

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

# PCT

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

To:

see form PCT/ISA/220

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/EP2019/083536

International filing date (day/month/year)  
03.12.2019

Priority date (day/month/year)  
06.12.2018

International Patent Classification (IPC) or both national classification and IPC  
INV. G06N3/04 G06N3/08 G06K9/00

Applicant  
IEE INTERNATIONAL ELECTRONICS & ENGINEERING S.A.

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

### 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:



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Date of completion of  
this opinion

see form  
PCT/ISA/210

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**Box No. I Basis of the opinion**

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1. With regard to the **language**, this opinion has been established on the basis of:
  - the international application in the language in which it was filed.
  - a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2.  This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3.  With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
  - a.  forming part of the international application as filed:
    - in the form of an Annex C/ST.25 text file.
    - on paper or in the form of an image file.
  - b.  furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
  - c.  furnished subsequent to the international filing date for the purposes of international search only:
    - in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
    - on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4.  In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	<u>1-11</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-11</u>
Industrial applicability (IA)	Yes: Claims	<u>1-11</u>
	No: Claims	

2. Citations and explanations

**see separate sheet**

**Re item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

- 1 Reference is made to the following document:
  - D1 US 2018/253645 A1 (BURR GEOFFREY W [US]) 6 September 2018 (2018-09-06)
  
- 2 The applicant has requested to have the present application processed under PCT Direct (PCT Guidelines B-IV, 1.2.1). Account taken of the applicant's comments submitted with the PCT Direct letter (from now on referred to as L) of 02-12-2019, this Authority considers that the claims do not meet the requirements of the PCT for the following reasons.
  
- 3 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of independent claims 1, 7, 10 and 11 does not involve an inventive step in the sense of Article 33(3) PCT.
  - 3.1 Claim 1: D1 (by default, references in parentheses apply to this document) is regarded as being the prior art closest to the subject-matter of claim 1, and discloses a method of operating an artificial intelligence sensor system for supervised training purposes (col.11, 1.67-col.12, 1.9), the artificial intelligence sensor system having one or more sensors (e.g. fig.2: sensors 232, 234, 460 472) and at least one classifier or artificial neural network that is configured for receiving and processing signals from the sensor or the sensors (e.g. fig.6B), wherein the method comprises at least the following steps that are to be executed iteratively:
    - providing signals from the sensor or the sensors as input data to the at least one classifier or artificial neural network (e.g. fig.6B and col.21, 1.24-1.48),
    - operating the at least one classifier or artificial neural network to derive an output representing a quality, which encompasses abstract objects such as classes used for classification purposes as well as properties of the object (the classes "unsafe driving" and "unsafe driving") with a confidence level regarding the provided signals (col.21, 1.24-1.48: confidence).
    - if the derived confidence level of the quality is equal to or larger than a predetermined confidence level, permanently storing at least a portion of the provided signals and the derived quality as labeled online training data, using

the derived quality as the label (col.21, 1.24-1.48: in the case of "high degree of confidence"; col.48, 1.25-27: "the sensor data [...] may be labelled prior to [...] block 1806"),

- if the derived confidence level of the quality is lower than the predetermined confidence level, temporarily storing the at least one provided signal and the derived quality (col.21, 1.24-1.48: in the case of "unable to determine [...] with a high degree of confidence"),
- confirming the quality having a derived confidence level lower than the predetermined confidence level by use of at least one independent sensor signal (col.21, 1.36-1.40: "combine these outlier images with other images captured by the sensor 716"), ~~including using a signal of another sensor from which the at least one classifier or artificial neural network derives an out put representing a quality with a confidence level that is equal to or larger than the predetermined confidence level, and~~
- after completion of the step of confirming, permanently storing at least a portion of the temporarily stored signal or signals and the derived quality as labeled online training data, using the derived quality as the label (considered implicitly disclosed by col.48, 1.25-27: "the sensor data [...] may be labelled prior to [...] block 1806"; the recovered "outlier images" form inevitably part of the training dataset, otherwise the recovery process would be pointless).

The subject-matter of claim 1 differs from D1 in that classes assigned with a low level of confidence are reassessed "using a signal of another sensor from which the at least one classifier or artificial neural network derives an output representing a quality with a confidence level that is equal to or larger than the predetermined confidence level".

The technical effect of this difference is to discriminate between classes assigned with a low level of confidence due to an intrinsic low quality of the sensor data, that should be removed from the learning dataset, and classes assigned with a low level of confidence due to a borderline situation, that should be included in the learning dataset.

This technical effect is already achieved by D1 (col.21, 1.24-1.48) by considering other images captured by the same sensor; whereas claim 1 specifies using data captured by another sensor.

Starting from D1, the technical problem is formulated as how to further improve the discrimination.

D1 (col.21, 1.24-1.48) discloses how to deal with outliers from one sensor, "sensor 716". The previous paragraph (col.20, 1.57-col.21, 1.23) discloses that a plurality of sensors, including "sensor 716", look concurrently at the same thing (the driver). Therefore it would be obvious to the skilled person to also use data acquired concurrently by the other sensors when assessing the outliers from "sensor 716".

- 3.1.1 In L, it is argued by the applicant that D1 discloses processing the outliers on a remote device. This argument is not followed by the examining division. Claim 1 does not specify that this method step is performed on a local machine. Besides, this alleged difference would be an obvious alternative design choice that the skilled person would consider depending on the size of the dataset, available computing resources...
- 3.1.2 In L, it is argued by the applicant that D1 discloses an outliers assessment performed by a human. This argument is not followed by the examining division. A user-based validation is only one example disclosed by D1 (col.21, 1.8: "(e.g. based on a user input)") which is simply inapplicable for large datasets, which D1 contemplates (col.17, 1.33: "the large quantity of images may be 100,000 images").
- 3.2 Claim 7: The objection in §3.1 above also applies, mutatis mutandis, to the subject-matter of claim 7.
- 3.3 Claim 10: D1 further discloses an automotive exterior sensing system (col.16, 1.34-1.35: "based on detection of surrounding hazards")
- 3.4 Claim 11: D1 further discloses an automotive interior sensing system (col.10, 1.41-1.54).
  
- 4 Dependent claims 2-6, 8 and 9 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of novelty and/or inventive step.
  - 4.1 Claim 2: Disclosed by D1 (fig.18 and col.48, 1.13-1.27).
  - 4.2 Claim 3: Disclosed by D1 (col.18, 1.20-1.37).

- 4.3 Claim 4: D1 discloses multiple hidden layers (fig. 6B). However, D1 does not disclose using freezing layers during the training. Layer freezing and its impact on learning rate is a known to the skilled person. Therefore, the skilled person would decide to use it depending on a compromise between accuracy and processing time.
- 4.4 Claims 5-6: It would be obvious to use ground truth to assess if the classifier operates properly, in order to avoid divergence, overfitting...
- 4.5 Claim 8: Disclosed by D1 (col. 10, 1.53-1.55).
- 4.6 Claim 9: Disclosed by D1 (fig. 6B).