

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Axon Enterprise, Inc., Dedrone Holdings, Inc., and Skydio, Inc.

Petitioners,

v.

Airspace Defense, Inc.

Patent Owner

Case No. IPR2025-00629

U.S. Patent No. 10,514,711

PATENT OWNER'S CORRECTED SUR-REPLY

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List of Patent Owner Exhibits

Exhibit No.	Description
EX2001	U.S. Army Contract No. W15QKN-17-9-1022
EX2002	Smithsonian, National Air and Space Museum Letter to Mr. Banga, dated March 13, 2024
EX2003	Z. Yang and R. Sinnott, "Snake Detection and Classification using Deep Learning," in Proceedings of Hawaii International Conference on System Sciences (2021), https://scholarspace.manoa.hawaii.edu/server/api/core/bitstreams/f9f2de4d-ddaa-4984-9fc3-9bbca4e27247/content
EX2004	Q. Ji, "Object Detection and Recognition," https://sites.ecse.rpi.edu/~qji/CV/ObjectDetRecog2.pdf
EX2005	The National Science Foundation, "How to Radars Work?," https://www.eol.ucar.edu/content/how-do-radars-work
EX2006	Principles of Doppler Radar, http://ww2010.atmos.uiuc.edu/(Gh)/guides/rs/rad/basics/dpmod.rxml
EX2007	https://developer.apple.com/documentation/corelocation/-configuring-your-app-to-use-location-services
EX2008	https://developer.apple.com/documentation/corelocation/-cllocation
EX2009	https://developer.android.com/develop/sensors-and-location/location/retrieve-current
EX2010	https://developer.android.com/reference/android/location-/Location
EX2011	https://www.merriam-webster.com/dictionary/autonomous

Exhibit No.	Description
EX2012	https://dictionary.cambridge.org/us/dictionary/english/-autonomous
EX2013	Declaration of Noah Moore
EX2014	Airspace Interceptor, Fully Autonomous Physical Mitigation System Designed to Detect, Capture or Ram Drone, https://www.airspace.co/airspace-interceptor/
EX2015	Smithsonian National Air and Space Museum, Donate a Personal Item, https://airandspace.si.edu/donate-item
EX2016	Smithsonian National Air and Space Museum, Roger Connor Bio, https://airandspace.si.edu/people/staff/roger-connor
EX2017	Smithsonian National Air and Space Museum, About the Collection, available at https://airandspace.si.edu/collections/about-collection (last visited July 14, 2025)
EX2018	Jointly Proposed Protective Order
EX2019	U.S. Patent App. No. 16/142,452 (from which U.S. Patent No. 10,514,711 issued), as filed (the “’452 App.”)
EX2020	Streaming, Definition of Streaming by Merriam-Webster (2016)
EX2021	Streaming definition and meaning, Collins English Dictionary (2018)
EX2022	R. Wang et al., “An Effective Image Denoising Method for UAV Images via Improved Generative Adversarial Networks,” <i>Sensors</i> vol. 18(7):1985 (2018), doi:10.3390/s18071985.
EX2023	A. Ahmad et al., “Noise and Restoration of UAV Remote Sensing Images.” <i>International Journal of Advanced Computer Science</i>

Exhibit No.	Description
	<i>and Applications</i> , vol. 11, no. 12 (2020) doi:10.14569/ijacsa.2020.0111222
EX2024	Curriculum Vitae of Dr. Nikolaos Papanikolopoulos
EX2025	Declaration of Nikolos Papaniklopoulos, Ph.D., in support of Patent Owner's Response and Motion to Amend
EX2026 (Served; Not filed)	Frequently Asked Questions, About the Internet Archive Affidavit and the Wayback Machine, https://archive.org/legal/faq
EX2027 (Served; Not filed)	Supplemental Declaration of Nikolos Papaniklopoulos, Ph.D., in support of Patent Owner's Response and Motion to Amend
EX2028	<i>Number not used</i>
EX2029	<i>Number not used</i>
EX2030	<i>Number not used</i>
EX2031	Withdrawn
EX2032	Withdrawn
EX2033	Transcript of Deposition of Dr. Singhose (Apr. 15, 2026)
EX2034	E. Biediger and W. Singhose, "Formation Flying Satellite Control Utilizing Input Shaping," in AIAA/AAS Astrodynamics Specialist Conf., Big Sky, Montana (2003).
EX2035	Withdrawn

I. INTRODUCTION

PO's construction of "autonomously navigating" that claim 12 recites is derived from the specification and is corroborated by extrinsic evidence. Petitioners on the other hand, do not point out a single embodiment in the '711 patent that supports their construction, and that construction contradicts certain disclosed embodiments. Petitioners also do not account adequately for the different definitions of the extrinsic evidence they cite and would have known. As such, Petitioners' definition should not be adopted. All prior art combinations that Petitioners cite fail to teach the above identified limitation of claim 12, per a proper construction of that claim term. As such, claim 12 is patentable over the cited combinations.

II. CLAIM CONSTRUCTION

A. *Autonomously Navigating a Drone*

1. UAV's CPU makes flight decisions

The '711 patent expressly discloses a drone navigating "autonomously." EX1001 15:64-16:3 ("the direction and/or speed of the aerial vehicle is automatically and **autonomously** adjusted to turn and **fly towards the received location**"), FIG. 4. A UAV 301 has a CPU "configured to control the **overall** operation of UAV 301," where "the CPU is configured to **autonomously fly UAV 301**." *Id.* 9:25-27, 9:47-51. "The CPU may ... **perform** one or more **flight decisions for the UAV**" by providing **flight commands** that include "a **specified**

speed for the UAV, a **specified flight height** for the UAV, a particular **flight path** for the UAV, etc. *Id.* 9:38-47; POR at 10-11; EX1025 ¶82.

2. The '711 patent distinguishes “autonomously” flying drones from “remotely controlled” and semiautonomous drones

The '711 patent **explicitly distinguishes** autonomous drone navigation from remote-controlled navigation:

“[i]n some embodiments , the CPU is configured to receive flight instructions from a remote command center .”	“In other embodiments , the CPU is configured to autonomously fly UAV 301.”
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EX1001, 9:47-51.

The “**other embodiments**” according to which the drone flies “autonomously” are **distinguished** from those where flight instructions are received from “a remote command center,” where flight instructions at the remote command center may be generated by a human or a computer. The '711 patent does not distinguish between **who/what** generates instructions at the remote command center, but does distinguish between receiving flight instructions from a remote command center and generating them “autonomously.”

Embodiments in which the flight instructions or control signals are received from a remote location are described **not** as autonomously, but as “**remotely controlled**.” *Id.* 14:10-16 (“UAV 301 may be **remotely controlled** from a remote

location” and “[i]n response to **receiving the flight control signals**, the CPU of UAV 301 may determine how UAV 301 should fly”), 12:14-17 (similar).

The ’711 patent also distinguishes autonomous drones from semi-autonomous drones. The UAV 200 includes an interdiction control system 210 and a processor 211. EX1001 5:21-23, 7:53-56, FIG. 2. The specification states:

If the relative position between the target UAV and the defending UAV is not optimal, interdiction control system 210 may provide a recommendation or indication **to the remote controller of the UAV**. Interdiction control system 210 may provide or suggest course corrections **directly to the processor 211** to maneuver the UAV into an ideal interception position **autonomously or semi-autonomously**.

EX1001, 8:15-21.

Thus, a POSITA would understand that when the UAV’s interdiction module provides information directly to the UAV’s own processor, the UAV operates “autonomously,” but when the interdiction module provides information to “the remote controller,” the UAV operates “semi-autonomously.” A POSITA would have also understood that just as the interdiction control system 210 can “suggest” a correction “directly” to the UAV’s processor, the “recommendation” provided “to the remote controller” can be a recommendation provided not necessarily to a human but to the remote controller’s processor. Thus, a POSITA would understand, that when information is provided to the computer/processor of a remote controller,

where that remote computer/processors may then send flight control signals / instructions, the '711 patent describes such an operation as autonomous, and not autonomous.

Claim 12 recites “autonomously navigating,” and is thus not directed to the “remotely controlled” or semi-autonomous embodiments.

B. PO’s Interpretation of “Autonomously Navigated” Recited in Claim 12 is Correct Because It Is Rooted in the Specification and Is the Plain and Ordinary Meaning

1. PO’s Interpretation Is Not Overly Narrow

Contrary to Petitioners’ assertions, *see* Rep. at 2, PO’s interpretation is the plain and ordinary meaning, and is informed by the specification. *Supra* ¶¶II.1 (CPU makes flight decisions), II.2 (“autonomously” flying embodiments are different from “remotely controlled” and semi-autonomous embodiments). PO’s construction properly excludes remote controlled and semi-autonomous drone operation, because the specification distinguishes those from autonomous operations, and is therefore correct and not overly narrow. PO’s construction is also fully supported and warranted by the specification and consistent with the plain and ordinary meaning of “autonomously navigating.” *See infra* II.5; POR § III; EX2025 § IX.

2. PO’s Interpretations of “Autonomously” in the POPR and POR are Consistent, and the Construction in the POR is the Plain and Ordinary Meaning

PO’s interpretations of “autonomously” in the POPR and POR are not

inconsistent as Petitioners' falsely allege. Rep. at 2-3.

POPR states that the plain and customary meaning of “autonomously navigating” is “performing navigation by the reference UAV itself,” and further that the claim term means “making flight decisions by a component of the reference UAV itself.” POPR at 30-31. While the words are different, their meaning is the same; the later statement simply elaborates on the meaning of “performing navigation,” which does include making flight decisions and may include controlling the RAV operation. The common, important aspect of these two interpretations is that they both require the RAV to perform navigation by making navigation decisions by itself. Thus these two POPR interpretations are consistent.

POR states that the plain and ordinary meaning of “autonomously navigating the RAV” is making navigation decisions by the RAV by-itself, without outside control.” POR at 11-12. This interpretation is not inconsistent with the POPR. It still requires the RAV to make navigation decisions by itself.

To the extent the construction in the POR is narrower, because the navigation decisions must be made without outside control, this requirement follows directly from the specification. The specification discloses remotely controlled, semi-autonomous, and autonomous RAV navigation, and distinguishes them. *Supra* § II.2. Specifically, the specification describes receiving flight control signals / commands from a remote location / command center as “remotely controlled,” and

thus excludes outside control from autonomous navigation. Therefore, the POR construction is correct.

Petitioners' cite no legal authority in arguing that for **allegedly** presenting inconsistent constructions, the POR construction should be rejected. Rep. at 3. To the contrary, the Board and Federal Circuit have allowed even an opposite construction in the POR, as long as the petitioner has an opportunity to respond. *See Axonics, Inc. v. Medtronic, Inc.*, 75 F. 4th 1374, 1376, 1378-79, 1383 (Fed. Cir. 2023).

3. The Board Has Not Addressed Claim 12 and Construction of “Autonomously Navigating”

Contrary to Petitioners' assertion, *see* Rep. at 3, in the Institution Decision (“ID”), the Board did not address claim 12 or the construction of “autonomously navigating.” ID at 22 (“express[ing] no opinion on” claim 12).

Claim 1 does not recite “on-board,” “at the reference aerial vehicle,” etc. for its steps. Nevertheless, POPR argued claim 1 should be interpreted such that its steps are performed on-board the RAV. POPR at 12-13. The Board rejected that argument. ID at 10-11. In stark contrast, claim 12 recites “**autonomously** navigating.” In the ID, the Board did not even address, much less reject, any construction of claim 12. ID at 22. This, PO does not present any already rejected argument.

4. The Reasons for Rejection of Interpretation of Claim 1 Do Not Apply to Claim 12

Though Petitioners' contend otherwise, Rep. at 3-4, arguments for claim 1 do not apply to claim 12; and PO does not improperly import limitations from the specification into claim 12.

It is **not** the case of “a party [] attempting to import a limitation from the specification into the claims” when the claim “already contains [a particular] limitation.” *Curtiss-Wright Flow Control Corp. v. Velan, Inc.*, 438 F. 3d 1374, 1379 (Fed. Cir. 2006). “[E]very claim does not need to cover every embodiment,” particularly when the “the plain language of a limitation of the claim does not appear to cover that embodiment.” *Pacing Technologies, LLC v. Garmin Intern., Inc.*, 778 F. 3d 1021, 1026 (Fed. Cir. 2015); *SIMO Holdings v. Hong Kong uCloudlink Network*, 983 F. 3d 1367, 1378-79 (Fed. Cir. 2021); *Littelfuse, Inc. v. Mersen USA EP Corp.*, 29 F. 4th 1376, 1380 (Fed. Cir. 2022) (“dependent claim [can] read[] on a particular embodiment”).

For claim 1, in construing the “detecting” limitation, the Board explained that the specification discloses detection of a target on-board an RAV but also by a ground station, and does not define “detecting” as limited to on-board detection or provide a disclaimer. ID at 8-9. None of these factors apply to “autonomously navigating” in claim 12. In claim 1, “detecting” is unqualified. In claim 12, however, the limitation is not “navigating”; it is qualified as “autonomously

navigating.”

The specification discloses three ways of RAV navigation: (i) remotely controlled, (ii) semi-autonomous, and (iii) autonomous. *See supra* §§ II.1-II.2. Claim 12 recites “autonomously,” and hence, is limited to embodiments that employ autonomous RAV navigation. Other embodiments, that do not employ autonomous navigation and instead are directed to semi-autonomous or remotely controlled navigation are properly excluded. *Curtiss-Wright* at 1379-80; *Pacing Technologies* at 1026; *Littlefuse* at 1380; *SIMO Holdings* at 1378-79.

Moreover, by clearly distinguishing between “remotely controlled,” “semi-autonomous[],” and “autonomous[]” RAV operation, the specification disclaims from the “autonomously navigating” embodiments directed to “remotely controlled” and semi-autonomous RAV operations. *See supra* §§ II.1-II.2; *Phillips* at 1320; ID at 10. As such, the reasons for rejecting claim 1’s interpretation do not apply to claim 12.

5. Intrinsic Evidence Supports PO’s Interpretation

Petitioner’s argument, that like claim 1, claim 12’s step of “autonomously navigating” does not “recite **where** the step is performed,” Rep. at 5-6, misses the point. Petitioners ignore the express limitation “autonomously.” The claim step at issue could be written as: “autonomously navigating, by the reference aerial vehicle, a reference aerial vehicle.” This, however, is wholly superfluous. “Autonomously”

as the specification discloses means by the RAV itself; not via outside control.” *See supra* §§ II.1-II.2.

Petitioners repeat their previous allegation that PO improperly imports specific embodiments into claim 12, but as discussed above, limiting the scope of claim 12 is not improper – the claim expressly refers to autonomous navigation embodiments. *Supra* § II.4.

Petitioners’ arguments that ’711 patent does not show a UAV making navigation decisions without outside control and does not preclude outside control, Rep. at 6-7, are also wrong. The ’711 patent states that UAV’s “CPU is configured to **autonomously fly** UAV 301,” by making “one or more **flight decisions**,” i.e., navigation decisions, by providing flight commands including “a specified **speed** for the UAV,” “a specified **flight height**,” “a particular **flight path**,” etc. *Id.* 9:25-27, 9:38-47; POR at 10-11. This embodiment is directed to “autonomously fly[ing]” the UAV, and as explained above, is distinct from “remotely control[ed]” embodiments, and thus excludes outside control. *supra* §§ II.1-II.2.

Petitioners’ assertion that receiving continuously updated target locations from a ground sensor amounts to control/commands by a ground station, Rep. at 7-9, is also wrong. Claim 12 recites “receiving a geographical location associated with [a] target.” “[A]utonomously navigating” per PO’s interpretation requires the RAV to make “navigation decisions” “by itself, without outside control.” Receiving a

destination, whether once or in a series of updates, is not making navigation decisions, i.e., deciding where to go next to reach the received destination and/or how to go there. The received destination is thus neither a navigation/flight-control signal nor a navigation command.

Petitioners refer to the “ground station 104 [] used to manage interceptor aerial vehicle 102,” by providing “instructions, commands,” etc. as another example of outside control. Rep. at 8 (citing EX1001, 3:43-61). This embodiment does not limit the scope of claim 12 because ‘the 711 patent does not identify this embodiment as “autonomously navigating.”

Thus, each of the Petitioners’ arguments fails. PO’s construction of “autonomously navigating” is derived from and consistent with the specification.

6. PO’s Construction Is Based on the Specification; Extrinsic Evidence Simply Corroborates that Construction

Petitioners argue that the dictionary definitions that PO cited are not from the relevant time period. Rep. at 9. Petitioners also characterizes POR’s construction as “attorney arguments,” and Dr. Papanikolopoulos’ analysis as “conclusory” and not supporting PO’s interpretation. Rep. at 9-10. These allegations are false.

PO’s arguments in the POR are not “attorney arguments.” POR’s Section III (“Claim Construction”) cites Dr. Papanikolopoulos’ Initial Declaration’s Section IX, also labeled “Claim Construction,” and presents the arguments in POR’s Section III. POR at 11-12. Thus, PO’s arguments are based on Dr. Papanikolopoulos’

interpretation and are not “attorney arguments.” Dr. Papanikolopoulos’ interpretation of “autonomously navigating” in his Initial Declaration was not conclusory. Additionally, Dr. Papanikolopoulos’ analysis did inform PO’s construction and arguments. *Compare* POR Section III *with* EX2025 § IX.

C. Petitioners’ Construction Is Incorrect

1. Intrinsic Evidence Does Not Support Petitioners’ Construction

Petitioners state that “the plain and ordinary meaning of the disputed claim term is “navigating the reference aerial vehicle towards the received geographical location without human control.” Rep. at 10. In support of its construction Petitioners provide three arguments purportedly based on intrinsic evidence: (i) the ’711 patent “addresses issues in the background art associated with ‘flight controllers manually operated by a human user,’” *Id.* at 10 (quoting EX1001, 1:27-34); (ii) the ’711 patent’s “use of ‘autonomous’ is [allegedly] rooted in a lack of human control,” *id.* at 10-11; and (iii) Petitioners’ “interpretation [] is consistent with, and does not exclude, the ’711 Patent’s embodiments describing [] the ground station provid[ing] commands to the reference aerial vehicle.” *Id.* at 11. Each of these arguments is wrong.

a The '711 patent is not limited to just addressing issues associated with human controlled drones – it also solves issues arising when a drone's communication link is lost/unreliable

Petitioners do not cite any legal authority according to which claim scope can be limited based on the issues identified with the background art that the patent solves. To the contrary, the “court’s task is not to limit claim language to exclude particular devices because they do not serve a perceived ‘purpose’ of the invention.” *E-Pass Technologies, Inc. v. 3Com Corp.*, 343 F. 3d 1364, 1370 (Fed. Cir. 2003). Rather, “claims are directed to the **invention that is described in the specification**,” *Phillips*, 415 F. 3d at 1315-16 (Fed. Cir. 2005) (cleaned), and the “invention” may go beyond the stated/implied purpose of overcoming identified issues with the background art.

Moreover, the issues that the '711 patent addresses are not limited to those arising from human control of drones. In support of their allegation, Petitioners cite EX1001, 1:27-34. Rep. at 10. **But, the very next sentence, which Petitioners did not cite, states: “[a]dditionally if communication between the aerial vehicle and the flight controller is lost or becomes unreliable, the aerial vehicle may be unable to complete a desired flight operation.”** EX1001, 1:34-37. If human control were the **only** problem, replacing human control with computer control would solve that problem. But, in that case, the problem of “lost or unreliable communication” would still remain. It is also this problem that the '711 patent

solved.

*b The '711 discloses examples of embodiments lacking human control that are **not** labeled “autonomous”*

Although Petitioners allege that the '711 patent's “use of ‘autonomous’ is rooted in a lack of human control,” Rep. at 10-11, the specification does not suggest so because it describes some embodiments where there is no human control as something **other** than “autonomous.” Such embodiments, are labeled as “semi-autonomous” or “remotely controlled.”

Specifically, in disclosing the “semi-autonomous” embodiment, the specification states:

[The UAV's] interdiction control system 210 may provide a recommendation or indication **to the remote controller of the UAV**. Interdiction control system 210 may provide or suggest course corrections **directly to the [UAV's] processor 211** to maneuver the UAV into an ideal interception position **autonomously or semi-autonomously**.

EX1001, 8:15-21.

A POSITA would have understood that in the two cases above, both lacking human control, one providing a recommendation/indication to the remote controller and the other “provid[ing] or suggest[ing] course corrections directly to the [UAV's] processor,” **only the case in which** the suggestion is provided “**directly to the processor**” of the UAV is labelled “**autonomously**.” The other is described as semi-

autonomous even though it too lacks human control.¹

In disclosing the “remotely controlled” embodiment, the ’711 patent states: “UAV 301 may be **remotely controlled** from a remote location” and “[i]n response to **receiving the flight control signals**, the CPU of UAV 301 may determine how UAV 301 should fly.” *Id.* at 14:10-16, 12:14-17 (similar). A POSITA would have understood that the case above is **labelled “remotely controlled” regardless of where the controller at the “remote location” is human or a computer.**

Accordingly, contrary to Petitioners’ argument, the ’711 patent’s use of “autonomous” is not rooted in a lack of human control. The embodiments discussed above demonstrate that “autonomously” as described in the ’711 patent excludes receiving any navigation instruction from a remote controller, whether controlled by a human or a processor.

c Petitioners’ interpretation wrongfully includes embodiments describing ground-based control

Petitioners also argue that Petitioners’ interpretation “does not exclude, the ’711 Patent’s embodiments describing [] the ground station provid[ing] commands to the reference aerial vehicle.” Rep. at 11. This assertion, in itself shows that

¹ When the recommendation/indication is provided to the remote controller, the remote controller can be a computer or human – the specification labels this case as semi-autonomous.

Petitioners' construction is wrong, because the specification describes three ways of navigating an RAV, namely "remotely controlled," "semi-autonomously," and "autonomously." *See supra* §§ II.1-II.2. As such, those embodiments that the specification describes as "remotely controlled" or "semi-autonomously" navigating are properly excluded from within the scope of "autonomously navigating." In particular, Petitioners' interpretation is inconsistent with at least three of the '711 patent's embodiments.

First Improperly Included Embodiment: A POSITA would have understood that in one of the examples discussed in Section **Error! Reference source not found.** above, upon providing "a recommendation or indication" to the remote controller, the remote controller would provide a command, instruction, or course correction to maneuver the UAV into an ideal interception position. Per Petitioners' construction, "navigating the reference aerial vehicle ... without human control," the embodiment under which processor of the remote controller receives a recommendation and responds automatically with a command or instruction would be considered as performing autonomous navigation.

The '711 patent, however, excluded this embodiment in describing **autonomous** navigation. Only the systems in which the "[i]nterdiction control system 210 may **provide or suggest** course corrections **directly to the processor 211**" are described as operating "autonomously." EX1001, 8:18-21. Systems in

which the interdiction module “may **provide a recommendation or indication** to the remote controller of the UAV” are **not** described as operating “autonomously.” *Id.* 8:15-18.

Two Additional Improperly Included Embodiments: In support of its argument, Petitioners cite certain portions of the ’711 patent. Rep. at 11 (citing EX1001, 3:54-61, 4:34-37, 12:15-17, 14:10-13, 15:59-63); EX1030 ¶40 (citing the same portions). None of these cited portions uses the word “autonomous” or “autonomously.” Dr. Singhose confirmed this. EX2033 at 25:15-26:20 (“I could not find “autonomously” in those portions.”).

In fact, two of those cited portions (EX1001, 12:15-17, 14:10-13) explicitly describe the embodiment discussed as “remotely controlled” and not as “autonomously” navigating:

UAV 301 may be **remotely controlled** from a remote location. UAV 301 may include an antenna that receives flight control signals from the remote location. **In response to receiving the flight control signals**, the CPU of UAV 301 may determine how UAV 301 should fly.

EX1001, 14:10-16, 12:14-17 (also disclosing a “remotely controlled” drone); *see also id.* 9:47-49 (“In some embodiments, the CPU is configured to receive flight instructions from a remote command center.”).

The flight control signals that are received from the remote location / remote command center may be provided by a human operator and/or may be generated by

a computer/processor at the remote location that is configured to generate such signals, such as Laufer's. *See* EX1010 ¶40 (“**Central controller 115** uses autopilot command module 440 to **generate autopilot aircraft commands**”); EX1025 ¶¶91-94 (explaining that the central controller 115 is ground based).

The '711 patent does not discuss or distinguish between the above-described two types of received flight control signals, i.e., human generated or computer generated, and identifies all the embodiments in which the flight control signals are received from a remote location as “remotely controlled.”

As discussed earlier, the specification clearly distinguishes, however, the “remotely controlled” embodiments from “autonomously” navigating ones. *Supra* ¶¶II.1-II.2.

Thus, the specification refers to **all** the embodiments in which a flight control signal/command is received from a remote location as “remotely controlled,” and not as “autonomously” navigating. But Petitioners’ construction distinguishes between remotely generated flight control signals/commands based on whether they are human-generated or computer-generated, and includes within the scope of “autonomously navigating” embodiments in which the flight control signals/commands are computer-generated and received from a remote location, even though, the specification describes such an operation as “remotely controlled.” Petitioners’ construction thus contradicts the specification.

2. Petitioners’ Extrinsic Evidence Also Does Not Support Petitioners’ Construction

Petitioners argue that extrinsic evidence supports Petitioners’ interpretation. Rep. at 11. In support of this argument, Petitioners argue that: (i) the dictionary definitions PO cited are not from the relevant timeframe; (ii) the dictionary that Petitioners cite and one of the dictionaries that PO cited are consistent with Petitioners’ construction. Rep. at 11-12. These arguments are flawed.

In claim construction, extrinsic evidence “is less significant than the intrinsic record,” *Phillips*, 415 F. 3d at 1317, and cannot “introduce ambiguity in a way that disregards language usage in the patent itself.” *Immunex Corp. v. Sanofi-Aventis US LLC*, 977 F. 3d 1212, 1221 (Fed. Cir. 2020). PO’s construction is based on the specification of the ’711 patent. *See supra* §§ A, II.5; EX2025 ¶¶86-87. PO cited two dictionary definitions not because they informed the construction but because they corroborated PO’s construction. PO and Dr. Papanikolopoulos did not weigh the dictionary definitions more significantly than the specification.

A “claim should not rise or fall based upon the preferences of a particular dictionary editor, or the court's independent decision, uninformed by the specification, to rely on one dictionary rather than another.” *Ultimax Cement Mfg. Corp. v. CTS Cement Mfg. Corp.*, 587 F. 3d 1339, 1347 (Fed. Cir. 2009) (internal quotation marks and citations omitted) (“multiple dictionary definitions of [a claim term] should be construed in a manner which is consistent with their use in the

intrinsic record”). Petitioners’ construction does not abide by these rules.

As a threshold matter, Petitioners do not point to a single embodiment in the specification that, in describing autonomous navigation, excludes human control but allows external control by a computer. There is no such embodiment in the ’711 patent.

Petitioners cite a definition of “autonomous” from Dictionary.com that is provided “in the vehicle context.” Rep. at 11. First, while they are both “vehicles,” in 2017 a POSITA would have understood (and would understand even today) that an “autonomous vehicle” is substantially different from an “aerial vehicle.” To a POSITA, the term “autonomous vehicle” is associated with road vehicles and not aerial vehicles. *See e.g.*, Cal. Veh. Code § 670 (2016) (“A **vehicle** is a device by which any person or property may be propelled, moved, or drawn **upon a highway**, excepting a device moved exclusively by human power or used exclusively upon stationary rails or tracks.”); EX1033 at 128:9-21 (Dr. Papanikolopoulos stating that “an autonomous vehicle and an autonomous drone have some significant differences” because the former has constraints that the latter does not).

Petitioners have also failed to give due weight to a highly relevant portion of the very definition they cite. The cited definition recites “without a need for human control or intervention under **normal road conditions**: autonomous vehicle.” EX1031 at 5; Rep. at 11. This clarifies that the context of vehicles, and particularly

autonomous vehicles, in this definition pertains to **road** vehicles and not aerial vehicles. Likewise, in Cambridge Dictionary (that PO cites) the definition “operate without being controlled directly by humans” is provided in the context of “autonomous vehicles,” which a POSITA would understand as road vehicles. Therefore, the definition that Petitioners cite is not relevant to aerial vehicles.

Additionally, Petitioners do not address Definition #2 in the very document they cite. That definition is “having autonomy; not subject to control from outside.” EX1031 at 5. Dictionary.com also describes the “[o]rigin of autonomous” as “laws of one’s own, independent.” *Id.* at 5-6. Both Definition #2 and the origin of autonomous are consistent with PO’s construction, which is “making navigation decisions by the reference aerial vehicle by-itself, without outside control.” POR at 11-12; EX1033 (Dr. Papanikolopoulos stating that PO’s interpretation “represents what is in the spec[ification]”), 129:6-10 (same).

Regarding choosing between the second and third definition, Dr. Singhose state that he found the third definition “the most relevant” to claim 12 because “it’s specifically talking about vehicles.” EX2033 at 29:17-20; *see id.* 27:22-29:20. But, that definition is “specifically,” and explicitly talking about vehicle operating “**under normal road conditions.**” Dr. Singhose also stated that although the third definition says “road conditions,” “it could be airspace conditions.” *Id.* at 29:2-4. Dr. Singhose does not explain why a POSITA would find road conditions similar to airspace

conditions. In fact, a POSITA would not find these similar at all, because road conditions typically include traffic signs, lane marking, and traffic lights, none of which is present in the airspace. Airspace and ground operations also involve, respectively, different kinds of variables.

Although Dr. Singhose cites the Dictionary.com definition, in his Declaration, he did not discuss an interpretation of “autonomous” that he himself had described in the context of autonomous satellites. *See* EX2034, Abstract; *see* generally EX1030; EX2033 at 58:18-59:3.

In his article, Dr. Singhose states that “the satellites must be **autonomous** and able to **generate and correct their own orbit and attitude profiles** without continual guidance from the ground.” EX2034, Abstract.

In summary, the one particular definition that Petitioners selected is not relevant to aerial vehicles, and contradicts at least three embodiments disclosed in the specification, and Dr. Singhose’s own earlier interpretation. *See supra* 15-18, 21. Moreover, the dictionary that Petitioners cite itself presents another definition and background that support PO’s construction.

For the forgoing reasons, PO’s construction of “autonomously navigated” is correct, and should be adopted.

III. EACH OF GROUNDS 1, 9, 10, 17, AND 18 FAILS TO DEMONSTRATE UNPATENTABILITY OF CLAIM 12 BY A PREPONDERANCE OF THE EVIDENCE

A. *Ground 1*

Though Petitioners' contend otherwise, Rep. at 15, PO did challenge the combination of Beard and Laufer. POR at 12-15. Beard does not teach, and Petitioners do not allege that Beard teaches, "autonomously navigating." *See* Pet. at 34; POR at 15. POR explained that by adding Laufer to Beard, a POSITA would not achieve claim 12's invention because Laufer's central controller providing autopilot commands is wire-connected to ground-based components, and hence, cannot be included in Beard's UAV. POR at 14-15; EX2025 ¶¶91-94.

Petitioners reiterated argument that "claim 12 includes no requirement that 'autonomously navigating' 'occurs on-board a UAV,'" Rep. at 16, is flawed. *Supra* § II.5 (such recitation would be redundant, superfluous).

Furthermore, contrary to Petitioners' allegation, *see* Rep. 16, in 2017 a POSITA would have recognized that navigation using autopilot commands received from a different, remote entity that is not the RAV itself is not self-navigation or autonomous navigation. Laufer's central controller 115 that includes the autopilot command module 440 is such a remote entity, described in the '711 patent. The '711 patent states:

UAV 301 may be **remotely controlled** from a remote location. UAV 301 may **include an antenna** that receives flight control signals from

the remote location. **In response to receiving the flight control signals**, the CPU of UAV 301 may determine how UAV 301 should fly and provide control signals to flight controller module 352.

EX1001, 14:10-16, 12:14-17 (disclosing a “remotely controlled” drone). The ’711 patent also states that in “[i]n some embodiments, the CPU is configured to **receive flight instructions from a remote command center**. In **other embodiments**, the CPU is configured to **autonomously** fly UAV 301.” EX1001, 9:47-51.

Laufer’s central controller 115 is ground based and cannot be placed on a drone. POR at 13-16; EX1025 ¶¶91-94. Petitioners do not allege otherwise. *See generally* Pet.; Rep. In the Board-Laufer combination, Beard’s UAV would receive via its antenna flight instructions generated by Laufer’s autopilot command module 440 and transmitted by Laufer’s central controller 115. Thus, Laufer’s central controller 115 is analogous to the remote location or remote command center described in the ’711 patent. The ’711 patent refers to such an embodiment “remotely controlled” and not “autonomously” navigated. *See id.* 9:47-51.

Petitioners’ reliance of Dr. Papanikolopoulos’ deposition testimony in alleging that using Laufer’s autopilot commands would result in “autonomously navigating,” Rep. at 16-17, is misplaced. Petitioners do not take into account Dr. Papanikolopoulos’ entire explanation of autonomous navigation. Dr. Papanikolopoulos stated that “changing speed in response to a speed command [is] a navigation decision,” EX1033 at 124:7-9, because speed can be changed regardless

of whether the navigation is autonomous or not. Dr. Papanikolopoulos did not say that changing speed necessarily means making an autonomous navigation decision. *See generally id.* He explained further that the terms “**making** navigation decisions and **performing** flight decisions ... can be used interchangeably” but they both must be implemented, “within the means of that particular aerial vehicle” that is autonomously navigating to a received location. *Id.* at 125:8-21.

In Beard-Laufer combination, Laufer’s autopilot command module makes all the decisions about navigation and Beard’s UAV merely receives and executes them. Thus, while Beard’s UAV **implements** navigation decisions, that UAV is not “autonomously navigating” because it does not **make** navigation decisions, e.g., decide at what speed to fly, at what height to fly, etc. Thus, the Beard-Laufer combination, should a POSITA make it, describes a remotely controlled UAV and not a UAV or RAV that is “autonomously navigating ... towards the received geographical location,” as claim 12 recites.

B. Grounds 9, 10, 17, 18

As in Ground 1, in Grounds 9, 10, 17, and 18 also Petitioners rely on Laufer as allegedly teaching the “autonomously navigating the reference aerial vehicle” limitation of claim 12. Rep. at 17-18 (“Laufer’s teachings are utilized in these grounds in the same way as in the Beard-Laufer ground.”). Therefore, for the reasons provided in connection with Ground 1, Grounds 9, 10, 17, and 18 also fail.

See POR at 16-18.

In light of the foregoing, PO respectfully submits that PO's construction of "autonomously navigating" is correct and should be adopted, and that claim 12 is patentable.

Respectfully submitted,

Dated: May 8, 2026

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Certificate of Compliance with Word Count

Pursuant to 37 C.F.R. § 42.24(d), I certify that this Patent Owner's Corrected Sur-reply complies with the type-volume limits of 37 C.F.R. § 42.24(c)(4) because it contains 5,123 words (excluding the parts of this Patent Owner's Response that are exempted by 37 C.F.R. § 42.24(a)), according to the word processing system used to prepare this Patent Owner's Sur-reply.

Dated: May 8, 2026

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), I hereby certify that on May 8, 2026, a copy of the foregoing Patent Owner's Corrected Sur-reply to Petitioners' Reply to Patent Owner's Response, and its exhibits, is being served electronically (per counsel's consent) to lead and backup counsel of record for Petitioners as follows:

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