

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSARA, INC.,
Petitioner,

v.

MOTIVE TECHNOLOGIES, INC.,
Patent Owner.

Case IPR2026-00108
U.S. Patent No. 12,062,243

PATENT OWNER'S PRELIMINARY RESPONSE

TABLE OF CONTENTS

	<u>Page</u>
I. INTRODUCTION	1
II. BACKGROUND	3
A. The '243 Patent	3
B. Person of Ordinary Skill in the Art	9
C. The Alleged Prior Art.....	11
1. Chun/Ex. 1005 (Ex. 1005)	11
2. Chao (Ex. 1006)	11
3. Zhengyang (Ex. 1007)	13
4. He (Ex. 1008).....	14
III. GROUND 1: PETITIONER FAILS TO ESTABLISH A REASONABLE LIKELIHOOD THAT CHUN/EX. 1005 IN VIEW OF CHAO RENDERS OBVIOUS ANY OF CLAIMS 1, 2, 6-14, 18- 20 AND 24-33	15
A. Petitioner Fails to Establish a Reasonable Likelihood That Chun/Ex. 1005 is a “Printed Publication” Under 35 U.S.C. § 102	15
B. Petitioner Fails to Establish a Reasonable Likelihood That a POSITA Could Have Combined Chun/Ex. 1005 and Chao With a Reasonable Expectation of Success	20
1. Relevant Legal Standard	20
2. A Detailed Explanation Regarding the Proposed Combination of Chun and Chao is Required Here	21
3. Petitioner’s Motivation to Combine Showing Falls Far Short	23

C.	The Totality of the Record Evidence Establishes That a POSITA Would Not Have Had a Reasonable Expectation of Success in Combining Chun/Ex. 1005 and Chao	26
1.	The Lack of “Plug-And-Play” Compatibility Between Chun/Ex. 1005 and Chao Defeats Any Reasonable Expectation of Success	26
2.	Petitioner’s Own Expert Has Published Research That Teaches Away From the Very “Plug-and-Play” Approach He Now Proposes Here	28
3.	Re-training the Proposed Chun/Ex. 1005-Chao Model Risks “Catastrophic Forgetting,” Further Undermining Any Reasonable Expectation of Success in Combining the References	29
IV.	GROUND 2: PETITIONER FAILS TO ESTABLISH A REASONABLE LIKELIHOOD THAT CHUN/EX. 1005 IN VIEW OF CHAO AND FURTHER IN VIEW OF SHANMUGAMANI RENDERS OBVIOUS ANY OF CLAIMS 3-5, 15-17, AND 21-23	31
V.	GROUND 3: PETITIONER FAILS TO ESTABLISH A REASONABLE LIKELIHOOD THAT ZHENGYANG IN VIEW OF HE RENDERS OBVIOUS ANY OF CLAIMS 1-6, 9-18, and 20-24.....	32
A.	Petitioner Fails to Establish a Reasonable Likelihood That a POSITA Could Have Combined Zhengyang and He With a Reasonable Expectation of Success	33
B.	The Totality of the Record Evidence Establishes That a POSITA Would Not Have Had a Reasonable Expectation of Success of Combining Zhengyang and He	35
1.	Zhengyang and He’s Datasets Serve Fundamentally Different Purposes, Undercutting Any Reasonable Expectation of Success	35
2.	Petitioner’s Expert’s Own Research Teaches Away From the Very Manner of Combining Zhengyang With He That He Proposes Here	37

3.	Re-training the Proposed Zhengyang-He Model Risks “Catastrophic Forgetting,” Further Undermining Any Reasonable Expectation of Success of Combining These References.....	38
VI.	GROUND 4: PETITIONER FAILS TO ESTABLISH A REASONABLE LIKELIHOOD THAT ZHENGYANG IN VIEW OF HE AND FURTHER IN VIEW OF CHAO RENDERS OBVIOUS ANY OF CLAIMS 7, 8, 19, AND 25-33	39
VII.	CONCLUSION.....	40

TABLE OF AUTHORITIES

Page(s)

Cases

<i>Eli Lilly & Co. v. Teva Pharm. Int’l GmbH</i> , 8 F.4th 1331 (Fed. Cir. 2021)	25, 26, 33, 35
<i>Harmonic Inc. v. Avid Tech., Inc.</i> , 815 F.3d 1356 (Fed. Cir. 2016)	31, 38
<i>Hulu, LLC v. Sound View Innovations, LLC</i> , IPR2018-01039, Paper 29 (P.T.A.B. Dec. 20, 2019)	15, 16, 17
<i>KSR Int’l Co. v. Teleflex Inc.</i> , 550 U.S. 398 (2007).....	20, 33
<i>PersonalWeb Techs., LLC v. Apple, Inc.</i> , 848 F.3d 987 (Fed. Cir. 2017)	<i>passim</i>
<i>Samsung Elecs. Co. v. Elm 3DS Innovations, LLC</i> , 925 F.3d 1373 (Fed. Cir. 2019)	21, 33

Statutes

35 U.S.C. § 102	15, 28
35 U.S.C. § 314(a)	2, 3

Rules and Regulations

37 C.F.R. § 42.24	41
-------------------------	----

TABLE OF EXHIBITS

Ex. No.	Description
2001	Memorandum Opinion issued by the U.S. District Court for the District of Delaware in <i>Samsara Inc. v. Motive Technologies, Inc.</i> , Case No. 1:24-cv-00084 (D. Del.), on August 14, 2024 (Dkt. 60)
2002	Scheduling Order issued by the U.S. District Court for the Northern District of California in <i>Motive Technologies, Inc. v. Samsara Inc.</i> , Case No. 3:24-cv-00902 (N.D. Cal.), on August 8, 2025 (Dkt. 115)
2003	Samsara Inc.’s Motion for Partial Stay Pending <i>Inter Partes</i> Review filed in <i>Motive Technologies, Inc. v. Samsara Inc.</i> , Case No. 3:24-cv-00902 (N.D. Cal.), on November 25, 2025 (Dkt. 147)
2004	Motive Technologies Inc.’s Opposition to Samsara Inc.’s Motion for Partial Stay Pending <i>Inter Partes</i> Review filed in <i>Motive Technologies, Inc. v. Samsara Inc.</i> , Case No. 3:24-cv-00902 (N.D. Cal.), on December 9, 2025 (Dkt. 148)
2005	Samsara Inc.’s Invalidity Contentions in <i>Motive Technologies, Inc. v. Samsara Inc.</i> , Case No. 3:24-cv-00902 (N.D. Cal.), dated November 18, 2025
2006	Motive Technologies Inc.’s Complaint filed in <i>Motive Technologies, Inc. v. Samsara Inc.</i> , Case No. 3:24-cv-00902 (N.D. Cal.), on February 15, 2024 (Dkt. 1)
2007	Motive Technologies Inc.’s Second Amended Complaint filed in <i>Motive Technologies, Inc. v. Samsara Inc.</i> , Case No. 3:24-cv-00902 (N.D. Cal.), on July 9, 2025 (Dkt. 107)
2008	The District Court’s Order denying Samsara’s Motion for Partial Stay Pending <i>Inter Partes</i> Review filed in <i>Motive Technologies, Inc. v. Samsara, Inc.</i> , Case No. 3:24-cv-00902 (N.D. Cal.), on February 6, 2026 (Dkt. 166)

Ex. No.	Description
2009	Declaration of David Znidarsic
2010	Larry Hardesty, <i>Explained: Neural Networks</i> , MIT News (Apr. 14, 2017), <i>available at</i> https://news.mit.edu/2017/explained-neural-networks-deep-learning-0414
2011	Judy Hoffman, <i>et al.</i> , <i>One-Shot Adaptation of Supervised Deep Convolutional Models</i> , arXiv:1312.6204 (Feb. 18, 2014), <i>available at</i> https://arxiv.org/abs/1312.6204
2012	Eric Tzeng, <i>et al.</i> , <i>Deep Domain Confusion: Maximizing for Domain Invariance</i> , arXiv:1412.3474 (Dec. 10, 2014), <i>available at</i> https://arxiv.org/abs/1412.3474
2013	Ivan Belcic & Cole Stryker, <i>What Is Catastrophic Forgetting?</i> , IBM Think, <i>available at</i> https://www.ibm.com/think/topics/catastrophic-forgetting (last visited Feb. 25, 2026)
2014	Romain Guesdon, <i>et al.</i> , <i>DriPE: A Dataset for Human Pose Estimation in Real-World Driving Settings</i> , in Proceedings of the IEEE/CVF International Conference on Computer Vision Workshops 2865 (2021)

Patent Owner Motive Technologies, Inc. (“Patent Owner”) respectfully submits this Preliminary Response to the Petition for *Inter Partes* Review (“Petition”) of claims 1–33 (“Challenged Claims”) of U.S. Patent No. 12,062,243 (“the ’243 Patent”) filed by Samsara, Inc. (“Samsara” or “Petitioner”). This Preliminary Response is supported by the declaration of Mr. David Znidarsic, an expert in the fields of computer vision and machine learning – including as applied to vehicular systems – who provides the technical facts and opinions on which this Preliminary Response relies. *See* Ex. 2009, ¶¶ 1-9, 40-47.

I. INTRODUCTION

Institution of Samsara’s Petition should be denied because none of the grounds asserted in the Petition presents a combination of references that has a reasonable likelihood of rendering obvious any Challenged Claims.

The Petition asserts four grounds of invalidity:

- Ground 1: Obviousness of Claims 1, 2, 6-14, 18-20, and 24-33 based on Chun, S., *et al.* “NADS-Net: A nimble architecture for driver and seat belt detection via convolutional neural networks,” as allegedly published on February 2, 2020 in the Proceedings of the IEEE/CVF International Conference on Computer Vision Workshops (2019) (“Chun/Ex. 1005,” Ex. 1005) in view of U.S. Publication No. 2020/0242381 to Chao *et al.* (“Chao,” Ex. 1006);

- Ground 2: Obviousness of Claims 3-5, 10, 15-17, and 21-23 based on Chun/Ex. 1005 in view of Chao and further in view of Shanmugamani, R. “Deep Learning for Computer Vision” (2018) (“Shanmuganmani,” Ex. 1010);
- Ground 3: Obviousness of Claims 1-6, 9-18, and 20-24 based on Chinese Publication No. CN111860253 to Dongguan Zhengyang Electronic Mechanical Co. Ltd. (“Zhengyang,” Ex. 1007) in view of He, K., *et al.* “Mask R-CNN,” IEEE International Conference on Computer Vision (2017) (“He,” Ex. 1008); and
- Ground 4: Obviousness of Claims 7, 8, 19, 25-33 based on Zhengyang in view of He and further in view of Chao.

All Grounds must be denied because Petitioner fails to meet its burden of proof to demonstrate a reasonable likelihood that it would prevail with respect to invalidity of any Challenged Claims. *See* 35 U.S.C. § 314(a).

Grounds 1 and 2, which rely on the combination of Chun/Ex. 1005 and Chao, fail for three independent reasons: (1) Petitioner has not shown a reasonable likelihood that Chun/Ex. 1005 qualifies as a printed publication; (2) Petitioner has not demonstrated a reasonable likelihood that a person of ordinary skill in the art (“POSITA”) could have combined Chun/Ex. 1005 and Chao with a reasonable expectation of success; and (3) the totality of the record establishes that a POSITA

actually would not have had a reasonable expectation of success in combining Chun/Ex. 1005 with Chao.

Grounds 3 and 4, which largely rely on the combination of Zhengyang and He, likewise fail for two independent reasons: (1) Petitioner has not demonstrated a reasonable likelihood that a POSITA could have combined Zhengyang and He with a reasonable expectation of success and (2) the totality of the record establishes that a POSITA would not have had a reasonable expectation of success in combining Zhengyang with He.

Because Petitioner fails to show that the cited prior art renders obvious any of the Challenged Claims, the Petition does not present “a reasonable likelihood that the petitioner would prevail with respect to at least one of the claims challenged in the petition,” and thus it must be denied. 35 U.S.C. § 314(a).

II. BACKGROUND

A. The '243 Patent

The '243 Patent, titled “Distracted Driving Detection Using a Multi-Task Training Process,” was issued to Motive Technologies, Inc. on August 13, 2024. The patent addresses driver distraction, a critical safety concern regarding the operation of motor vehicles, which remains “one of the major causes of road fatalities, especially involving heavy-duty vehicles.” Ex. 1001, 1:26-28.

The inventors of the '243 Patent recognized that prior art driver distraction

detection systems suffered from significant limitations. Existing solutions relied on deep neural network (DNN) models that had been trained to perform a *single task* (e.g., object identification, face detection, gesture recognition, etc.) and simply attempted to repurpose those models for other tasks related to predicting distracted driving (e.g., estimating body and/or head pose). *Id.*, 1:16-23. In practice, these prior art systems performed poorly and were inaccurate because the DNNs had not learned the full range of visual cues indicative of driver distraction. Ex. 2009, ¶ 27.

The '243 Patent addresses this problem by introducing an innovative *multi-task* training approach that trains a “distraction model” to simultaneously detect multiple types of specific driver-distraction indicators (e.g., mobile-device use, head turning, hands off the steering wheel, etc.). Ex. 1001, Fig. 2, 1:42-2:10. The system employs a convolutional neural network (CNN) with “a plurality of downstream prediction heads for each of these tasks (e.g., mobile detection, face detection, etc.).” *Id.*, 1:46-49. By training the distraction model to detect multiple types of driver-distraction indicators simultaneously, the model is taught to efficiently focus on the most relevant features for distraction detection all at once, thereby improving its predictive capability. *See, e.g., id.*, 7:62-66.

The core architecture of the '243 Patent's distraction model 104, shown below in Fig. 2 of the '243 Patent, includes a backbone network 204 and Featured

Pyramid Network (FPN) 206, both of which may be coupled to multiple prediction heads 208A-208N and 212A-212N, each dedicated to detecting different driver-distraction indicators.

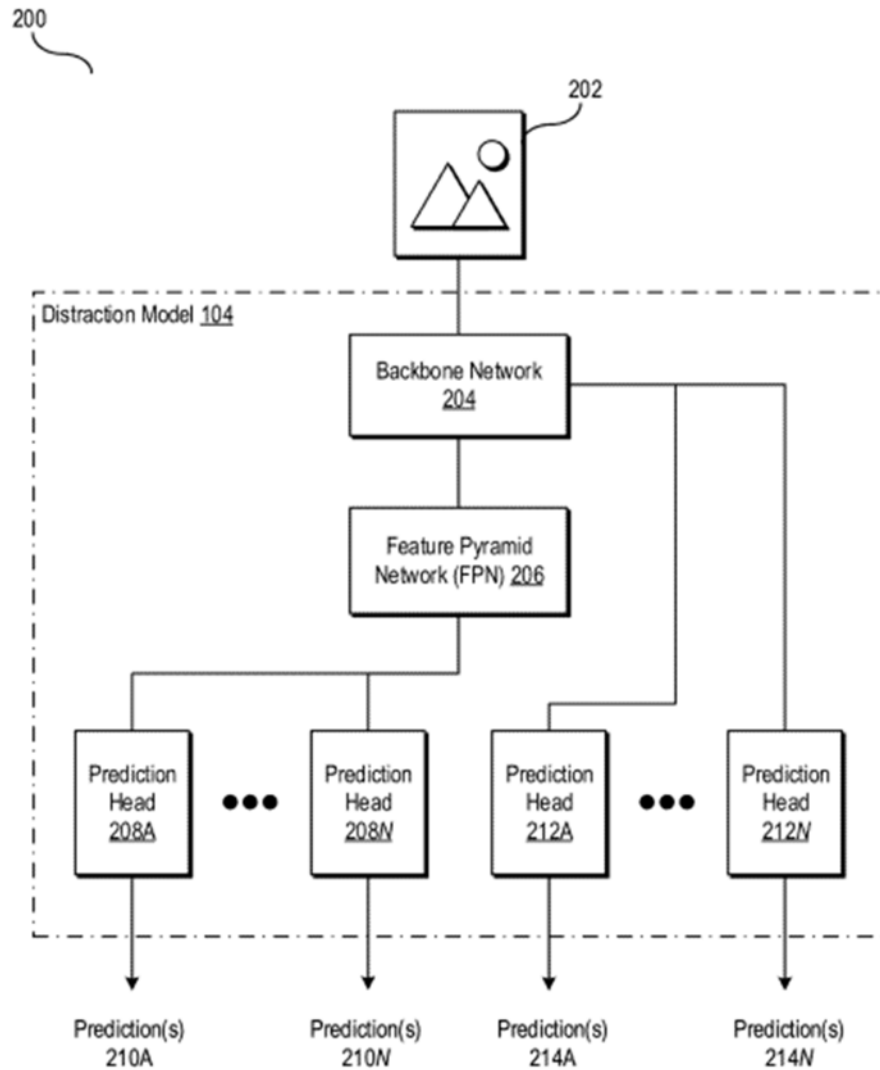


FIG. 2

Id., Fig. 2.

In operation, an “image 202” that is to be analyzed for a distracted driver is first processed by backbone network 204, which typically comprises “a

convolutional neural network (CNN) (e.g., an EfficientNet)” coupled to FPN 206. *Id.*, 2:63-66. A CNN is a type of deep-learning model designed to analyze visual data (e.g., image frames) by mimicking how the human brain processes visual information to detect and identify objects in the image frames being analyzed, for example, here, to detect a human driving a vehicle, a mobile device, etc. Ex. 2009, ¶ 30.

The output of CNN 204 may then be passed on to various prediction heads 212A-212N to determine whether any driver-distraction indicators are present in the analyzed image frame. *See, e.g.*, Ex. 1001, 5:30-49; Fig. 2. The output from CNN 204 may also be fed into FPN 206 for further analysis. *See id.* The FPN enhances object-detection performance by recognizing objects across different scales and sizes, ensuring that smaller items in the image frame (e.g., a mobile device) and larger items in the image frame (e.g., the driver’s upper body) are not overlooked. Ex. 2009, ¶ 31. The object-detection results generated by the FPN may then be fed into prediction heads 208A–208N to determine whether any additional driver-distraction indicators are present. *See, e.g.*, Ex. 1001, 5:30-49; Fig. 2.

As shown in Fig. 2, different prediction heads 208A-208N and 212A-212N receive inputs from different parts of the architecture: some receive input directly from CNN 204 while others receive input from FPN 206. *Id.*, 2:66-3:2. The ’243

Patent describes three primary prediction heads: the “distraction classification” prediction head (*id.*, 3:4-6); the “object detection” prediction head (*id.*, 3:9-12); and the “pose estimation” prediction head (*id.*, 3:21-23). Each of these prediction heads analyze the processed image frame to determine whether any driver-distraction indicators are present. Ex. 2009, ¶ 32.

The process for training the distraction model is a central aspect of the ’243 Patent’s innovation. Ex. 2009, ¶ 33. During training, the model minimizes a “joint loss” function that combines the losses produced by each of the model’s prediction heads (e.g., how wrong the previous prediction was). *Id.* As the patent explains, minimizing this joint loss “caus[es] a change in the parameters of the backbone network,” thereby shaping how the model learns to extract meaningful features from the input image frames. Ex. 1001, 2:56-58. In practical terms, the joint loss optimization forces the network to focus on the regions of each image frame that matter most for determining whether a driver is distracted – for example, the driver’s face, hands, or a handheld device – because errors in accurately identifying any of these regions increase the overall loss, or lack of precision, of the model. *Id.*, 6:12–15.

The patent expresses the joint loss function as:

$$\text{loss} = \text{loss}_{\text{detection}} + \text{loss}_{\text{bbox}} + \text{loss}_{\text{classification}} + \text{loss}_{\text{landmarks}} + \text{loss}_{\text{reg}}.$$

Id., 5:61-65. Each type of loss corresponds to a different task the model must

learn:

- $\text{loss}_{\text{detection}}$ and $\text{loss}_{\text{bbox}}$ measure the accuracy of the object-detection prediction head (i.e., identifying and localizing an object within the vehicle, for example, a phone or driver, accurately);
- $\text{loss}_{\text{classification}}$ measures the accuracy of the distraction-classification head (i.e., accurately determining whether the driver is distracted);
- $\text{loss}_{\text{landmarks}}$ reflects the performance of the pose-estimation head (i.e., identifying facial landmarks such as the inner and outer corners of each eye and body landmarks such as neck and shoulders); and
- loss_{reg} is an L_2 regularization term that stabilizes training and prevents overfitting by discouraging overly large parameter values.

Id., 5:61–6:5.

The Challenged Claims capture this joint loss minimization feature. For example, Claim 1 recites:

A method comprising:

- [a] inputting labeled examples into a neural network, the neural network comprising:
- [b] a backbone network, and;
- [c] one or more prediction heads coupled to the backbone network, the one or more prediction heads comprising one or more of a distraction classification prediction head, object detection prediction head, and a pose

estimation prediction head;

- [d] minimizing a loss based on outputs of the one or more prediction heads causing a change in parameters of the backbone network; and
- [e] storing a distraction classification model after minimizing the loss, the distraction classification model comprising the parameters of the backbone network and parameters of at least one of the one or more prediction heads.

Id., Claim 1 (emphasis added).

By minimizing the joint loss, the claimed invention enables the distraction model to accurately classify and detect a wide range of distraction types, including “cell phone usage (e.g., talking, texting, other usages), smoking, talking to fellow passengers, talking on a handsfree headset, taking both hands off the wheel, eating/drinking, reading or writing, [and] one-handed driving while the other hand is doing a secondary action.” *Id.*, 1:56-62.

B. Person of Ordinary Skill in the Art

Petitioner asserts that a POSITA at the time of the alleged invention would have had “a bachelor’s [degree] in computer science with a focus on computer/machine vision, and at least two years of experience with each of: (1) machine-learning (including neural-network) methods as applied to machine/computer vision and (2) classical machine/computer vision algorithms (e.g., R-CNN, Mask R-CNN, Fast R-CNN, and SSD).” *Pet.*, p. 2. Petitioner

further contends that “[a]dditional education could serve as a substitute for experience.” *Id.*

Patent Owner disagrees with Petitioner’s definition of a POSITA. The field of the ’243 Patent relates to multiple technologies: computer vision with respect to vehicular systems, predictive models and their linear algebra origins, and artificial intelligence and its inference engines. Ex. 2009, ¶ 41. In view of these technologies, a POSITA in the field of the ’243 Patent as of June 2021 would have (1) earned a bachelor’s degree in mathematics, computer science, or a similar engineering or science degree and (2) attained two or more years of experience in a combination of the multiple technologies listed above. *Id.* Alternatively, a person with a more advanced degree in the above fields might have had less practical experience and still be deemed a POSITA. *Id.* Conversely, a person with a general college background not necessarily in the above fields might also have become a POSITA by acquiring more real-world experience in designing and/or implementing hardware components for computers, servers, and/or other electronic devices. *Id.*

With that said, Patent Owner’s technical expert, Mr. Znidarsic, qualifies as a POSITA (and as an expert) under either of the definitions proposed by Petitioner and Patent Owner. *Id.*, ¶¶ 42-47.

C. The Alleged Prior Art

1. Chun/Ex. 1005 (Ex. 1005)

Chun/Ex. 1005, an article entitled “NADS-Net: A Nimble Architecture for Driver and Seat Belt Detection via Convolutional Neural Networks,” describes “NADS-Net,” a convolutional neural-network architecture designed for monitoring vehicle occupants for distracted driving behaviors and improper or non-use of seat belts. Ex. 1005, cover. Chun/Ex. 1005 explains that NADS-Net employs an FPN-based ResNet-50 backbone to generate multi-resolution feature maps, which are then fed into and processed by three distinct detection heads: (1) a “key point” detection head, which outputs ten probability maps corresponding to nine body joints and one for the background (2) a “PAF” detection head, which generates vector fields encoding pairwise relationships between those joints and (3) a “seat belt segmentation” head, which predicts the likelihood that each pixel represents a seat belt, subsequently converting that output into a binary detection mask. *Id.*, p. 5. Each head consists of a series of convolutional layers used to produce pixel-wise probability distributions for its assigned task. *Id.* Collectively, these components enable the system to infer driver posture, joint relationships, and seat-belt usage from in-cabin imaging.

2. Chao (Ex. 1006)

Chao is a U.S. patent application that was filed on March 26, 2020 and published on July 30, 2020. It is entitled “Methods and Devices for Triggering

Vehicular Actions Based on Passenger Actions.” Ex. 1006, cover. Chao discloses an autonomous-driving system that continuously monitors the state of vehicle occupants and activates safety-related vehicle controls such as steering, braking, and acceleration based on the occupant state information. *Id.*, Abstract, ¶ [0037]. The system employs a “Feature-Level Temporal Filtering (FTF)” technique that operates in two stages. *Id.*, ¶ [0097]. First, a “two-dimensional (2D) convolutional neural network (CNN)” identifies and extracts features or objects from “video frames” captured by in-vehicle cameras. *Id.*, ¶ [0098]. The 2D CNN processes each frame to detect objects such as hands, phones, or steering wheel positions, outputting “a series of segments” with each segment containing values that quantify how likely it is that a given object (e.g., a hand, phone, or steering wheel position) has been correctly detected. *Id.*, ¶¶ [0098], [0100]. Second, a temporal filtering component applies “convolutional kernels [or filters] to the series of segments” to identify features or objects that are “emerging” or “vanishing” across frames. *Id.*, ¶ [0101]. This tracks “changes over time of the plurality of features.” *Id.*, ¶ [0129]. The system then determines a driver state from predefined classes (e.g., “texting” and “paying attention”) and associates each state with a “reaction time” value. *Id.*, ¶¶ [0094], [0114]. Based on the determined state and reaction time, the system calculates a “theoretical safe distance” to external objects and triggers vehicular actions such as braking, acceleration adjustments, or driver

notifications when safety thresholds are violated. *Id.*, ¶¶ [0115]-[0117].

3. Zhengyang (Ex. 1007)

Zhengyang is a Chinese patent application that was filed on July 10, 2020 and published on October 30, 2020. It is entitled “A Multi-Task Attribute Recognition Method, Apparatus, Medium, and Device for Driving Scenarios.” Ex. 1007, cover. Zhengyang is directed to the problem of accurately recognizing a driver’s state. *Id.*, cover (“Summary”). The system employs a multi-task main network using “SE-ResNet 18 network” as its backbone, which produces feature maps at 7×7 scale. *Id.*, ¶ [0069]. These feature maps are then processed through a one-squeeze multi-excitation (OSME) module, which extracts four different types of feature maps – mask, eyeglasses, smoking, and phone call – corresponding to different attribute recognition tasks. *Id.* The architecture includes four specialized attribute recognition modules corresponding to mask-wearing, eyeglasses-wearing, smoking, and phone calling. *Id.*, ¶ [0094]. For simpler attributes like masks and eyeglasses, “each module is used for attribute recognition to output the results” directly. *Id.*, ¶ [0030]. However, for more complex behaviors like smoking and phone calls, “each recognition module comprises a subject recognition module and an attention module.” *Id.*, ¶ [0031]. The attention module includes an “attention proposal sub-network” with “two fully connected layers in series,” which output center point coordinates and edge lengths to crop and enlarge image frame regions

for refined analysis. *Id.*, ¶ [0034]. The system employs multiple loss functions including classification loss, metric loss, and L_{rank} loss, with adjustable weights to optimize training results across tasks. *Id.*, ¶¶ [0022], [0023], [0097].

4. He (Ex. 1008)

He is an article published in 2017, entitled “Mask R-CNN.” Ex. 1008, cover. He is directed to a “framework for object instance segmentation” (or object detection in an image frame) named “Mask R-CNN.” *Id.*, Abstract. Mask R-CNN adopts a two-stage procedure for detecting objects in an image frame. *Id.*, p. 2982. The first stage, called “Region Proposal Network (RPN),” proposes “candidate object bounding boxes” in the image frame. *Id.* In the second stage, the network simultaneously outputs a class prediction, a refined bounding box, and a binary segmentation mask for each region of interest containing the detected object (“RoI”). *Id.* The mask branch employs a “Fully Convolutional Network” (“FCN”) to predict masks, maintaining “the explicit $m \times m$ object spatial layout without collapsing it into a vector representation.” *Id.*, pp. 2980, 2982. The mask branch generates “a Km^2 -dimensional output for each RoI, which encodes K binary masks of resolution $m \times m$, one for each of the K classes.” *Id.*, p. 2982. Another feature of Mask R-CNN is “RoIAlign,” which is a standard operation for extracting a small feature map (e.g., 7×7) from each RoI. *Id.* The framework supports multiple backbone architectures, including “ResNet” and “ResNeXt” with depths of 50 or

101 layers, and the “Feature Pyramid Network (FPN),” which “uses a top-down architecture with lateral connections to build an in-network feature pyramid.” *Id.*, p. 2983.

III. GROUND 1: PETITIONER FAILS TO ESTABLISH A REASONABLE LIKELIHOOD THAT CHUN/EX. 1005 IN VIEW OF CHAO RENDERS OBVIOUS ANY OF CLAIMS 1, 2, 6-14, 18-20 AND 24-33

In Ground 1, Petitioner challenges Claims 1, 2, 6-14, 18-20, and 24-33 as rendered obvious by Chun/Ex. 1005 (Ex. 1005) in view of Chao (Ex. 1006). This Ground fails for at least three independent reasons, any one of which is sufficient on its own to warrant denial of institution. *First*, Petitioner fails to establish a reasonable likelihood that Chun/Ex. 1005 qualifies as a “printed publication” under 35 U.S.C. § 102. *Second*, Petitioner fails to demonstrate that a POSITA could have combined Chun/Ex. 1005 with Chao with a reasonable expectation of success. *Third*, the evidence of record establishes that a POSITA would not, in fact, have had a reasonable expectation of success in combining Chun/Ex. 1005 with Chao. Trial should not be instituted on Ground 1.

A. Petitioner Fails to Establish a Reasonable Likelihood That Chun/Ex. 1005 is a “Printed Publication” Under 35 U.S.C. § 102

“There is no presumption in favor of institution or in favor of finding a [prior art] reference to be a printed publication.” *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29, at *16 (P.T.A.B. Dec. 20, 2019)

(precedential). At the institution stage, “the burden is on the petitioner to identify with particularity evidence sufficient to establish a reasonable likelihood that the reference was publicly accessible before the critical date of the challenged patent, and therefore that there is a reasonable likelihood that it qualifies as a printed publication.” *Id.* (emphasis added). Here, Petitioner fails to make the required showing that Chun/Ex. 1005 was publicly accessible – and thus qualifies as a printed publication – before the ’243 Patent’s critical date of June 15, 2021.¹

The Petition states that “the Chun [Ex. 1005] paper was published in the Proceedings: 2019 International Conference on Computer Vision and was publicly available no later than February 2, 2020.” Pet., p. 3. Petitioner, however, offers no evidence that the version of Chun/Ex. 1005 submitted as Ex. 1005 was publicly accessible by February 2, 2020, and thus fails to meet its burden.

As an initial matter, Chun/Ex. 1005 does not contain any mention of the 2019 International Conference on Computer Vision within its four corners. Nor does Chun/Ex. 1005 make any mention of the February 2, 2020 date. In fact, Chun/Ex. 1005 bears none of the indicia the Board typically considers probative of

¹ The ’243 Patent claims priority to U.S. Pat. Appl. No. 17/347,682, which was filed on June 15, 2021.

publication.² For example, in *Hulu*, the Board found a reference publicly available in part because it included a copyright date, a printing date, and an ISBN date, and was part of a well-known book series from a reputable publisher (O'Reilly). *Hulu*, at *19. None of these indicia are present in Chun/Ex. 1005. Nor does Chun/Ex. 1005 contain any information within its four corners that can establish publication on February 2, 2020, or on any other date.

With Chun/Ex. 1005 itself silent on any publication details, Petitioner relies entirely on the Declaration of Sylvia Hall-Ellis (“Hall-Ellis Declaration”; Ex. 1041)³ to establish Chun/Ex. 1005’s publication date. But the Hall-Ellis Declaration provides no evidence that Chun/Ex. 1005 was ever published, and certainly not that it was publicly accessible by February 2, 2020, ahead of the June 15, 2021 critical date for the Challenged Claims. As explained below, the Hall-Ellis Declaration fails to establish that Chun/Ex. 1005 was publicly accessible

² Chun contains a marking in the left-hand margin of its cover reflecting a date of October 8, 2019. Petitioner does not rely on this date for its printed publication argument and offers no explanation of its significance, if any. Petitioner does not mention the marking at all. Regardless, the record contains no evidence establishing that Chun was publicly accessible on October 8, 2019.

³ Petitioner proffers Dr. Hall-Ellis as an expert in “library science.”

by February 2, 2020 for two distinct and dispositive reasons.

First, none of the opinions in the Hall-Ellis Declaration concerns *Chun/Ex. 1005* itself – that is, the document Petitioner submitted at Exhibit 1005 in this proceeding. Instead, the Hall-Ellis Declaration addresses an entirely different document that Dr. Hall-Ellis claims to have located at the Christopher Newport University library in Virginia that she asserts was publicly accessible as of February 2, 2020.⁴ It is clear that this other document is not *Chun/Ex. 1005*, at least because the Hall-Ellis Declaration (1) describes a document paginated from pages 2413-2421, page numbering that *Chun/Ex. 1005* does not bear, and (2) assigns it a different exhibit number (*Ex. 1002*) rather than referring to it as *Ex. 1005*. Because the Hall-Ellis Declaration speaks only to the alleged publication of a document other than *Chun/Ex. 1005* – and does not describe any relationship between that document and *Chun/Ex. 1005* – the declaration offers no basis from

⁴ To make matters more confusing, Dr. Hall-Ellis refers to this *other* document she allegedly found in the Virginia library as “Chun” throughout her declaration, but “Chun” is the document submitted in this proceeding at *Ex. 1005*, not the different document Dr. Hall-Ellis allegedly found in the library. For clarity here, we have referred to the Chun document submitted in this proceeding by the Petitioner as “Chun/Ex. 1005”).

which the Board could conclude that Chun/Ex. 1005 was ever publicly accessible. In fact, the Hall-Ellis Declaration does not even acknowledge the existence of Chun/Ex. 1005. Whatever the declaration might say about the public accessibility of the other document Hall-Ellis allegedly found, it bears no relevance to whether Chun/Ex. 1005 itself qualifies as a printed publication. Thus, the Hall-Ellis Declaration is immaterial for determining if Chun/Ex. 1005 was publicly available early enough to be prior art here.

Second, even if the Hall-Ellis Declaration had attempted to draw a connection between the document Hall-Ellis claims to have found and Chun/Ex. 1005 (and it does not), that still would not suffice. The document she discusses is neither attached to her declaration nor otherwise included in the record. As a result, there is no way to corroborate that this other document even exists, much less whether it can be used to support the alleged publication date of Chun/Ex. 1005. Frankly, if this other alleged “Chun” document actually exists and could establish a publication date for Chun/Ex. 1005, why did Petitioner not use that one instead of relying solely on Chun/Ex. 1005? Petitioner’s choice to use Chun/Ex. 1005 only heightens the doubt surrounding its claim that any Chun reference was publicly accessible by February 2, 2020.

In sum, Chun/Ex. 1005 does not contain any indicia of publication (and Petitioner does not point to any), and the Hall-Ellis Declaration – Petitioner’s lone

evidence on public accessibility – contains nothing that would allow the Board to conclude that Chun/Ex. 1005 was ever publicly accessible.

Accordingly, Petitioner fails to establish a reasonable likelihood that Chun/Ex. 1005 was publicly accessible before the critical date of the '243 Patent. A trial on Ground 1 should be not instituted for this reason alone.

B. Petitioner Fails to Establish a Reasonable Likelihood That a POSITA Could Have Combined Chun/Ex. 1005 and Chao With a Reasonable Expectation of Success

1. Relevant Legal Standard

In *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007), the Supreme Court explained that “inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.” *Id.* at 418-19. And in considering whether those building blocks might be combined to invalidate a future patent, “it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.” *Id.* at 418. “[T]his analysis should be made explicit” by the Petitioner in the Petition. *Id.* at 418 (emphasis added). The Federal Circuit has “repeatedly applied [this] requirement[] in reviewing the adequacy of the Board’s obviousness analysis, noting that the amount of explanation needed will vary from case to case, depending on the complexity of

the matter and the issues raised in the record.” *PersonalWeb Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 992 (Fed. Cir. 2017). “A brief explanation may do all that is needed if, for example, the technology is simple and familiar and the prior art is clear in its language and easily understood. On the other hand, complexity or obscurity of the technology or prior-art descriptions may well make more detailed explanations necessary.” *Id.* at 994 (internal citation omitted) (emphasis added).

2. A Detailed Explanation Regarding the Proposed Combination of Chun and Chao is Required Here

In cases involving complex technology, such as this one, a Petitioner attempting to combine art for obviousness purposes must provide “a clear, evidence-supported account of the contemplated workings of the combination [as] a prerequisite to adequately explaining and supporting a conclusion that a relevant skilled artisan would have been motivated to make the combination and reasonably expect success in doing so.” *Id.* (vacating final written decision finding claims obvious where the decision “nowhere clearly explained, or cited evidence showing, *how* the combination of the two references was supposed to work”); *see also Samsung Elecs. Co. v. Elm 3DS Innovations, LLC*, 925 F.3d 1373, 1382–83 (Fed. Cir. 2019) (affirming final written decisions finding claims patentable where the Board repeatedly stated that the technology at issue was complex and, as such, looked for specific evidence that a POSITA would have reasonably expected success in combining two references, yet ultimately finding Petitioner’s evidence

on this point to be lacking).

Again, the Federal Circuit in *PersonalWeb* instructs that the “complexity or obscurity” of the technology can require a “detailed explanation.” *See* 848 F.3d at 994. There, the technology involved complex mathematical algorithms (called “hash functions”) that warranted heightened explanation when attempting to combine prior art references. The technology here—neural networks—is no less complex. The ’243 Patent is directed to the sophisticated process of training a neural network to detect driver distraction. Neural networks are complicated and elaborate systems whose internal feature learning and interactions are not self-evident to lay readers (or even to many technical practitioners). *See* Ex. 2010, p. 6 (“The [neural] networks’ opacity is still unsettling to theorists. . . .”); Ex. 2009, ¶ 50. The field of neural networks was rapidly evolving around the ’243 Patent’s critical date, and even now, as it experiences a renaissance. *See* Ex. 2010, p. 6 (“The recent resurgence in neural networks – the deep-learning revolution – comes courtesy of the computer-game industry. . . . the architecture of a GPU is remarkably like that of a neural net.”); Ex. 2009, ¶ 50. Moreover, as discussed further below (*see infra* Section III.C.1), Chao is itself obscure in describing certain key characteristics of its neural network model. Taken together, these circumstances make “detailed explanations necessary” by the Petitioner for any proper obviousness analysis of the ’243 Patent. *PersonalWeb*, 848 F.3d at 994.

3. Petitioner's Motivation to Combine Showing Falls Far Short

Against this backdrop, Petitioner provides neither the required “clear, evidence-supported account of the contemplated workings” of the proposed Chun/Ex. 1005-Chao combination nor a basis for any reasonable expectation of success. As such, the Petition fails to establish a reasonable likelihood that a POSITA could combine Chun/Ex. 1005 with Chao to achieve the claimed invention of the '243 Patent.

Petitioner and its expert, Dr. Trevor Darrell, assert that routing features outputted by Chun/Ex. 1005's backbone into Chao's classification head “would require no architectural redesign.” Pet., p. 8 (emphasis added). More specifically, Petitioner claims that “[a] POSITA would connect Chao's head at the same point where Chun/Ex. 1005 attaches its pose/seat-belt heads.” *Id.* at 14. Petitioner provides no explanation or evidence for this assertion.

In essence, Petitioner and Dr. Darrell posit a plug-and-play compatibility – i.e., that these complex neural-network components can be detached from one system and attached to another “as is.” The only support Dr. Darrell offers for this assertion is that Chun/Ex. 1005 and Chao each apply multi-task CNNs to detect driver distraction. *See* Ex. 1003 ¶¶ 133–135. But simply describing a neural network model as a multi-task CNN does not convey to a POSITA all of the characteristics of that model which are necessary to determine if the POSITA

would have a reasonable expectation of success in combining that model even with another multi-task CNN model. Ex. 2009, ¶ 53. Describing a neural network model as a multi-task CNN conveys to a POSITA merely that the model has at least one convolution layer, at least one layer that outputs a feature map, and at least one other layer that takes the feature map as input, and that the model makes multiple predictions. *Id.*

Moreover, neither reference discusses, much less teaches, portability of prediction heads (i.e., adding another head to their models or transplanting their heads into a different model). Ex. 2009, ¶ 54. The mere fact that both systems have modular components does not mean those modules were designed, trained, and tuned to interoperate across architectures or be repurposed from one model to another. *Id.* Neural networks are highly complex systems whose components (backbones, feature pyramids, heads, loss functions, training protocols, and data distributions) are often co-dependent of each other; successful integration requires concrete, architecture-specific steps – not generalities. *Id.*

Petitioner is left with conclusory statements – such as repeated assertions that mixing and matching the parts of Chun/Ex. 1005 and Chao would be easy and straightforward – to prop up its otherwise baseless obviousness analysis. *See, e.g.*, Ex. 1003 ¶¶ 91, 118, 129, 135. Such bald assertions are not a “clear, evidence-based account of the contemplated workings” of the Chun/Ex. 1005-

Chao combination – they are exactly the opposite of that. *PersonalWeb*, 848 F.3d at 994. For example, Petitioner cites no evidence that industry practitioners have successfully ported a prediction head from one network into another with limited difficulty, let alone that such cross-model portability was routine. Ex. 2009, ¶ 55. Without such evidence, Petitioner also fails to establish that a POSITA would have had a reasonable expectation of success in combining Chun/Ex. 1005 with Chao – and Petitioner offers nothing beyond a bare conclusion to suggest otherwise. See *Eli Lilly & Co. v. Teva Pharm. Int’l GmbH*, 8 F.4th 1331, 1348 (Fed. Cir. 2021) (“[I]t [is], at all times, [petitioner’s] burden to show that the claims would have been obvious, including that a skilled artisan would have had a reasonable expectation of success in achieving the claimed invention.”). All Petitioner says about this is that the “reasonable expectation of success follows directly” from the fact that a POSITA would know how to mix and match these parts. Pet., p. 14. This circular logic is not enough.

* * *

Because Petitioner and its expert provide no evidence-based explanation of how the proposed Chun/Ex. 1005–Chao combination would work (and why a POSITA would reasonably expect it to work), Petitioner has not shown a reasonable likelihood that a POSITA could have made the combination with a reasonable expectation of success. Accordingly, Petitioner fails to establish a

reasonable likelihood that Chun/Ex. 1005 in view of Chao renders obvious any of claims 1, 2, 6-14, 18-20, and 24-33, and institution on Ground 1 should be denied for this reason too.

C. The Totality of the Record Evidence Establishes That a POSITA Would Not Have Had a Reasonable Expectation of Success in Combining Chun/Ex. 1005 and Chao

The burden to show obviousness – including that a POSITA would have had a reasonable expectation of success of combining the prior art references to achieve the claimed invention – rests with Petitioner at all times. *See Eli Lilly*, 8 F.4th at 1348. As discussed above, Petitioner does not meet that burden, and institution should be denied for Ground 1 on this basis alone. *See* Section III.B., *supra*. While Patent Owner could simply rest on Petitioner’s failure to meet its burden, the totality of the record (including Petitioner’s lack of evidence) affirmatively demonstrates that a POSITA would not have reasonably expected success in combining Chun/Ex. 1005 with Chao.

1. The Lack of “Plug-And-Play” Compatibility Between Chun/Ex. 1005 and Chao Defeats Any Reasonable Expectation of Success

Petitioner asserts that “[a] POSITA would connect Chao’s head at the same point where Chun/Ex. 1005 attaches its pose/seat-belt heads.” Pet., p. 14. In other words, Petitioner contends that the output of Chun/Ex. 1005’s backbone could be fed directly into Chao’s classification head without architectural redesign. But

Petitioner offers no facts or evidence supporting a reasonable expectation that such a connection would work, and the record in fact points to the opposite conclusion. Chao's inadequate disclosure undercuts Petitioner's claimed compatibility with Chun/Ex. 1005.

Chao never discloses backbone specifications – the very characteristics a POSITA would need to assess for compatibility (e.g., the spatial dimensions and channel depth of the backbone's feature maps, or the pyramid levels/strides if an FPN is used). Ex. 2009, ¶ 60. By contrast, Chun/Ex. 1005 discloses that its backbone produces: (1) a 96×96 feature map with 512 channels, and (2) an FPN with levels C2–C5 at strides of 1/4, 1/8, 1/16, and 1/32. Ex. 1005, 5; Ex. 2009, ¶ 60. Because Chao does not disclose corresponding specifications, a POSITA would have no basis to conclude that Chun/Ex. 1005's backbone output could drive Chao's head with a reasonable expectation of success. Ex. 2009, ¶ 60. Instead, a POSITA would understand that integrating Chao with Chun/Ex. 1005 would require non-trivial design work, implementation work, training work, and testing work, not the “straightforward” connection Petitioner and Dr. Darrell posit (without evidence). Ex. 2009, ¶ 61. Put simply, a POSITA would not have a reasonable expectation of success in combining Chao's prediction heads with Chun/Ex. 1005's backbone. Ex. 2009, ¶ 62.

Thus, the record evidence, which shows missing technical detail, forecloses

any finding that a POSITA would have reasonably expected success in Petitioner's proposed combination of Chun/Ex. 1005 and Chao.

2. Petitioner's Own Expert Has Published Research That Teaches Away From the Very "Plug-and-Play" Approach He Now Proposes Here

Even assuming *arguendo* that Chun/Ex. 1005's backbone output was compatible with Chao's prediction heads, a POSITA still would not have reasonably expected success for practical reasons reflected in Dr. Darrell's own work. Ex. 2009, ¶ 63. Dr. Darrell has co-authored research expressly cautioning that transferring CNN backbone models to new domains without adaptation historically leads to poor recognition performance, and proposing a framework for selectively adapting CNN parameters to address that problem. See Ex. 2011 at 1 (Abstract), 3; Ex. 2009, ¶ 64. Although Dr. Darrell opines here that combining Chun/Ex. 1005 and Chao would have required "no architectural redesign," his published⁵ work suggests the opposite: adapting or redesigning a backbone from one system to properly work with prediction heads of another is typically necessary to avoid significant performance degradation. Ex. 2009, ¶ 65.

⁵ Petitioner refers to Dr. Darrell's research herein as "publications" in a general sense, and such statements should not be deemed an admission that his research necessarily qualifies as a "printed publication" under 35 U.S.C. § 102.

Dr. Darrell’s publications also warn that fine-tuning a backbone in a new domain often requires substantial data, which is “simply not available” in many applications. *See* Ex. 2011, p. 1 (Abstract); Ex. 2012, p. 1 (Abstract). This guidance suggests that a successful Chun/Ex. 1005-Chao combination would demand significant training data, and the availability or unavailability of such data was never addressed by Petitioner when discussing the Chun/Ex. 1005-Chao combination. Ex. 2009, ¶ 66. Dr. Darrell never addresses why these same adaptation requirements and data demands would somehow not apply when trying to combine the Chun/Ex. 1005 backbone with Chao’s prediction head. *Id.*

In sum, Dr. Darrell’s own publications teach away from the effortless, “plug-and-play” combination he suggests would be possible when combining Chun/Ex. 1005 and Chao, further undercutting any reasonable expectation of success.

3. Re-training the Proposed Chun/Ex. 1005-Chao Model Risks “Catastrophic Forgetting,” Further Undermining Any Reasonable Expectation of Success in Combining the References

If Chun/Ex. 1005 and Chao are not truly “plug-and-play” compatible, and a POSITA would therefore have needed to adapt Chun/Ex. 1005’s backbone for integration with Chao’s prediction head (as Dr. Darrell’s own research suggests), another significant obstacle would arise that further undermines any reasonable expectation of success in combining Chun/Ex. 1005 and Chao.

Integrating a prediction head from one neural network model into another often requires re-training the weights of the transplanted prediction head, the backbone, or both. Ex. 2009, ¶ 69. Beyond the engineering effort this entails (which Petitioner and its expert do not address), such re-training risks the loss of information previously learned by the affected component. *Id.* This degradation, known as “catastrophic forgetting,” is well-recognized in the machine-learning field. *Id.*

IBM warns that “catastrophic forgetting can have substantial effects on the performance of machine learning models,” and that in domains such as robotics and autonomous-vehicles, “these effects might be especially dangerous.” *See, e.g.,* Ex. 2013, p. 4. In the vehicular-safety context of the ’243 Patent – detecting distracted human driving – the consequences would be no less severe. Ex. 2009, ¶ 70. A POSITA would appreciate that catastrophic forgetting could render the resulting model unreliable or unusable, creating unacceptable risks to driver safety by a poorly-trained neural network. *Id.* The substantial risk that re-training would induce catastrophic forgetting further undermines any conclusion that a POSITA would have reasonably expected success in combining Chun/Ex. 1005 with Chao. *Id.*

In sum, although the burden to establish a reasonable expectation of success rests wholly with Petitioner – and Patent Owner need not prove the absence of

such reasonable expectation – the record here demonstrates that a POSITA would not have reasonably expected success in combining Chun/Ex. 1005 with Chao. For this reason, Petitioner fails to show a reasonable likelihood of prevailing on Ground 1, and institution should be denied.

* * *

For each of the three independent reasons set forth above, Petitioner has not shown a reasonable likelihood that Chun/Ex. 1005 in view of Chao renders obvious any of Claims 1, 2, 6-14, 18-20, and 24-33 of the '243 Patent. Having failed to satisfy its burden, institution on Ground 1 should be denied. *See Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (petitioner “has the burden from the onset to show with particularity why the patent it challenges is unpatentable”).

IV. GROUND 2: PETITIONER FAILS TO ESTABLISH A REASONABLE LIKELIHOOD THAT CHUN/EX. 1005 IN VIEW OF CHAO AND FURTHER IN VIEW OF SHANMUGAMANI RENDERS OBVIOUS ANY OF CLAIMS 3-5, 15-17, AND 21-23

In Ground 2, Petitioner challenges Claims 3-5, 15-17, and 21-23 as allegedly obvious over Chun/Ex. 1005 in view of Chao, and further in view of Shanmugamani. *See* Pet., p. 38. All of these claims are dependent claims: Claims 3-5 depend from independent Claim 1; Claims 15-17 depend from independent Claim 13; and Claims 21-23 depend from independent Claim 20. *See* Ex. 1001. Petitioner does not rely on Shanmugamani to challenge any of the

independent Claims 1, 13, or 20; instead, it rests entirely on its Ground 1 theory that those claims are rendered obvious by Chun/Ex. 1005 in view of Chao. See Pet., pp. 37-52. For the reasons discussed above with respect to Ground 1, that challenge fails. Because Petitioner has not established a reasonable likelihood that any of independent Claims 1, 13, or 20 is obvious based on Chun/Ex. 1005 and Chao, Petitioner necessarily fails to show a reasonable likelihood that the dependent claims challenged in Ground 2 are obvious.

Institution on Ground 2 should be denied.

V. GROUND 3: PETITIONER FAILS TO ESTABLISH A REASONABLE LIKELIHOOD THAT ZHENGYANG IN VIEW OF HE RENDERS OBVIOUS ANY OF CLAIMS 1-6, 9-18, AND 20-24

In Ground 3, Petitioner challenges Claims 1-6, 9-18, and 20-24 as allegedly obvious over Zhengyang (Ex. 1007) in view of He (Ex. 1008). This Ground fails for at least two independent reasons, either of which is sufficient to defeat institution. *First*, Petitioner does not show that a POSITA could have combined Zhengyang and He with a reasonable expectation of success. *Second*, the record affirmatively demonstrates that a POSITA would not, in fact, have had such a reasonable expectation.

Accordingly, institution on Ground 3 should be denied.

A. Petitioner Fails to Establish a Reasonable Likelihood That a POSITA Could Have Combined Zhengyang and He With a Reasonable Expectation of Success

The standards governing a proper obviousness analysis under *KSR*, *PersonalWeb*, *Samsung*, and *Eli Lilly*, as discussed above in connection with Ground 1 apply with equal force here and are not repeated.

Petitioner falls far short of providing the required clear, evidence-supported account of how Zhengyang and He could be combined with a reasonable expectation of success. Petitioner and Dr. Darrell assert that “[a] POSITA would simply attach He’s conv/deconv keypoint-regression branch as another prediction head to Zhengyang’s backbone and co-train with labeled keypoints.” Pet., p. 61. In essence, Petitioner again suggests without any evidence that complex neural-network components exhibit “plug-and-play” compatibility, just as it wrongly claimed with the Chun/Ex. 1005–Chao combination.

But the only support Dr. Darrell offers for this assertion is that both references disclose multi-task CNNs used for driver-state analysis. See Ex. 1003, ¶¶ 427–428. Again, simply describing a neural network model as a multi-task CNN does not convey to a POSITA all of the characteristics of that model which are necessary to determine if the POSITA would have a reasonable expectation of success in combining that model even with another multi-task CNN model. Ex. 2009, ¶ 76. Describing a neural network model as a multi-task CNN conveys to a

POSITA merely that the model has at least one convolution layer, at least one layer that outputs a feature map, and at least one other layer that takes the feature map as input, and that the model makes multiple predictions. *Id.*

Further, neither Zhengyang nor He teaches that their prediction heads are portable, nor do they suggest that such heads could be inserted into, or detached from, another neural-network architecture. Ex. 2009, ¶ 77. The mere fact that both systems contain multiple connected components does not imply that those components were designed to be repurposed or interchanged. *Id.* Neural networks are complex and highly interdependent systems; their components cannot simply be mixed and matched with another system. *Id.* And, Petitioner has the burden to show otherwise and has not done so.

Petitioner's theory rests entirely on Dr. Darrell's repeated conclusory assertions that mixing and matching components from Zhengyang and He would be easy or straightforward. *See, e.g.*, Ex. 1003, ¶¶ 422, 427. Such conclusory opinions do not constitute the "clear, evidence-based account of the contemplated workings" that the Federal Circuit requires, as evidenced for example in *PersonalWeb*. Dr. Darrell identifies no industry practice or evidence suggesting that prediction heads can be transplanted between architectures with minimal effort, let alone that practitioners in the field routinely do so. Ex. 2009, ¶ 78. Absent such evidence, Petitioner cannot show that a POSITA would have had a

reasonable expectation of success in attempting the proposed combination of Zhengyang and He. *See Eli Lilly*, 8 F.4th at 1348.

In sum, Petitioner and its expert provide no evidentiary support for their assertion that the Zhengyang–He combination would have been simple to implement or likely to succeed. Thus, Petitioner fails to establish a reasonable likelihood that Zhengyang in view of He renders obvious any of Claims 1-6, 9-18, or 20-24, and institution on Ground 3 should be denied.

B. The Totality of the Record Evidence Establishes That a POSITA Would Not Have Had a Reasonable Expectation of Success of Combining Zhengyang and He

As discussed above, the burden to show that the Challenged Claims would have been obvious – including that a POSITA would have had a reasonable expectation of success in combining them – remains with Petitioner at all times. *See Eli Lilly*, 8 F.4th at 1348. While Patent Owner could rest on Petitioner’s failure to meet that burden as to Zhengyang and He, the record affirmatively demonstrates that a POSITA would not have had a reasonable expectation of success in combining these references.

1. Zhengyang and He’s Datasets Serve Fundamentally Different Purposes, Undercutting Any Reasonable Expectation of Success

Petitioner claims that “[a] POSITA would simply attach He’s conv/deconv keypoint-regression branch as another prediction head to Zhengyang’s backbone

and co-train with labeled keypoints.” Pet., p. 61. That is, Petitioner asserts that the output of Zhengyang’s backbone could be fed directly into He’s prediction head with no additional architectural redesign work. Petitioner, however, offers no factual or evidentiary support for this conclusion.

Zhengyang’s model is trained on in-vehicle image frames—dash-camera frames depicting drivers and passengers. See Ex. 1007 ¶ [0058]. He’s model, in stark contrast, is trained on the MS COCO dataset, which consists of image frames of humans and animals engaged in activities wholly outside the vehicular context, such as standing, walking, surfing, skateboarding, skiing, motorcycle riding, and the like. See Ex. 1008, Figs. 3-6. COCO (“**C**ommon **O**bjects in **C**ontext”) is a Microsoft-curated, generic human-pose dataset. Ex. 2009, ¶ 83.

Zhengyang and He’s datasets serve fundamentally different purposes and are not interchangeable. *Id.* A POSITA would readily understand that generic, out-of-vehicle pose-estimation data (like COCO) is ill-suited for in-vehicle driver-monitoring tasks, and a model designed for the former would not be expected to function effectively in the latter. Ex. 2009, ¶ 84. The literature in the field evidences the limitations of using COCO in the driver pose estimation context. See, e.g., Ex. 2014, p. 2869 (“[T]he COCO annotation style does not provide hand or head size. The use of the torso is also not an appropriate option in the car cockpit context since, depending on the viewing angle, the torso’s full

length is not always fully visible on the image.”); Ex. 2009, ¶ 84. In light of this dataset incompatibility – and the importance of consistent, domain-specific training – a POSITA would not have reasonably expected success in “plug-and-play” combining Zhengyang with He. *Id.*

In sum, the incompatibility of Zhengyang and He’s input domains, which a POSITA would have readily recognized, undermines any assertion of a reasonable expectation of success of combining these references.

2. Petitioner’s Expert’s Own Research Teaches Away From the Very Manner of Combining Zhengyang With He That He Proposes Here

As discussed above in Ground 1, Dr. Darrell’s own published research warns that transferring CNN components across domains without adaptation leads to poor performance, and that substantial adaptation (and sometimes significant data) is required to make such transfers successful. *See* Ex. 2011, p. 1 (Abstract); Ex. 2012, p. 1 (Abstract). That teaching applies with full force here and directly contradicts Dr. Darrell’s assertion that the Zhengyang-He combination could have been accomplished without architectural redesign or meaningful difficulty. Ex. 2009, ¶ 86. This alone undercuts any reasonable expectation of success in combining Zhengyang and He.

3. Re-training the Proposed Zhengyang-He Model Risks “Catastrophic Forgetting,” Further Undermining Any Reasonable Expectation of Success of Combining These References

As also discussed in Ground 1, integrating prediction heads across different architectures would require re-training at least portions of the backbone or prediction heads. Such re-training gives rise to the risk of catastrophic forgetting – the well-documented phenomenon in which a neural network loses previously learned information when trained on new tasks. Ex. 2009, ¶ 87. This risk can have serious consequences in safety-critical applications, such as detecting distracted drivers. *Id.* A POSITA would have recognized catastrophic forgetting as a significant obstacle, further diminishing any expectation of success in the proposed Zhengyang–He combination. *Id.*

In sum, again, although Petitioner bears the burden of showing that a POSITA would have had a reasonable expectation of success—and Patent Owner need not prove the opposite—the record makes clear that a POSITA would not have reasonably expected success in combining Zhengyang with He.

* * *

For these two independent reasons, Petitioner fails to establish a reasonable likelihood that Zhengyang in view of He renders obvious any of Claims 1-6, 9-18, or 20-24 of the ’243 Patent. Petitioner therefore has not met its burden, and institution on Ground 3 should be denied. *See Harmonic*, 815 F.3d at 1363.

VI. GROUND 4: PETITIONER FAILS TO ESTABLISH A REASONABLE LIKELIHOOD THAT ZHENGYANG IN VIEW OF HE AND FURTHER IN VIEW OF CHAO RENDERS OBVIOUS ANY OF CLAIMS 7, 8, 19, AND 25-33

In Ground 4, Petitioner challenges independent Claims 26 and 30 and dependent Claims 7, 8, 19, 25, 27-29 and 31-33 as allegedly obvious over Zhengyang in view of He, and further in view of Chao. *See* Pet., p. 76. Claims 7 and 8 depend from independent Claim 1; Claim 19 depends from independent Claim 13; and Claim 25 depends from independent Claim 20. *See* Ex. 1001. In this Ground, Petitioner does not rely on Chao to challenge independent Claims 1, 13, or 20; rather, it again rests entirely on its assertion that those claims are rendered obvious by Zhengyang in view of He, for the same reasons advanced under Ground 3. *See* Pet., pp. 76-79. As discussed above in connection with Ground 3, that challenge fails.

As for independent claims 26 and 30, Petitioner invokes Chao only for a single alleged limitation of each claim: triggering a warning, such as a visual or audible notification, based on the detected distracted state of the driver. *See* Pet., pp. 80-81. But its obviousness theory still fundamentally depends on the same combination of Zhengyang with He as used for Claims 1, 13, and 20. Thus, for the same reasons Ground 3 fails, Petitioner's challenge to Claims 26 and 30 likewise fails.

Because Petitioner has not established a reasonable likelihood that any of

independent Claims 1, 13, 20, 26, or 30 would have been obvious based on a combination involving Zhengyang and He, Petitioner necessarily fails to establish a reasonable likelihood that any of the dependent claims challenged in Ground 4 – Claims 7, 8, 19, 25, 27-29, and 31-33 – would have been obvious.

VII. CONCLUSION

For the foregoing reasons, the Petition for *Inter Parties* Review should be denied.

Respectfully submitted,

Dated: February 25, 2026

By: /Vincent M. Ferraro/

Vincent M. Ferraro

Michael J. Zinna

KELLEY DRYE & WARREN LLP

7 Giralda Farms, Suite 340

Madison, New Jersey 07940

Telephone: (973) 503-5900

Facsimile: (973) 503-5950

E-mail: vferraro@kelleydrye.com

E-mail: mzinna@kelleydrye.com

*Attorneys for Patent Owner
Motive Technologies, Inc.*

CERTIFICATION OF COMPLIANCE WITH WORD LIMIT

Pursuant to 37 C.F.R. § 42.24(d), I certify that this preliminary response complies with the type-volume limits of 37 C.F.R. § 42.24(c)(1) because, according to the word-processing system used to prepare this preliminary response, it contains 8,508 words, excluding the parts that are exempted by 37 C.F.R. § 42.24(c) (*i.e.*, table of contents, table of authorities, exhibit list, listing of facts, certificate of service, certificate of compliance with word limit, and appendix of exhibits).

Dated: February 25, 2026

Respectfully submitted,

/Vincent M. Ferraro/

Vincent M. Ferraro, Reg. No. 79,197

CERTIFICATE OF SERVICE

The undersigned certifies that on February 25, 2026, a complete and entire copy of this PATENT OWNER'S PRELIMINARY RESPONSE was provided via electronic mail (by consent) to the Patent Owner by serving the correspondence address identified in the Mandatory Notices:

Jason Eisenberg

Lestin Kenton

Tyler Dutton

Jean Selep

jasone-PTAB@sternekessler.com

lkenton-PTAB@sternekessler.com

tdutton-PTAB@sternekessler.com

jselep-PTAB@sternekessler.com

PTAB@sternekessler.com

/Vincent M. Ferraro/

Vincent M. Ferraro, Reg. No. 79,197