UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NICHOLSON MANUFACTURING LTD.,

Petitioner

v.

BID GROUP TECHNOLOGIES LTD.,

Patent Owner

Case No. PGR2025-00081

U.S. Patent No. 12,163,947

PETITION FOR POST-GRANT REVIEW OF U.S. PATENT NO. 12,163,947

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EX-1001	U.S. Patent No. 12,163,947 to Clement et al. (the "'947 patent")
EX-1002	Declaration of Dr. Michael Pazzani
EX-1003	Prosecution File History of U.S. Patent Application No. 17/445,974 (issued as the '947 patent)
EX-1004	International Publication No. WO 2013/188948 A1 to Gagnon et al. ("Gagnon")
EX-1005	Junya Ido et al., *CNN-Based Tree Species Identification from Bark Image*, 10th Int'l Conf. on Graphics and Image Processing 2018 ("Ido") (also included as Exhibit A to EX-1013)
EX-1006	U.S. Patent Publication No. 2019/0003829 A1 to Kambla et al. ("Kambla")
EX-1007	Frank D. Petruzella, *Programmable Logic Controllers*, chs. 1, 5, 6, 15 (5th ed. 2017) ("Petruzella")
EX-1008	Nicholson Mfg. Ltd., *A8 Manual* § 1
EX-1009	Nicholson Mfg. Ltd., *A5B Manual* § 1
EX-1010	Nicholson Mfg. Ltd., *A5B Brochure*
EX-1011	Tom Fawcett, *An Introduction to ROC Analysis*, 27 Pattern Recognition Letters 861 (2006)
EX-1012	Sergey Levine et al., *Learning Hand-Eye Coordination for Robotic Grasping with Deep Learning and Large-Scale Data Collection*, 37 Int'l J. Robotics Rsch. 421 (2018)
EX-1013	Declaration of Patrick Franzen

Exhibit #	Reference Name
EX-1014	*Characterization*, Merriam-Webster, https://www.merriam-webster.com/dictionary/characterization (last visited Aug. 25, 2025)
EX-1015	*Characterize*, Merriam-Webster, https://www.merriam-webster.com/dictionary/characterize (last visited Aug. 25, 2025)
EX-1016	*Sensor*, Merriam-Webster, https://www.merriam-webster.com/dictionary/sensor (last visited Aug. 25, 2025)
EX-1017	*Attribute*, Merriam-Webster, https://www.merriam-webster.com/dictionary/attribute (last visited Aug. 25, 2025)
EX-1018	Nicholson Mfg. Ltd., *A5A Brochure*

LIST OF CHALLENGED CLAIMS

Claims 1-18	
No.	**Claim Limitation**
1[pre]	A computer-implemented method for characterizing an undebarked log in real time, the method comprising:
1[a]	performing a contactless characterization of the undebarked log;
1[b]	identifying characteristics of the undebarked log based on the characterization of the undebarked log using a trained deep learning model;
1[c]	computing operating parameters of a debarker based on the identified characteristics; and
1[d]	sending the computed operating parameters to the debarker,
1[e]	wherein the computation of the operating parameters further comprises retrieving operating parameters associated with the identified characteristics.
2	The method of claim 1, the characterization of the undebarked log using a scanning device.
3	The method of claim 1, the characterization of the undebarked log using one or more sensors.
4	The method of claim 1, the identification of the characteristics of the log further comprising one or a combination of any of the followings [sic]: identifying the species of the log; measuring the moisture level of the log; and calculating an intensity of knot presence on the log.
5	The method of claim 1, the operating parameters being indexed in a table having operating parameters associated with one or more log characteristics.

Claims 1-18	
6	The method of claim 5, the indexation of the log operating parameters taking into account the intensity level of the one or more log characteristics.
7[pre]	The method of claim 1, the trained deep learning model being trained comprising the steps of:
7[a]	selecting a representative sample of a plurality of logs having identifiable characteristics;
7[b]	scanning the plurality of logs to obtain scan data of the logs;
7[c]	identifying with a deep learning algorithm software of the deep learning model the identifiable characteristics of the logs based on the scan data;
7[d]	analysing [sic] the identified characteristics of the logs to output an identification score; and
7[e]	considering the deep learning model trained if the identification score is different from a predetermined value.
8	The method of claim 7, the deep learning model being automatically trained by using the characterization of the undebarked log for the analysis of the identified characteristics of the logs to output the identification score.
9	The method of claim 1, the deep learning model being manually trained with training data and human validations for the analysis of the identified characteristics of the logs to output an identification score.
10	The method of claim 1, the characterization of the undebarked log further comprising external data to the undebarked log.
11[pre]	A system for characterizing an undebarked log in real time, the system comprising:
11[a]	a contactless log characterization sensor for identifying attributes of the undebarked log;

Claims 1-18	
11[b]	a characterizing unit in communication with the contactless log characterization sensor, the characterizing unit comprising:
11[b][i]	a deep learning model; and
11[b][ii]	a computerized device configured to identify characteristics of the undebarked log using the dep learning model;
11[c]	a debarker optimizer in communication with the characterizing unit, the debarker optimizer being configured to compute operating parameters of a debarker based the characteristics identified by the characterizing unit; and
11[d]	a debarker controller in communication with the debarker optimizer and the debarker, the debarker controller being configured to control the debarker using the computed operating parameters from the debarker optimizer,
11[e]	wherein the characteristics identified by the characterizing unit are indexed in a table comprising operating parameters associated with one or more identifiable log characteristics.
12	The system of claim 11, the deep learning model being trainable.
13	The system of claim 12, the dep learning model being automatically trainable with the measured attributes of the undebarked log.
14	The system of claim 12, the deep learning model being manually trainable with sample logs having identifiable characteristics and with human intervention.
15	The method [sic] of claim 11, the characterizing unit taking into account the intensity levels of the identified log characteristics when indexing the characteristics in the table.
16	The system of claim 11, the system further comprising one or more light sources for illuminating the undebarked log when identified by the log measurement device.

Claims 1-18	
17	The system of claim 11, the system further comprising external sensors identifying attributes external to the undebarked log, the attributes external to the undebarked log being used by the debarker optimizer.
18	The system of claim 11, the log measurement device being any one or a combination of a line scanner, an area scan camera or an infrared camera.

I. INTRODUCTION

Petitioner Nicholson Manufacturing Ltd. ("Petitioner" or "Nicholson") respectfully requests the Board institute post grant review ("PGR") of claims 1-18 of U.S. Patent No. 12,163,947 (the "'947 patent") (EX-1001) issued to Bid Group Technologies Ltd. ("PO").

II. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8

A. Real Parties-in-Interest

Petitioner identifies the following real parties in interest: Nicholson Manufacturing Ltd. and Kadant Inc.

B. Related Matters

There are no related matters.

C. Lead and Backup Counsel

Petitioner appoints as lead counsel Jeffrey E. Danley (Reg. No. 52,747), and Steve Lawrenz (Reg. No. 37,376) and Bilal Adra (Reg. No. 79,439) as backup counsel, all at Seed Intellectual Property Law Group LLP, 701 Fifth Avenue, Suite 5400, Seattle, WA, 98104, phone 206-622-4900, and facsimile 206-682-6031.

D. Service Information

Petitioner consents to electronic service by email to the following addresses: Jeff.Danley@SeedIP.com, SteveL@SeedIP.com, BilalA@SeedIP.com, and LitStaff@SeedIP.com.

III. FEE AUTHORIZATION

The required fee is being paid electronically through P-TACTS. Pursuant to 37 C.F.R. § 42.15(a) and § 42.103(a), the PTO is authorized to charge any and all fees to Deposit Account No. 191090.

IV. GROUNDS FOR STANDING

Petitioner certifies that the '947 patent is available for review, and Petitioner is not barred or estopped from requesting review. This Petition is being filed less than 9 months after the issue date (December 10, 2024). 37 C.F.R. § 42.202; 35 U.S.C. § 321(c).

V. PRECISE RELIEF REQUESTED

Petitioner requests cancellation of claims 1-18 of the '947 patent under AIA 35 U.S.C. § 103 ("section 103") and AIA 35 U.S.C. § 101 ("section 101") on the following grounds, supported by a declaration from Dr. Pazzani. EX-1002 ("Pazzani Declaration"). Petitioner also requests cancellation of claims 7-8 under AIA 35 U.S.C. § 112(b) ("section 112(b)"), also supported by the Pazzani Declaration.

Ground	Summary
1	Claims 1-4 and 7-10 are obvious over Gagnon (EX-1004) in view of Kambla (EX-1006) and the knowledge of a POSITA
2	Claims 1-18 are obvious over Gagnon in view of Ido (EX-1005) and Petruzella (EX-1007)
3	Claims 1-18 are obvious over Gagnon in view of Kambla and Petruzella

4	Claims 1-18 as claiming unpatentable subject matter under section 101
5	Claims 7 and 8 as indefinite under section 112(b)

VI. THE CHALLENGED PATENT

U.S. Patent No.12,163,947 ("the '947 patent") issued on December 10, 2024, from U.S. Application No. 17/445,974, filed August 26, 2021, and claims priority to U.S. Provisional Patent Application No. 63/070,887, filed August 27, 2020. '947 patent. The '947 patent is assigned to PO. *Id.*

The '947 patent describes methods for "characterizing undebarked wooden logs and computing optimal debarking parameters in real time" using "a scanning device upstream of a debarker" that provides data "to a deep learning algorithm model." *See id.*, Abstract. The '947 patent describes that classification processing of images, such as for identifying wood species, is too slow or inaccurate, or requires special equipment (i.e., ultraviolet or infrared radiation devices, microscopic inspections, etc.). *See id.*, 2:3-37.

The '947 patent purports to solve this problem by scanning logs before they enter the debarker to "measur[e] attributes of the undebarked log" and "identify[] characteristics of the undebarked log based on measured attributes . . . using a trained deep learning model." *See* '947 patent, 3:10-19; *see also* EX-1002 ¶¶ 50, 54. The output from the deep learning model is then used to "comput[e] operating parameters of a debarker based on the identified characteristics," and those operating parameters are sent to the debarker. *See* '947 patent, 3:11-19; *see also* EX-1002 ¶¶ 54-55.

Figure 1 illustrates the system used to identify characteristics of undebarked logs and compute operating parameters of the debarker:

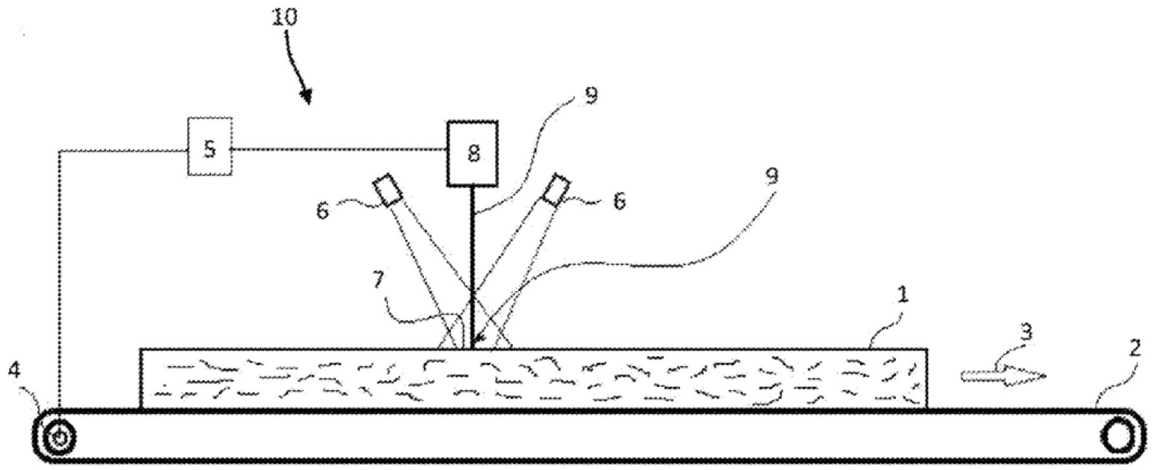


FIG. 1

See '947 patent 3:11-19, Fig. 1. In this embodiment, "[a] wooden log having bark 1 is conveyed . . . using a conveyor 2, towards direction 3" to be debarked. *Id.*, 4:67-5:2. The debarker further includes a "scanning device 8" used to scan an area of the log and a data acquisition unit 5 that may include a CPU that is used to implement the deep learning model application. *Id.*, 5:4-20, 6:17-22; EX-1002 ¶¶ 50, 54.

The '947 patent broadly discloses the use of generic components for each part of the disclosed system:

- Conveyor: "may be any type of conveyor known in the art." '947 patent, 5:11-12; *see also* EX-1002 ¶ 53.

- Scanning device: "[a]ny type of scanning device… for example a line scan, an area scan camera or an infrared camera." '947 patent, 5:25-28; *see also* EX-1002 ¶ 53.
- Data acquisition unit: comprised of "a transient memory unit, a central processing unit (CPU), a storage unit and a network unit." '947 patent, 5:4-8; *see also* EX-1002 ¶ 54.
- Deep learning model: "any type of deep learning algorithm may be used with the method of the present invention and is not limited to one type only." '947 patent, 8:19-22; *see also* EX-1002 ¶ 54.

The deep learning model determines characteristics of the log "using the collected data from the scans as input." '947 patent, 5:37-42; *see also* EX-1002 ¶¶ 53-54. The debarking optimization software uses the determined log characteristics to "compute optimal debarking parameters 150." '947 patent, 6:56-60; *see also* EX-1002 ¶ 55.

The specification provides no guidance on how to calculate or determine the optimal parameters. *See* EX-1002 ¶¶ 55-56. Instead, the specification discloses that the "computation of operating parameters" comprises "retrieving operating parameters associated with the identified characteristics." '947 patent 3:27-30; *see also* EX-1002 ¶¶ 56, 336. The specification then provides a non-exhaustive list of potential operating parameters followed by a non-exhaustive list of potential log characteristics without providing any associations between the entries in the two

lists. ’947 patent, 5:43-55; *see also* EX-1002 ¶ 56. Presumably, such associations were well known in the debarking field, as noted in the Background of the Invention. *See* ’947 patent, 1:57-60, 2:47-48 (noting that debarking optimization “is a very complex task” that “requires detailed knowledge of the incoming material and knowledge of the control of the debarking devices” such that “[t]raditionally, human judgment was the only way to adjust the settings of the debarker”); *see also* EX-1002 ¶¶ 34-36.

VII. PATENT PROSECUTION HISTORY (EX-1003)

The application that became the ’947 patent was filed on August 26, 2021, as U.S. Patent Application No. 17/445,974, and claimed priority to U.S. Provisional Patent Application No. 63/070,887, filed August 27, 2020. EX-1003 at 289, 297-301. The examiner rejected the original claims in a non-final Office Action dated April 10, 2024, but noted that dependent claims 5 and 16 would be allowable if re-written in independent format. EX-1003 at 73-89. In response, the Applicant amended claim 1 to include the elements of original claim 5 (wherein the computation of operating parameters “further comprises retrieving operating parameters associated with the identified characteristics”) and amended claim 12 to include the elements of original claim 16 (wherein “characteristics identified by the characterizing unit are indexed in a table comprising operating parameters associated with one or more identifiable log characteristics”). *Id.* at 62-69. The application was allowed on August 8, 2024. *Id.* at 38-44.

VIII. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art ("POSITA") before the effective filing date of the '947 patent would have a Bachelor's degree in Mechanical, Electrical, Computer, or Systems engineering, and at least two years of experience in the field of engineering programming. EX-1002 ¶¶ 26-27. Alternatively, a POSITA would have a Master's degree in any of the above fields. *Id*. The '947 patent is directed to the use of a deep learning AI model, and such a POSITA would have experience in the training and use of such a model. *Id*.

IX. PRIORITY DATE

The '947 patent claims priority to U.S. Provisional Application No. 63/070,887, filed August 27, 2020. EX-1001. For purposes of this Petition, Nicholson uses a priority date of August 27, 2020.

X. CLAIM CONSTRUCTION

To resolve this Petition, Petitioner does not believe that any term requires express construction. Petitioner discusses the plain and ordinary meaning of certain terms as needed in the below sections. There is currently no pending litigation involving the '947 patent. Petitioner reserves all rights to raise claim construction and other arguments in district court. If an action is filed, Petitioner will request leave to submit the claim construction once available.

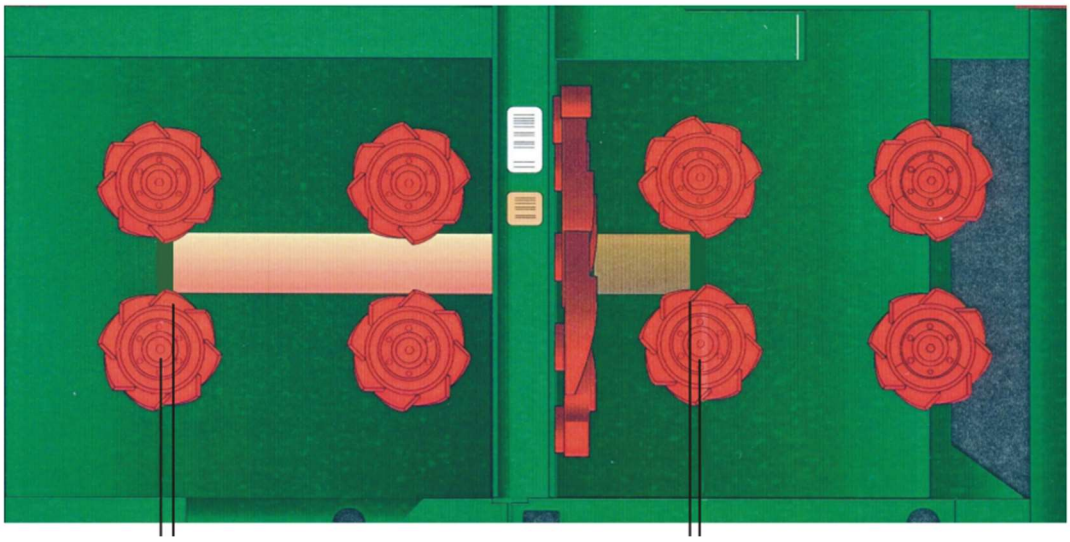
XI. BACKGROUND OF TECHNOLOGY

The disclosures in the '947 patent relate to a debarking machine in combination with and controlled by a deep learning, artificial intelligence ("AI"), algorithm. *See* EX-1002 ¶¶ 50, 54.

A. Debarking Machines

A debarking machine is used to remove the outer layer of a log, in particular the bark layer and a portion of the cambium layer. *See* EX-1002 ¶ 30. The remaining wood fiber is processed into lumber and wood chips, which ideally contain less than 1% bark. *Id.* Therefore, a debarking machine (or "debarker") should remove enough bark for wood chips to be acceptable without impacting the amount of lumber that can be obtained. *Id.*

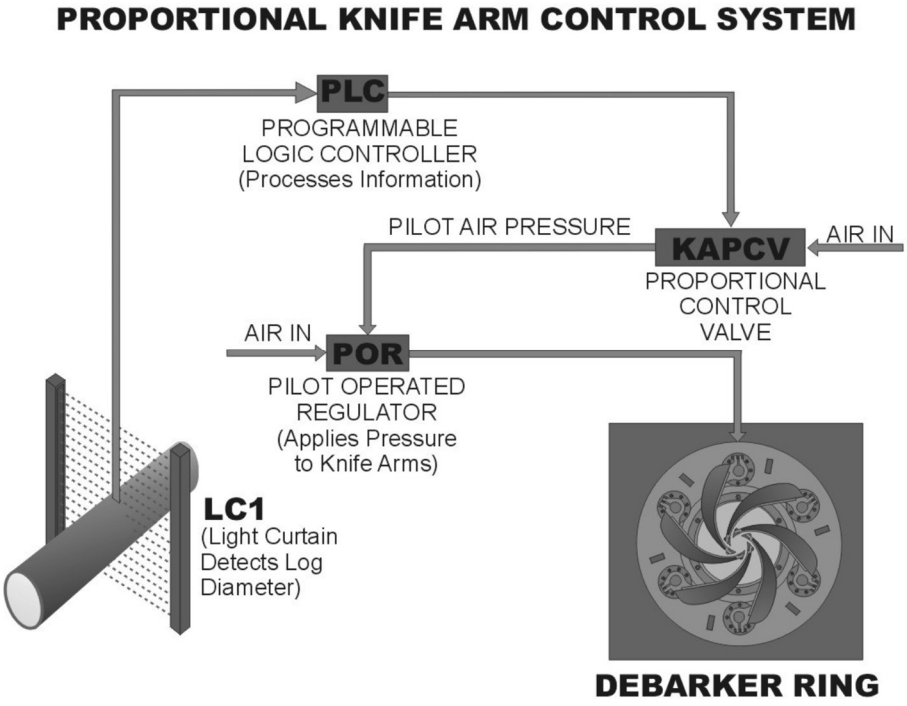
Debarkers have been in use in the United States since at least 1948. *See id.* ¶ 31. The following diagram was printed in a debarker manual dated 2019 and illustrates a debarker that was available before the priority date of the '947 patent:



EX-1008 § 1.4.2; EX-1002 ¶ 31. The debarker in the diagram includes four sets of feed rollers that position a log to be fed through a debarker ring, going from right to left in the diagram. *See* EX-1002 ¶ 31.

Debarkers have various types of debarking mechanisms, such as debarking rings that include a number of knife arms arranged radially around an opening. *See id.* ¶¶ 32-33. As the log passes through the debarker ring, pressure (e.g., pneumatic or hydraulic pressure) causes the knife arms to engage with the outer layer of the log and a motor causes the debarker ring to rotate. *See id.* ¶ 33. By rotating the knife arms around the log, the outer layer of the log is removed. *Id*.

Additionally, light curtains may be used to automatically determine a log's diameter before it enters the debarker ring, such as in the illustration below:



See EX-1009 § 1.6.5.2; *see also* EX-1002 ¶ 35. With knowledge of the diameter of the log and with use of a PLC, as illustrated above, operating parameters of the debarker ring (e.g., parameters that affect the pressure applied to knife arms) can be automatically modified to allow logs of different sizes to be debarked. EX-1002 ¶¶ 34-35.

Accordingly, systems available well before the priority date of the '947 patent were able to automatically modify operating parameters of a debarker based on log characteristics. *See id*. ¶¶ 35-36; *see also, e.g.*, *id.* ¶¶ 63-68. Additionally, the general concept of operating a debarker is consistent with the types of technology suited for AI because a debarker is controlled by a number of well-known and well-understood controls that may be set based on a number of well-known inputs. *Id*. ¶ 36.

B. Artificial Intelligence

Deep learning is a type of AI known as machine learning, and can be traced back to the development of the perceptron. *Id*. ¶ 37. A perceptron is a single artificial neuron designed for binary classification – it receives a number of inputs associated with a weight that represents the importance of the input to the output, and produces an output. *Id*.

A present-day model is trained by adjusting the weights – initially assigned randomly – based on training examples for which the inputs and desired output is known. *Id*. ¶ 38. If an incorrect output is produced, the weights are adjusted based on the difference between the correct and incorrect output. *Id*. Deep learning

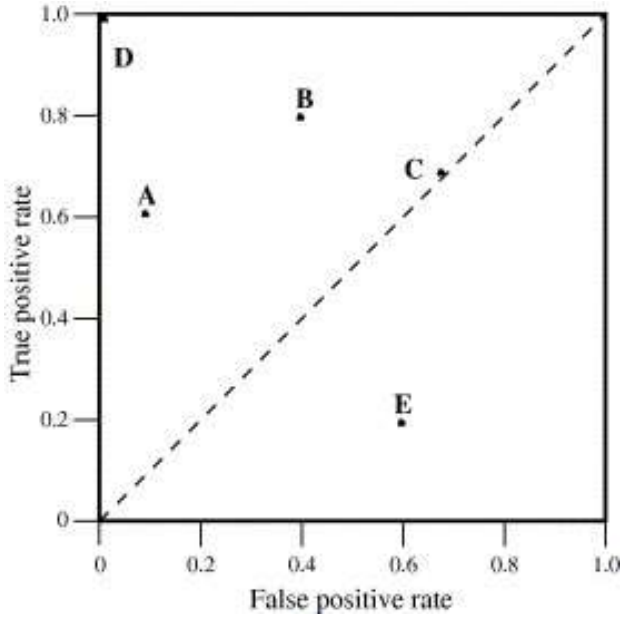
model algorithms may also produce a number that can be viewed as a probability. *Id*. ¶ 39.

Convolutional neural networks ("CNNs") may process image data by extracting features from images. *Id*. ¶¶ 40-41. VGG and ResNet, developed in 2014 and 2016 respectively, are examples of general-purpose CNNs for image classification that receive labeled images as training data and output a probability that an image belongs to a class of data (i.e., a label) when presented with an unlabeled image. *Id*. ¶¶ 42-43.

Image classification technology has been in use in a wide variety of fields and commercial applications, such as foods (to determine cooking conditions) and security cameras (to notify a user regarding package delivery), etc. *Id.* ¶ 44. Students in machine learning classes typically learn how to train CNNs to distinguish or classify images. *Id*. ¶ 43. Classifying tree species only requires collecting photographs of different trees and labeling those photographs to train the CNN. *Id*. ¶ 44.

Deep learning models are typically part of a larger process in which data is collected, represented, and input into a machine learning algorithm, and the results are sampled. *Id*. ¶ 45. Evaluating a model typically involves using test examples which are not included in training data and whose correct output is known to generate evaluation metrics. *An Introduction to ROC Analysis* (EX-1011) describes several metrics, such as accuracy, true positive rate, false positive rate, etc. *See* EX-1011 §§ 2-3; *see also* EX-1002 ¶ 45. The graph below plots the true

positive rate as a function of the false positive rate, which can be used to compare various models or settings of a single model:



EX-1011, Fig. 2; *see also* EX-1002 ¶ 46. Another evaluation technique is the use of a confusion matrix, in which the predicted and true classification for each test example is plotted. EX-1002 ¶ 47.

Training and evaluation of a model relies upon having correct classifications for examples, which are often provided by human experts manually looking at the data. *Id*. ¶ 48. The desired classification can be determined by other tests without involving people examining the training or evaluation data. *See* EX-1012 §§ 3-4 (describing using photos of a scene to predict whether a robot arm will be able to pick up an object – the classification is successful if sensors in the robot arm detect that the object is picked up); *see also* EX-1002 ¶ 48.

XII. BRIEF DESCRIPTION OF THE APPLIED PRIOR ART REFERENCES

A. International Publication No. WO 2013/188948 A1 to Gagnon et al. ("Gagnon")

1. Public Availability of Gagnon

Gagnon published on December 27, 2013. Gagnon claims priority to U.S. Patent Application No. 13/614,761, which appears on the face of the '947 patent. *See* '947 patent, References Cited. Gagnon is thus prior art under 35 U.S.C. § 102 ("section 102").

Although the examiner of the application that became the '947 patent characterized the disclosures in the patent application as being "pertinent to the applicant's disclosure," the examiner did not rely upon these disclosures when rejecting the claims in the application that became the '947 patent. Further, Nicholson relies upon different combinations in this petition than those used by the examiner. Petitioner reserves the right to raise additional argument if PO moves for a discretionary denial of this petition.

2. Overview of Gagnon

Gagnon discloses methods and systems related to debarking logs. EX-1004, Abstract; EX-1002 ¶ 63. The sensors and debarker of Gagnon are shown in Figures 3 and 3A, reproduced below.

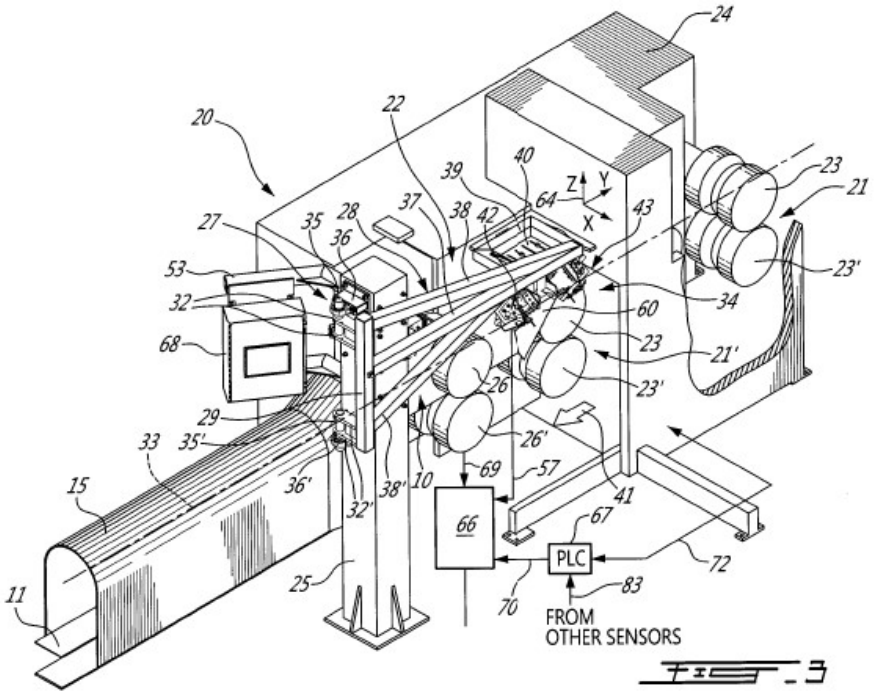


FIG. 3

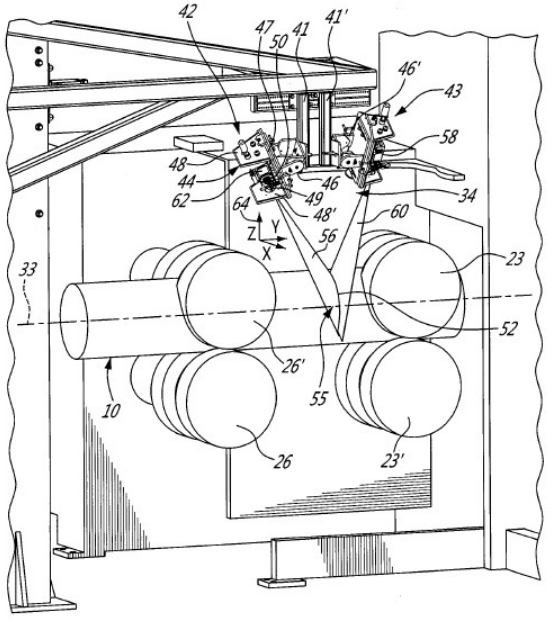


FIG. 3A

EX-1004, Figs. 3, 3A.

Gagnon further discloses that "wood processing involves a large variation in raw material characteristics at the input end of the sawing process" such that "variations of log physical properties, environmental and storage conditions, as well as debarking operating conditions strongly influence the residual bark and fiber loss levels on the surface of debarked logs." *Id.* ¶¶ 2-3. These log characteristics, according to Gagnon, may include "wood species, moisture content, freshness, mean diameter, and bark thickness." *Id.* ¶ 3; EX-1002 ¶ 64. Determining the intrinsic characteristics of each log entering the debarker "may be used to automatically perform feedback [for] the required debarker adjustments, such as magnitude of controlled pressure applied to cutting tools, ring rotational speed and log feed speed, to provide optimal performance in real time." Gagnon ¶ 6; EX-1002 ¶ 66.

The system disclosed in Gagnon also includes a computer 66 that is "connected to the controller (PLC) 67 of the debarker 24 using link 70 to receive information on debarker operating parameters." *See* Gagnon ¶ 49; EX-1002 ¶ 67. The computer may use "information on fiber loss and residual bark as measured, to provide commands enabling the controller 67 to send through link 72 feedback control signals for the required debarker adjustments providing optimal performance in real time, ***on the basis of input data related to intrinsic characteristics*** of each log" including "wood species information, mean log diameter, taper shape indicator, and environmentally influenced characteristics such as log surface temperature and moisture content, coming from other sensors

or data entry means through link 83." *See* Gagnon ¶ 49 (emphasis added); EX-1002 ¶ 67.

Finally, Gagnon discloses the use of non-contact sensors, like cameras, to obtain intrinsic and environmentally influenced characteristics. *See* Gagnon ¶¶ 49, 52; EX-1002 ¶ 68.

B. Junya Ido et al., *CNN-Based Tree Species Identification from Bark Image*, Tenth International Conference on Graphics and Image Processing 2018 ("Ido")

1. Public Availability of Ido

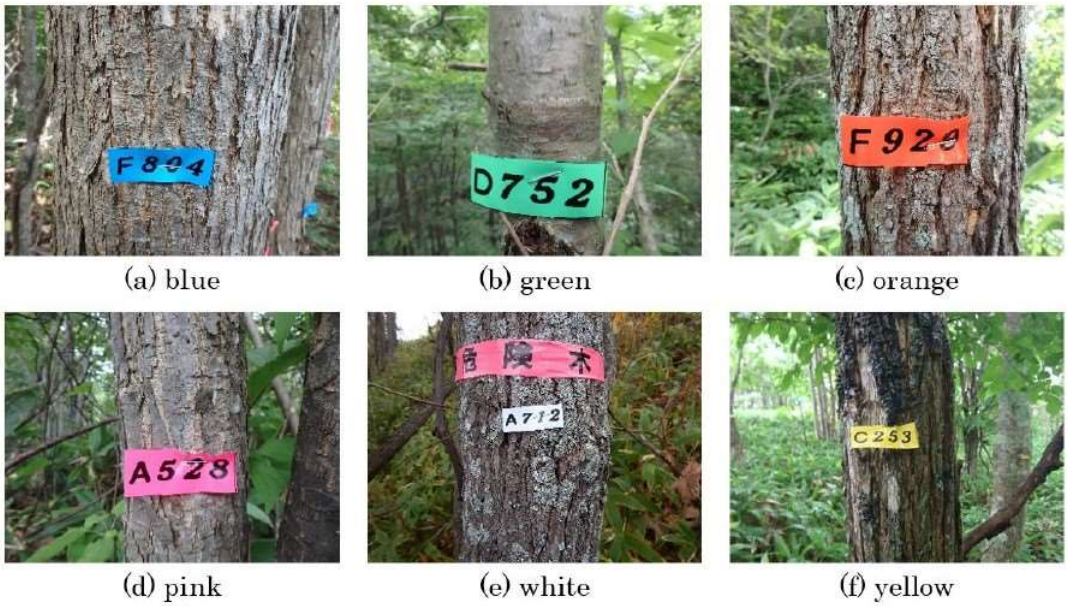
Ido is prior art under section 102. "Whether a document is prior art under [section 102(a)] is a legal determination, based on the specific facts." *VidStream LLC v. Twitter, Inc.*, 981 F.3d 1060, 1063 (Fed. Cir. 2020). "'Public accessibility' has been called the touchstone in determining whether a reference constitutes a 'printed publication.'" *See id.* (citation modified) (quoting *In re Hall*, 781 F.2d 897, 899 (Fed. Cir. 1986)). "A reference will be considered publicly accessible if it was disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence can locate it." *Id.* (quoting *Medtronic Inc. v. Barry*, 891 F.3d 1368, 1380 (Fed. Cir. 2018)). In *In re Lister*, the Federal Circuit found a reference stored in a database that allowed keyword searching by title to be publicly available. *See* 583 F.3d 1307, 1315-16 (Fed. Cir. 2009).

Ido was published in Proceedings Volume 11069 of the Tenth International Conference on Graphics and Image Processing on May 6, 2019, by SPIE. EX-

1002 ¶ 69; EX-1013 ¶¶ 8-10. SPIE is a well-known professional organization in the field of optics and image processing and is an organization a POSITA would reference if interested in research related to AI for classifying images. EX-1002 ¶ 69. Ido was also made available in the SPIE Digital Library as of May 6, 2019, where the entire content of Ido, not just its title, was made searchable to a POSITA. EX-1013 ¶¶ 9-10. In addition, a POSITA would know to search SPIE for papers and other publications relevant to the field of the '947 patent and, by exercising reasonable diligence in searching, would have been able to find Ido via the SPIE Digital Library search functionality. EX-1002 ¶ 69. If the ability to perform keyword searching by title was sufficient to show "public accessibility" in *Lister*, 583 F.3d at 1315-16, then certainly the ability to perform keyword searching across the contents of an entire article, like for Ido, would also be considered publicly accessible. Accordingly, Ido qualifies as prior art under section 102.

2. Overview of Ido

Ido discloses a convolutional neural network ("CNN") for identifying the species of a tree based on an image of the tree bark. EX-1005 § 1; EX-1002 ¶ 70. Ido describes using "well-known CNN architectures" and training the CNN by using input data comprising 19,995 images of undebarked trunks of six different tree species. EX-1005 §§ 2.4, 3.2; EX-1002 ¶ 73. According to Ido, the "[i]nput data for identifying the tree species of this research is a bark image," such as that shown in the following figure:



EX-1005. Fig. 1; § 2.1.

Ido teaches extracting a region of interest (ROI) from the picture, as shown in the following pictures:



Figure 6. Extracted ROI images.

Id., Fig. 6; § 2.3; EX-1002 ¶ 72. While Ido describes using images of trees with a tag to train the CNN, the tag is not needed to use the trained CNN. *See* EX-1005 § 2.2; EX-1002 ¶¶ 71-72. Ido noted that the disclosed method "shows an optimal condition to obtain high recognition accuracy," reported as a 74.7% accuracy rate. *See* EX-1005 § 1; Table 3; EX-1002 ¶ 73.

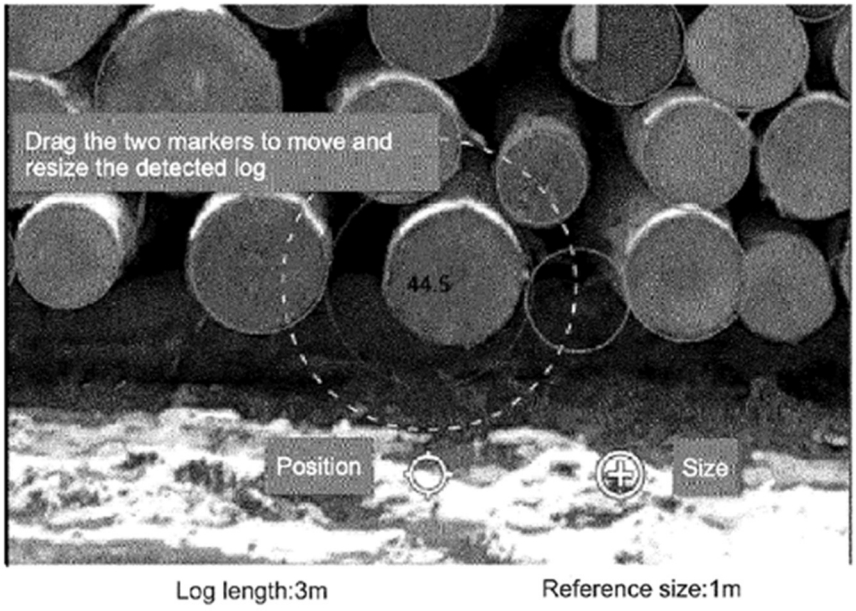
C. U.S. Patent Publication No. 2019/0003829 A1 to Kambla et al. ("Kambla")

1. Public Availability of Kambla

Kambla claims priority to PCT Application No. PCT/EP2017/050038, filed January 2, 2017, which entered the U.S. national stage on June 28, 2018, and was published on January 3, 2019. Kambla is prior art under section 102.

2. Overview of Kambla

Kambla discloses a system for determining the volume of a stack of logs based on a digital image of the stack of logs. *See* Kambla ¶ 8. According to Kambla, the measurement process begins by using a camera "to capture a digital image of the log ends together with a known reference dimension." *Id.* ¶ 51; EX-1002 ¶ 76. The following image shows the log ends of undebarked logs being characterized and measured as part of the process disclosed in Kambla:



Kambla, Fig. 9; EX-1002 ¶ 76. Kambla uses a trained classifier to identify the log ends from the image and determine the log diameter. *See* Kambla ¶¶ 80-86; EX-1002 ¶¶ 76, 77. The system in Kambla then attempts to more closely match the contours of "the true log." Kambla ¶ 100; EX-1002 ¶ 79. According to Kambla, this process can proceed on a log-by-log basis or a stack of logs. Kambla ¶ 15; EX-1002 ¶ 80.

Kambla also discloses that "a defect and tree species detector is added . . . to determine the primary defect present of a detected log." *See* Kambla ¶ 89; EX-1002 ¶ 81. These processes are "carried out by a trained neural network classifier . . . that is the output of a training process that included images of logs that were of a predetermined species and had a predetermined defect or no defect." Kambla ¶ 89; EX-1002 ¶ 81. The input to this routine includes "a subregion of the image containing the detected log" where the "subregion is centered on the log and have [*sic*] margins that are of a predefined size relative to the log diameter in pixels." Kambla ¶ 89; EX-1002 ¶ 81.

D. Frank Petruzella, *Programmable Logic Controllers* (5th ed. 2017) ("Petruzella")

1. Public Availability of Petruzella

Petruzella qualifies as prior art under section 102. "When there is an established publisher there is a presumption of public accessibility as of the publication date." *See VidStream*, 981 F.3d at 1065. Moreover, public availability may further be shown through a publisher-disclosed copyright date and an

International Standard Book Number ("ISBN") being assigned to the reference. *See Alacritech, Inc. v. Dell Inc.*, No. 2:16-cv-00695-RWS-RSP, 2023 WL 6793208, at *2-3 (E.D. Tex. Oct. 13, 2023). Petruzella was copyrighted in 2017 by McGraw-Hill Education, and was made available by McGraw-Hill Education at least by 2017 with an ISBN. Petruzella at iv. McGraw-Hill Education is a well known, established publisher of educational texts. EX-1002 ¶ 83. Moreover, a POSITA exercising reasonable diligence in searching would have been able to locate Petruzella. *Id*.

2. Overview of Petruzella

Petruzella describes programmable logic controllers ("PLCs"), their components, their uses, and how they are programmed. EX-1002 ¶ 84. A PLC "is an industrial grade computer that is capable of being programmed to perform control functions." Petruzella at 2; EX-1002 ¶ 83. The PLC is like a digital computer, but it "has been designed to operate in the industrial environment and is equipped with special input/output interfaces and a control programming language." Petruzella at 2; EX-1002 ¶ 83. Petruzella lists a number of advantages of using PLCs, including that a PLC based system offered (i) increased reliability, (ii) more flexibility, (iii) lower cost, (iv) communication capabilities, (v) faster response times, and (vi) easier troubleshooting capabilities. Petruzella at 2-3; EX-1002 ¶ 83.

A PLC includes a processor and memory for storing "program instructions, numerical values, and I/O devices status." *See* Petruzella at 5; EX-1002 ¶¶ 84-85.

The processor executes programs that determine outputs based on input received by the PLC. *See* Petruzella at 6; EX-1002 ¶ 87. The memory may also include tables, such as in the form of arrays, used as part of executing a program on a PLC. *See* Petruzella at 343; EX-1002 ¶¶ 89-92. Arrays may have one or more dimensions, such as the one, two, and three dimensional arrays shown in the following diagram:

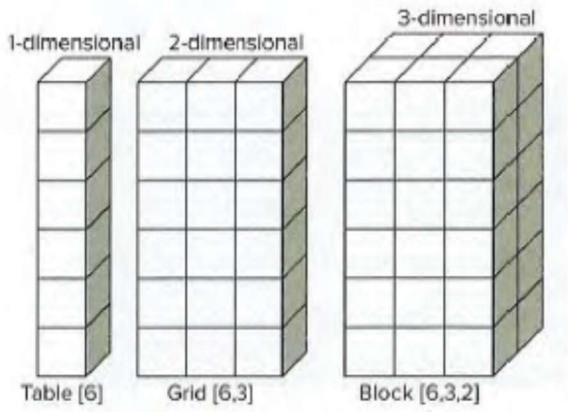
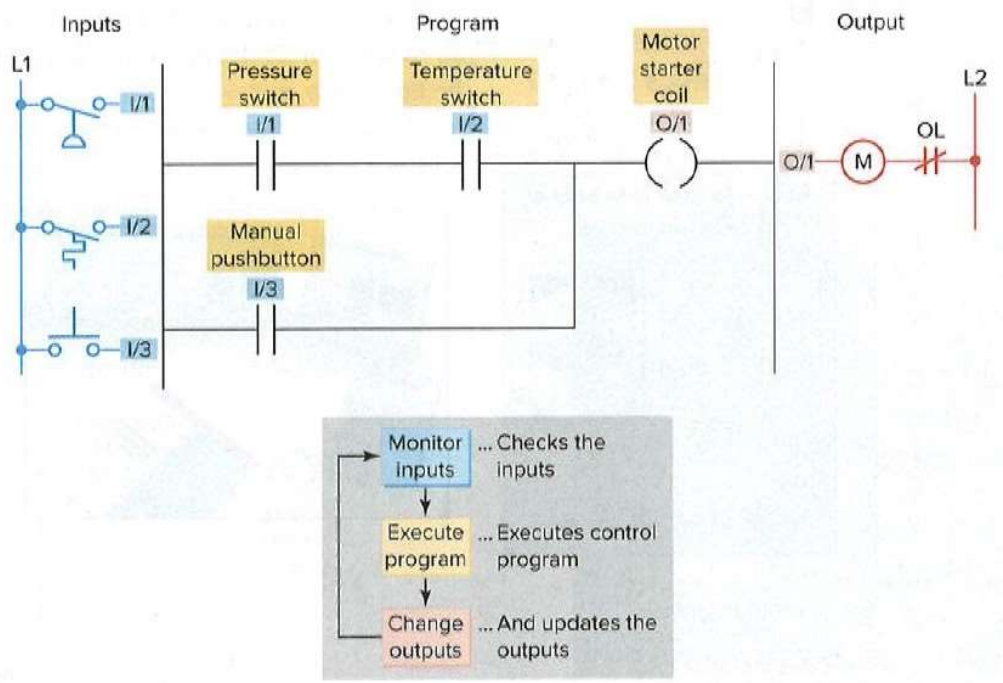


Figure 15-24 Types of arrays.
Source: Image Courtesy of Rockwell Automation, Inc.

Petruzella at 342 (Fig. 15-24); Ex-1002 ¶90.

Furthermore, the PLC processor may be programmed by using relay ladder logic ("RLL"), which "graphically represents rungs of contacts, coils, and special instruction blocks," and is based on the relay logic previously used in industrial settings. *See* Petruzella at 7; EX-1002 ¶85. An example of a simple RLL program is shown below:



Petruzella at 9 (Fig. 1-20); EX-1002 ¶86. The ladder logic starts on the left side rail and determining whether there is a continuous logic path from left to right given the state of the input devices, and an RLL program can include multiple rungs. *See* Petruzella at 7, 115-16; EX-1002 ¶86, 88.

The PLC typically starts with the CPU reading the status of the inputs, then executing the RLL program, and then updating the status of the outputs based on the execution of the RLL program. *See* Petruzella at 6, 79, 80; EX-1002 ¶ 87. The PLC stores the values for the inputs in an "input image table file" and the values for the outputs in an "output image table file," and the ladder logic program provides the association between values for input devices and values for output devices. Petruzella at 79; EX-1002 ¶ 89.

XIII. DISCRETIONARY DENIAL IS NOT WARRANTED

Petitioner will address issues related to discretionary denial should PO raise such arguments in a separate Discretionary Denial brief.

XIV. DETAILED EXPLANATION OF THE UNPATENTABILITY GROUNDS

A. Grounds and References

Ground	Summary
1	Claims 1 – 4 and 7 – 10 are obvious over Gagnon (EX-1004) in view of Kambla (EX-1006) and the knowledge of a POSITA
2	Claims 1 – 18 are obvious over Gagnon in view of Ido (EX-1005) and Petruzella (EX-1007)
3	Claims 1 – 18 are obvious over Gagnon in view of Kambla and Petruzella
4	Claims 1 – 18 as claiming unpatentable subject matter under 35 U.S.C. § 101
5	Claims 7 and 8 as indefinite under 35 U.S.C. § 112(b)

B. Ground 1: Gagnon in Light of Kambla and the Knowledge of a POSITA Renders Obvious Claims 1-4 and 7-10.

1. Independent Claim 1

a. Element 1[pre]:

To the extent the preamble is limiting, Gagnon discloses it. EX-1002 ¶ 97. Gagnon recites:

> [K]nowing or measuring upstream the intrinsic characteristics of each log entering the debarker such as diameter and wood species, its environmentally influenced characteristics such as temperature and moisture content, as well as debarker tool data such as angular position

> of cutting tools and wear level of tools, information on fiber loss and residual bark obtained while debarking or at the output of debarker may be used to automatically perform in feedback the required debarker adjustments.

Gagnon¶ 6; *see* EX-1002 ¶¶ 97-99.

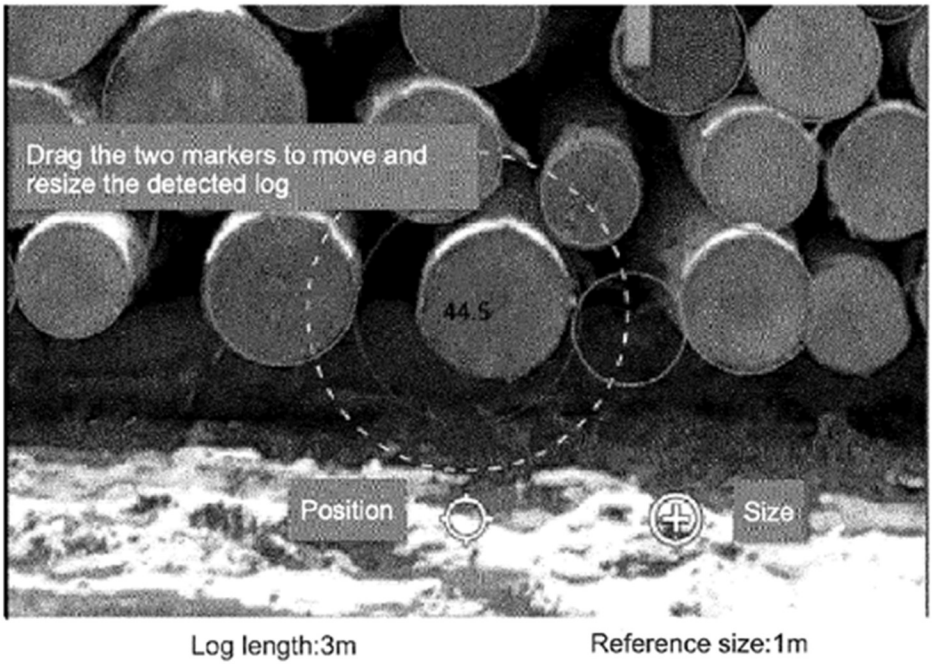
b. Element 1[a]:

Gagnon and Kambla, both alone and in combination, disclose the limitations from element 1[a]. EX-1002 ¶ 100. The '947 patent does not use the term "characterization" within the specification as it is used in the context of claim 1. The dictionary defines "characterization" as "the act of characterizing," and "characterize" as "to describe the character or quality of." *See Characterization*, Merriam-Webster, https://www.merriam-webster.com/dictionary/characterization (last visited Aug. 25, 2025) (EX-1014); *see also Characterize*, Merriam-Webster, https://www.merriam-webster.com/dictionary/characterize (last visited Aug. 25, 2025) (EX-1015); *see also* EX-1002 ¶ 100. Accordingly, the plain and ordinary meaning of the term "characterization" would include gathering data to describe the character or quality of a log. EX-1002 ¶ 100. This plain and ordinary meaning is consistent with the claim language because "characterization" is used to identify characteristics (*e.g.*, tree species, moisture level, diameter) of the undebarked log. *See* '947 patent, claim 1; EX-1002 ¶ 101. In addition, dependent claims 2 and 3 recite that sensors and a scanning device may be used to perform the contactless characterization, indicating that the characterization includes the type of data

regarding the character of a log that a scanning device or sensors may obtain. EX-1002 ¶ 101.

Gagnon describes how measurements of the log may be taken based on signals obtained by contactless sensors, such as "log diameter and length measurement device 17" which outputs "signals indicative of the diameter and length of the log 10' as it is moved past the measuring device 17." Gagnon ¶ 49. Gagnon describes that "[a]ny appropriate non-contact sensor may be used as diameter and log length measurement device 17." *Id*.; *see* EX-1002 ¶ 102

According to Kambla, "a hand held programmable smart device, which comprises a camera, an accelerometer and an angle sensor routine" is used to "assure virtual positioning of the camera parallel to the stack end" of the logs. Kambla ¶¶ 43, 50. The camera "capture[s] a digital image of the log ends together with a known reference dimension along a plane parallel to the log ends" as illustrated in the following figure showing undebarked logs:



Id. ¶ 44; *id.*, Fig. 9. Kambla also discloses that the system captures a subregion that contains the detected log where the subregion can be used to determine tree species. *Id.* ¶ 89; *see* EX-1002 ¶ 103.

Motivation to Combine: A POSITA would be motivated to combine the contactless image capture devices and deep-learning model of Kambla into the debarking system disclosed by Gagnon. EX-1002 ¶ 104. Gagnon describes the advantages of obtaining diameter and tree species information to set operating parameters of a debarker. *See, e.g.*, Gagnon ¶ 3. Kambla provides methods for using a single hand held device to obtain diameter and tree species information. *See, e.g.*, Kambla ¶¶ 86, 89. Kambla also provides a method for automating the detection of tree species. *Id*. Kambla and Gagnon are in the same field related to logging operations. *See, e.g.*, *id.* ¶ 1; Gagnon ¶ 1; EX-1002 ¶ 104. Therefore, a POSITA would combine the tree measuring and characterization features of

Kambla with the debarking system of Gagnon to use diameter and tree species information to set operating parameters of the debarking system. EX-1002 ¶ 104.

A POSITA would expect the contactless image capture devices and deep learning model of Kambla in the debarking system of Gagnon to be successful. *Id*. ¶ 105. The AI model would be expected to function successfully when arranged at the input of a debarker system to measure and characterize logs one at a time, without having to distinguish logs in a pile. *Id*. The contactless sensor disclosed in Kambla (i.e., a camera) corresponds to the same type of sensor disclosed in Gagnon at the output end of the debarker. *See* Kambla ¶ 43; Gagnon ¶ 48; EX-1002 ¶ 105. Although Gagnon discloses a camera at the output end of a debarker, a POSITA would be able to construct a similar system including a camera at the input end of the debarker. EX-1002 ¶ 105.

c. Element 1[b]:

Kambla discloses this limitation. EX-1002 ¶ 107. Kambla describes capturing images of logs using a non-contact image capture device to determine both the diameter and tree species of the undebarked log. *See* Kambla ¶¶ 86, 89. Additionally, Kambla describes the use of a deep learning model to determine tree species information. *Id*; EX-1002 ¶ 108. Kambla also describes that the tree species identification feature "is carried out by a trained neural network classifier," which is a trained deep learning model. Kambla ¶[0089]; EX-1002 ¶ 106.

The motivation to combine the deep learning model from Kambla into the system of Gagnon is the same as that described for limitation 1[a]. *See* EX-1002 ¶ 107; *supra* § XIV(B)(1)(b)

d. Element 1[c]:

Gagnon and/or the level of skill in the art discloses this limitation. *See* EX-1002 ¶¶ 108-11. According to Gagnon, its system "may include a control module using information on fiber loss and residual bark as measured, to provide commands enabling the controller 67 to send through link 72 feedback control signals for the required debarker adjustments providing optimal performance in real time, ***on the basis of input data related to intrinsic characteristics*** of each log entering the debarker such as wood species information . . . ." Gagnon ¶ 49 (emphasis added); *see also id*. ¶ 6. The following diagram shows an illustration of a debarking quality detection system 22:

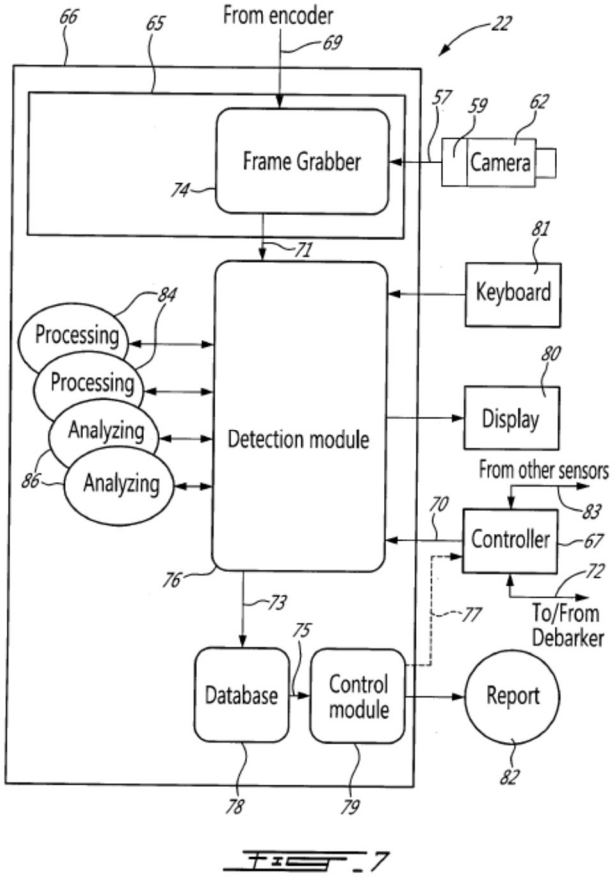


Fig. 7

Id., Fig. 7.

Gagnon further describes that "different wood species have their own characteristics that may affect the debarking process[;] for example black spruce is more easily debarked that balsam fir during winter." *Id.* ¶ 3. Gagnon discloses that "an optimal debarking quality implies a compromise between fiber loss and residual bark at the debarked surface of the log, and the operating conditions at which said compromise may be reached are dependent on the characteristics of the logs fed to the debarker, such as species and dryness state (moisture content)." *Id.* ¶ 68.

As an alternative disclosure related to this claim limitation, Gagnon describes that "a plurality of models respectively adapted to a plurality of input parameter ranges may be built, allowing a selection of the most appropriate model according to actual measurements made on logs to be debarked." *Id.* ¶ 96. A POSITA would recognize that such measurements could include tree species or other characteristics, as Gagnon describes the species of a log as being important to obtain an "optimal debarking quality." *See id.* ¶ 68; EX-1002 ¶ 110. Further, "computing operating parameters of a debarker" is recited later in the claim as comprising "retrieving operating parameters," such that retrieving values associated with the model would meet this limitation. *See infra* § XIV(B)(1)(f).

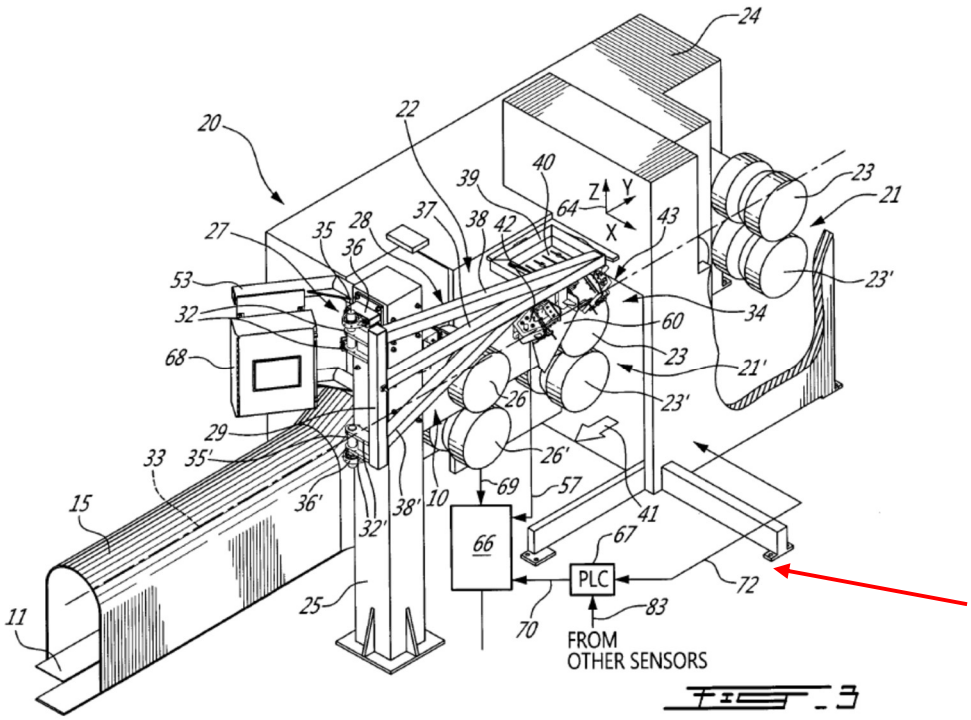
The '947 patent also states that "human judgement" was traditionally the "only way to adjust the settings of debarkers." *Id*. 2:47-48. Accordingly, a POSITA would recognize that operating parameters of a debarker are computed or retrieved based on the ordinary knowledge in the field of debarking, as this is already done manually. *See* EX-1002 ¶ 111.

Therefore, Gagnon and the knowledge of a POSITA, either alone or in combination, teach this element of claim 1.

e. Element 1[d]:

Gagnon discloses this limitation. *See* EX-1002 ¶¶ 112-14. Figure 3 of Gagnon, for example, illustrates the link 72 used by the system in Gagnon to allow the control module "to provide commands enabling the controller 67 to send …

feedback control signals for the required debarker adjustments providing optimal performance in real time."



Id. ¶ 49; *id.*, Fig. 3 (annotation added); *see also, e.g.*, *id.* ¶ 6.

f. Element 1[e]:

Gagnon along with the level of skill in the art discloses this limitation. *See* EX-1002 ¶¶ 115-18. Gagnon describes using a computer connected to a PLC "to receive information on debarker operating parameters that could be used by the programmed computer 66 or displayed to the operator." Gagnon ¶ 49. Additionally,

> the computer software may include a control module . . . to provide commands enabling the controller 67 to send through link 72 feedback

> control signals for the required debarker adjustments providing optimal performance in real time, on the basis of input data related to intrinsic characteristics of each log entering the debarker such as tree species information, mean log diameter, taper shape indicator, and environmentally influenced characteristics such as log surface temperature and moisture content, coming from other sensors or data entry means through link 83.

Id.

Therefore, Gagnon describes that controller 67 selects debarker operating parameters based on the input data related to the intrinsic characteristics of the log, such as tree species. EX-1002 ¶ 116. A POSITA would recognize that the controller 67 is able to take an input value (e.g., tree species as determined by the Kambla model) and retrieve the appropriate debarker operating parameters based on that input. *Id*.

In another example, Gagnon describes that "a plurality of models respectively adapted to a plurality of input parameter ranges may be built, allowing a selection of the most appropriate model according to actual measurements made on logs to be debarked." Gagnon ¶ 96. Gagnon further describes that operating parameters related to a debarked log may be obtained by the control module from an optimizer based upon the model selected from the Model Predictive Control structure. *See* Gagnon ¶ 95; EX-1002 ¶ 118. Therefore, the selection of the model by the control module results in the control data being retrieved from the optimizer. EX-1002 ¶ 117.

A POSITA would understand that actual measurements and input parameters for selecting the appropriate model could include tree species. EX-1002 ¶ 118; *see* Gagnon ¶¶ 49, 95. Selecting a model based on input parameters results in control data in the form of a control vector being retrieved by the control module. Gagnon ¶ 95; EX-1002 ¶ 118.

2. Dependent Claims

a. Claim 2:

Kambla discloses the additional limitations of claim 2. EX-1002 ¶¶ 119-23. The '947 patent describes a "scanning device" as a camera or other device that captures "color and/or grayscale images of partial or complete external surface of the undebarked wooden log." '947 patent, 5:25-31; *see* EX-1002 ¶ 120. Kambla describes the use of a camera to capture images of undebarked logs. *See, e.g.*, Kambla ¶¶ 43, 50; EX-1002 ¶ 121.

A POSITA would be motivated to incorporate Kambla's tree-species-identification deep-learning model, along with the associated scanning devices, into the debarking system disclosed by Gagnon, and would expect that this combination would succeed. *See supra* § XIV(B)(1)(b); EX-1002 ¶ 122.

b. Claim 3:

Kambla discloses the additional limitations of claim 3. EX-1002 ¶¶ 124-27. The '947 patent states that "the characteristics of the log 1 may be measured or calculated using different means, not shown, ***such as capturing color images using a sensor*** or camera . . . ." EX-1001, 5:55-59 (emphasis added).

Additionally, the system of the '947 patent "is configured to receive data from the one or more scanning device 8 or ***sensors***, not shown, such as images of the surface of the undebarked logs 1." *Id.*, 6:15-17 (emphasis added). Based on these descriptions, a POSITA would understand that a sensor could include devices capable of capturing images of a tree. EX-1002 ¶ 125. Moreover, the plain and ordinary meaning of a "sensor" is "a device that responds to a physical stimulus (such as heat, light, sound, pressure, magnetism, or a particular motion) and transmits a resulting impulse (as for measurement or operating a control)." *Sensor*, Merriam-Webster, https://www.merriam-webster.com/dictionary/sensor (last visited Aug. 25, 2025) (EX-1016); *see* EX-1002 ¶ 126.

Accordingly, a digital camera includes multiple image sensors that respond to light by outputting a corresponding electrical signals that are used to generate an image. EX-1002 ¶ 126. Kambla discloses the use of a digital hand held device having a camera that includes image sensors to capture digital images of the bark of undebarked logs. *Id.* ¶ 126; *see, e.g.*, Kambla ¶¶ 44, 51, 58.

A POSITA would be motivated to incorporate the one or more sensors from Kambla into the debarking system of Gagnon for the reasons discussed above. *See supra* § XIV(B)(1)(b); EX-1002 ¶ 127.

c. Claim 4:

Kambla discloses the additional limitations of claim 4. EX-1002 ¶ 128-130. Kambla describes identifying the species of the log. *See, e.g.*, Kambla ¶ 89.

A POSITA would be motivated to incorporate Kambla's tree-species-identification deep-learning model, along with the associated image capture devices, into the debarking system of Gagnon, and would expect that this combination would succeed. *See supra* § XIV(B)(1)(b); EX-1002 ¶ 130.

d. Claim 7

(1) Element 7[pre]:

As described above, Gagnon, Kambla, and the knowledge of a POSITA disclose the method of claim 1. *See supra* § XIV(B)(1). Kambla further discloses training a deep learning model, including the steps recited in claim 7. EX-1002 ¶¶ 131-140.

(2) Element 7[a]:

Kambla discloses this limitation. EX-1002 ¶ 133. Kambla describes that a tree species and defect classifier "is the output of a training process that included images of logs that were of a predetermined species and had a predetermined defect or no defect." Kambla ¶ 89; *see* EX-1002 ¶ 133.

(3) Element 7[b]:

Kambla discloses this limitation. EX-1002 ¶ 134. Kambla describes obtaining digital images of logs with "a hand held programmable smart device" that includes a camera. Kambla ¶ 50. The images are used by a trained log end detection model and/or a tree species and defect classifier. *See id.* ¶¶ 80, 89; EX-1002 ¶ 134.

(4) Element 7[c]:

Kambla discloses this limitation. EX-1002 ¶ 135. Kambla describes identifying a tree species by using a deep learning model that is a trained neural network classifier. *See*, *e.g.*, Kambla ¶¶ 81-83, 89; EX-1002 ¶ 135.

(5) Element 7[d]:

Kambla discloses this limitation. EX-1002 ¶ 136. Kambla describes the training process applied to a log end face classifier and a tree species identification classifier. *See*, *e.g.*, *id.* ¶¶81-83, 89. The classifiers are used to classify images of logs and log ends put into the model after they are adequately trained to make the desired classifications. *Id*. The accuracy score used to determine if the classifiers are adequately trained is the identification score. *See id.* ¶ 81; EX-1002 ¶ 136. Additionally, Kambla describes that "[p]arameters for the training process are optimized for the highest accuracy and detection rate possible." Kambla ¶ 81; *see* EX-1002 ¶ 137.

(6) Element 7[e]:

Kambla discloses this limitation. EX-1002 ¶¶ 138-40. According to this claim element, the model is considered trained if and only if the identification score differs from the predetermined value[1]. EX-1002 ¶ 139. Thus, if the model is referenced as "trained," one can infer that the identification score differs from the predetermined value. *Id*. Kambla describes a "trained neural network classifier"

[1] It is unclear what exactly the term "predetermined value" means in the context of the '947 patent because it could be a wide range of values, based on a variety of metrics. *Id.* ¶ 138.

to determine the tree species and presence of defects. *See*, *e.g.*, Kambla ¶ 89. Because Kambla discloses a trained classifier, the classifier must have an identification score different from a "predetermined value," or the classifiers would not be trained. EX-1002 ¶ 139.

(7) Motivation to Combine

A POSITA would be motivated to incorporate Kambla's deep-learning models and associated sensors into the debarking system of Gagnon. *See supra* § XIV(B)(1)(b); EX-1002 ¶ 140.

e. Claim 8:

According to claim 8, a deep learning model is automatically trained if it is trained by "using the characterization of the undebarked log for the analysis of the identified characteristics of the logs to output the identification score." *See* EX-1002 ¶ 142.

Kambla discloses the additional limitations of claim 8. *Id*. ¶¶ 142-44. Kambla describes that the tree species classifier is trained by using images of logs of known species, both with and without defects. Kambla ¶ 89. Kambla trains the classifier based on identified characterizations obtained from pictures of the trees (e.g., log end locations and/or characterizations of the bark) during the training process to determine the characteristics of the trees (i.e., tree species) to arrive at an acceptable accuracy level. *See id*. ¶¶ 80, 89; EX-1002 ¶ 143.

Motivation to Combine: A POSITA would be motivated to incorporate Kambla's automatic training of deep learning models into the debarking system of

Gagnon for the same reasons as discussed above. *See supra* § XIV(B)(1)(b); EX-1002 ¶ 144.

f. Claim 9:

Kambla discloses the additional limitations of claim 9. EX-1002 ¶¶ 145-47. Kambla describes a training process in which selected images are used to train deep learning models and classifiers. *See id*. ¶¶ 80, 89. These images are subject to human validation for the analysis of the identified characteristics. EX-1002 ¶ 146.

Motivation to Combine: A POSITA would be motivated to incorporate Kambla's deep-learning models and associated sensors into the debarking system of Gagnon. *See supra* § XIV(B)(1)(b); EX-1002 ¶ 147; *see also* EX-1002 ¶¶ 104-05. Furthermore, a POSITA would be motivated to specifically combine the fine tuning process from Kambla with the debarking system of Gagnon because it would make for a more accurate model given sufficient data. *See* EX-1002 ¶ 147; *see, e.g.*, Gagnon ¶ 4 (describing a need for more accurate quality control); Kambla ¶ 7 ("The aim of the present invention is to provide a system to measure timber . . . quickly, accurately and efficiently . . . ."). A POSITA would expect success in doing so because Kambla uses well known deep learning techniques, and such training is well known in the art and being used in the usual and expected manner. EX-1002 ¶ 147; *see* Kambla ¶ 81.

g. Claim 10:

Gagnon discloses the additional limitations of claim 10. EX-1002 ¶¶ 148-50. The '947 patent describes "external data" as being "historical temperature or weather data associated with the logs or the environment where the log 1 growth may be used to identify characteristics of the log 1." '947 patent, 6:51-55. Gagnon states that "environmental conditions such as log temperature state (frozen or non-frozen) have significant influence over debarking quality." Gagnon ¶ 49. Gagnon further states that "air temperature, which influences temperature state of log surface (i.e. frozen or non-frozen), has an effect on wood/bark adhesion strength when the log moisture content is greater than fiber saturation point." *Id.* ¶ 3. Gagnon further describes a "non-contact temperature sensor 63 conveniently located adjacent the conveyer 13 for measuring the temperature at the surface of the next log 10' to be debarked, to send a temperature indicative signal to the controller 67 shown in Fig. 3." *Id.* ¶ 49; EX-1002 ¶ 150.

C. Ground 2: Gagnon in Light of Ido and Petruzella Renders Obvious Claims 1-18

1. Independent Claim 1

a. Element 1[pre]:

Gagnon discloses a computer-implemented method for characterizing an undebarked log in real time, to the extent the preamble is limiting. *See supra* § XIV(B)(1)(a); EX-1002 ¶ 152.

b. Element 1[a]:

Gagnon and Ido, both alone and in combination, disclose this element of claim 1. *See supra* § XIV(B)(1)(b) (Gagnon alone); EX-1002 ¶¶ 153-63. As noted before, "characterization" should be construed according to its plain and ordinary meaning. *See supra* §§ X, XIV(B)(1)(b).

Ido also describes capturing images of the bark on a tree or log using non-contact image capture devices (e.g., cameras) so that the images of the bark could be used to determine the tree species. EX-1002 ¶ 154. For example, Ido discloses that "[i]nput data for identifying the tree species of this research is a bark image as shown in Fig. 1." Ido, § 2.1. Figure 6 of Ido also includes exemplary images of bark that were used in Ido:



Figure 6. Extracted ROI images.

Id., Fig. 6; *see id.* § 2.3; EX-1002 ¶¶ 155-56.

Accordingly, the cited portions of Ido and Gagnon, both alone and in combination, teach this element of claim 1. EX-1002 ¶¶ 153-63

Motivation to Combine: A POSITA would be motivated to combine the deep-learning model of Ido along with the necessary contactless image sensor

devices into the debarking machine described in Gagnon because Gagnon discloses that tree-species is highly relevant to determining the settings of a debarking machine. Gagnon ¶ 3; EX-1002 ¶ 157. The deep-learning capabilities disclosed in Ido provide an automated way to determine this highly relevant characteristic, an improvement over the manual entry method that would be necessary in Gagnon. EX-1002 ¶ 157; *see* Ido § 4; Gagnon ¶ 3.

Furthermore, a POSITA would expect that the Ido trained deep-learning model and associated image capture devices disclosed in Ido could be successfully incorporated into Gagnon's debarking system. EX-1002 ¶¶ 158-63. First, a POSITA would expect that the Ido deep-learning model would be able to accurately identify the tree species because the Ido model can identify tree species with up to 74.7% accuracy. *Id.* ¶ 159; *see* Ido § 3.2.3. Further, the log in Gagnon by definition is undebarked such that the same input necessary for the system in Ido – pictures of bark – would also be present as part of the undebarked log that is part of the system in Gagnon. EX-1002 ¶ 159; *see* Gagnon ¶¶ 3, 4. In addition, a POSITA would understand that the model in Ido could be updated to identify additional tree species by training the model on those additional species using the methods disclosed in Ido, and that the accuracy level could be increased through additional training, using the same processes described in Ido. EX-1002 ¶ 159. A POSITA would not consider Ido's deep-learning model to be limited to just the six disclosed species. *Id.*

Additionally, it would be within the capabilities of a POSITA to successfully incorporate the image capture devices from Ido into the debarker system of Gagnon to capture images of the incoming logs. EX-1002 ¶ 160. These image capture devices are well-known in the art and are performing their ordinary and expected functions. *Id.* ¶ 160. Moreover, Gagnon already discloses the use of cameras to capture images on the output side of the machine, such that a POSITA would expect that similar devices could be mounted on the input side of the machine as well. *Id.* ¶ 160; *see* Gagnon ¶¶ 45, 49. Moreover, a POSITA could mount the image capture devices in such a way as to address the "inclination" problem identified in Ido. EX-1002 ¶ 161; Ido § 2.3;. Finally, Gagnon already discloses the use of a computer as part of its debarking system. *See* Gagnon ¶ 46; EX-1002 ¶ 162. Ido did not disclose that a particular type of computer would be necessary to deploy the deep learning program, and indeed, none would be needed. EX-1002 ¶ 162. Accordingly, a POSITA would expect that the necessary deep learning model and image capture devices from Ido could be successfully incorporated into the debarker system from Gagnon. *Id.*

c. Element 1[b]:

Ido discloses this limitation. EX-1002 ¶¶ 164-67.

Ido describes capturing images of the bark on a tree using cameras so that the images of the bark could be used to determine the tree species. Ido § 1; EX-1002 ¶ 164. Ido also describes a convolutional neural network (a "CNN") which is a deep learning model "for image recognition tasks." Ido § 2.4; EX-1002 ¶ 165.

Furthermore, Ido describes how this model is trained to identify a species of a tree based on an image of the bark on the tree. *See* Ido §§ 3.1-2; EX-1002 ¶ 165.

Accordingly, Ido teaches identifying characteristics (i.e., species) of an undebarked log based on the characterization (i.e., an image) of the undebarked log using a trained deep learning model (i.e., a CNN). EX-1002 ¶ 165. The motivation to combine and expectation of success in combining the deep learning model from Ido into the system of Gagnon is the same as that described for limitation 1[a]. *See supra* § XIV(C)(1)(b); EX-1002 ¶ 166-67.

d. Element 1[c]:

The combination of Gagnon, Petruzella, and Ido disclose this limitation of claim 1. EX-1002 ¶¶ 168-73. Gagnon and Ido both describe how to identify characteristics of a log to be processed by a debarking machine, such as the tree species of the log. *See supra* § XIV(C)(1)(b). Gagnon also describes using tree species of a log to compute operating parameters for a debarker. *See supra* § XIV(B)(1)(d).

Gagnon describes using "***a control module*** using information on fiber loss and residual bark as measured, ***to provide commands*** enabling the controller 67 to send through link 72 feedback control signals for the required debarker adjustments providing optimal performance in real time, ***on the basis of input data related to intrinsic characteristics of each log*** entering the debarker such as wood species information . . . ." Gagnon ¶ 49 (emphasis added); *see id.* ¶ 6. Also, Gagnon describes the controller 67 as being a "PLC." *Id*. ¶ 49.

According to Petruzella, a PLC includes a central processing unit "for implementing the logic and controlling the communications among the modules," and includes a memory component "for storing user program instructions, numerical values, and I/O devices status." Petruzella at 5, Fig. 1-8. Therefore, Petruzella discloses to a POSITA that the PLC described in Gagnon could receive input values related to tree species, perform any necessary calculations regarding output parameters, and output those values to the debarker. EX-1002 ¶ 171.

"Computing" the operating parameters also includes retrieving the operating parameters. *See supra* § XIV(B)(1)(d). The combination of Petruzella and Gagnon describe that a PLC could retrieve operating parameters of the debarker machine based on the input characteristics of the tree. EX-1002 ¶ 172; *see infra* § XIV(C)(1)(e).

Motivation to Combine: A POSITA would be motivated to combine the teachings from Petruzella related to PLC operation with the system of Gagnon because Gagnon explicitly identifies a PLC for receiving input and determining operating parameters for the debarker. EX-1002 ¶ 173; *see* Gagnon ¶ 49. Petruzella discloses the uses, components, and operation of a PLC. Petruzella at 5, Fig. 1-8. Petruzella also states that PLCs have a faster response time, are easier to troubleshoot, and provide increased flexibility and reliability, when compared to other control systems. *See* Petruzella at 2-3; EX-1002 ¶ 173. PLCs were also well known before the priority date of the '947 patent, and the manner in which the PLC from Petruzella would be incorporated into Gagnon is the ordinary and

expected manner. EX-1002 ¶ 173. Thus, a POSITA would expect this combination to succeed. *Id.*

e. Element 1[d]:

Gagnon discloses this element of claim 1. *See supra* § XIV(B)(1)(e); EX-1002 ¶ 175.

f. Element 1[e]:

Gagnon in light of Petruzella discloses this limitation. EX-1002 ¶¶ 175-80. Gagnon describes that "the computer software may include a control module . . . to provide commands enabling the controller 67 to send through link 72 feedback control signals for the required debarker adjustments providing optimal performance in real time, on the basis of input data related to intrinsic characteristics of each log entering the debarker." Gagnon ¶ 49. Gagnon also describes using a PLC (controller 67) to receive input of a wood species and determine operating parameters for the debarker based on that input. *See supra* § XIV(B)(1)(f); Gagnon ¶ 49.

Petruzella describes that a PLC includes a processor and memory component. Petruzella at 5. Operating parameters calculated by the PLC (e.g., as a result of element 1[c]) will be stored at a memory address in the memory of the PLC. EX-1002 ¶ 177; *see* Petruzella at 5-6. The processor retrieves these values to transmit them to a debarker via a communication port. EX-1002 ¶ 177; *see, e.g.*, Petruzella at 12, 75, 78;. More specifically, each "ladder rung" of a PLC program

may be "scanned and solved using the dat[a] in the input files," where "[t]he resulting logic is written to the output image table":

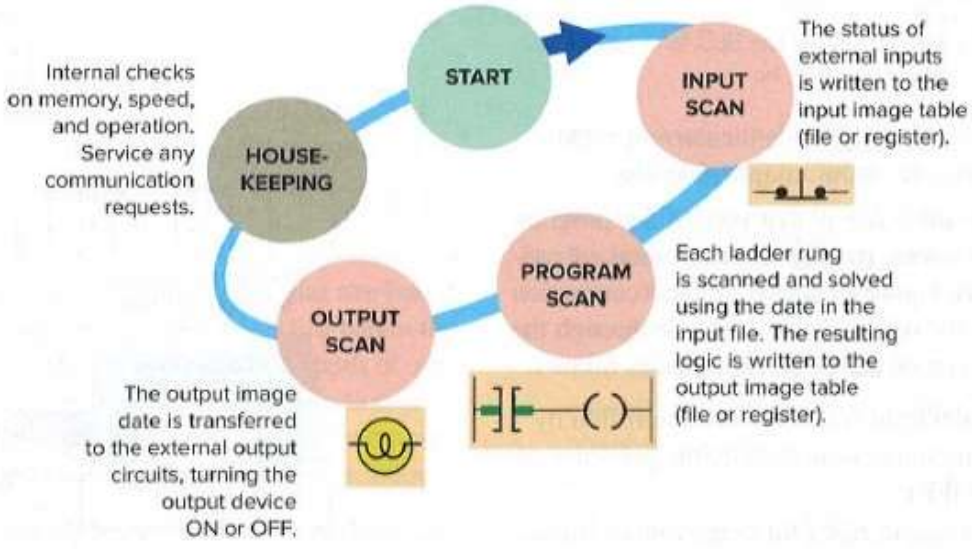


Figure 5-8 PLC program scan cycle.

Petruzella at 78, Fig. 5-8. After a rung is scanned and solved, "[t]he output image dat[a] is transferred to the external output circuits, turning the output device ON or OFF." *Id.* As part of this functionality, the data from the output image table is retrieved to be provided to the external output circuits. *Id.*; *see* EX-1002 ¶ 177.

In a combined system of Gagnon and Petruzella, values of the input file would correspond to tree species and values of the output file would correspond to debarker operating parameters. EX-1002 ¶ 178. The input values of a specific rung related to a specific tree species would be associated with operating parameters contained on that same rung. *Id.* The program of Petruzella updates data in an output file based on values contained in an input file. *Id.* ¶ 179. When

the output file is updated, the PLC's processor retrieves the output file to transfer new values to the output device (i.e., components of the debarker). *Id.*

A POSITA would be motivated to combine Gagnon, Ido, and Petruzella for the same reasons discussed above. *See supra*, §§ XIV(C)(1)(b), (d); EX-1002 ¶ 180.

2. Dependent Claims

a. Claim 2:

Ido discloses the additional limitations of claim 2. EX-1002 ¶¶ 182-85. The '947 patent describes a "scanning device" as a camera or other device that captures "color and/or grayscale images of partial or complete external surface of the undebarked wooden log." '947 patent, 5:25-31. Ido describes the use of a camera to capture images of the bark of undebarked trees, such as the training data used to train the CNN. *See* Ido § 3.2.2; EX-1002 ¶ 183. Additionally, Ido discloses that one or more images of undebarked trees are used in determining a tree species. *See*, *e.g.*, Ido § 2.3; *id.*, Fig. 6 (showing regions of interest of bark from trees and/or logs); EX-1002 ¶ 183. Therefore, the camera of Ido is a scanning device that obtains a characterization of an undebarked log. EX-1002 ¶¶ 183-84.

A POSITA would be motivated to incorporate Ido's tree-species-identification deep-learning model, along with the associated scanning devices, into the debarking system disclosed by Gagnon, and would expect that this combination would succeed. *See supra* § XIV(C)(1)(b); EX-1002 ¶ 185.

b. Claim 3:

Ido discloses the additional limitations of claim 3. EX-1002 ¶¶ 187-91. The '947 patent states that "the characteristics of the log 1 may be measured or calculated using different means, not shown, ***such as capturing color images using a sensor*** or camera . . . ." '947 patent, 5:55-59 (emphasis added). Additionally, the system of the '947 patent "is configured to receive data from the one or more scanning device 8 or ***sensors***, not shown, such as images of the surface of the undebarked logs 1." *Id.*, 6:15-17 (emphasis added). Based on these descriptions, a POSITA would understand that a sensor could include devices capable of capturing images of a tree. EX-1002 ¶¶ 125, 188. Moreover, the plain and ordinary meaning of a "sensor" is "a device that responds to a physical stimulus (such as heat, light, sound, pressure, magnetism, or a particular motion) and transmits a resulting impulse (as for measurement or operating a control)." EX-1016; *see* EX-1002 ¶¶ 126, 189.

Accordingly, a digital camera, such as the digital camera in Ido, includes multiple image sensors that respond to light by outputting a corresponding electrical signals that are used to generate an image. EX-1002 ¶ 189. Therefore, Ido discloses the use of a digital camera that includes image sensors to capture images of the bark of an undebarked log used to create the 19,995 images used as training data. EX-1002 ¶¶ 189-190; *see* Ido §§ 2.3, 3.1, 3.2.2.

A POSITA would be motivated to incorporate the one or more sensors from Ido into the debarking system of Gagnon for the reasons discussed above. *See supra* § XIV(C)(1)(b); EX-1002 ¶ 191.

c. Claim 4:

Ido discloses the additional limitations of claim 4. EX-1002 ¶¶ 193-97. Ido describes a CNN that uses captured images of the bark on a tree or log using non-contact image capture devices (e.g., cameras) to determine the species of the tree. Ido § 1; *see* EX-1002 ¶ 194. Additionally, Ido discloses the ability to identify up to 6 different types of tree species. Ido § 4; *see* EX-1002 ¶ 194. A POSITA would be able to expand Ido's model to identify additional trees-of-interest using the techniques Ido describes. EX-1002 ¶ 194.

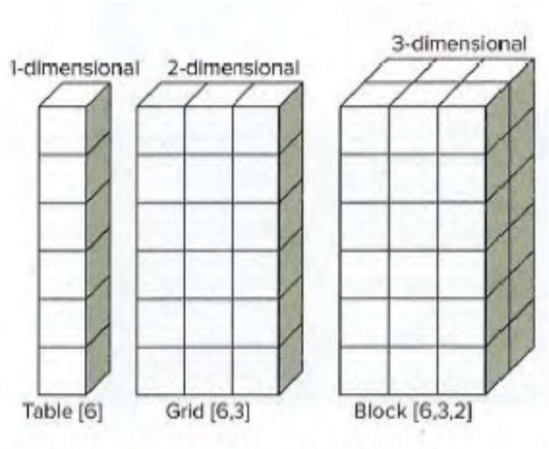
Ido also discloses the use of a trained deep learning model. The CNN model of Ido "is a deep artificial neural network that is used primarily to classify images." Ido § 1. Ido also describes the training of the CNN, and that, after training, the CNN is able to correctly identify tree species with an accuracy rate of up to 74.7% based on images of the bark captured by a non-contact image capture device. Ido §§ 3.2.2, 4; *see* EX-1002 ¶ 195.

A POSITA would be motivated to incorporate Ido's tree-species-identification deep-learning model, along with the associated scanning devices, into the debarking system disclosed by Gagnon, and would expect that this combination would succeed. *See supra* § XIV(C)(1)(b); EX-1002 ¶¶ 196-97.

d. Claim 5:

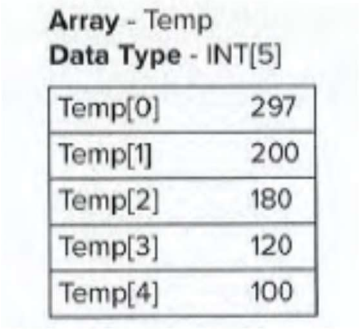
Petruzella and/or Petruzella in light of Ido discloses the additional limitations of claim 5. EX-1002 ¶¶ 198-205. Petruzella describes that a PLC includes both a processor and a memory component. *See* Petruzella at 5-6. The ladder logic implementation of a PLC results in each ladder rung of a PLC program being "scanned and solved using the dat[a] in the input files," where "[t]he resulting logic is written to the output image table." *Id*. at 78 (Fig. 5-8). Once each rung is scanned and solved, "[t]he output image dat[a] is transferred" from the output image table "to the external output circuits, turning the output device ON or OFF." *Id*. Solving the ladder rung by rung associates input values (e.g., tree species) for a specific rung with output values stored in the output image file (e.g., operating parameters for the debarker). EX-1002 ¶ 199.

Petruzella also discloses the use of single and multiple dimensional arrays for storing data values, as shown in the following illustration:



Petruzella at 342 (Fig. 15-24). "[A]n array is a tag type that contains a block of multiple pieces of data" where the "array occupies a contiguous block of values."

Id.. Further, the elements in an array "may be a basic data type or a structure." *Id.* Each element of the array can be accessed, as shown in Figure 15-25 below:



Id.(Fig. 15-25).

Accordingly, it would be obvious to a POSITA to construct an array of elements containing operating parameters in which each element could be accessed based on tree species. EX-1002 ¶ 202. In such an example, the "Temp" array of Figure 15-25 would be named "Parameters," and each number in brackets would correspond to a species of tree, such as a species identified using the CNN of Ido. EX-1002 ¶ 203. A POSITA could use the numbers in the existing table of Ido to index the positions in a Parameters array according to the technique disclosed in Petruzella. EX-1002 ¶ 202-04.

Motivation to Combine: A POSITA would be motivated to combine the use of the typical rung-by-rung determinations of Petruzella with the debarking system of Gagnon for the same reasons discussed above. *See supra* § XIV(C)(1)(d).

In addition, a POSITA would also be motivated to combine the arrays described in Petruzella with the debarking system of Gagnon. EX-1002 ¶ 205. Petruzella states that "[t]he use of arrayed data types offers the fastest data

throughput (output) from a ControlLogix processor," and "[b]ecause arrays are numerically sequenced tags of the same data type that occupy a contiguous memory location, large amounts of data can be retrieved efficiently." Petruzella at 343. Therefore, a POSITA would be motivated to incorporate the array functionality of Petruzella into the system of Gagnon because it would result in a more efficient and faster control system. *See* EX-1002 ¶¶ 202-05.

e. Claim 6:

Ido in light of Petruzella discloses the additional limitations of claim 6. EX-1002 ¶¶ 206-12. Ido describes using an array of image sensors to capture images of the bark on a tree or log. *See supra* § XIV(C)(2)(b). Image sensors capture various ranges of light intensities to depict images. EX-1002 ¶ 207. An image sensor that captures a higher intensity of light appears lighter as compared to a corresponding image sensor that captures comparatively less light, which will appear relatively darker. *Id*. The intensities captured by the array of image sensors are used to identify characteristics of a log (e.g., tree species) in the AI system of Ido. *Id*. The characteristic of the log could be associated with operating parameters stored in an array, such as those described by Petruzella. *See supra* § XIV(C)(2)(d).

Ido also describes the use of various deep-learning CNN models that return probability values based on different categories into which an item is sorted. EX-1002 ¶ 208; *see, e.g.*, Ido § 3.2.2. In Ido, the four CNN models listed in Table 3 return a set of six probabilities each time a picture of a tree or log is to be

categorized. *See* Ido, Table 3. These probabilities, associated with the six tree species each model has been trained to learn, correspond to the intensity levels recited in claim 6. EX-1002 ¶ 208. These intensity levels are also used when indexing the table to categorize the picture of the tree according to the highest probability across the six tree species. *Id*. Accordingly, the tree species with the highest probability are used to index the table for that picture. *Id*.

Therefore, Ido describes intensity levels being used to index operating parameters stored in a table, as shown by Petruzella. *See supra* § XIV(C)(2)(d); EX-1002 ¶ 209.

A POSITA would be motivated to incorporate this AI functionality from Ido and the array structure disclosed in Petruzella into the debarker system described by Gagnon. *See supra* § XIV(C)(2)(d); EX-1002 ¶ 210-212. Additionally, a POSITA would expect the combination of the AI features of Ido, the array functionality of Petruzella, and the debarker system of Gagnon to succeed because each of these components would operate in its normal and expected manner. EX-1002 ¶ 212.

f. Claim 7

(1) Element 7[pre]:

As described above, Gagnon, Ido, and Petruzella disclose the method of claim 1. *See supra* § XIV(C)(1). Ido further discloses training a deep learning model, including the steps recited in claim 7. EX-1002 ¶ 214.

(2) Element 7[a]:

Ido discloses this limitation. EX-1002 ¶ 215. Ido describes "a convolutional neural network (CNN)-based tree species identification method using a bark image." Ido, § 1. Ido further describes that the testing data included 100 randomly selected "samples for each species as the test data, and the remaining samples were used as the training data." *Id.* § 3.1.

Additionally, a POSITA would recognize that the same training could be performed on trees that have been cut down (i.e., logs) as well as trees still standing. EX-1002 ¶ 215.

(3) Element 7[b]:

Ido discloses this limitation. EX-1002 ¶ 216. Ido describes that "shooting distance of tree varies depending on individuals and photographers." Ido § 2.1. Ido further discloses that the "[c]ollecting task is cooperated by several company workers," and that "there are five type of tree image size: 1280x960 [pixels] 1440x1920 [pixels], 1600x1200 [pixels], 1920x1440 [pixels], 2048x1536 [pixels]." *Id.* § 3.1. Finally, as described above, a digital camera is a scanning device that is used to obtain scan data of logs. *See supra* § XIV(C)(2)(b).

(4) Element 7[c]:

Ido discloses this limitation. EX-1002 ¶¶ 217-18. Ido describes that that "[w]e evaluated the proposed method with six tree species" and "carried out the evaluation experiment with various conditions," obtaining "the highest recognition accuracy of 74.7%." Ido § 4. In addition, Ido discloses examples of the extracted

regions of interest (ROIs) that would be used to identify the tree species. *Id*., Fig. 6. Accordingly, the CNN described in Ido would identify tree species based on characteristics identifiable in the captured image data. EX-1002 ¶¶ 217-18.

(5) Element 7[d]:

Ido discloses this limitation. EX-1002 ¶ 219. Ido describes various accuracy measures for different types of analyses. *See*, *e.g.*, Ido, Table 3. As disclosed in Ido, the highest recognition accuracy achieved was 74.7%. *Id.* § 4. A POSITA would recognize that an accuracy score is a type of identification score. EX-1002 ¶ 219. Note that according to the claim, a single "identification score" is calculated across multiple logs, like the accuracy score of Ido. *See*, *e.g.*, *id*. ¶¶ 219, 221-222.

(6) Element 7[e]:

Ido discloses this limitation. EX-1002 ¶¶ 220-23. It is unclear what the term "predetermined value" means in the context of the '947 patent. *See supra* § XIV(B)(2)(d)(6) n.1. In particular, neither the claims nor the specification in the '947 patent describes which value is used to determine whether the deep learning model is trained. *See* EX-1002 ¶¶ 220-222. However, according to the claim, a deep learning model is considered trained ***if*** the identification score differs from the predetermined value. *See id*. ¶ 221. Likewise, one can infer that the identification score differs from the predetermined value ***if*** the deep learning model is described as being trained. *See id*.

Ido describes a successful accuracy score of 74.7%. Ido § 4. Moreover, Ido characterizes the research done as resulting in "an optimal condition to obtain high recognition accuracy for our problem." Ido § 1; *see also* EX-1002 ¶ 221. Accordingly, a POSITA would consider Ido to have a trained model. EX-1002 ¶ 222. For this reason, a POSITA would consider that the identification score differed from the predetermined value or else the system would not be considered "trained" or able to "obtain high recognition accuracy." *Id*.

Motivation to Combine: The same motivation to combine the tree-species-identification capabilities of Ido with the system of Gagnon also applies here. *See supra* § XIV(C)(1)(b); EX-1002 ¶ 223.

g. Claim 8:

Ido discloses the additional limitations of claim 8. EX-1002 ¶¶ 225-29. Ido applies training data of 19,995 images to train various CNN models. Ido § 3.2.2. Ido further applies random values to the CNN models with and without data augmentation, and achieved a 74.7% accuracy during this process. *Id.* Ido uses identified characterizations obtained from pictures of trees (e.g., characterizations of the bark) during the training process to determine characteristics of the trees (i.e., tree species) to obtain an accuracy value of 74.7%. *Id*; *see* EX-1002 ¶ 227. A POSITA would recognize that an accuracy value is an identification score. EX-1002 ¶ 227.

Motivation to Combine: A POSITA would be motivated to combine the automatic training of the deep learning model in Ido with the debarking system of Gagnon as described above. *See supra* § XIV(C)(1)(b); EX-1002 ¶¶ 228-29.

h. Claim 9:

Ido discloses the additional limitations of claim 9. EX-1002 ¶¶ 231-33. Ido describes that once the ROI is captured, it is fed into the CNN for training purposes using fine-tuning. Ido, § 3.2.2. To fine-tune the deep learning model, Ido "train[s] a CNN to learn features for a broad domain with a classification function targeted at minimizing error in that domain." *Id.* Ido also "replace[s] the classification function and optimize[s] the network again to minimize error in another, more specific domain" by "transferring the features and the parameters of the network from the broad domain to the specific one." *Id.* A POSITA would understand that transferring features and parameters constitutes manually training a deep learning model by using human validation. EX-1002 ¶ 232.

Motivation to Combine: A POSITA would combine the training of the deep learning model described in Ido with the debarking system in Gagnon because the training would produce an accurate deep learning model. EX-1002 ¶ 233. Such training is well known in the art, and would be used in the usual and expected manner. *Id*.

i. Claim 10:

Gagnon describes the additional elements of claim 10. *See supra* § XIV(B)(2)(g); EX-1002 ¶ 235.

3. Independent Claim 11

a. Element 11[pre]:

Gagnon describes this element of claim 11. *See supra*, § XIV(C)(1)(a); EX-1002 ¶ 236.

b. Element 11[a]:

Gagnon and Ido, both alone and in combination, describe this element of claim 11. *See supra* §§ XIV(C)(1)(b), (2)(b); EX-1002 ¶ 237. A POSITA would interpret the term "attributes" to mean "a quality, character, or characteristic ascribed to someone or something." EX-1002 ¶ 237; *see Attributes*, Merriam-Webster, https://www.merriam-webster.com/dictionary/attributes (last visited Aug. 25, 2025) (EX-1017). This definition is consistent with the use of the term within the specification of the '947 patent. *See*, *e.g.*, '947 patent, 3:54-62. Under this interpretation, the "attributes" of claim 11 correspond to the images of bark described with respect to claim limitation 1[a]. *See supra* § XIV(C)(1)(b); EX-1002 ¶ 237.

c. Element 11[b]:

Ido describes this element of claim 11. *See supra* § XIV(C)(1)(c) EX-1002 ¶ 238. The computerized device implementing Ido's deep learning model would be the characterizing unit. *See* EX-1002 ¶ 240.

(1) Element 11[b][i]:

Ido describes this element of claim 11. *See supra* § XIV(C)(1)(c); EX-1002 ¶ 239.

(2) Element 11[b][ii]:

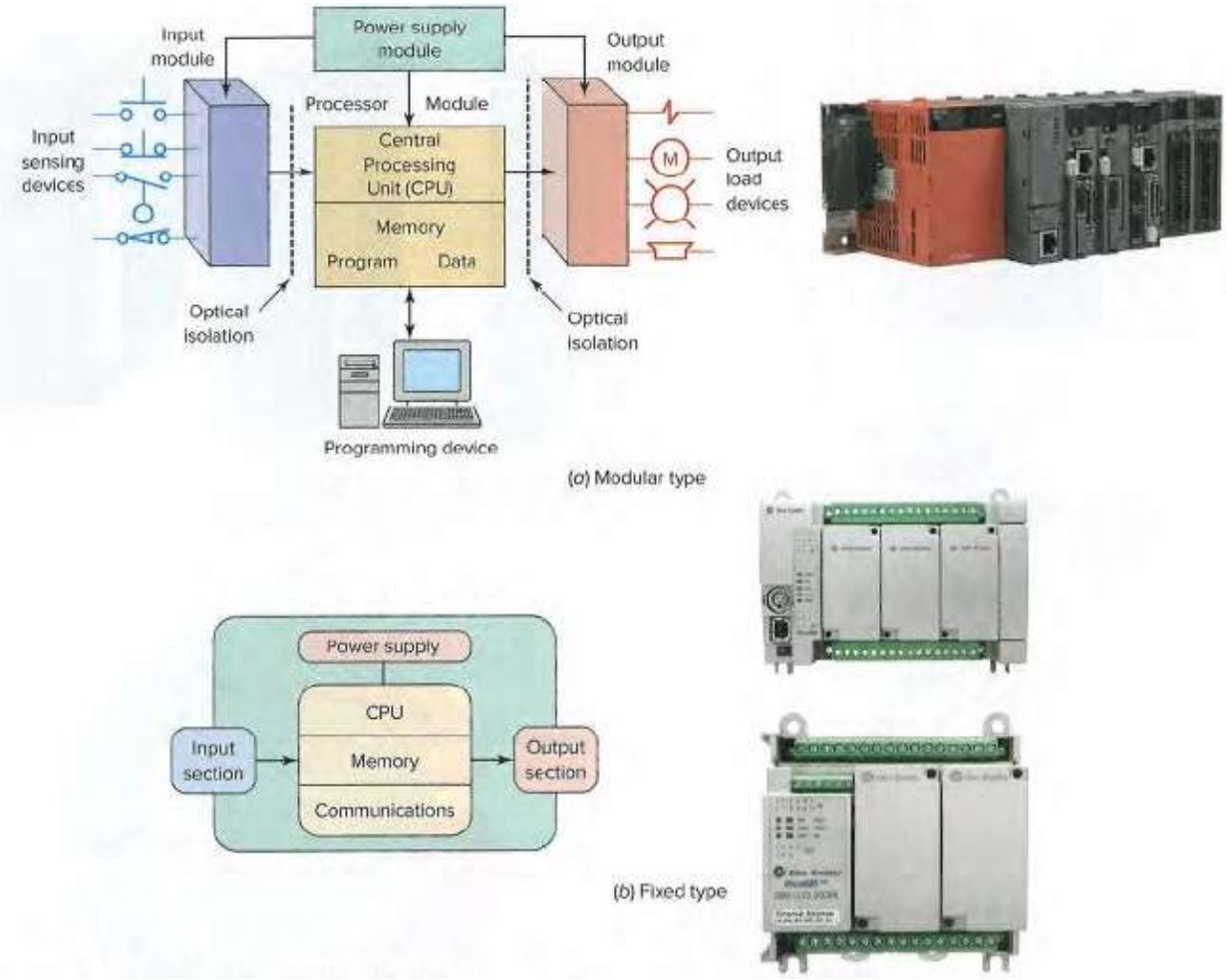
Ido describes this element of claim 11. *See supra* § XIV(C)(1)(c); EX-1002 ¶ 240.

d. Element 11[c]:

The combination of Gagnon, Ido, and Petruzella teach this element of claim 11. *See supra* § XIV(C)(1)(d); EX-1002 ¶ 241. The processor component of the PLC of Gagnon, further described in Petruzella, corresponds to the debarker optimizer. *See*, *e.g.*, Gagnon, Fig. 7; ¶ 49; *see also* Petruzella at 5, 7, Fig. 1.8; EX-1002 ¶ 241. Furthermore, the computerized device implementing Ido's deep learning model (i.e., the "characterizing unit") would communicate with the processor component of the PLC of Gagnon (i.e., the debarker optimizer) via the link 72 of Gagnon. *See*, *e.g.*, Gagnon, Figure 7; ¶ 49; *see also* Petruzella at 5, 7, Fig. 1.8; EX-1002 ¶ 241; *supra* § XIV(C)(3)(c).

e. Element 11[d]:

The combination of Gagnon and Petruzella discloses this limitation. EX-1002 ¶¶ 242-43. Gagnon describes sending computed operating parameters to control the debarker. *See supra* § XIV(C)(1)(e). Petruzella describes a communication unit that operates to provide communications with the output components (i.e., the components of the debarker), as shown in the following diagram:



Petruzella, Fig. 1-8; *see id.* at 6-7. Additionally, "[t]he I/O system forms the interface by which field devices are connected to the controller" and thereby "condition the various signals received from or sent to external field devices." *Id.* at 6. Therefore, the I/O system and communications components in Petruzella constitute a debarker controller. EX-1002 ¶ 243. The I/O system and communications components are also in communication with the processor component of the PLC. *Id.*

f. Element 11[e]:

Petruzella on its own, or Petruzella combined with Ido describes this element of claim 11. *See supra* § XIV(C)(2)(d); EX-1002 ¶ 244.

4. Dependent Claims

a. Claim 12:

Ido describes the additional elements of claim 12. *See supra* §§ XIV(C)(2)(f))-(h); EX-1002 ¶ 246.

b. Claim 13:

Ido describes this additional limitation of claim 13. *See supra* §§ XIV(C)(2)(g)-(h); EX-1002 ¶ 248.

c. Claim 14:

Ido discloses the additional elements of claim 14. *See supra* § XIV(C)(2)(h); EX-1002 ¶ 250. In this respect, the "human intervention" limitation recited in claim 14 is met for the same reasons that the "human validations" limitation in claim 9 is met. *See supra* § XIV(C)(2)(h); EX-1002 ¶ 250.

d. Claim 15:

Ido in light of Petruzella describes the additional element of claim 15. *See supra* § XIV(C)(2)(e); EX-1002 ¶ 252.

e. Claim 16:

Gagnon in light of Ido discloses the additional limitations of claim 16. EX-1002 ¶ 253. Gagnon describes a light source at the output of a debarker to assist in

obtaining intensity image data for logs that have been debarked. *See*, *e.g.,* Gagnon ¶¶ 44, 48. Because the system in Ido would be used to obtain image data at the input side of the debarking process, a POSITA would be motivated to include a light source on the input side of the debarker machine where the sensors and scanning devices for Ido would be located for obtaining images for the deep learning, tree identification model for the same reason. EX-1002 ¶ 254.

f. Claim 17:

Gagnon describes the additional elements of claim 17. *See supra* § XIV(B)(2)(g); EX-1002 ¶ 256. Gagnon also describes the signals from the external sensors being input into the PLC component (i.e., the debarker optimizer) to be used in the debarking process. *See*, *e.g.*, Gagnon ¶ 49; *id.*, Fig. 7.

g. Claim 18:

Ido discloses this limitation. EX-1002 ¶ 258. It is unclear what the limitation "the log measurement device" references because that term is not used in claim 11, from which claim 18 depends. EX-1001, claim 11. Ido describes the use of an area scan camera to obtain images of the undebarked trees and logs. Ido, Fig. 1.

D. Ground 3: Gagnon in Light of Kambla and Petruzella Renders Obvious Claims 1-18

1. Independent Claim 1

a. Element 1[pre]:

Gagnon describes this element of claim 1. *See supra* § XIV(B)(1)(a); EX-1002 ¶ 260.

b. Element 1[a]:

Gagnon and Kambla, both alone and in combination, describe this element of claim 1. *See supra* § XIV(B)(1)(b); EX-1002 ¶ 261.

Motivation to Combine: A POSITA would be motivated to combine the contactless image capture devices and deep-learning model of Kambla into the debarking system disclosed by Gagnon. *See supra* § XIV(B)(1)(b); EX-1002 ¶ 262.

c. Element 1[b]:

Kambla discloses this limitation. *See supra* § XIV(B)(1)(c); EX-1002 ¶ 263.

The motivation to combine the deep learning model from Kambla into the system of Gagnon is the same as that described for limitation 1[a]. *See supra* § XIV(B)(1)(b); EX-1002 ¶ 264.

d. Element 1[c]:

The combination of Gagnon, Kambla, and Petruzella discloses this limitation. EX-1002 ¶¶ 265-68. The combination of Gagnon and Kambla disclose identifying the characteristics of a log to be processed by a debarking machine,

e.g., diameter and tree species. *See supra* § XIV(B)(1)(d); EX-1002 ¶ 266. Gagnon also describes using the diameter and tree species of a log to compute operating parameters of a debarker. *See, e.g.*, Gagnon ¶ 48. As described above, the system of Gagnon may include a "control module" to "provide commands" for debarker adjustments "***on the basis of input data related to intrinsic characteristics*** of each log entering the debarker such as ***wood species information, mean log diameter*** . . . ." *Id.* ¶ 49; *see supra* § XIV(B)(1)(d).

As shown in Figure 7 of Gagnon, the wood species and diameter data would be received by controller 67, described as a PLC. EX-1002 ¶ 267; *see* Gagnon ¶ 49, Fig. 7. Petruzella discloses a PLC that includes a CPU and a memory component. Petruzella at 5. Petruzella describes a PLC that could receive input values, like tree species and/or diameter, and calculate output operating parameters for a debarker. *See supra* § XIV(C)(1)(d); EX-1002 ¶ 267. A POSITA would be motivated to incorporate the teachings of the PLC of Petruzella into the debarker system of Gagnon. *See supra* § XIV(C)(1)(d); EX-1002 ¶ 268.

e. Element 1[d]:

Gagnon discloses this limitation. *See supra* § XIV(B)(1)(e); EX-1002 ¶ 269.

f. Element 1[e]:

The combination of Gagnon and Petruzella disclose this limitation. *See supra* § XIV(C)(1)(f); EX-1002 ¶ 270.

2. Dependent Claims

a. Claim 2:

Kambla discloses the additional limitations of claim 2. *See supra* § XIV(B)(2)(a); EX-1002 ¶¶ 272-73. See above for the motivation to combine. *See supra* §§ XIV(B)(1)(b), (2)(a); *see also* EX-1002 ¶ 273.

b. Claim 3:

Kambla discloses the additional limitations of claim 3. *See supra* § XIV(B)(2)(b); EX-1002 ¶¶ 275-76. See above for the motivation to combine. *See supra* §§ XIV(B)(1)(b), (2)(b); *see also* EX-1002 ¶ 276.

c. Claim 4:

Kambla discloses the additional limitations of claim 4. *See supra* § XIV(B)(2)(c); EX-1002 ¶¶ 278-79. See above for the motivation to combine. *See supra* §§ XIV(B)(1)(b), (2)(c); *see also* EX-1002 ¶ 279.

d. Claim 5:

Petruzella teaches the additional limitations of claim 5. *See supra* § XIV(C)(2)(d); EX-1002 ¶ 280.

e. Claim 6:

Kambla in light of Petruzella disclose the additional limitations of claim 6. EX-1002 ¶¶ 282-88. Kambla describes the use of an array of image sensors to capture images of the bark on a tree or log. *See* Kambala ¶¶ 44, 51, 58. Image sensors capture various ranges of light intensities to depict images and are used to identify characteristics of a log (e.g., tree species) in Kambla. EX-1002 ¶ 283;

Kambla ¶ 89. These characteristics are then used to index the operating parameters stored in the PLC array disclosed in Petruzella. *See supra* § XIV(C)(2)(e); EX-1002 ¶ 283.

Kambla includes a separate type of intensity level. In particular, the neural network classifier of Kambla would output probability values based on the different categories that an item is to be sorted into. EX-1002 ¶ 284; *see, e.g.,* Kambla ¶ 89. The probabilities would correspond to the tree species of an undebarked log and the intensity levels recited in claim 6, and can be used to index the table of operating parameters. EX-1002 ¶¶ 283-85. For example, the intensity levels would be used when indexing the table because the neural network classifier would categorize the picture of the tree according to the highest probability of the species of the tree, and the logs with the highest probability would be used to index the table. *See id*.

Motivation to Combine: A POSITA would be motivated to combine the AI functionality of Kambla and the array of Petruzella into the debarker system disclosed in Gagnon. *See supra* §§ XIV(B)(1)(d), (C)(1)(d); EX-1002 ¶¶ 286-88.

f. Claim 7:

(1) Element 7[pre]:

Kambla describes training a deep learning model. *See supra* § XIV(B)(2)(d)(1); EX-1002 ¶ 290.

(2) Element 7[a]:

Kambla discloses this limitation. *See supra* § XIV(B)(2)(d)(2); EX-1002 ¶ 291.

(3) Element 7[b]:

Kambla discloses this limitation. *See supra* § XIV(B)(2)(d)(3); EX-1002 ¶ 292.

(4) Element 7[c]:

Kambla discloses this limitation. *See supra* § XIV(B)(2)(d)(4); EX-1002 ¶ 293.

(5) Element 7[d]:

Kambla discloses this limitation. *See supra* § XIV(B)(2)(d)(5); EX-1002 ¶ 294.

(6) Element 7[e]:

Kambla discloses this limitation. *See supra* § XIV(B)(2)(d)(6); EX-1002 ¶ 295.

(7) Motivation to Combine

See above for the motivation to combine. *See supra*, § XIV(B)(1)(b); EX-1002 ¶¶ 104-105, 140, 296.

g. Claim 8:

Kambla discloses the additional limitations of claim 8. *See supra* § XIV(B)(2)(e); EX-1002 ¶¶ 298-99.

h. Claim 9:

Kambla discloses the additional limitations of claim 9. *See supra* § XIV(B)(2)(f); EX-1002 ¶¶ 301-02.

i. Claim 10:

Gagnon discloses this limitation of claim 10. *See supra* § XIV(B)(2)(g); EX-1002 ¶ 304.

3. Independent Claim 11

a. Element 11[pre]:

Gagnon discloses this limitation of claim 11 to the extent the preamble is limiting. *See supra* § XIV(C)(3)(a); EX-1002 ¶ 305.

b. Element 11[a]:

Gagnon and Kambla, alone and in combination, disclose this limitation of claim 11. *See supra* §§ XIV(B)(1)(b); EX-1002 ¶ 306. A POSITA would interpret the term "attributes" to mean "a quality, character, or characteristic ascribed to someone or something." *See* EX-1017; *see also* EX-1002 ¶ 306. This definition is consistent with the use of the term within the specification of the '947 patent. *See*, *e.g.*, '947 patent, 3:54-62. Under this interpretation, the "attributes" of claim 11 would correspond to the images of bark and/or log ends described with respect to claim limitation 1[a]. *See supra* § XIV(D)(1)(b).

c. Element 11[b]:

Kambla discloses this limitation. *See supra* § XIV(B)(1)(c); EX-1002 ¶¶ 307-09. The hand held unit in Kambla that runs the deep learning model would be the characterizing unit. *See* EX-1002 ¶¶ 307-09.

(1) Element 11[b][i]:

Kambla discloses this limitation. *See id*.

(2) Element 11[b][i]:

Kambla discloses this limitation. *See id*.

d. Element 11[c]:

The combination of Gagnon, Kambla, and Petruzella discloses this limitation of claim 11. *See supra* § XIV(D)(1)(d); EX-1002 ¶ 310. The processor component of the PLC of Gagnon, further described in Petruzella, corresponds to the debarker optimizer. *See*, *e.g.*, Gagnon, Figure 7; ¶ 49; *see also* Petruzella at 5, 7, Fig. 1.8; EX-1002 ¶ 310. Furthermore, the hand held unit that runs Kambla's deep learning model (i.e., the "characterizing unit") would communicate with the processor component of the PLC of Gagnon (i.e., the debarker optimizer) via the link 72 of Gagnon. *See*, *e.g.*, Gagnon, Figure 7; ¶ 49; *see also* Petruzella at 5, 7, Fig. 1.8; EX-1002 ¶ 310; *supra* § XIV(D)(3)(c).

e. Element 11[d]:

The combination of Gagnon and Petruzella discloses this limitation. *See supra* § XIV(C)(1)(e); EX-1002 ¶ 311.

f. Element 11[e]:

Petruzella discloses this limitation. *See supra*, § XIV(C)(2)(d); EX-1002 ¶ 312.

4. Dependent Claims

a. Claim 12:

Kambla discloses the additional limitation of claim 12. *See supra* § XIV(B)(2)(d)-(f), (D)(2)(f)-(h); EX-1002 ¶ 314.

b. Claim 13:

Kambla discloses the additional limitations of claim 13. *See supra* §§ XIV(B)(2)(e), (D)(2)(g); EX-1002 ¶ 316.

c. Claim 14:

Kambla discloses the additional limitations of claim 14. *See supra*, §§ XIV(B)(2)(f), (D)(2)(h); EX-1002 ¶ 318. In this regard, the "human intervention" term recited in claim 14 corresponds to the "human validation" term in claim 9. EX-1002 ¶ 318.

d. Claim 15:

The combination of Kambla and Petruzella discloses the additional limitations of claim 15. *See supra* §§ XIV(C)(2)(e), (D)(2)(e); EX-1002 ¶ 320.

e. Claim 16:

The combination of Gagnon and Kambla discloses the additional limitations of claim 16. EX-1002 ¶ 322. Gagnon describes using a light source at the output of the debarker to assist in obtaining intensity image data for logs that have been

debarked. *See*, *e.g.*, Gagnon ¶ 48. For the same reason, a POSITA would be motivated to include a light source on the input side of the debarker, where sensors and scanning devices would be located for obtaining images for the deep learning, tree identification model, in a combination of Gagnon and Kambla. EX-1002 ¶ 322.

f. Claim 17:

Gagnon discloses the additional limitations of claim 17. *See supra*, § XIV(B)(2)(g); EX-1002 ¶ 324. Gagnon additionally teaches signals from external sensors are input into a PLC component to be used by the processor component (*i.e.*, the debarker optimizer) in the debarking process. *See*, *e.g.*, Gagnon ¶ 49; Fig. 7.

g. Claim 18:

Gagnon and Kambla, both alone and in combination, teach the additional limitations of claim 18. EX-1002 ¶ 326. Although the term "the log measurement device" does not appear in claim 11, and is therefore unclear, Kambla describes an area scan camera used to obtain images of undebarked trees and logs. *See* EX-1002 ¶ 326; *see also* Kambla ¶¶ 43, 50.

E. Ground 4: Claims 1-18 Claim Unpatentable Subject Matter Under 35 U.S.C. § 101

Ever since the Supreme Court's ruling in *Alice Corp. v. CLS Bank International*, 573 U.S. 208 (2014), over a decade ago, courts have routinely struck down claims that do no more than digitize well-known systems or processes via

integration with a generic computer system or the Internet. The emergence of artificial intelligence/deep learning models adds one further entry to this list of technologies that cannot provide the sole basis for patentability when incorporated into existing systems, as the Federal Circuit made clear in a recent decision. Yet, the claims in the '947 patent do just this by incorporating a generic AI model into the operation of a debarker machine. This attempt should be rejected, and these claims found to cover unpatentable subject matter.

1. Independent Claims 1 and 11 Cover Abstract Concepts

Under *Alice*, the court performs a two-step process to determine patent eligibility. 573 U.S. at 217. The first step requires that the court determine whether the claims are directed towards a patent ineligible concept – laws of nature, natural phenomena, or abstract ideas. *Id.* For software patents, including those directed towards AI, "the step-one inquiry determines whether the claims focus on the specific asserted improvement in computer capabilities … or, instead, on a process that qualifies as an abstract idea for which computers are invoked merely as a tool." *See Recentive Analytics, Inc. v. Fox Corp.*, 134 F.4th 1205, 1212 (Fed. Cir. 2025) (internal citations omitted). The claims must also recite the specific improvements; otherwise, they will be considered abstract if they describe various operations without "sufficiently describ[ing] how to achieve [the] results in a non-abstract way." *See IBM v. Zillow Grp., Inc.*, 50 F.4th 1371, 1381 (Fed. Cir. 2022).

Moreover, "[a]n abstract idea does not become nonabstract by limiting the invention to a particular field of use or technological environment," *Intell. Ventures I LLC v. Capital One Bank (USA)*, 792 F.3d 1363, 1366 (Fed. Cir. 2015), or by disclosing the use of an "already available [technology], with [its] already available basic functions, to use as [a] tool[] in executing the claimed process." *Recentive*, 134 F.4th at 1214 (alterations in original).

The claims in the '947 patent do nothing more than apply generic deep learning capabilities to an existing technical field – debarking machines. *See* EX-1002 ¶ 328. There is no description in the specification, much less contained within the claims, that specifies how to improve upon an existing AI model. To the contrary, the specification states that "any type of deep learning algorithm may be used with the method of the present invention and is not limited to one type only", *see* '947 patent, 8:19-22, confirming that the deep learning technology "is conventional." *See Recentive*, 134 F.4th at 1212. Moreover, the claims merely recite identifying characteristics of the log "using a trained deep learning model." *See*, *e.g.*, '947 patent, claims 1, 11. Neither the specification nor the claims recite any specific improvement to the operation of a generic deep learning model directed toward identifying log characteristics. *See* EX-1002 ¶¶ 329-330, 333.

The application of deep learning models to the field of debarking does not save the claims from being abstract. *See Recentive*, 134 F.4th at 1213-14. In this case, the deep learning model automates a process the patent describes as "[t]raditionally" being subject to "human judgement" when adjusting the control

parameters. *See* '947 patent, 2:47-48. Moreover, other than automating this process, the specification and claims do not otherwise alter the debarking process. *See* EX-1002 ¶ 333. Instead, the specification merely provides a list of tree characteristics and a list of operating parameters, both in non-exhaustive form. *See* '947 patent, 5:43-55; *see also* EX-1002 ¶ 336. With one generic exception involving high moisture level and high knot presence, the specification leaves it to the practitioner to provide the associations between the input and the output. *See* '947 patent, 7:10-16; *see also* EX-1002 ¶¶ 56, 336-337, 339-342.

The training process described in the specification and recited in some of the dependent claims also fails to take the claims out of the abstract realm. EX-1002 ¶ 343. According to the specification, the model can be trained manually or automatically. *See* '947 patent, 7:53-60; *see also* EX-1002 ¶¶ 333, 342. The training process can result in an identification score, which if "satisfying," may result in the model being considered trained. '947 patent, 8:7-12; *see also* EX-1002 ¶¶ 139-140, 343. The *Recentive* court, however, rejected the argument that iterative training using selected training material and dynamic adjustments made AI claims not abstract. *See* 134 F.4th at 1212-13. Moreover, even if PO did make this argument, the independent claims do not include this limitation, and the specification notes that automatic training "may both provide unexpectedly good or bad results," '947 patent, 7:58-60, such that this disclosure does not represent an advancement over the prior systems.

Finally, the use of a table in claim 11 does not create patent eligibility. *Recentive*, 134 F.4th at 1214. "[C]ollecting information, including when limited to particular content (which does not change its character as information)" is "within the realm of abstract ideas." *Id.* (quoting *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016)). The indexed table in claim 11 merely stores input data and output operating parameters, without changing the nature of that data or establishing any association between the data and parameters. *See* EX-1002 ¶ 341-342. Accordingly, the claims are still abstract.

2. Independent Claims 1 and 11 Do Not Transform the Nature of the Claims

At step 2 of the *Alice* analysis, courts will "consider the elements of [the] claim both individually and 'as an ordered combination' to determine whether the additional elements 'transform the nature of the claim' into a patent-eligible application." 573 U.S. at 217. Something more is needed to transform the claims than merely "stating the abstract idea while adding the words 'apply it.'" *See Recentive*, 134 F.4th at 1214 (quoting *Trinity Info Media, LLC v. Covalent, Inc,*, 72 F.4th 1355, 1365 (Fed. Cir. 2023) . Thus, "the claim must include 'an inventive concept sufficient to transform the claimed abstract idea into a patent-eligible application.'" *Id.* at 1215 (quoting *Trinity*, 72 F.4th at 1365 (Fed. Cir. 2023) (citation modified))).

Here, claim 1 recites a method that includes the steps of (i) performing a characterization of an undebarked log; (ii) using a deep learning model to identify

characteristics of that log; (iii) computing operating parameters for a debarker; and (iv) sending those parameters to the debarker. *See* EX-1002, ¶ 339. Nothing within this claim, either individually or in combination, takes it out of the abstract idea.

Claim 1 further recites a step for "retrieving operating parameters," but such a step can hardly be the "something more" required at *Alice* step 2 because "retrieving operating parameters" is a step that any computer device will take. *See* EX-1002 ¶¶ 340, 342. When a table stores those operating parameters, the processor will retrieve them prior to transmitting them to the debarker. *Id*. Similarly, when the processor calculates the operating parameters, e.g., according to some equation, it will store the calculated value in some memory location from where the processor will then retrieve it as part of the communications routine. *Id*. Accordingly, whatever the "something more" is that is necessary to transform the claim, reciting a step that is coextensive with one of the ordinary operations a computer processor takes fails to provide it.

Claim 11, likewise, fails to recite something significantly more to transform the nature of the claim. Claim 11 recites a system that includes (i) a contactless sensor; (ii) a characterizing unit that includes "a deep learning model" and a computerized device "configured to identify characteristics of the undebarked log"; (iii) a debarker optimizer "configured to compute operating parameters of a debarker based" on the identified characteristics; and (iv) a debarker controller

configured to "control the debarker using the computed operating parameters." *See* EX-1002, ¶ 341.

The indexed table further recited in claim 11 fails to transform the claim into patent eligible subject matter. "[M]erely selecting information, by content or source, for collection, analysis, and display does nothing significant to differentiate a process from ordinary mental processes, whose implicit exclusion from § 101 undergirds the information-based category of abstract ideas." *Elec. Power* , 830 F.3d at 1355 . Further, claims that "do not even require a new source or type of information, or new techniques for analyzing it" fail to clear the step 2 hurdle. *See id.*

Here, claim 11 merely recites an indexed table "comprising operating parameters associated with one or more identifiable log characteristics." *See* '947 patent, claim 11. The claim fails to identify any operating parameters or log characteristics, much less specify any particular association or index between these two categories. *See* EX-1002 ¶¶ 336, 341-342. This shortcoming is unsurprising given that the specification similarly did little more than provide non-exhaustive lists of operating parameters and log characteristics. '947 patent, 5:46-55; *see also* EX-1002 ¶¶ 336, 341-342. Elsewhere, the specification noted that the non-exhaustive list of debarking parameters "may be any parameter of a debarking apparatus ***known in the art***." '947 patent, 7:18-20 (emphasis added). Accordingly, taking known operating parameters and associating known log

characteristics in an unspecified way fails to provide the something more to transform the claims under step 2.

3. The Dependent Claims Are Also Abstract Under the *Alice* Test

For the most part, the dependent claims do no more than add insignificant pre- or post-solution activities as claim limitations, which does not save the claims from being abstract. *See*, *e.g.*, *Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229, 1244 (Fed. Cir. 2016). For example, claims 2, 3, 16, and 18 recite generic types of sensors or light sources to be used when capturing data. *See* EX-1002 ¶¶ 121, 254, and 343. But the use of generic components operating in the normal and expected way makes the claims no less abstract. *See id*.

Claims 4, 10, and 17 describe the use of additional sensors or limit the types of data to be input into the claimed system. *See* EX-1002 ¶¶ 194, 256, 343. But specifying the type of data captured by the system or the types of sensors used is directed at nothing more pre-solution activities that also do not save the claims. *See id*.

Dependent claims 7, 8, 9, 12, 13, and 14 attempt to narrow the scope of the training covered by the patents, but as the Federal Circuit noted, training is an inherent part of building an AI model, *see Recentive*, 134 F.4th at 1212, and the specification did not describe any of the disclosed methods or techniques as improving the training process. In fact, the specification notes that at least one of the training methods may "provide unexpectedly good or bad results." *See* '947

patent, 7:58-60. Accordingly, narrowing the training process to using well-known techniques also does not establish patentability for these claims.

Finally, claims 5, 6, and 15 focus on the use of an index table, but these claims fail to provide patentability for the same reasons that the index table recited in claim 11 failed to provide patentability.

F. Ground 5: Claims 7 and 8 Are Indefinite Under 35 U.S.C. § 112(b)

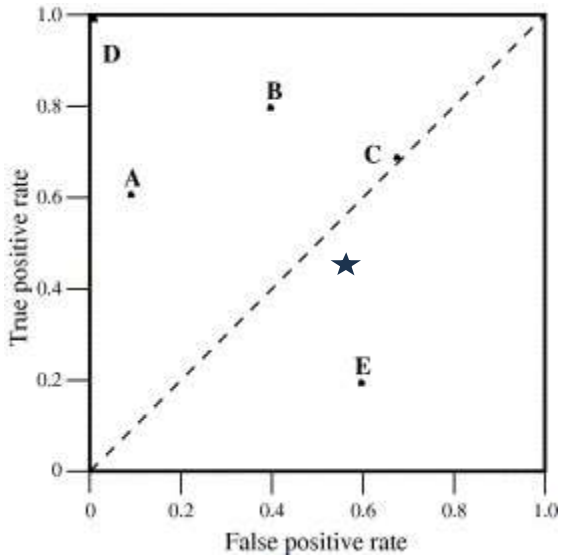
Under section 112, a patent "shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention." 35 U.S.C. § 112(b). Claims fail this definiteness requirement when, "read in light of the specification delineating the patent, and the prosecution history," they "fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments Inc.*, 572 U.S. 898, 901 (2014).

In *Dow Chemical Co. v. Nova Chemicals Corp.*, the Federal Circuit held a set of claims to be indefinite when those claims involved the possible application of "multiple methods leading to different results" when neither the claims nor the specification provide guidance "as to which method should be used." 803 F.3d 620, 634 (Fed. Cir. 2015). In that case, the court found that at least four methods could be used to determine the maximum slope of a hardening curve, and that these methods "do not always produce the same results." *See id.* Further, even though a POSITA "*could* determine which method was most appropriate," a patent claim is

still indefinite "if it leaves the skilled artisan to consult the unpredictable vagaries of any one person's opinion." *See id.*, 635 (emphasis added) (citation modified).

Here, claim 7 is indefinite because it recites, "*considering* the deep learning model trained if the identification score is different from a *predetermined value*" without providing guidance on what that predetermined value should be. The term "predetermined" appears four times in the patent specification: once in the Summary of the Invention section in a description that parallels claim 7, and three more times in column 7 discussing training of deep learning models. *See* '947 patent, 3:43-45, 7:34-40. In neither of these locations, however, does the specification provide guidance on how to determine this "predetermined level." *See id.* Claim 7 suffers from the same defect.

Without such guidance, the '947 patent leaves it to a POSITA to determine what metric to use in determining this "predetermined level." A POSITA, however, would be aware of at least three different methods for determining the acceptability of a trained deep learning model. *See* EX-1002 ¶ 345. These three methods – accuracy, false positive, and true positive – can lead to different results in terms of whether a deep learning model is considered "trained." *See id*. As shown in the following annotated diagram, a POSITA using the false negative metric (point E) may consider the model achieving the starred results to be trained, whereas a POSITA using an accuracy metric (e.g., point B) may not:



See EX-1011; *see also* EX-1002 ¶ 345. Yet the specification and the claims provide no guidance on what metric to use in this application.

Compounding this defect is that the claim relies upon the POSITA's subjective opinion to determine whether the model is trained. In particular, the claim recites, "*considering* the deep model trained." *See* '947 patent, claim 7. This limitation, thus, relies upon the opinion of each operator of the debarker machine. *See* EX-1002 ¶ 345. In fact, even operators who use the *same metric* may arrive at *different infringement conclusions* for the same trained model if one operator considers a system trained and the other operator does not. *See id.*

Each of these reasons, standing alone, suffices to find claim 7 indefinite. Both of them, together, point to an overwhelming conclusion that claim 7 is unpatentable as indefinite. Claim 8 depends from claim 7 and is indefinite for the same reason.

XV. CONCLUSION

The unpatentability grounds presented above are reasonably likely to prevail, post-grant review should be instituted, and claims 1-18 should be cancelled as unpatentable.

Respectfully submitted,

/ Jeffrey Danley /

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CERTIFICATE OF WORD COUNT COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), Petitioner certifies that this petition includes 16,619 words, as measured by Microsoft Word, exclusive of the table of contents, table of authorities, mandatory notices under § 42.8, certificate of service, word count, and table of exhibits.

CERTIFICATE OF SERVICE

The undersigned hereby certifies that the above document was filed through the Patent Trial and Appeal Board P-TACTS System and was served on Patent Owner's attorneys of record via express mail as follows :

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Respectfully submitted,

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