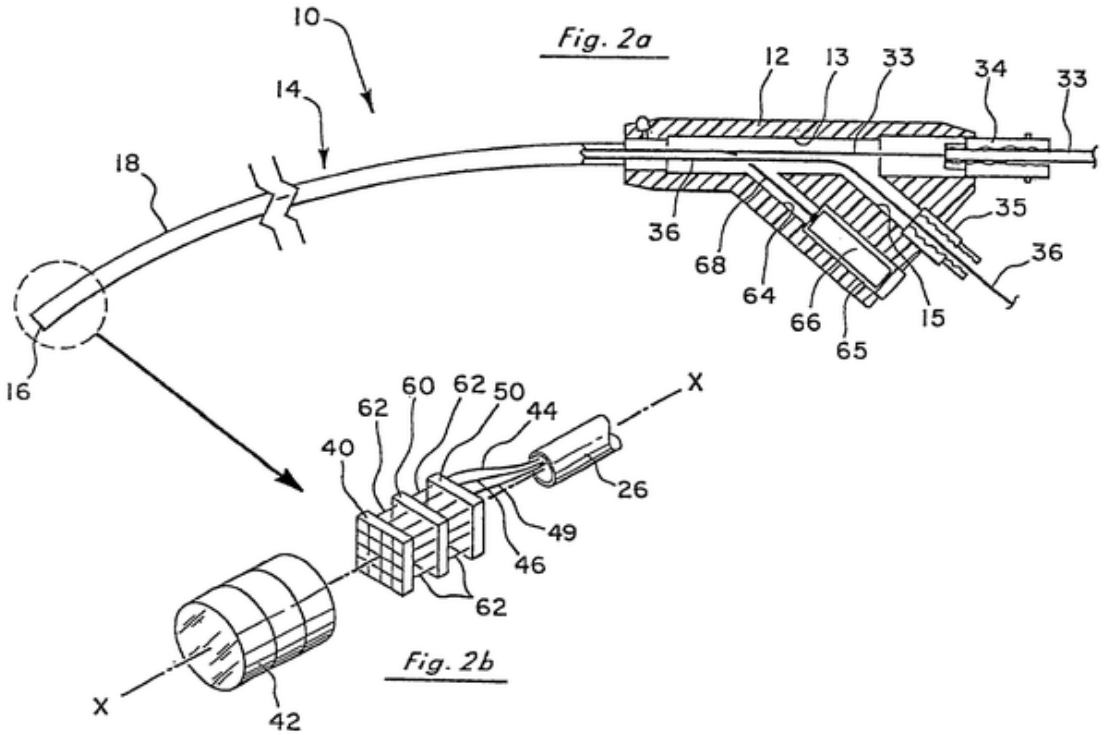
Although there are a variety of reasons why the '052 Patent is valid over Petitioner's asserted prior art references, this Preliminary Response focuses on only limited reasons why *inter partes* review should not be instituted. See *Travelocity.com L.P. v. Cronos Techs., LLC*, Case CBM2014-00082, Paper 12 at 10 (P.T.A.B. Oct. 16, 2014) ("[N]othing may be gleaned from the Patent Owner's challenge or failure to challenge the grounds of unpatentability for any particular reason.").

II. OVERVIEW OF THE '052 PATENT AND ASSERTED REFERENCES

A. The '052 Patent

The '052 Patent generally discloses "a reduced area imaging device incorporated within endoscopic devices." '052 Patent at Title. The '052 Patent generally describes a reduced area imaging device in various configurations, and connections (either wired or wireless) between the imaging device elements and a video display. *Id.* at Abstract. The '052 Patent discloses and specifically claims

inventive concepts that represent significant improvements over conventional single-chip imaging devices with the image sensor and image processing on the same plane. An example of the reduced area imaging device is seen in Fig. 2a which is reproduced below:



B. Challenged Claims

Petitioner challenges only independent claim 2 of the ’052 Patent.

C. Swift (Ex. 1005)

Swift is a reference fundamentally at odds with itself. Although *Swift* states that its image sensor “is **preferably** of a CMOS/Aps (Active Pixel Sensor) type,” *Swift*’s description of its system architecture betrays the reality that the author merely contemplated placing a CMOS imager within the incompatible CCD

system architecture. Ex. 1005 at 10 (emphasis added). Yet the author presumably gave no thought to the fact that the two systems are incompatible, let alone plug and play, in the way contemplated in *Swift*. *See* Ex. 1001 ('052 Patent) at 1:66.

The size of *Swift*'s circuit boards also establishes that the circuitry on its circuit boards is circuitry for supporting a CCD image sensor, not a CMOS image sensor. *See* Ex. 1001 at 2:9-12 ("This CMOS imager can incorporate a number of other different electronic controls that are usually found on **multiple circuit boards of much larger size**."). Thus, while *Swift* boasts that its "miniature camera 50 may have very small dimensions," it is many times larger than the CMOS imager disclosed in the '052 Patent. *Compare* Ex. 1005 at 5 (contemplating a maximum dimension of 100, 80, or 50 mm); *id.* 9 (contemplating a 38x38 mm housing) *with* Ex. 1001 at 9:22-26 ("Image sensor 40 can be **as small as 1 mm in its largest dimension**. However, a more preferable size for most endoscopic procedures would dictate that the image sensor 40 be **between 4 mm to 8 mm** in its largest dimension.").

The power supply used in *Swift* is in the range of voltages used for CCD imagers, not CMOS imagers. *See* Ex. 1005 at 15 ("The power supply device 170 may comprise, for example, a low-voltage transformer in order to receive 30 mains power and provide, as an output, **a low (eg 12 volt) operating voltage** for the camera 152."); Ex. 1001 at 48-51 ("Additionally, this hybrid is able to run on a low

power source (5 volts) which is normally not possible on standard **CCD imagers which require 10 to 30 volt power supplies**.") (emphasis added). On the other hand, CMOS imagers operate at a far lower voltage and require orders of magnitude less power than CCD imagers. Ex. 2034 at 5:28–41 (running Fossum's CMOS imager with a 5 volt power supply); Ex. 2004 at 85 (confirming that CCD imagers are "driven with relatively high voltages); Ex. 1001 at 2:15-16 ("Furthermore, this particular CMOS imager requires 100 times less power than a CCD-type imager.").

D. Ricquier (Ex. 1033)

Ricquier discloses a test setup for a dedicated imager (camera) demonstrating proof of concept for machine vision applications. Ex. 1033 (*Ricquier*) at 10. The imager includes a 256 x 256 pixel array on the sensor plane, fabricated using 1.5 um CMOS technology. *Id.* The imager was developed as part of the "CIVIS project" with the goal to "acquire data only from a specific region of interest and this with a variable resolution." *Id.*

Critically, having considered CCD-based cameras for this application, the authors instead chose to use CMOS technology "because it offers the selective addressability **together with the possibility of further cointegration of processing electronics on the same chip**." *Id.* Indeed, the authors explicitly stated that their work was focused on "emphasizing the development of a multi-purpose

flexible sensor architecture that can be used as a module in further sensor systems **on a single chip**." *Id.* at 11. As discussed in detail above, Fossum's CMOS imager seen in *Swift* realizes such an on-chip sensor system, and a POSITA would not have modified a system that realizes Ricquier's goals with Ricquier's test bench setup, particularly as Petitioner has not identified any motivation for doing so, and such off-chip timing control causes well-known problems that limit the "read-out frame rate." *See* § VII.A.1, *infra*; Ex. 1033 at 10 (disclosing a single output amplifier); Ex. 2034 at 1:44–62 (discussing the negative impact of using a single output amplifier on an imager's frame rate).

E. Suzuki

Suzuki describes a solid-state image pickup device that includes a solid-state image pickup chip 221 and a circuit module 222. Ex. 1015 (*Suzuki*), 2:38-41. *Suzuki's* circuit module 222 comprises a chip-connecting board 226, a circuit board 227 including a circuit for driving the solid-state image pickup chip 221 and a circuit for amplifying the video signal from the solid-state image pickup chip 221, and a connector board 228. *Id.* at 2:50-54, Fig. 2. "Signals are fed between these boards via connection pins 229, and signals are fed between the solid-state image pickup chip 221 and each of these boards via the outer-leads 221m and side electrodes 226e, 227e and 228e of the boards." *Id.* at 2:55-59.

A POSITA would understand Suzuki to be a CCD device, as Suzuki refers to a solid-state imager and describes a conventional CCD device design used in 1991 (when *Suzuki* was filed). The fact that *Suzuki's* circuit board 227 includes "a circuit for ***driving*** the solid-state image pickup chip 221 and a circuit for ***amplifying*** the video signal from the solid-state image pickup chip 221" separate from the image pickup chip tells a POSITA that *Suzuki* describes a CCD imaging sensor. Ex. 1015 at 2:51-54 (emphasis added). Petitioner cites *Suzuki* for allegedly disclosing alternative arrangements and sizing of circuit boards and image sensors. Petition at 24.

F. Larson

Larson teaches a videophone that "includes a video camera for transducing and digitizing images at a station and connected to a video processor for compressing and encoding the digitized images into video data." Ex. 1029 (*Larson*), Abstract. *Larson* reveals an embodiment of packaging a display within the same housing as the image sensor and related circuitry. *Id.* at 26:43-54. *Larson* describes a CCD camera in a "housing 131 for the CCD camera lens 44A and the LCD panel 56B." *Id.* at Fig. 8B1. Petitioner cites *Larson* to address deficiencies in the other cited references as to the disclosure of a physical camera within the same physical housing as the video monitor to form the claimed device required by independent claim 2. Petition at 50.

III. CLAIM CONSTRUCTION

The Board should deny institution because Petitioner takes no claim construction positions on claim terms central to its varying invalidity positions—including a term that it has argued requires construction in the co-pending district court litigation. For example, Petitioner does not advocate in this proceeding for a construction of "pre-video signal" that it pushes for in the co-pending litigation.

The Board's rules require that the Petitioner establish "[h]ow the challenged claim is to be construed" and "[h]ow the construed claim is unpatentable." 37 CFR 42.104(b). Having failed to meet its burden to construe a claim term that it admits may or may not be met by the combination of references cited in Grounds 1 and 2—and in particular a claim term that it argued required a specific instruction in the co-pending litigation—the Board should deny the Petition. *See Orthopediatrics Corp. v. K2M, Inc.*, IPR2018-01548, Paper 9 at 9–11 (PTAB Mar. 1, 2019) (denying institution where petitioner failed to propose a construction for a term expected to be in dispute).

A. "circuitry thereon to convert said pre-video signal to a post-video signal"

In the co-pending district court litigation, Petitioner proposed a narrow construction for the term "pre-video signal," arguing that it is limited to "an ***analog*** image signal transmitted by the image sensor." Ex. 2005 at 1. Notwithstanding this narrow construction, which Patent Owner disputes, Petitioner fails to address

the construction and whether the references relied upon Petitioner disclose an analog image signal. Furthermore, Petitioner did not request this or any other construction of this claim term in this proceeding, as required under 37 C.F.R. § 42.104, despite asserting a broad interpretation as to how the cited references allegedly meet this claim limitation. *See* Petition at 36-38.

Because Petitioner has failed to construe a claim term that it argued required an affirmative construction in the co-pending litigation, and upon which its patentability arguments depend, Petitioner has not met its threshold burden under 37 CFR 42.104(b), and the Board should deny the Petition.

IV. THE BOARD SHOULD DENY THE PETITION PURSUANT TO 35 U.S.C. § 325(d)

The Board should exercise its discretion to deny institution of the *inter partes* review of the Challenged Claims of the '052 Patent under 35 U.S.C. § 325(d). The subject matter of the prior art relied on by Petitioner was previously considered and distinguished during prosecution of the '052 Patent, and the arguments presented by Petitioner add nothing new from what was already known and considered by the Examiner during prosecution of the '052 Patent and its related applications.

The Board uses a two-part framework to evaluate whether to exercise its discretion under Section 325(d). *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR 2019-01469, Paper 6 at 8-9, (P.T.A.B.

Feb. 13, 2020) (precedential) (framework demonstrates "a commitment to ***defer to previous Office evaluations*** of the evidence of record ***unless material error is shown***") (emphasis added). The Board focuses on: (1) whether the same or substantially the same art or arguments previously were presented to the Office; and (2) if that condition is satisfied, then whether Petitioner has demonstrated that the Office erred in a manner material to the patentability of the Challenged Claims. *Id.*

Here, the same or substantially the same art and arguments were previously presented to the Office as evidenced by the '052 Patent's prosecution history, and the Petitioner fails to demonstrate that the Office materially erred in the patentability of the Challenged Claims.

A. Petitioner Presents the Same Prior Art and Arguments That Were Previously Considered by the Office.

The Board reviews the following relevant factors, identified in *Becton, Dickinson, & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8, at 17-18 (P.T.A.B. Dec. 15, 2017), to determine if the same prior art or arguments were previously considered: factor (a)—the similarities and material differences between the asserted art and the prior art involved during examination; factor (b)—the cumulative nature of the asserted art and the prior art evaluated during examination; and factor (d)—the extent of the overlap between the arguments

made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art. *Id*.

To provide "useful insight into how to apply the framework under 35 U.S.C. § 325(d)," the Board in *Advanced Bionics* advanced these three factors "to apply to any situation in which a petition relies on the same or substantially the same art or arguments previously presented to the Office during a proceeding pertaining to the challenged patent." *Id*. at 9-10. These three factors are "read broadly" and apply to "prior art previously presented to the Office during ***any*** proceeding." *Id.* at 10.

1. References Involved During Examination

a. Prior Art Already Considered

During prosecution of the '052 Patent, and its related applications, the Examiner rejected claims over the combinations of several references, as summarized in the following charts below. These references are a part of the intrinsic record of the '052 Patent and describe the exact same subject matter relied on by Petitioner. *See E.I. du Pont De Nemours & Co. v. Unifrax I LLC*, 921 F.3d 1060, 1070 (Fed. Cir. 2019) (statements made in parent application involving common subject matter with the terms at issue are intrinsic evidence and relevant to construction of terms in child patent).

Prior Art References	Exhibit	Patent/Printed Publication
Yarush	2040	U.S. Patent No. 5,879,289 to Yarush *et al.*[1]
Sonnenschein[2]	2041	U.S. Patent No. 7,369,176 to Sonnenschein *et al.*
Pelchy	2006	U.S. Patent No. 5,754,313 to Pelchy *et al.*[3]
Zarnowski	2007	Zarnowski & Pace, *Imaging Options Expand with CMOS Technology*, LASER FOCUS WORLD (June 1997).[4]
Danna	2008	U.S. Patent No. 4,491,865 to Danna *et al.*[5]
Lenhardt	2009	U.S. Patent No. 5,453,785 to Lenhardt *et al.*[6]

[1] Ex. 1002 at 117.

[2] Patent Owner notes that *Sonnenschein* does ***not qualify as prior art*** against the '052 Patent. The Section 102(e) effective date of *Sonnenschein* is its U.S. filing date—July 31, 2003. MPEP § 2136. Here, the '052 Patent claims the benefit of its earliest priority date to U.S. Application No. 08/944,322, filed October 6, 1997. Ex. 1002 at 2. Accordingly, the effective date of **Sonnenschein** postdates the '052 Patent's effective filing date, but Patent Owner does not rely on **Sonnenschein's** status as prior art in this response.

[3] Considered in parent application U.S. Patent Application No. 09/175,685 ("'685 Application"), which became U.S. Patent No. 6,043,839 ("'839 Patent") (Ex. 1003 at 120), and in U.S. Patent Application No. 09/496,312 ("'312 Application"), which became U.S. Patent No. 6,275,255 ("'255 Patent") (Ex. 2042 at 68, 87).

[4] Ex. 1003 at 121; Ex. 2042 at 69, 87.

[5] Ex. 1003 at 120; Ex. 2042 at 68, 91.

[6] Ex. 1003 at 148, 157; Ex. 2042 at 68.

Prior Art References	Exhibit	Patent/Printed Publication
Armstrong	2039	Armstrong, L., *NASA's Tiny Camera Has a Wide-Angle Future*, BUS. WEEK (Mar. 6, 1995)[7]

Rejection Grounds	References	Statutory Basis	'052 Patent Claims
1	**Pelchy** in view of **Zarnowski**	§ 103	N/A[8]
2	**Pelchy** in view of **Zarnowski** & **Danna**		N/A[9]
3	**Lenhardt** in view of **Zarnowski**		N/A[10]

(i) Yarush

Yarush describes a hand-held endoscopic camera, which has an image sensor comprising a CCD array 91 on a printed circuit board 80. Ex. 2040 (*Yarush)*, Abstract, 7:15-19. Yarush discloses an orthogonal image sensor-circuit board arrangement, as depicted below in Figs. 2, 4, and 9. *Id.* at Figs. 2, 4, 9.

[7] Ex. 1003 at 121; Ex. 2042 at 69.

[8] Ex. 1003 at 100 (raised in August 6, 1999, Office Action of '685 Application).

[9] *Id.* at 110, 116-17 (same Office Action).

[10] *Id.* at 148 (raised in November 14, 1999, Office Action of '685 Application).

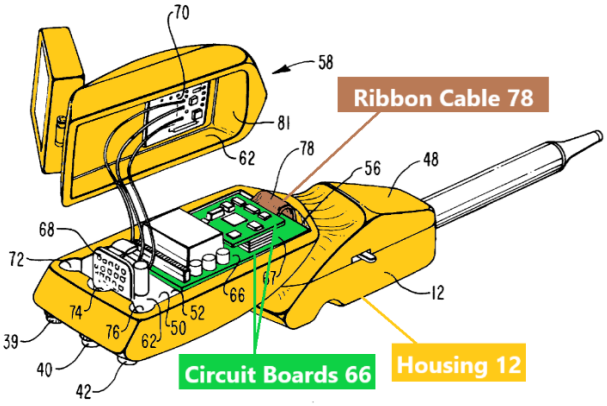


FIG. 2

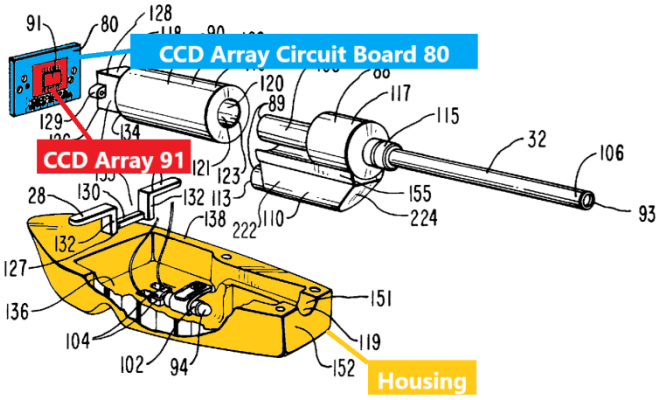


FIG. 4

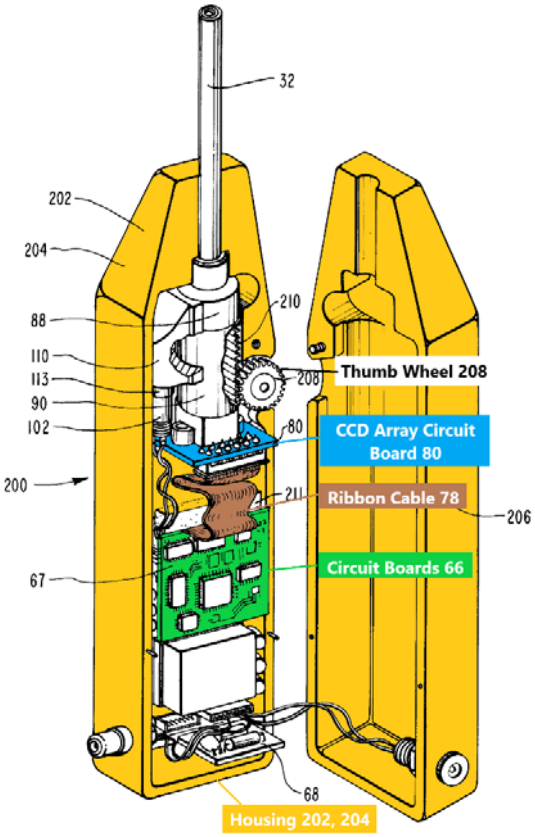


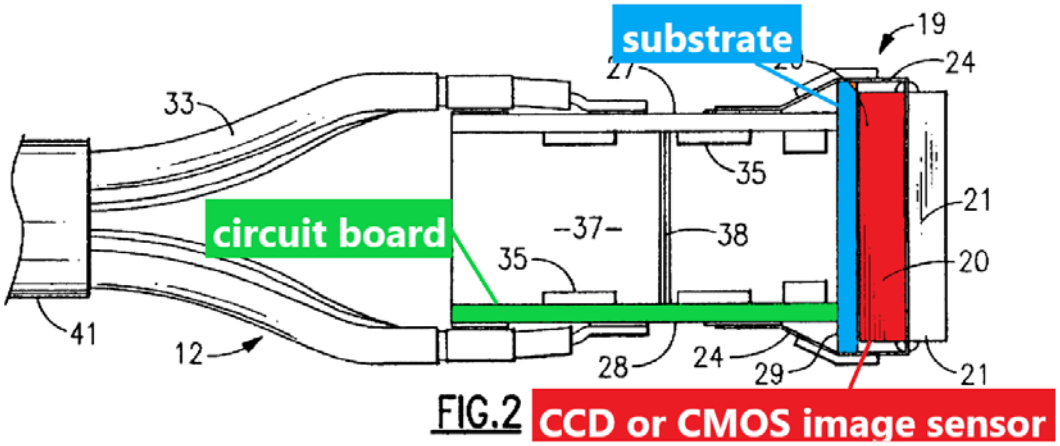
FIG. 9

Ex. 2040 at Figs. 2, 4, 9.

(ii) Pelchy

During prosecution of the '052 Patent's related patents—U.S. Patent Nos. 6,043,839 ("'839 Patent") and 6,275,255 ("'255 Patent"), the Examiner cited and Patent Owner overcame Pelchy. Pelchy describes an image sensor assembly as "[a] solid state imager assembly for use in an insertion tube of a video endoscope" that "includes a CCD imager" and notes that "CCD or CMOS technologies has surpassed the ability of conventional wire bonding techniques to take full

advantage of the space savings afforded by these small imagers," although providing no details for CMOS implementation. Ex. 2006 (*Pelchy)*, Abstract, 1:8-12, 3:46-50. As illustrated below, Pelchy also teaches that the CCD (or CMOS) image sensor "is connected to parallelly align circuit boards 27 and 28 mounted beneath the imager in general perpendicular alignment therewith." *Id.* at 3:54-57. "Circuitry [such as timing and control circuitry] is mounted on the opposed inside surfaces of the boards." *Id.* at Abstract.

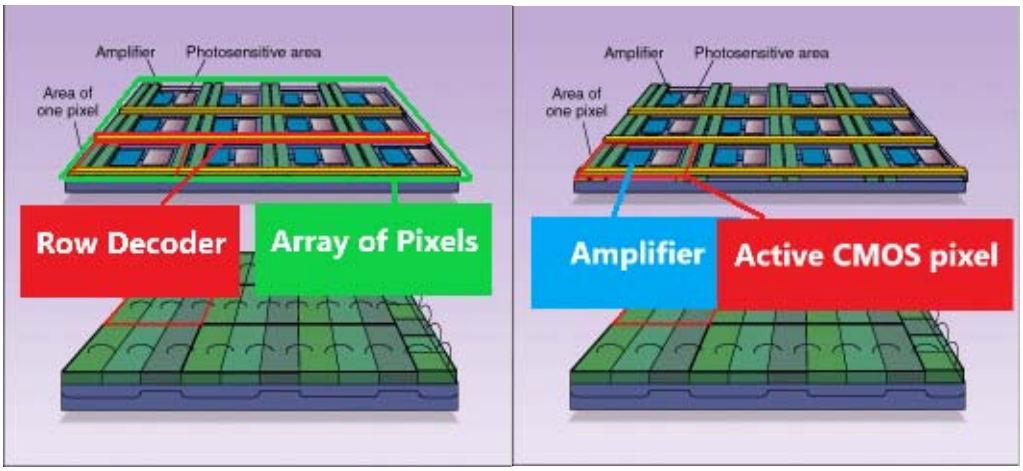


Ex. 2006, Fig. 2.

(iii) Zarnowski

Also during prosecution of the '052 Patent's related patents—the '839 and '255 Patents, the Examiner cited and Patent Owner overcame Zarnowski. Zarnowski describes how, "[b]y shifting imager designs to CMOS processing [from traditional solid-state imager technologies, e.g., CCD, CID, and PDA], designers can implement many camera functions on-chip." Ex. 2007 (*Zarnowski)*, 1. Another section in Zarnowski describes CMOS imagers that "incorporate an

amplifier at or near the pixel site, so only one row and column are necessary to address a pixel (see Fig. 1 [reproduced further below])." *Id.* at 2, Fig. 1. These "CMOS imagers can be further classified as active- or passive-pixel sensors. An active-pixel sensor (APS) consists of randomly addressable pixels with an amplifier at each pixel site." *Id.* at 2. Zarnowski provides several images of CMOS imager as illustrated below.

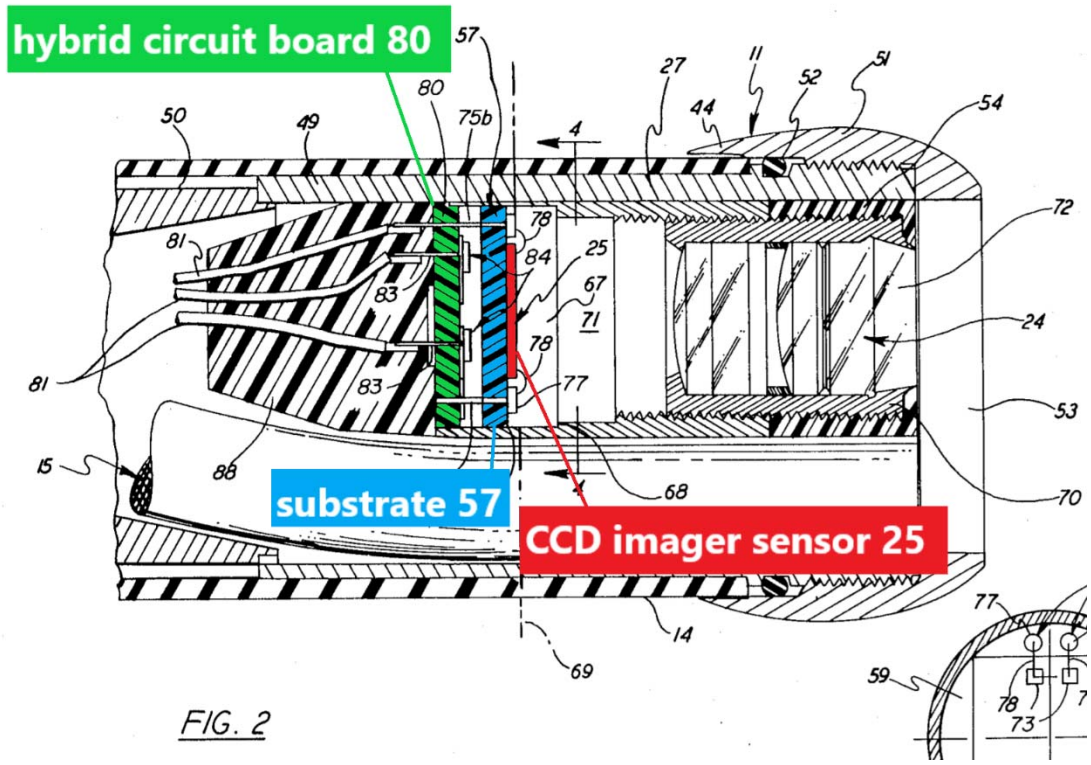


Ex. 2007, 2, Fig. 1 (top image depicting a CMOS active-pixel sensor (APS)).

(iv) Danna

The Examiner cited and Patent Owner overcame Danna during prosecution of the '052 Patent's related patents—the '839 and '255 Patents. Danna describes "a compact image sensor package for use in an endoscope or borescope," including "a solid state sensor 25," which "[i]n practice, the imager sensor is a charge coupled device (CCD)." Ex. 2008 (*Danna*), Abstract, 2:62-65. Danna discloses that "[t]he solid state image sensor 25 is mounted upon the front surface of [a

circular or disc-like substrate 57] with the image recording surface of the sensor being supported in coplanar relationship with the [image sensor]." *Id.* at 4:7-11. In particular, Danna describes that "a hybrid circuit board 80 is also mounted . . . immediately behind the support substrate" and "the circuit board contains circuitry for supporting the operation of the image sensor and for processing signal information that is exchanged between the sensor and the external electrical section." *Id.* at 4:33-39. Danna's CCD imager design is illustrated below.



Ex. 2008 at Fig. 2.

(v) Lenhardt

Patent Owner overcame Lenhardt during prosecution of one of the '052 Patent's related patents—the '839 Patent. Lenhardt describes a measuring camera

which "[f]or the contactless measurement of length in two-dimensional and three-dimensional space." Ex. 2009 (*Lenhardt*) at 1:13-14. The measuring camera uses a semiconductive image sensor 4, preferably a CCD image sensor. *Id.* at 6:39-40. Indeed, "[t]he readout of the image sensor 4 and the preparation of the image signals for the signal processing and evaluation is effected in the manner known for CCD video cameras and which have proved to be satisfactory." *Id.* at 6:41-45. Specifically, Lenhardt also shows "five printed circuit boards 21 onto which the active and passive electronic components are affixed" placed in parallel with image sensor 4. *Id.* at 6:47-50. Lenhardt's CCD image sensor and board circuitry orientation is illustrated below.

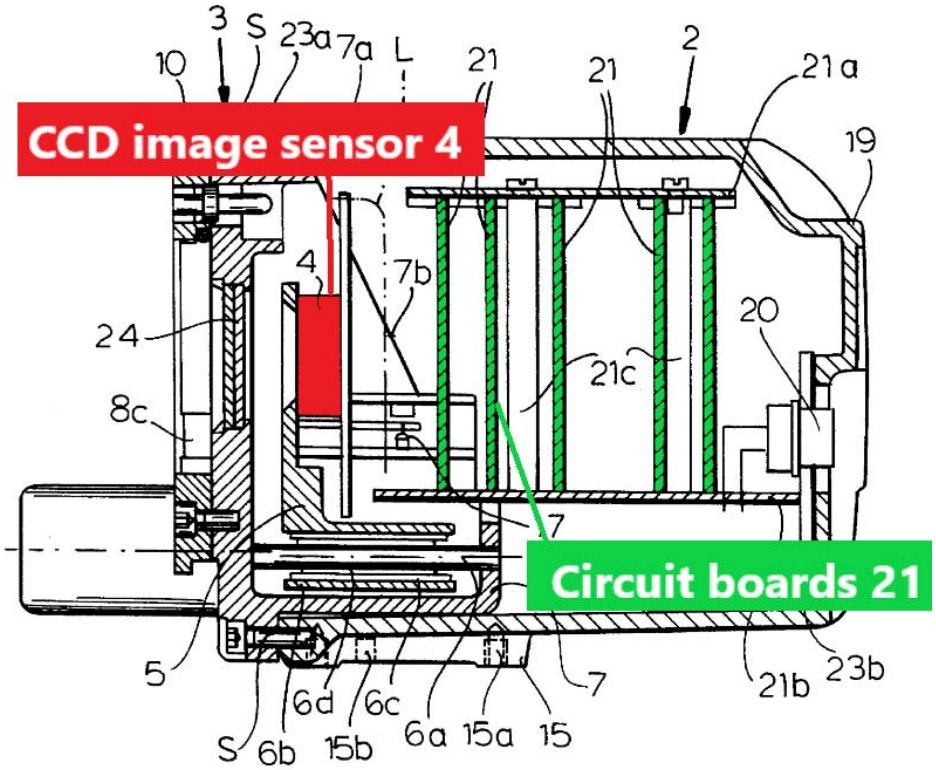


FIG.2

Ex. 2009 at Fig. 2.

2. The Similarities Between, and the Cumulative Nature of, the Asserted Art and the References from Examination

Petitioner asserts references that contain substantial similarities to, and no material differences from, the art evaluated by the Examiner during prosecution. In this case, Petitioner relies on the following asserted references and grounds against Claim 2, as summarized in the following charts:

References

Asserted Reference	Exhibit	Patent/Printed Publication
Swift	1005	WO 95/34988 to Swift *et al.*
Suzuki	1015	U.S. Patent No. 5,233,426 to Suzuki *et al.*
Larson	1027	U.S. Patent No. 5,541,640 to Larson
Ricquier	1033, 1038	Ricquier, N., *et al.*, *CIVIS Sensor: A Flexible Smart Imager with Programmable Resolution*, PROC. SPIE CHARGE-COUPLED DEVICES & SOLID STATE OPTICAL SENSORS IV (Feb. 1994).
Dierickx	1041	U.S. Pat. Pub. No. 2001/0010551 A1 to Dierickx

Related Reference	Exhibit	Patent/Printed Publication
Fossum (cited in **Swift**)	1048	Fossum, E., *Active-Pixel Sensors Challenge CCDs*, SUPPLEMENT TO LASER FOCUS WORLD, DETECTOR HANDBOOK IMAGING SYSTEMS, at 83 (June 1993).

Grounds

Ground No.	Asserted Grounds
1	**Swift** in view of **Ricquier**, **Dierickx**, & **Suzuki**
2	**Larson** in view of **Swift**, **Ricquier**, **Dierickx**, & **Suzuki**

Each of the references asserted by Petitioner bears remarkable similarity to art already overcome during the prosecution of the '052 Patent—as explained below.

a. Swift Compared to Pelchy, Yarush, and Danna

One of the primary references relied upon by Petitioner, *Swift*, demonstrates key similarities in image sensor/circuit board design and orientation with Pelchy and Danna. *Swift* describes a miniature camera that can use a CMOS/APS image

sensor carried on a circuit board, which is mounted on a chassis. Ex. 1005 (*Swift*) at Abstract. In particular, *Swift* refers to a CMOS APS imager developed by Eric Fossum—the same Eric Fossum whose CMOS imagers are repeatedly referred to in the '052 Patent prosecution history and related patents. As shown in *Swift*'s Figs. 2 and 4, *Swift* describes an image sensor/circuit board design and orientation in which an image sensor, referred to as preferably a CMOS imager, is carried on a circuit board and mounted at an orthogonal angle to a second circuit board. *See id.* at 11-16. Various circuitry components are mounted on the second orthogonal circuit board to provide power to the image sensor as well as to host the video processor circuitry. *Id.* at 11.

Patent Owner notes that in addition to describing a CMOS/APS image sensor as described in a June 1993 *Laser Focus World* article by Eric Fossum, *Swift* describes that the image sensor is preferably, but not necessarily, a CMOS image sensor. The application claims in *Swift* similarly recite the camera device with and without the CMOS image sensor being a CMOS sensor. This is consistent with the state of imager sensors in 1994, when *Swift* was filed, and still in 1997—the priority date for the '052 Patent. In that 1993–97 time frame, it was well-established that CCD image sensors were the dominant technology used in such security surveillance applications. *See* Ex. 2036 (Optoelectronics Industry Development Association, *Optoelectronics Industry Development Association*

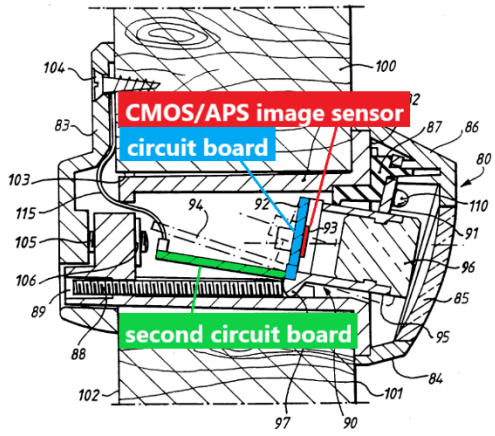
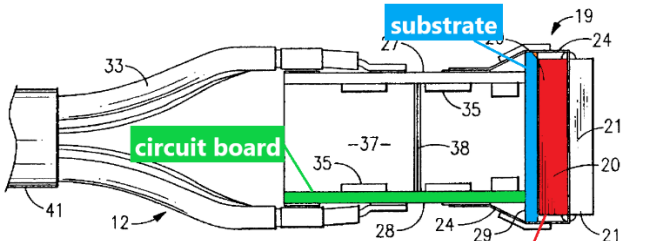
Global Optoelectronics Industry Market Report and Forecast (Michael Lebby ed., Oct. 2007)) at 10 (CCD was dominant technology for security and surveillance camera systems in 2007). Thus, to the extent the *Swift* application is not describing a CMOS imager, a person skilled in the art would understand *Swift* to use a CCD imager.

Moreover, that is exactly how a person skilled in the art would understand *Swift* to the extent *Swift* was not describing a security system using a CMOS APS image sensor.

During prosecution of Patent Owner's related '839 Patent, Dr. Jack Baird addressed this very same issue. Reviewing Armstrong—a *Business Week* article describing a CMOS image sensor developed by Eric Fossum—combined with Pelchy, Dr. Baird provided a declaration explaining the problems with the combination, including that "standard CCD technology [from Pelchy] is impractical for making a reasonably small CCD imaging device with all imaging elements on a single plane" as would be the design for the Fossum CMOS imager. Ex. 1003 at 91. Further, Dr. Baird explained that "on-chip processing [taught in the Fossum CMOS imager] impractical with standard CCD technology . . . . In fact, the CCD process is so unique that it simply is not possible to put timing and control circuits co-planar with the pixel array." *Id.* at 92. In other words, Dr. Baird explained that the Armstrong article was correct—it was known to those

skilled in the art that CMOS technology was synonymous with a camera-on-a-chip architecture—an incompatible design with CCD devices that separated the CCD pixel array from other off-chip circuitry. Just as Dr. Baird explained that Pelchy's separate pixel array and off-chip circuitry reflected a conventional CCD design and was, in fact, a CCD device, the same analysis applies here. The design of *Swift*, if not using a CMOS APS image sensor, reflects a standard CCD imager design with off-chip circuitry, such as the video processor on the separate, paralleled circuitry boards.

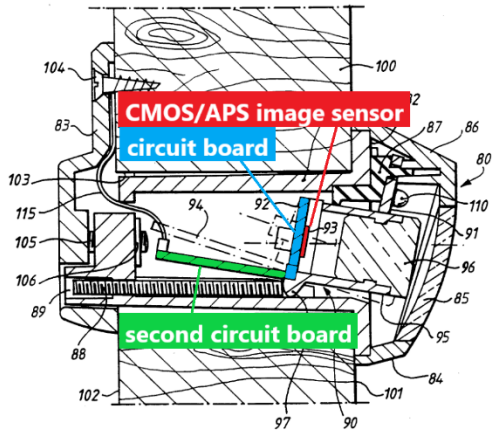
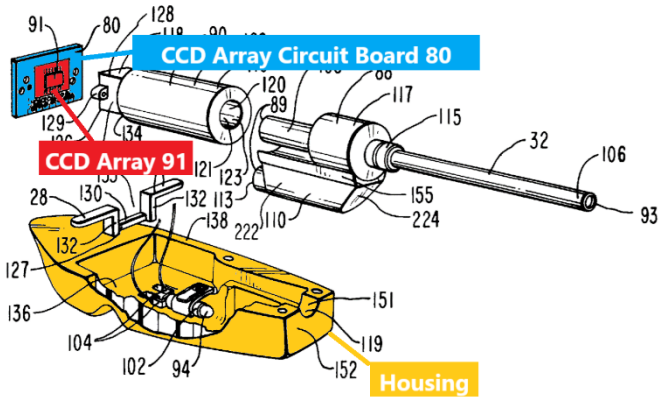
The table below illustrate the similarities between *Swift* and Pelchy.

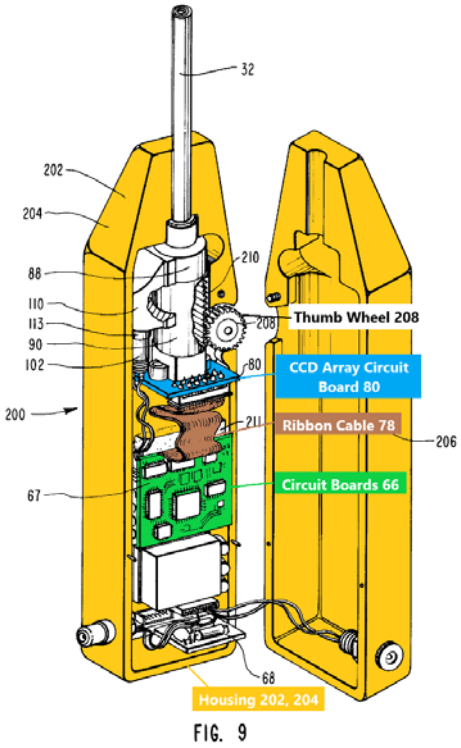
Swift	Pelchy
 Fig.4. Ex. 1005 at Fig. 4.	 FIG.2 Ex. 2006 at Fig. 2.

Similar to *Swift*'s image sensor, Pelchy teaches an imager package that includes a CCD or CMOS image sensor. Ex. 2006 at 1:8-12; 3:46-50. Just as *Swift*'s image sensor is mounted to a circuit board, Pelchy describes that the image sensor is mounted upon a substrate via various attachment means. *Id.* at 3:66-4:2;

see also id. at 6:1-10 (epoxy resin). Also as *Swift* discloses various circuitry components mounted on a second orthogonal circuit board, Pelchy describes mounting circuit components 35 on the inside face of one of two parallel boards (e.g., circuit board 28), which are perpendicular to the image sensor. *Id*. at 4:17-21. As shown in Fig. 2, Pelchy shows the substrate coupled to the circuit board in an orthogonal fashion.

The table below illustrates the similarities between *Swift* and Yarush.

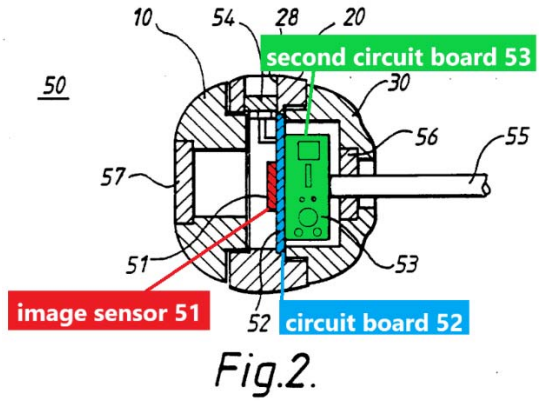
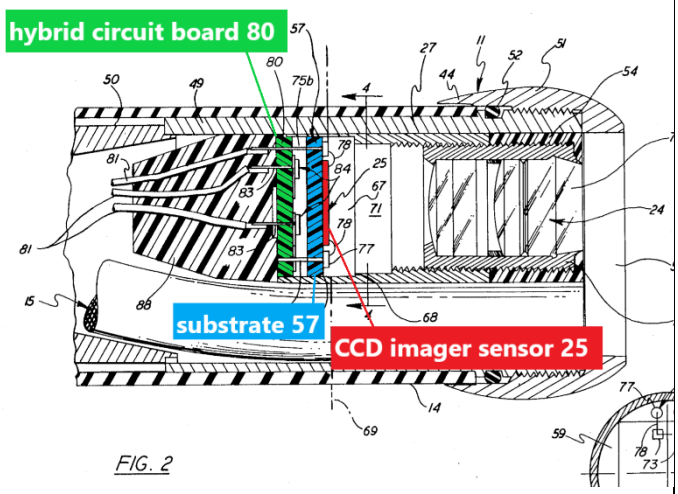
Swift	Yarush
 Fig.4. Ex. 1005 at Fig. 4.	 FIG. 4

Swift	Yarush
	Ex. 2040 at Fig. 4.  FIG. 9 Ex. 2040 at Fig. 9.

Like *Swift*'s imager apparatus, Yarush also teaches a hand-held portable endoscopic camera that includes a CCD array 91. Ex. 2040 at 7:1-8. Just as Swift's image sensor 93 is mounted to a circuit board 92, Yarush describes that the CCD array 91 is mounted upon a CCD printed circuit board 80. *Id.* at 7:6-8. As *Swift* discloses various circuitry components are mounted on a second circuit board 93 coupled orthogonally to circuit board 92, Yarush also shows various circuit components on a plurality of vertically stacked printed circuit boards 66 oriented orthogonally to CCD array circuit board 80. *Id.* at Fig. 9. As *Swift* discloses "a connector 115 is connected to the circuit board(s) 94 and/or 92 . . . to a receiving

and image processing apparatus," Yarush also describes a ribbon cable 78 that connects the CCD array circuit board 80 to the circuit boards 66 upon which various circuit components are mounted. *Id.* at 7:1-3.

The table below illustrates the similarities between Swift and Danna.

Swift	Danna
	
Ex. 1005 at Fig. 2.	Ex. 2008 at Fig. 2.

Like Swift's imager, Danna teaches a CCD image sensor mounted upon the front surface of the substrate with the image recording surface of the sensor. *See* Ex. 2008 at 4:4-12. As shown in Fig. 2, Danna describes a hybrid circuit board, containing circuitry thereon, mounted within the image sensor housing immediately behind the support substrate for the image sensor. *See* Ex. 2008 at 4:33-41, fig.2. Fig. 2 shows an exemplary orientation in Danna such that the circuit board is parallel to the CCD image sensor mounted on the substrate. *See* Ex. 2008 at 4:33-41, fig.2.

b. Swift and Zarnowski

As noted in Subsection (i) above, *Swift* describes a CMOS APS image sensor as set forth in the 1993 *Laser Focus World* article by Eric Fossum. As explained below, Eric Fossum was a recognized inventor of CMOS imager technology and emphasized the camera-on-a-chip design which featured on-chip integration. Ex. 1048 (*Fossum*) at 4. This same CMOS APS imager technology is also disclosed in Zarnowski, as shown in the table below. Petitioner relies on *Swift* for its disclosure of a camera-on-a-chip design, yet ignores that the subject matter in Zarnowski captures the same disclosure as *Swift*. As noted previously, *Swift* describes an embodiment where the image sensor and circuitry components are mounted on "[a] ***single circuit board*** (e.g. circular) . . . instead of the two circuit boards 52 and 53." Ex. 1005 at 11 (emphasis added). *Swift*'s citation of Eric Fossum's article *Active-Pixel Sensors Challenge CCDs* in the context of CMOS/APS sensors is an express reference to CMOS/APS image sensors based on a camera-on-a-chip-based design. *See id.* at 12; Ex. 1048 at 2 (demonstrating a clear motivation to combine APS sensors with on-chip electronics), 4 (same).

Pertinent portions of *Swift* and Fossum compared to Zarnowski are provided below and highlight the extensive overlap of subject matter.

Swift (referencing Fossum)	Zarnowski
A single circuit board (e.g. circular) may be provided, instead of the two circuit boards 52 and 53. Ex. 1005 at 11 (referencing a camera-on-a-chip design). The image sensor 51 is preferably of a CMOS/APS (Active Pixel Sensor) type. An APS acts similarly to a random access memory (RAM) device, wherein each pixel contains its own selection and readout transistors. Further information on APS-type sensors may be found in the publication "Laser Focus World", June 1993, Page 83. Ex. 1005 at 12 (citing to Fossum, *Laser Focus World* at 83 (June 1993) ("Fossum")). **With random access, nondestructive readout, and easy integration with on-chip electronics, active-pixel sensors may supplant CCDs in imaging applications.** *Eric R. Fossum* The active-pixel sensor (APS) is a new type of sensor device emerging from the most advanced image-sensor research and development laboratories in Japan. These sensors may one day supplant charge-coupled devices (CCDs) in many imaging applications. A CCD relies on the shifting of charge to read out the image. In contrast, an APS acts similarly to a random access memory (RAM) device, wherein each pixel contains its own selection and readout transistors. The signal readout then take place over metallic wires rather than by shifting charge, giving the APS advantages such as random access, nondestructive readout, and integrability with on-chip electronics.	To illustrate the versatility of CMOS imaging technology, consider an imaging system on a chip designed by engineers at Integrated Electronic Technologies (IET; Cicero, NY). The imaging area consists of a 600 × 800 array of 39-μm pixels. Featuring on-chip self-scanning and self-biasing electronics, the device, once initiated, reads out one frame of video and provides required synchronization information as well. This device is produced at a fraction of the piece cost of a CCD. Ex. 2007, 4. Increased functionality offered by CMOS imagers now includes partial or complete integration of electronics, random access, variable integration time, video processing, background subtraction, and digitization. Future systems will feature smart sensor systems, video compression to minimize bandwidth, smart pixels, and application-specific integrated circuit subcells. Ex. 2007, 4-5.

Swift (referencing Fossum)	Zarnowski
Ex. 1048 at 2. If implemented in 0.8-µm CMOS, a 16 × 16-µm pixel could have an intrinsic fill factor of more than 50%. To improve the fill factor to the levels typically associated with CCDs, the emerging microlens technology must be used (see Fig. 3). At Jet Propulsion Laboratory (JPL, Pasadena, CA), this approach is being pursued in conjunction with on-chip analog-to-digital conversion to explore cameras-on-a-chip for future microspacecraft applications. Ex. 1048 at 4.	

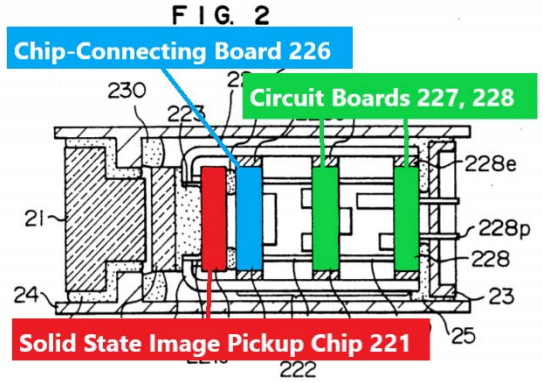
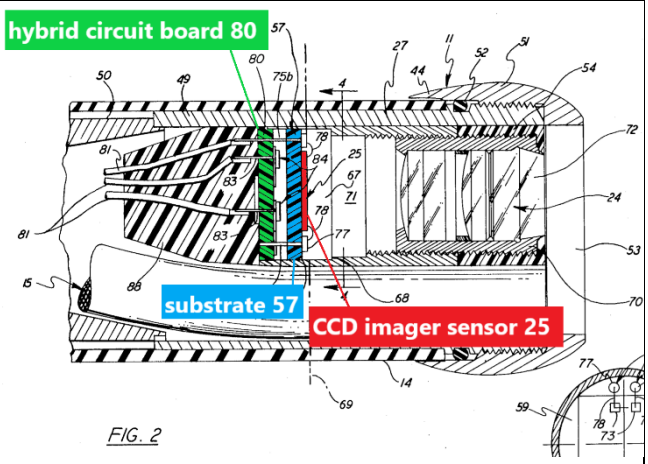
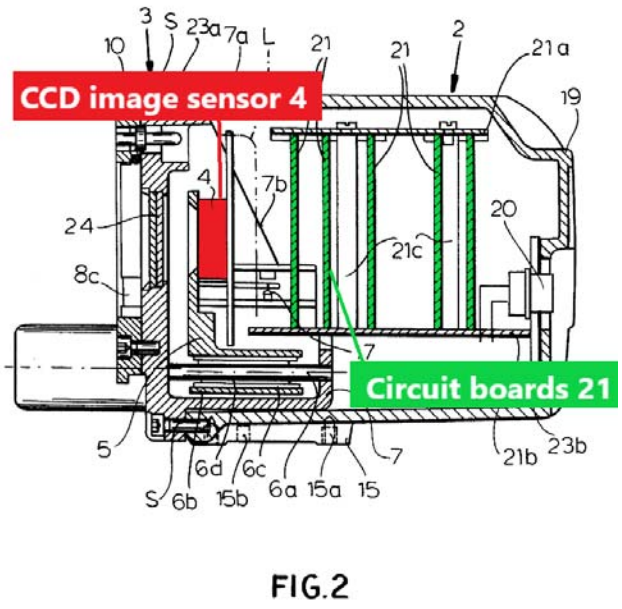
Zarnowski speaks to the very same subject matter as *Swift*/Fossum. Zarnowski comments on the state of the art in 1997, specifically that "[i]ncreased functionality offered by CMOS imagers now includes ***partial or complete integration of electronics, random access, variable integration time***, video processing, background subtraction, and digitization." Ex. 2007, 4-5 (emphasis added). In fact, Zarnowski describes an exemplary imaging system on a chip (e.g., 600 x 800 array of 39-µm pixels), "[f]eaturing on-chip self-scanning and self-biasing electronics." *Id.* at 4.

c. Suzuki Compared to Danna and Lenhardt

Suzuki is another reference asserted by Petitioner that demonstrates key similarities in image sensor/circuit board design and orientation with Danna and

Lenhardt. The table below illustrates these similarities. Suzuki teaches a solid-state image pickup device that includes a solid-state image pickup chip 221 and a circuit module 222. Ex. 1015, 2:38-41. As shown in Fig. 2, Suzuki's circuit module 222 comprises a chip-connecting board 226, a circuit board 227 including a circuit for driving the solid-state image pickup chip 221 and a circuit for amplifying the video signal from the solid-state image pickup chip 221, and a connector board 228. *Id.* at 2:50-54. "Signals are fed between these boards via connection pins 229, and signals are fed between the solid-state image pickup chip 221 and each of these boards via the outer-leads 221m and side electrodes 226e, 227e and 228e of the boards." *Id.* at 2:55-59.

A POSITA would understand Suzuki to be a CCD device, as Suzuki refers to a solid-state imager and describes a conventional CCD device design used in 1991 (when Suzuki was filed). As described above, Dr. Baird explained that Pelchy's separate pixel array and off-chip circuitry reflected a conventional CCD design and was, in fact, a CCD device, the same analysis applies here. The fact that Suzuki's circuit board 227 includes "a circuit for ***driving*** the solid-state image pickup chip 221 and a circuit for ***amplifying*** the video signal from the solid-state image pickup chip 221" separate from the image pickup chip tells a POSITA that Suzuki describes a CCD imaging sensor. Ex. 1015,2:51-54 (emphasis added). The table below illustrates the similarities between Suzuki and the prior art of record.

Suzuki	Danna
 Ex. 1015, Fig. 2.	 Ex. 2008 at Fig. 2.
	Lenhardt
	 Ex. 2009 at Fig. 2.

Similar to Suzuki's image pickup device, Danna describes a compact image sensor package that preferably includes a CCD image sensor 25. Ex. 2008 at 4:21-

24. Like Suzuki disclosing parallel chip-connecting board 226 and circuit boards 227 and 228, Danna also teaches that a hybrid circuit board 80 is also mounted behind the support substrate 57 such that the circuit board 80 and the image sensor 25 mounted on substrate 57 are substantially parallel with each other as shown in Fig. 2. *Id.* at 4:33-35, Fig. 2.

Lenhardt and Suzuki both share key features in circuit board placement. Lenhardt teaches a semiconductive image sensor 4, preferably a CCD image sensor. Ex. 2009 at 6:39-40. Similar to Suzuki's placement of circuit boards 227 and 228 parallel to image pickup chip 221, Lenhardt also shows "five printed circuit boards 21 onto which the active and passive electronic components are affixed" placed in parallel with image sensor 4. Ex. 2009 at 6:47-50.

d. Ricquier and Dierickx Compared to Zarnowski

Another pair of primary references relied upon by Petitioner—Ricquier and Dierickx—also demonstrate crucial resemblances in CMOS image sensor technology with Zarnowski. The table below illustrates these similarities. Ricquier describes a CMOS-camera-on-a-chip technology that "offers the selective addressability together with the possibility of further *cointegration of processing electronics on the same chip*." Ex. 1033 at 8 (emphasis added). Ricquier's work is closely related to this research of "processing circuitry [being] integrated at the edges of the photodiode array exploiting the possibility to access a whole row of

data at once"—*i.e.*, "the development of a multi-purpose flexible sensor architecture that can be used as a module in further *sensor systems on a single chip*." *Id.* at 9 (emphasis added). As shown in Fig. 1, Ricquier provides an X-Y addressable pixel architecture and "[b]ased on X-Y addresses and control pulses generated by an external driving unit, [i.e., "processing electronics" "***cointegrat[ed] . . . on the same chip***,"] two decoders drive one particular row selection and column selection signal." *Id*. at 8-9 (emphasis added). In Fig. 1, Ricquier lays the pixel structure and the different read out stages of the pixel charges. *Id.* For instance, "[t]he readout of the charge packets . . . proceeds as follows. After selecting one particular row of pixels, these charges are converted simultaneously to a voltage at the output of the different charge sensitive amplifiers located at the end of the column readout lines." *Id.*

Dierickx, who coauthored Ricquier, similarly describes a CMOS or MOS-based imaging device. Dierickx at Abstract. In particular, Dierickx discloses an amplifying circuit and a method for eliminating fixed pattern noise in the output signal of a pixel or of an image sensor. *Id.* at [0002]. In the specification, Dierickx distinguishes between passive and active pixels—"[a]n active pixel is configured with means integrated in the pixel to amplify the charge that is collected on the light sensitive element" but also experiences fixed pattern noise (FPN), while a passive pixel does not. *Id.* at [0006]. In Fig. 6, Dierickx describes timing controls

relative to a pixel array such that "[a]n active pixel may be constructed so as to take its signal from different places and times as e.g. from different photodiodes that may be shared with other active pixels." *Id.* at [0053] ("(81),(82) are photo detectors [(pixels)], (91),(92) are schematic representations of the amplifying part of the pixel").

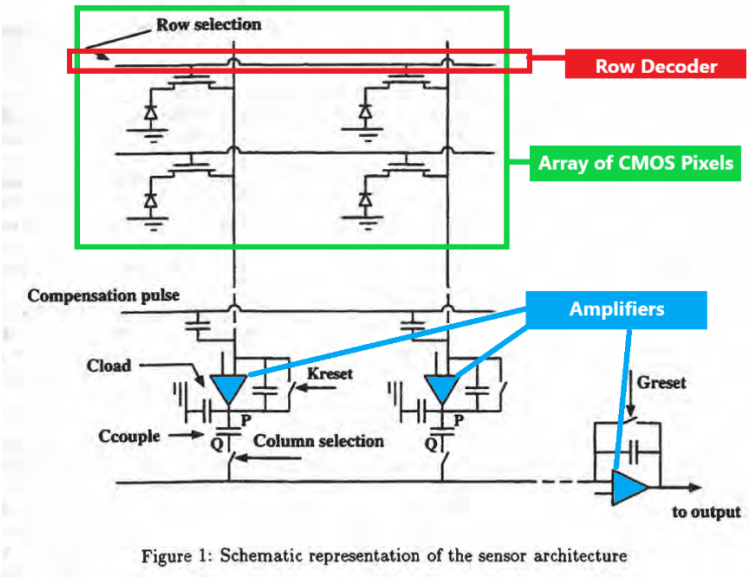
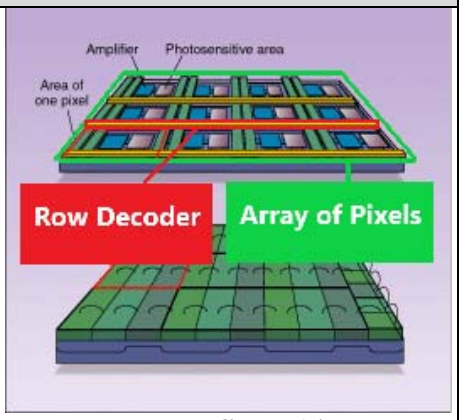
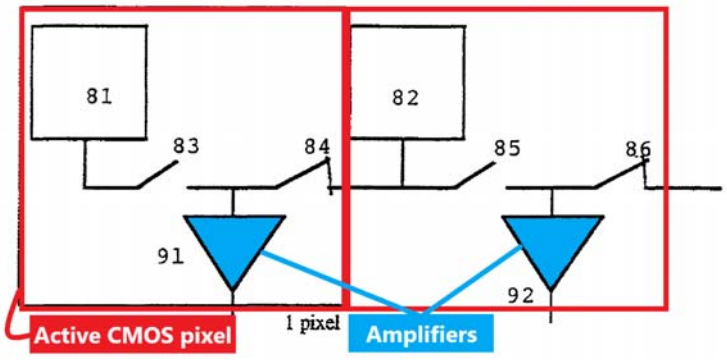
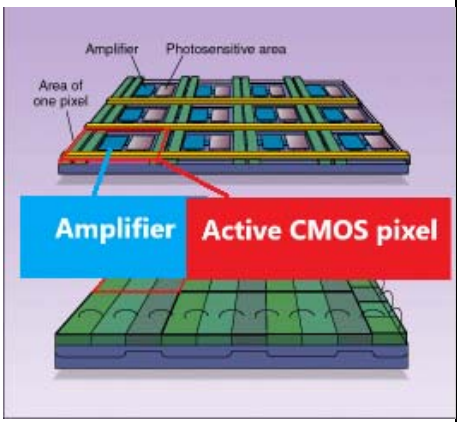
<table>
<tr><th>Ricquier</th><th>Zarnowski</th></tr>
<tr><td> 

Figure 1: Schematic representation of the sensor architecture
Ex. 1033 at Fig. 1.</td><td> 

Ex. 2007 at 2 fig.1 (the top image depicting a CMOS active-pixel sensor (APS)).</td></tr>
<tr><th>Dierickx</th><th></th></tr>
<tr><td> 

Dierickx at Fig. 6.</td><td> 

Id.</td></tr>
</table>

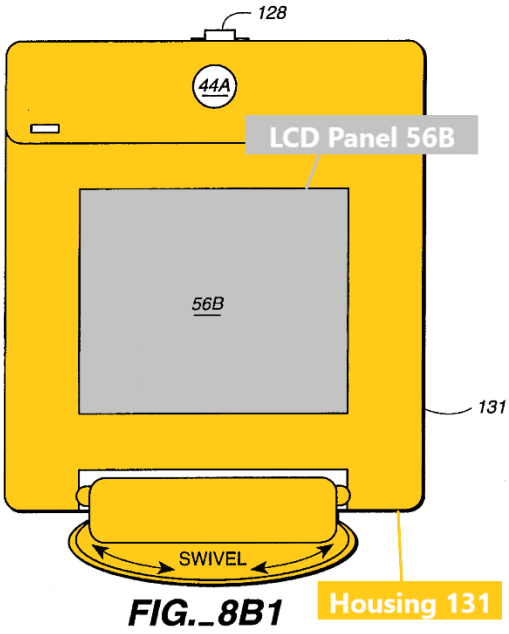
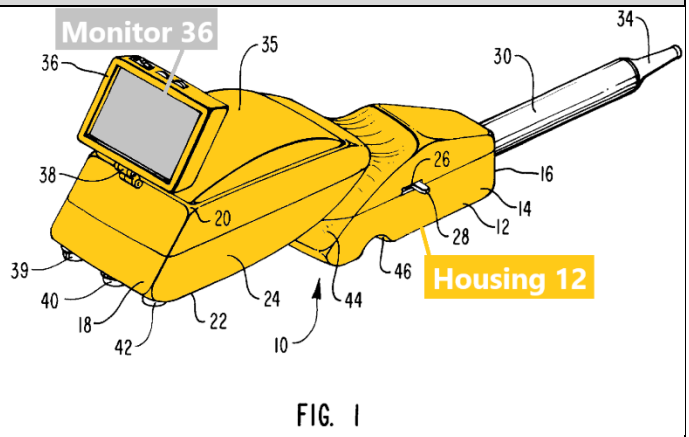
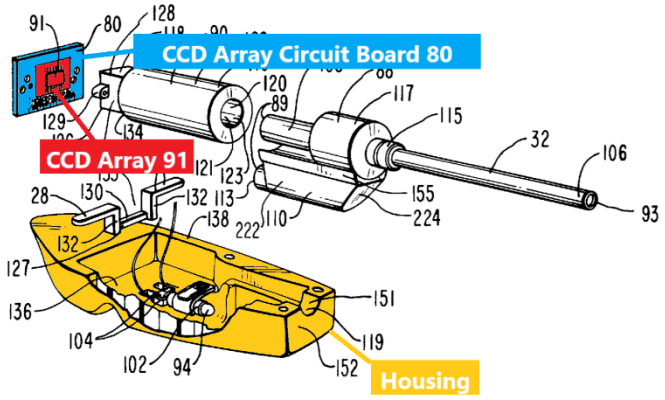
Like Ricquier and Dierickx, Zarnowski describes substantially the same CMOS image sensor. "True CMOS imagers incorporate an amplifier at or near the pixel site, so only one row and column are necessary to address a pixel." Ex. 2007 at 2. For instance, like Ricquier and Dierickx's active pixels 81, 82 and amplifiers 91, 92, Zarnowski's CMOS active-pixel sensor (APS) in Fig. 1 "features an amplifier at each pixel to reduce noise." *Id.* at 2 fig.1 (bottom image). Indeed, this shows that Zarnowski's "amplifier placement results in lower noise levels than with CCDs . . . in which the collected signal at the pixel site is degraded by long bus runs before reaching the amplifier often located off-chip." *Id.* at 2-3. As disclosed in Dierickx, Zarnowski discloses that "[c]orrection circuitry for FPN correction must be added to eliminate deleterious effects." *Id.* at 3. Alternatively, Zarnowski teaches a CMOS passive-pixel imager in Fig. 2 featuring "randomly addressable pixels with amplifiers at the end of the columns." *Id.* at 2 fig.2. In either sensor type, Zarnowski states that "[i]ncreased functionality offered by CMOS imagers now includes partial or complete integration of electronics, random access, variable integration time, video processing, background subtraction, and digitization." *Id.* at 4-5.

e. Larson Compared to Yarush

Another reference relied upon by Petitioner, Larson, reveals "packaging a display within the same housing as the image sensor and related circuitry," which

is the same subject matter described in Yarush. Petition at 15. As shown in Fig. 8B1, Larson teaches CCD camera in a "housing 131 for the CCD camera lens 44A and the LCD panel 56B." Ex. 1029, 26:43-54.

The table below illustrate these similarities between Larson and Yarush.

Larson	Yarush
 FIG._8B1 Ex. 1029, Fig. 8B1.	 FIG. 1 Ex. 2040 at Fig. 1.  FIG. 4 Ex. 2040 at Fig. 4.

Like Larson, Yarush teaches a portable, hand-held camera device that includes "an integral display means mounted on or within the housing means." Ex. 2040 at 8:55-60. Similar to Larson's internal display in Fig. 8B1, Yarush, in Fig. 1 and accompanying text, describes "a monitor 36 . . . mounted by hinge 48 on

housing means." *Id.* at Fig. 1, 8:60-62. Moreover, Yarush teaches in another embodiment in which "the monitor is disposed ***internally within a proximal end of the housing means*** such that it can be viewed by viewing the proximal end." *Id.* at 8:64-67 (emphasis added). As discussed in Subsection (i), *supra*, Yarush's CCD array 91 is disposed with the monitor 36 within the housing 12. *See id.* at Fig. 4.

The foregoing substantial similarities between, and the cumulative nature of, Petitioner's asserted art and the prior art considered and overcome during examination, causes this factor to weigh heavily in favor of a determination that the asserted art is the same as the prior art that was previously considered by the Office.

3. The Extent of the Overlap Between the Arguments Made During Examination and the Manner in Which Petitioner Relies on the Prior Art or Patent Owner Distinguishes the Prior Art.

a. Examiner's Arguments

During prosecution of the '052 Patent, the Examiner rejected claims 1 and 7 over the combinations of two references, as summarized in the following charts:

Ground No.	Rejection Grounds	Statutory Basis	Claims
1	**Yarush** in view of **Sonnenschein**	§ 103	1, 7

See Ex. 1002 at 113.

The Examiner recognized that Yarush describes "a portable, hand-held endoscope" and discloses use of a CCD array. *See, e.g.*, Ex. 1002 at 114 (citing to

Ex. 2040 at 15:12-28). To the extent that Yarush failed to describe parallel planes for circuit boards, the Examiner argued that combining Yarush with Sonnenschein would satisfy that limitation. Ex. 1002 at 114. According to the Examiner, "[a]t the time of invention, it would have been obvious to a person of ordinary skill in the art to use Sonnenchein's [sic] [parallel] circuit arrangement in Yarush's endoscopic camera to produce relatively small endoscope which can be introduced in small cavities that may result much less patient trauma." *See, e.g.*, Ex. 1002 at 114-15.

Patent Owner added features relating to the shape and size of the image sensor, resulting in the Challenged Claims.

b. Examiner's Arguments in Related Prosecution Matters

The '052 Patent claims priority to the '839 Patent. During prosecution of the '839 Patent, the Examiner rejected claims 1, 4, 30, and 32 (now claims 1, 4, 28, and 30 of the '839 Patent, respectively) over the combinations of several references, as summarized in the following charts:

Rejection Grounds	**References**	**Statutory Basis**	**Claims of '839 Patent**
1	**Pelchy** in view **Zarnowski**	§ 103	1
2	**Pelchy** in view of **Zarnowski** & **Danna**		4
3	**Lenhardt** in view of **Zarnowski**		1, 4, 30, & 32 (issued as 1, 4, 28, & 30)

See Ex. 1003 at 100, 110, 116.

Similar to the rejection made in the '052 Patent prosecution history based on Yarush and Sonnenschein, the Examiner in the '839 Patent file history focused on the fact that the Pelchy-Zarnowski CCD/CMOS combination "fails to disclose the parallel positioning of the circuit boards with the image sensor board" (Ex. 1003 at 112) and offered Danna for "the parallel arrangement of an image sensor and a circuit board in an endoscopic imaging housing in order to make the imaging head more compact." Ex. 1003 at 112 (citing Danna, 2:35-45, 4:20-68). Importantly, the Examiner asserted that it would have been obvious for one of ordinary skill in the art to modify the Pelchy-Zarnowski apparatus to have its CMOS imager and circuitry boards aligned in a parallel fashion as taught by Danna. Ex. 1003 at 112.

The Examiner also relied on Lenhardt, which describes "a CCD image sensor," parallel to five printed circuit boards 21, to show the parallel positioning of the image sensor and circuit board. *See, e.g.*, Ex. 1003 at 148 (citing Lenhardt, 6:39-50). To the extent that Lenhardt "fails to disclose the [sic] that the image sensor further includes timing and control circuitry means on said first plane and coupled to said pixel array such as a CMOS imager," the Examiner argued that a Lenhardt-Zarnowski CCD/CMOS combination would satisfy that limitation. *See, e.g.*, Ex. 1003 at 149. Again, according to the Examiner, "given [Zarnowski's] teaching of advantageously using a passive CMOS image sensor, it would have been obvious for one of ordinary skill in the art to modify the Lenhardt CCD

imager apparatus by incorporating [Zarnowski's] disclosed passive CMOS imager for the standard Lenhardt imager . . . in order to minimize power consumption." *See, e.g.*, Ex. 1003 at 149.

Patent Owner overcame these rejections, including submission of the Baird Declaration described in Subsection A.1, *supra*, resulting in the issued claims of the '839 Patent.

c. Petitioner's Arguments

Here, Petitioner recites substantially the same arguments in its Petition. For claims 2—similar to the Examiner's **Pelchy**-Zarnowski (and **Yarush**-Sonnenschein) CCD/CMOS combinations, Petitioner introduces and heavily relies upon **Swift** in view of Ricquier and Dierickx for combining ***Swift*'s** imager apparatus (CCD or CMOS) with Ricquier and Dierickx's CMOS active pixel imaging system using a "CMOS active pixel array." Petition at 14. To the extent ***Swift*** does not teach the parallel arrangement of circuit boards relative to the image sensor, Petitioner depends on **Suzuki** for providing the circuit board orientation. Petition at 56-58.

However, these combinations already were considered and overcome during prosecution. In particular, the Examiner already evaluated that argument using the Pelchy-Zarnowski-**Danna** CCD/CMOS and **Lenhardt**-Zarnowski CCD/CMOS combinations and found that Patent Owner overcame those combinations. Ex.

1003 at 110, 116-17, 148, 171. As Patent Owner overcame those Examiner-proffered arguments then, the same, Petitioner-proffered arguments should ring hollow now as Petitioner compares references using the conventional CCD, or alternatively CMOS camera-on-a-chip, sensors modified with various circuit board orientations (e.g., parallel circuit boards).

Petitioner also introduces and heavily relies upon **Ricquier**, and **Dierickx** for disclosing "image sensors with an active CMOS pixel array and timing and control circuitry" in claims 3 and 7. Petition at 24, 26-32, 38-44, 58-73, 75-77, 81-83. Here again, the Examiner already considered **Zarnowski's** description of CMOS imagers including active pixel sensors for these same arguments. Ex. 1003 at 100, 110, 116-17; *see* Ex. 2007 at Fig. 1 (output signals from amplifiers shown at the right end of the array).

B. Petitioner Failed to Sufficiently Demonstrate Error by the Office

Having met the first prong of *Advanced Bionics*, the second prong requires that if the "same or substantially the same art or arguments previously were presented to the Office," then the Board will determine whether Petitioner made a "showing that the Office erred in evaluating the art or arguments." *Advanced Bionics*, Paper 6 at 8. That is, if ***either*** condition of the first part of the framework ***is satisfied***, the Petitioner ***must*** point out sufficiently ***how the examiner erred*** in its evaluation of the asserted prior art. *Id.* (citing *Becton, Dickinson*, Paper 8 at 24).

Regarding the second prong, the relevant *Becton, Dickinson* factors are: factor (c)—the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection; factor (e)—whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art; and factor (f)—the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments. *Becton, Dickinson*, Paper 8 at 17-18.

To provide "useful insight into how to apply the framework under 35 U.S.C. § 325(d)," the Board in *Advanced Bionics* advanced these three factors—factor (c), in particular, which "focuses on the record developed by the Office in reviewing the art or arguments"—as they "relate to whether the petitioner has developed a material error by the Office." *Advanced Bionics*, Paper 6 at 9-10. Once the Board reviews factor (c), the Board's review informs Petitioner's burden to produce "evidence of previous Office error" set forth in factors (e) and (f). *Id.* at 10. For instance, "if the alleged error is a disagreement with a specific finding of record by the Office," then "the petitioner's required showing of material error ***must overcome persuasively*** that specific finding of record." *Id.* at 10-11 (emphasis added).

As a preliminary matter, Petitioner must show that the Office erred "in a manner material to patentability." *Advanced Bionics*, Paper 6 at 8. "An example

of a material error may include misapprehending or overlooking specific teachings of the relevant prior art where those teachings impact patentability of the challenged claims." *Id.* at 8-9 n.9. "Another example may include an error of law, such as misconstruing a claim term, where the construction impacts patentability of the challenged claims." *Id.* Here, Petitioner made no showing that the Office erred at all, much less "in a manner material to patentability."

1. The Extent to Which the Asserted Art Was Evaluated During Examination, Including Whether the Prior Art Was the Basis for Rejection

Although the exact references were not used as the basis for the obviousness rejection during examination, as described above, Petitioner's asserted art is completely cumulative, and as a result, substantially the same art is advanced in the Petition as was evaluated during examination. *See* Subsection A.1, *supra*. Indeed, Petitioner's attempt to resurrect allegedly new references—despite the references containing the same subject matter as the prior art previously considered by the Examiner—speaks to Petitioner's lack of appreciation for the state of the art concerning CMOS camera-on-a-chip and CCD imagers and failure to account for hindsight.

The uniformity of Petitioner's asserted art—*e.g.*, through primary references *Swift* and Larson with Ricquier and Dierickx—demonstrates that Petitioner failed to account for the Baird Declaration (discussed *supra*), clearly evidenced by the

Petition's silence regarding the state-of-the-art of solid-state imagers and the inventive contributions by Patent Owner. Petitioner assesses this opportunity for *inter partes* review as merely another Office Action round and hopes for a different outcome. By oversimplifying the challenges in the art and using Patent Owner's claims as a roadmap, Petitioner fails to raise anything not already considered and rejected. Petitioner mistakes the trees for the forest and, thus, fails to appreciate that the claimed invention cannot be the product of a POSITA's motivation to combine.

2. Whether Petitioner has Pointed Out Sufficiently How the Examiner Erred in its Evaluation of the Asserted Prior Art

The Examiner correctly evaluated the very same subject matter and arguments during prosecution as explained above. Further, Petitioner makes no effort to point out—much less sufficiently point out—how the Examiner erred in its evaluation of the asserted prior art. Not once does Petitioner in the 62-page Petition say or explain how the Examiner erred in his analysis or failed to appreciate the key features of the prior art, such as the existence of active pixel CMOS imagers, the design of CMOS imagers with on-chip integration (*e.g.*, camera-on-a-chip), or the location of CCD pixel arrays with off-chip circuit boards, including parallel circuit boards used in various CCD devices. As explained in Section A, *supra*, Petitioner makes use of substantially the same,

cumulative references as the prior art evaluated during examination, as well as the same arguments.

If Petitioner can only show that "reasonable minds can disagree regarding the purported treatment of the art or arguments," then Petitioner has failed to show that the Office erred "in a manner material to patentability." *Advanced Bionics*, Paper 6 at 9. That is the case here, at bestf. "If a condition in the first part of the framework is satisfied and the petitioner fails to make a showing of material error, the Director generally will exercise discretion not to institute *inter partes* review." *Id.* at 8-9 (exercising discretion where "Petitioner has not pointed to error by the Examiner"). Here, Petitioner has not pointed to error by the Examiner. If anything, Petitioner merely shows that the very arguments advanced here were fully considered and rejected during prosecution.

Thus, the Director should exercise discretion not to institute *inter partes* review on the basis of Section 325(d).

V. THE BOARD SHOULD DENY THE PETITION PURSUANT TO 35 U.S.C. § 314(A) BASED ON THE ADVANCED STAGE OF THE CO-PENDING DISTRICT COURT LITIGATION

The Board should exercise its discretion under § 314(a) and deny the Petition because institution of this proceeding would not be consistent with the objective of the AIA to "provide an effective and efficient *alternative* to district court litigation." *NHK Spring Co., Ltd. v. Intri-Plex Techs., Inc.*, IPR2018-00752,

Paper 8 at 20 (PTAB Sept. 12, 2018) (precedential) (denying IPR institution where prior art previously considered and co-pending district court proceeding nearing completion).

Petitioner's filing of this Petition, along with 19 other petitions challenging Patent Owner's patents, demonstrates a volume-based, litigation-focused approach, rather than a substance-based tactical challenge on validity. However, volume alone cannot compensate for the lack of substantive merit in each of Samsung's IPR petitions, including this one. As set forth in detail in § III, the subject matter of the references and arguments in each of Petitioner's IPR Petitions has already been considered, rejected and overcome during the course of a twenty-year period of review by the Office. During this twenty year period, the applications, including the underlying application here, were thoroughly examined, and ultimately allowed. *See* Section III. This litigation-based decision to file 20 IPR petitions is not an attempt to provide an effective and efficient *alternative* to district court litigation—it is just another litigation strategy.

In addition to rehashing old prior art and arguments in the district court and IPR petitions, Samsung's invalidity contentions challenged the Asserted Patents on 35 U.S.C. §101 and 35 U.S.C. §112, grounds that can only be resolved in district court. *See* 35 U.S.C. § 311(b) (restricting the scope of IPR petitions to anticipation and obviousness grounds). Moreover, pursuant to the Scheduling Conference in the

parallel proceeding, Patent Owner is permitted to substitute any of the asserted claims at any time, so long as there is a rational basis for the substitution. *See* Ex. 2010 at 21:25-22:5. As a result, Patent Owner can assert claims in district court that are not and will not be subject to any IPR proceeding, significantly reducing the likelihood that institution of IPR on any of the challenged claims will simplify matters.

When determining whether to exercise discretion under § 314(a), the Board "takes a holistic view" and balances the following "considerations of system efficiency, fairness, and patent quality" as recently applied in a Precedential Order from the PTAB:

> (1) whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted; (2) proximity of court's trial date to the Board's projected statutory deadline for a final written decision; (3) investment in the parallel proceeding by the court and the parties; (4) overlap between issues raised in the petition and in the parallel proceeding; (5) whether the petitioner and the defendant in the parallel proceedings are the same party; and (6) other circumstances that impact the exercise of discretion, including the merits.

Apple Inc. v. Fintiv, Inc., IPR2020-00019, Paper 15, at 7-8 (P.T.A.B. May 13, 2020) (precedential). As explained herein, the 314(a) factors weigh plainly in favor of denial of this Petition.

A. Factors That Favor Discretionary Denial

1. Factor 2: Proximity of Court's Trial Date to the Board's Projected Statutory Deadline for a Final Written Decision

The advanced stage of the proceedings here weighs heavily in favor of denying institution. The parallel proceeding has been pending for over a year. During that time, the court set a case schedule and the pretrial conference is set for August 17, 2020. *See* Ex. 2011, 26-27. Further, based on the court's guidance, a trial date is likely to be set for the end of 2020 or early 2021 at the pretrial conference, thus resulting in a quick resolution of this dispute by the district court. *See* Ex. 2011, 15 ("The parties should expect to be given a firm trial setting that is 90 to 120 days from the date of the final pretrial conference, and should be available for trial accordingly.").

In contrast, an institution decision will issue on or around August 21, 2020, and if the Board institutes trial, a final written decision would likely issue in September 2021. *See* 37 C.F.R. §§ 42.100(c), 42.200(c) and 42.300(c). After a final written decision is provided by the PTAB, the parties have the right to appeal that decision to the Federal Circuit, a process that can take more than an additional year and a half to conclude, thus likely extending the matter into 2023. 35 U.S.C. § 141(c). As a result, this factor weighs in favor of discretionary denial. *See, e.g.*, *E-One, Inc. v. Oshkosh Corp.*, No. IPR2019-00161, Paper 16 (P.T.A.B. May 15, 2019) (denying institution under due to a parallel district court trial scheduled

eleven months away); *Next Caller Inc. v. TRUSTID, Inc.*, No. IPR2019-00961, Paper 10 (P.T.A.B. Oct. 16, 2019) (denying institution where the district court trial was set for nine months in the future and the prior art asserted substantially overlapped with the parallel district court litigation).

2. Factor 3: Investment in the Parallel Proceeding by the Court and the Parties

The parties and the court have heavily invested time and resources in the parallel proceeding. *See* Section B above. On February 14, 2019, Patent Owner filed its Complaint for infringement. Ex. 2011 at 1. On May 28, 2019, Petitioner filed a motion to dismiss, which the court denied on October 2, 2019. *See* Ex. 2011 at 16, 37. Following a hearing on June 10, 2019, the court entered a Scheduling Order. Ex. 2011 at 27. Pursuant to that Order, Patent Owner served its preliminary infringement contentions on November 21, 2019, including 113 claim charts and accompany document production. On January 21, 2020, Petitioner served its Invalidity Contentions, along with 29 invalidity charts. On March 13, 2020, Patent Owner served its Response to Petitioner's Invalidity Contentions.

To date, Patent Owner has served requests for production and interrogatories. Ex. 2012, Caplan Decl. ¶¶ 2-3. Petitioner has responded to both. *Id*. at ¶¶ 10-11. Petitioner served two sets of interrogatories and requests for production. *Id*. at ¶¶ 4-6. Patent Owner has responded to both. *Id*. at ¶¶ 7-9. Between August 26, 2019 and May 7, 2020, Patent Owner made seven document

productions, including conception and reduction to practice documents, non-disclosure and licensing agreements. Between October 1, 2019 and May 8, 2020, Petitioner made nine document productions, including extrinsic evidence support for claim construction, user manuals, 3D CAD/CAM models, and technical documents such as image sensor specifications, camera module specifications, and processor specifications. *Id*. at ¶ 12.

The parties are now working on claim construction that will be fully briefed within a month—by June 23, 2020. Ex. 2003 at 11. Fact discovery is closing shortly thereafter—in June 2020 or 60 days after the court's Claim Order. *Id.* at 11. Expert discovery is expected to close in October 2020. *Id.* at 12-13. In light of the extreme investment in the district court litigation by the parties and the court, this factor weighs in favor of discretionary denial. *See Cisco Sys., Inc.*, *v. Ramot At Tel Aviv Univ. Ltd.*, IPR2020-00122, Paper 15 (PTAB May 15, 2020) (finding this factor weighing in favor of discretionary denial of institution in nearly identical circumstances).

3. Factor 4: Overlap between Issues Raised in the Petition and in the Parallel Proceeding

Petitioner asserts substantially the same references in the district court action as it raises in this case:

Alleged Prior Art Asserted in District Court	Alleged Prior Art Asserted in IPR Petition
Swift - WO Application Publication No. 95/34988 Suzuki - U.S. 5,233,426 BusinessWeek – Publication Ackland - U.S. 5,835,141 Tanaka – U.S. 4,700,219 Fossum – U.S. 5,665,959 Stam – U.S. 5,837,994 Chamberlain – U.S. 5,221,964 Waldenmaier – U.S. 5,774,569 Wakabayashi – U.S. 5,903,706 Vivicam – Physical Object	Swift – WO Application Publication No. 95/34988 Suzuki – U.S. 5,233,426 Ricquier – Publication

Ex. 2037. There is, therefore, substantial overlap between the art and issues raised in the Petition and in the district court proceeding. This factor weighs very heavily in favor of discretionary denial. *Cisco Sys. , Inc., v. Ramot At Tel Aviv University Ltd.*, IPR2020-00122, Paper 15 (PTAB May 15, 2020).

4. Factor 5: Whether the Petitioner and the Defendant in the Parallel Proceedings Are the Same Party

The parties in the district court proceeding are the same parties in this IPR proceeding. This factor weighs in favor of discretionary denial. *See Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 15 (PTAB May 13, 2020).

5. Factor 6: Other Circumstances That Impact the Exercise of Discretion

Although not explicitly a *Fintiv* factor, Petitioner's lack of delay in filing this, and the 19 other petitions for IPR of the asserted patents should weigh in favor of discretionary denial under § 314(a). Indeed, at least one decision of the PTAB has indicated that "the Petitioner's diligence in filing its Petition" should be considered "as an 'other circumstance' under this *Fintiv* factor." *Cisco*, IPR2020-00122, Paper 15 at 12 (Crumbly, APJ, dissenting). In this case, Petitioner in delayed filing this Petition until February 15, 2020, almost exactly one year after service of the Complaint—the last day to do so under § 315(b). *See* Ex. 2002 (Complaint served on Feb. 19, 2019). And contrary to the *Cisco* case, this Petition was filed well *after* the Petitioner filed its invalidity contentions. Accordingly, Petitioner's lack of diligence in filing this Petition is another factor that weighs in favor of discretionary denial under § 314(a).

B. Factor That is Neutral

1. Factor 1: Whether the Court Granted a Stay or Evidence Exists That One May Be Granted If a Proceeding Is Instituted

Immediately upon filing its 20 IPRs, Petitioner filed a motion to stay the district court litigation. *See* Ex. 2011 at 56. That motion was fully briefed on April 15, 2020, and remains unresolved. This factor is therefore at least neutral.

Given the likely completion of the parallel proceeding months before the final written decision, the overlap between the issues in the parallel proceedings and this IPR, and the unlikelihood this IPR will streamline the parallel proceeding, institution of this proceeding would not be consistent with the objective of the AIA to "provide an effective and efficient *alternative* to district court litigation." *NHK Spring Co., Ltd. v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8 at 20 (P.T.A.B. Sept. 12, 2018) (precedential). Accordingly, the Board should exercise its discretion and deny institution under § 314(a).

VI. GROUND 1: SWIFT IN VIEW OF RICQUIER AND SUZUKI DOES NOT RENDER CLAIM 2 OBVIOUS UNDER 35 U.S.C. § 103(A)

A. Swift in view of Ricquier and Suzuki Does Not Disclose a Circuitry on a Second Circuit Board to Convert Pre-video Signal to a Post-Video Signal

Swift does not disclose the claimed "said second circuit board including circuitry thereon to convert said pre-video signal to a post-video signal." '052 Patent, claim 2. Petitioner asserts that "Swift discloses configuring circuit boards 52 and 53 and their associated circuitry in multiple different ways, at least one which meets the limitations." Petition at 38. As discussed below, this grab-bag approach to fails to raise a reasonable likelihood that Independent Claim 2 is unpatentable.

1. CMOS Image Sensor Embodiments

In its CMOS image sensor embodiments, Swift discloses utilizing the APS-type sensors disclosed in the *Laser Focus World* article referenced therein. *See* Ex. 1005 at 10; Ex. 1048. Petitioner acknowledges this connection between Swift and the *Laser Focus World* article. Petition at 33. These APS sensors refer to the same "camera[s] on a chip" referenced in the Background of the Invention section of the '052 Patent, which differ from the prior art CCD imagers because they "incorporate a number of other different electronic controls that are usually found on multiple circuit boards of much larger size." '052 Patent at 2:9-19.

One of the "electronic controls" found on Fossum's APS-type sensor is the claimed circuitry element:

> By consolidating many functions and reading images in a more efficient way, it requires one-hundredth the power of a CCD-based system. **And the chip does its own conversion from analog to digital for output on computer monitors or disk storage**. About all it needs is a power source and a lens to focus light on it.

Ex. 1060 at 1; *see also* Ex. 1048 (*Laser Focus World*) (disclosing that CMOS is the "preferred choice for implementation of on-chip signal processing"); *see also* '052 Patent at 2:6-19 (discussing Fossum's "camera on a chip"). Because Fossum's (and therefore Swift's) "camera on a chip" includes the "circuitry thereon to convert said pre-video signal to a post-video signal," Swift does not disclose the claimed

"circuitry" located on "said second circuit board being positioned in a stacked arrangement with respect to said first circuit board, said second plane of said second circuit board being substantially parallel to said first plane of said first circuit board," as recited in independent claim 2. Given that Swift utilizes Fossum's "camera on a chip," Petitioner's citation to *Ricquier* for its disclosure of "explicit implementation details regarding the image sensor applicable to Swift" does not add anything to Ground 1 not already taught by Swift. Petition at 14.

Petitioner asserts that the circuitry component mounted on circuit board 53 that is used to "process image signals received" from the image sensor is the claimed "circuitry… to convert said pre-video signal to a post-video signal." Petition at 39 (citing Swift 9:7-13). But because the APS-type image sensor discussed in Swift already "does its own conversion from analog to digital for output on computer monitors or disk storage" (Ex. 1060 at 1), the "image signal" received by Swift's circuitry component used to "process image signals" received from the image sensor cannot be a pre-video signal, as recited in independent claim 2 (i.e., "said second circuit board including circuitry thereon to convert ***said pre-video signal*** to a post-video signal").

And while Petitioner asserts that "Swift's "circuit board 53" that "includes a video processor for converting the pre-video signal generated by the image sensor to a post-video signal" or "includes a 'video processor' and 'circuitry components'

that convert the received signal into a signal that may be received by a monitor or television," the cited evidence demonstrates nothing of the sort. Petition at 15, 37. The evidence cited in the Petition only states that Swift's **camera** outputs a signal that may be viewed on a monitor, not that the circuitry component mounted on circuit board 53 is responsible for converting a pre-video signal to a post-video signal. *See* Petition at 15-16 (citing Swift 8:31-9-13, 3:31-4:4); see also *Id*. at 40 (citing Ex. 1005 at 15:7-8, 15:13-14, 17:34-18:3, 18:8-11). In Swift, that is done *on-chip*, and any further processing carried out by the circuitry on circuit board 53 is performed on a signal already suitable "for output on computer monitors or disk storage." Ex. 1060 at 1; Ex. 1005 at 10.

2. Non-CMOS Image Sensor Embodiments

Swift also contemplates non-CMOS image sensors which, unlike CMOS image sensors, are not amenable to "camera on a chip" integration. Ex. 1060 at 1 ("CCDs… are costly, power-hungry, and—with the accessory chips they require—bulky."). As discussed in § II.B, *supra*, Swift's bulky multiple-circuit board layout and relatively high-voltage power supply indicates that Swift's imager is made for use with the CCD image sensors typical at the time, **not** the "camera on a chip" CMOS imager disclosed in the *Laser Focus World* article referenced in Swift. *See* Ex. 1005 at 10 (citing Ex. 1048). Accordingly, to the extent that the processing circuitry located on Swift's circuit board 53 is able to "convert said pre-video

signal to a post-video signal" (which Swift does not disclose), a POSITA would understand that it would only perform such conversion for image signals received from a non-CMOS image sensor, which cannot implement such functionality on-chip.

Petitioner therefore has not demonstrated that Swift in view of *Ricquier* and *Suzuki* discloses or renders obvious an imaging device including a CMOS pixel array in which the "circuitry … to convert said pre-video signal to a post-video signal" is located on a circuit board on a different plane than the image sensor. In the CMOS embodiments, such circuitry is located *on-chip*, and in the CCD embodiments, there is no CMOS pixel array. For at least the foregoing reasons, Patent Owner respectfully requests that the Board determine that Petitioner has not raised a reasonable likelihood that Independent Claim 2 is unpatentable.

B. Ricquier Does Not Cure the Deficiencies of Swift

Ricquier discloses a dedicated imager (camera) for machine vision applications. Ex. 1033 at 10. The imager includes a 256 x 256 pixel array on the sensor plane, fabricated using 1.5 um CMOS technology. *Id.* The imager was developed as part of the "CIVIS project" with the goal to "acquire data only from a specific region of interest and this with a variable resolution." *Id.*

The "off-chip driving unit" described in *Ricquier* is used to select various groups of pixels to obtain images of different resolutions. However, a POSITA

would understand that *Ricquier* is describing a proof of concept prototype for programming a CMOS imager to operate in several resolutions. Since it is a prototype assessment, the "driving unit" was externally located while they experimented to see if it would work, with the expectation that the "driving unit" feature would be integrated on-chip in any actual CMOS imager having this feature as explained on the first page of the article ("further cointegration of processing electronics on the same chip"). In light of that teaching of *Ricquier*, a POSITA would not understand *Ricquier*'s use of an off-chip driving unit from a proof of concept design to be the timing and control circuit for other developed imager products, such as Swift*'s* camera.

Accordingly, it would not have been obvious to import and re-arrange the circuitry components described in *Ricquier* into the camera of Swift absent hindsight gleaned from the teachings of the '052 patent.

C. Suzuki Also Does Not Cure the Deficiencies of Swift and Ricquier

Recognizing that the combination of Swift and Ricquier fails to disclose the "first plane", "second plane", "stacked arrangement" limitations of independent claim 1, Petitioner incorrectly argues that it would have been obvious to modify Swift and *Ricquier* with *Suzuki* to reach this feature of the challenged claim 2. Petition at 24-27, 41 (i.e., admitting "[t]o the extent further disclosure of the arrangement of the circuit boards is required.")

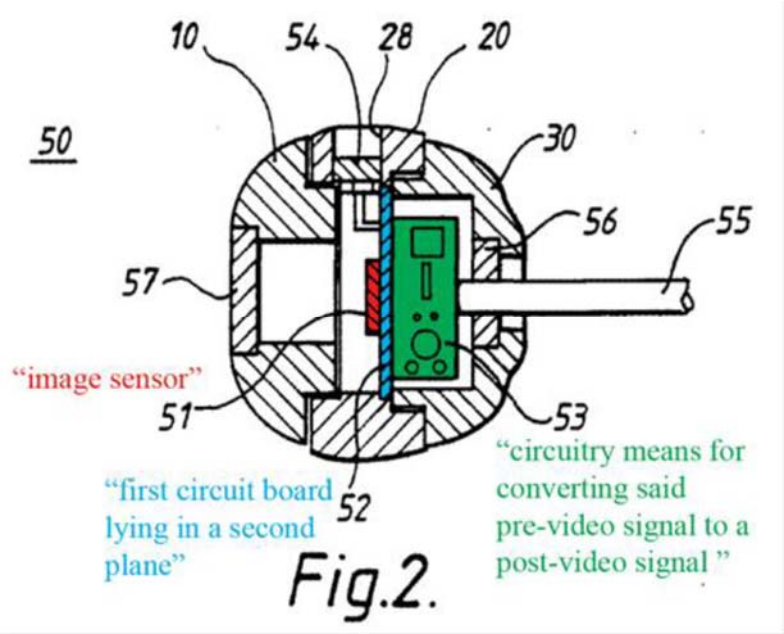
First, Petitioner's citation to *Suzuki* fails to address the fundamental deficiency of its argument, which is that in Swift's CMOS embodiments, which employs Fossum's "camera on a chip" CMOS imager, the pixel array, timing and control circuitry, and "circuitry … to convert said pre-video signal to a post-video signal" are all *on chip*. *See* § VI.A.1.a, *supra*. Thus, any other circuitry located on other circuit boards is not "to convert said pre-video signal to a post-video signal" and cannot reach the invention recited in independent claim 1.

Second, Petitioner fails to provide any reason to modify the Swift/Fossum CMOS/APS camera to **remove** on-chip circuitry and place it on Suzuki's separate circuit boards. Fossum's *Laser Focus World* article, referenced in Swift, explicitly teaches away from such a modification, as it states that "on-chip integration is the key to achieving future camera miniaturization." Ex. 1048 at 8.

Third, Petitioner's citation to *Suzuki* fails because the "first circuit board" alleged to define the claimed first plane facially does not include the claimed **circuitry to convert said pre-video signal to a post-video signal**. If *Suzuki's* circuit board 227 includes any claimed element at all, the "circuit for driving the solid-state image pickup chip **221** and a circuit for amplifying the video signal from the solid-state image pickup chip **221**," corresponds to the "**timing and control circuitry**" of independent claim 2 (if it indeed corresponds to any element of the challenged claims). Ex. 1015 (Suzuki) at 2:51–55. Although Suzuki it is not

at all clear (and Petitioner and its expert do not attempt to explain it), the element of Suzuki that is responsible for "converting said pre-video signal to a post-video signal for direct reception by a standard video device" is most likely located in "camera control unit 3." Accordingly, Petitioner's argument not only requires modification of Swift **and** Ricquier by Suzuki, but it also requires further modification of Swift, Ricquier, and Suzuki such that the circuitry located in Suzuki's camera control unit is moved to a circuit board for which there is no basis, but for Petitioner's attempt to reconstruct the challenged claims with the benefit of hindsight based on Patent Owner's claims.

Fourth, to the extent that all of the foregoing is ignored, Petitioner's argument still fails because Petitioner fails to provide a reasoned basis for modifying Swift's circuit board 53 to lie parallel to the image sensor. Petitioner asserts that "[b]y arranging the image sensor and circuit boards so that they are 'aligned with each other' as illustrated in Fig. 2, Suzuki explains that its camera head 'has an outer diameter closer to a diagonal length of a solid-state image pickup chip.'" Petition at 25. But the "outer diameter" of Swift's camera would be reduced if circuit board 53 was arranged parallel to circuit board 52:



Petition at 41 (annotating Swift, FIG. 2). Whether arranged perpendicular (as shown) or parallel (as suggested) to the image sensor, the maximum dimension of Swift's circuit board 53 would still limit the ability to allow the "camera head [to have] an outer diameter closer to a diagonal length of a solid-state image pickup chip." Ex. 1015 (Suzuki) at 1:53–56. In fact, only if Swift's circuit board 53 were oriented **perpendicular** to the image sensor such that its **minimum** dimension contacted circuit board 52 (as shown in the modified version of Fig. 2 below) would Swift be able to ensure an "outer diameter closer to a diagonal length of a solid-state image pickup chip":

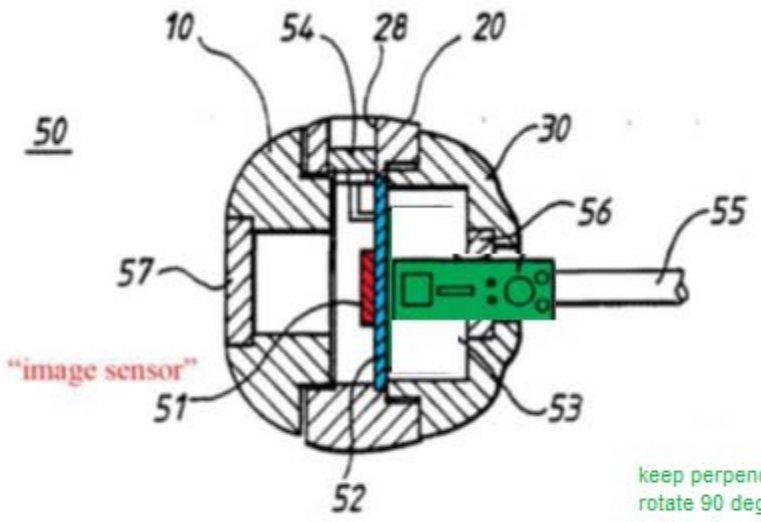


Fig.2.

Petitioner's argument to modify Swift and *Ricquier* with *Suzuki* fails for any and all of the reasons articulated above. Accordingly, the Board should determine that Petitioner has not raised a reasonable likelihood that independent claim 2 of the '052 Patent are unpatentable.

VII. GROUND 2: LARSON IN VIEW OF SWIFT, RICQUIER, AND SUZUKI DOES NOT RENDER CLAIM 1 OBVIOUS UNDER 35 U.S.C. § 103(A)

Petitioner cites *Larson* for "implementation details for such an imaging device … with a physical camera and a display screen contained in a single housing." Petition at 50. Petitioner does not assert that *Larson* cures any of the deficiencies of Ground 1 noted above. Accordingly, for the reasons articulated in §§ VII.A, supra, the Board should find that Petitioner has not raised a reasonable likelihood that Claim 2 of the '052 Patent are unpatentable.

VIII. CONCLUSION

Petitioner has not established a reasonable likelihood that it will prevail in establishing that claim 2 of the '052 Patent is invalid. Patent Owner accordingly requests that the Board deny institution of *inter partes* review of the '052 Patent.

Respectfully submitted,

Dated: May 21, 2020

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(Case No. IPR2020-00512)

Attorneys for Patent Owner

PATENT OWNER'S EXHIBIT LIST

EXHIBIT NO.	DESCRIPTION
Exhibit-2001	Complaint for Patent Infringement in *Cellect, LLC v. Samsung Electronics Co., LTD and Samsung Electronics America, Inc.,* 1:19-cv-00438, dated February 14, 2019.
Exhibit-2002	Proof of Service for Summons and Complaint, dated February 19, 2019.
Exhibit-2003	Scheduling Order in a Patent Case in *Cellect, LLC v. Samsung Electronics Co., LTD and Samsung Electronics America, Inc.,* 1:19-cv-00438, dated June 10, 2019.
Exhibit-2004	E. Fossum, *Active-pixel sensors challenge CCD,* Laser Focus World, pp. 83-87, June 1993 ("Fossum").
Exhibit-2005	Parties' Joint Claim Construction Chart in *Cellect, LLC v. Samsung Electronics Co., LTD and Samsung Electronics America, Inc.,* 1:19-cv-00438, dated May 8, 2020.
Exhibit-2006	U.S. Patent No. 5,754,313 ("Pelchy").
Exhibit-2007	Zarnowski and Pace, *Imaging options expand with CMOS technology*, Laser Focus World, June 1997 ("Zarnowski")
Exhibit-2008	U.S. Patent No. 4,491,865 ("Danna").
Exhibit-2009	U.S. Patent No. 5,453,785 ("Lenhardt").
Exhibit-2010	Hearing Transcript before Judge Hegarty, dated July 10, 2019.
Exhibit-2011	*Cellect, LLC v. Samsung Electronics Co., LTD and Samsung Electronics America, Inc.,* 1:19-cv-00438 Docket Sheet.
Exhibit-2012	Declaration of Jonathan S. Caplan, dated March 17, 2020.
Exhibit-2026	U.S. Patent No. 6,073,034 ("Jacobson").
Exhibit-2027	U.S. Patent No. 6,141,037 ("Upton").

EXHIBIT NO.	DESCRIPTION
Exhibit-2028	U.S. Patent No. 6,147,366 ("Drottar").
Exhibit-2029	U.S. Patent No. 5,929,901 ("Adair").
Exhibit-2030	PCT WO 90/10361 ("Ullman").
Exhibit-2031	PCT WO 95/15044
Exhibit-2032	U.S. Patent No. 5,896,375 ("Dent").
Exhibit-2033	U.S. Patent No. 6,590,928 ("Haartsen").
Exhibit-2034	U.S. Patent No. 5,471,515 ("Fossum '515").
Exhibit-2035	U.S. Patent No. 5,986,693 ("Adair '693").
Exhibit-2036	Image Sensors, OIDA's Global Optoelectronics Industry Market Report and Forecast, October 2007.
Exhibit-2037	Samsung's Invalidity Contentions, dated January 21, 2020.
Exhibit-2039	Armstrong, *NASA's Tiny Camera has a wide-angle future*, BusinessWeek, pp. 54-55, March 6, 1995. ("Armstrong").
Exhibit-2040	U.S. Patent No. 5,879,289 ("Yarush").
Exhibit-2041	U.S. Patent No. 7,369,176 ("Sonnenschein").
Exhibit-2042	File History of U.S. Patent No. 6,752,255
Exhibit-2043	U.S. Patent No. 5,986,693 ("Adair '693").

CERTIFICATE OF COMPLIANCE WITH 37 C.F.R. § 42.24

This paper complies with the type-volume limitation of 37 C.F.R. § 42.24. The paper includes 12,419 words, excluding the parts of the paper exempted by § 42.24(a).

This paper also complies with the typeface requirements of 37 C.F.R. § 42.6(a)(ii) and the type style requirements of § 42.6(a)(iii)&(iv).

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CERTIFICATE OF SERVICE

The undersigned certifies, in accordance with 37 C.F.R. § 42.6(e), that service was made on the Petitioner as detailed below.

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