AATRIZINVENTOR SOLUTION FOR INNOVATION BASED ON NATURE'S L.I.
Working Document to Build a Specific Solution.

INNOVATION CHALLENGE: Improve Facial recognition by a Facial Recognition Inspector affected by identification difficulties and poor performance

APLICATION OF NATURE'S LANGUAGE OF INNOVATION / Nature's L.I.
Web site: www.aatrizinventor.com
Reference book: The Nature's Language of Innovation, José Roberto Espinoza, Amazon, Kindle.
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STARTING FACTORS FOR INNOVATION:
FUNCTION AFFECTED: Facial recognition by a Facial Recognition Inspector affected by identification difficulties and poor performance
PHYSICAL VARIABLE OR CHARACTERISTIC: Less Ability for facial recognition
S1 OBJECT: FACIAL RECOGNITION INSPECTOR Type: Moving
S2 OBJECT: PEOPLE TO RECOGNITION Type: Moving
DESIRED ACTION VERB: Improve

INNOVATION CHALLENGE:
CHALLENGE: Improve Facial recognition by a Facial Recognition Inspector affected by identification difficulties and poor performance
DESIRED GOAL: More Ability for facial recognition
EVALUATED OBJECT: FACIAL RECOGNITION INSPECTOR
NEED TO SATISFY > 32. Ease of achieving desired outcome

SELECTED INNOVATION PARAMETERS TO EVALUATE:
A. UNDESIRABLE EFFECTS CAUSES OF DISSATISFACTION (UDEs)
There are More difficulty to Improve Facial recognition by a Facial Recognition Inspector affected by identification difficulties and poor performance because:
FACIAL RECOGNITION INSPECTOR Has More Heaviness, value, cost, or restriction, whether physical or figurative interacting with S2
FACIAL RECOGNITION INSPECTOR Has Less Measurement accuracy interacting with S2
FACIAL RECOGNITION INSPECTOR Has Less Adaptability or versatility to interaction variability of S2
FACIAL RECOGNITION INSPECTOR Has More Difficulty in detection and measurement interacting with S2
There are undesirable effects that cause dissatisfaction because:
There is Less Ability for facial recognition
B. DESIRED EFFECT FOR NEED TO SATISFY
There is More ease to Improve Facial recognition by a Facial Recognition Inspector affected by identification difficulties and poor performance because:
FACIAL RECOGNITION INSPECTOR Has Ease of achieving desired outcome interacting with S2

There is desirable effect for need to satisfy because:
There is More Ability for facial recognition

Table I. RELATIONSHIP WITH UNIVERSAL TRIZ INNOVATION PARAMETERS (maximum of 7 undesirable effects)
CHALLENGE: Improve Facial recognition by a Facial Recognition Inspector affected by identification difficulties and poor performance

This table presents the selected innovation parameters to evaluate the challenge that must be resolved for the interaction between an Object S1 and an Object S2, and no others. The choice of undesirable effects must be based on a thorough review of the current situation, identifying them based on the objective evidence present within the predefined space and time of evaluation.
Fulfilling this requirement is crucial: If you do not connect the dots of the current situation properly, the algorithm will deliver a disconnected solution.
The selection of the need to satisfy should reflect the best estimation of the innovation-evolution state of the object S1 being evaluated.
Recognizing the criticality of this selection process, the Aatrizinventor algorithm provides flexibility to change parameters and conducts a sensitivity analysis in order to offer alternative solutions. These alternatives are based on different combinations of the entered parameters, also including a different need to satisfy from the one originally posed.

Parameters to evaluate(s)	**It is understood as FACIAL RECOGNITION INSPECTOR has:**
Parámeters of undesirable effects (UDE):	**Undesirable effects causes of dissatisfaction:**
(+) 1. Heaviness of moving object	More Heaviness, value, cost, or restriction, whether physical or figurative interacting with S2
(-) 28. Measurement accuracy	Less Measurement accuracy interacting with S2
(-) 35. Adaptability or versatility	Less Adaptability or versatility to interaction variability of S2
(+) 37. Difficulty of detecting and measuring	More Difficulty in detection and measurement interacting with S2
Desirable parameter (DE):	**Desirable Effect for Need to satisfy:**
32. Ease of achieving desired outcome	Ease of achieving desired outcome interacting with S2
TRIZ undesirables parameters for sensitivity analysis	**It is understood as FACIAL RECOGNITION INSPECTOR has:**
(+) 7. Volume of moving object	More Own physical volume or accumulated quantitative volume or three-dimensional scope interacting with S2
(-) 12. Shape / composition / configuration	Less Appropriate shape, composition, or configuration interacting with S2

(+) 26. Quantity of substance / Capacity gains	More Quantity of substance delivered or produced per control unit interacting with S2
n/a	
n/a	

EVALUTION RESULTS TABLES

TABLE II. SPECIFIC CONTRADICTION MATRIX FOR UNDESIRABLE EFFECTS AND NEED TO SATISFY.
FOR EVALUATED OBJECT: FACIAL RECOGNITION INSPECTOR AND NEED TO BE SATISFIED > 32. Ease of achieving desired outcome
CHALLENGE: Improve Facial recognition by a Facial Recognition Inspector affected by identification difficulties and poor performance

(*) Preferred parameters: Improve 1. Heaviness of moving object & Attenuate or preserve 28. Measurement accuracy.
Contradictions/ E.C: Essential, Comp.:Complementary, Top 5: Up to the major fifth, noted if outside the preferred parameters.

Parameter to attenuate or preserve => Parameter to improve	Var.	(+) Par.1	**(-) Par.28 PREF.**	(-) Par.35	(+) Par.37	(+) Par.32	Sum wt
(+) 1. Heaviness of moving object PREF.	wt		**wt.1 E.C.**	**wt.18 Compl.**	**wt.4 Compl.**	**wt.11 Compl.**	100%
	IP(s)	0,0,0,0	28,27,35,26	29,5,15,8	28,29,26,32	27,28,1,36	
(-) 28. Measurement accuracy	wt	**wt.3 Top 5**		wt.10	wt.7	wt.20	71%
	IP(s)	32,35,26,28	0,0,0,0	13,35,2,0	26,24,32,28	6,35,25,18	
(-) 35. Adaptability or versatility	wt	wt.14	**wt.13 Compl.**		wt.8	wt.16	36%
	IP(s)	1,6,15,8	35,5,1,10	0,0,0,0	1,0,0,0	1,13,31,0	
(+) 37. Difficulty of detecting and measuring	wt	**wt.2 Top 5**	**wt.6 Compl.**	wt.12		wt.9	84%
	IP(s)	27,26,28,13	26,24,32,28	1,15,0,0	0,0,0,0	5,28,11,29	

32. Ease of achieving desired outcome	wt	wt.17	**wt.19 Compl.**	wt.15	**wt.5 Top 5**		39%
	IP(s)	28,29,15,16	1,35,12,18	2,13,15,0	6,28,11,1	0,0,0,0	
Sum wt		93%	86%	34%	84%	34%	

This table shows the essential contradiction (E.C.) that determines the solution strategy. Additionally, preferred parameters are established where complementary contradictions (Compl.) are found, allowing the definition of the Base Solution shown in Table III.
As a complement to the Base Solution, Table II also provides the following information that could be relevant to obtain an optimal solution:
a) The algorithm identifies the top 5 contradictions from the entire Table II and highlights those that are outside the preferred parameters for further review.
b) There are inventive principles present in Table II that are not part of the Recommended Solution proposed in Table V. In the latter, the top three most relevant ones are highlighted, and the contradictions they involve are presented to evaluate whether they contribute significant aspects to the desired solution. For further details, Table VIII provides a prioritization of the inventive principles from Table II, and those not included in the Recommended Solution in Table V are marked with ***.

TABLE III. BASE SOLUTION FOR THE EVALUATED OBJECT: FACIAL RECOGNITION INSPECTOR NEED TO SATISFY > 32. Ease of achieving desired outcome
CHALLENGE: Improve Facial recognition by a Facial Recognition Inspector affected by identification difficulties and poor performance

Table II Selection: Essential Contradiction wt.1 y Complementary contradictions with preferred parameters (*) wt.4/wt.6/wt.11/wt.13							
Parameter to improve	Parameter to attenuate or preserve	Contradict.	Wt.n	IP. Ord.1	IP Ord 2	IP Ord 3	IP Ord 4
(+) 1. Heaviness of moving object	(-) 28. Measurement accuracy	Essential	wt.1	**28 Es.**	**27 Es.**	**35 Es.**	**26 Es.**
(+) 1. Heaviness of moving object	(+) 37. Difficulty of detecting and measuring	Compl. 1	wt.4	**28 Es.**	29	**26 Es.**	32
(+) 37. Difficulty of detecting and measuring	(-) 28. Measurement accuracy	Compl. 2	wt.6	**26 Es.**	24	32	**28 Es.**
(+) 1. Heaviness of moving object	32. Ease of achieving desired outcome	Compl. 3	wt.11	**27 Es.**	**28 Es.**	1	36

(-) 35. Adaptability or versatility	(-) 28. Measurement accuracy	Compl. 4	wt.13	**35 Es.**	5	1	10

Inventive Principles (IP) selected for the Base Solution
IP.28. Mechanics Substitution - strategic type
IP.27. Cheap Short-Living Objects - strategic type
IP.35. Transformation / Parameter Changes - strategic type
IP.26. Copying/ Replicating - strategic type
IP.29. Controllable Soft Variables - tactical type
IP.32. Perception/ Appearance/ Color Changes - strategic type
IP.24. Intermediary - tactical type
IP.1. Segmenting/ Integrating - strategic type
IP.36. Phase, State or Condition Transitions - **operative type**
IP.5. Merging/ Separating - **operative type**
IP.10. Preliminary Action - strategic type

Table III shows the essential contradiction, the one with the highest weight, plus the following 4 complementary contradictions in weight, which are located in the row and column of the preferred parameters selected in Table II. These contradictions are considered relevant for the solution and are described as the Base Solution in Table IX.
Keep in mind that all inventive principles selected for a solution must be evaluated according to the specific context of the contradictions in which they participate.
Inventive principles marked with 'Es.' correspond to inventive principles that belong to the essential contradiction.
TABLE IV. CONTRADICTION MATRIX COVERAGE FOR SOLUTION AMONG NEEDS TO SATISFY FOR EVALUATED OBJECT: FACIAL RECOGNITION INSPECTOR, NEED TO BE SATISFY: 32. Ease of achieving desired outcome
Coverage is defined as the extent to which the inventive principles from Table II encompass the inventive principles from Table IV. If weighted coverage is higher, it has been observed that the obtained solution is more likely to have the lowest cost and the maximum benefit-to-cost ratio.

Parameter to improve	Parameter to preserve	IP. Ord.1	IP Ord 2	IP Ord 3	IP Ord 4
32. Ease of achieving desired outcome	15. Duration of action of moving object	27	1	**4 nT2**	0
32. Ease of achieving desired outcome	34. Ease of change, repair or maintain	35	1	11	**9 nT2**
32. Ease of achieving desired outcome	33. Ease of operation	2 nT3	5	13 nT3	16 nT3
32. Ease of achieving desired outcome	32. Ease of achieving desired outcome	0	0	0	0

32. Ease of achieving desired outcome	19. Use of energy by moving object	28	26	27	1
32. Ease of achieving desired outcome	39. Productivity	35	1	10	28
32. Ease of achieving desired outcome	27. Reliability	0	0	0	0
32. Ease of achieving desired outcome	38. Extent of automation/ autonomy	8 nT3	28	1	0
32. Ease of achieving desired outcome	35. Adaptability or versatility	2 nT3	13 nT3	15 nT3	0
32. Ease of achieving desired outcome	13. Stability	11	13 nT3	1	0

Inventive Principles (IP) selected for the Solution of relevant Contradictions between Needs to Satisfy
IP.27. Cheap Short-Living Objects - strategic tpe
IP.1. Segmenting/ Integrating - strategic tpe
IP.4. Asymmetry/ Symmetry - **operative type**
IP.35. Transformation / Parameter Changes - strategic tpe
IP.11. Beforehand Cushioning - tactical type
IP.9. Preliminary Anti-action - **operative type**

97.84 % weighted coverage of the inventive principles (IP) included in Table IV. of Contradictions between Needs to Satisfy (NS), in relation to the IP included in Table II Specific Contradiction Matrix. The inventive principles labeled with nT2 are not found in Table II. Due to this condition, the first three contradictions in Table IV containing principles marked with nT2 are described as a Solution among Needs to Satisfy in Table IX. This solution, combined with the previously mentioned Base Solution, forms the Recommended Solution by the Aatrizinventor Algorithm, shown in Table V.
From practical experience, if Table IV contains more than 3 contradictions with inventive principles not included in Table II, then it is likely to be more challenging to construct a specific solution. In that case, it is recommended to look for an alternative combination of parameters in Table VI of sensitivity analysis. It is also an option to select another need to satisfy, which is shown in Table VII Essential Contradictions of Needs to Satisfy (NS) for the same undesirable effects already evaluated for FACIAL RECOGNITION INSPECTOR.
To evaluate the recommended inventive principles here and the corresponding contradictions in which they participate, it is necessary for the Base Solution to guide an initial context for the solution, as the contradictions between Needs to Satisfy do not identify which variable of the evaluated object S1 should be operated.
Inventive principles labeled with nT3 are included in Table II, but do not participate in the Recommended Solution shown in Table V. The Innovation Team must review the contradictions where they participate, to determine if there were other specific aspects that could be significant for the solution.

Unmarked inventive principles are included in Table II Specific Contradiction Matrix and in Table V Recommended Solution.

TABLE V. RECOMMENDED SOLUTION FOR INNOVATION CHALLENGE FOR EVALUATED OBJECT FACIAL RECOGNITION INSPECTOR

CHALLENGE: Improve Facial recognition by a Facial Recognition Inspector affected by identification difficulties and poor performance

Evaluated need to satisfy in this report: **32. Ease of achieving desired outcome**

UDEs: (+) 1. Heaviness of moving object// (-) 28. Measurement accuracy// (-) 35. Adaptability or versatility// (+) 37. Difficulty of detecting and measuring

Parameter to improve	Parameter to attenuate or preserve	Contradict.	Wt.n	IP. Ord.1	IP Ord 2	IP Ord 3	IP Ord 4
(+) 1. Heaviness of moving object	(-) 28. Measurement accuracy	Essential	wt.1	**28 Es.**	**27 Es.**	**35 Es.**	**26 Es.**
(+) 1. Heaviness of moving object	(+) 37. Difficulty of detecting and measuring	Compl. 1	wt.4	**28 Es.**	29	**26 Es.**	32
(+) 37. Difficulty of detecting and measuring	(-) 28. Measurement accuracy	Compl. 2	wt.6	**26 Es.**	24	32	**28 Es.**
(+) 1. Heaviness of moving object	32. Ease of achieving desired outcome	Compl. 3	wt.11	**27 Es.**	**28 Es.**	1	36
(-) 35. Adaptability or versatility	(-) 28. Measurement accuracy	Compl. 4	wt.13	**35 Es.**	5	1	10
32. Ease of achieving desired outcome	15. Duration of action of moving object	NS.1	wns.1	**27 Es.**	1	4	0
32. Ease of achieving desired outcome	34. Ease of change, repair or maintain	NS.2	wns.2	**35 Es.**	1	11	9

Relevant inventive principles from Table II not included in Recommended Solution

Before deciding on the solution, make sure you have previously reviewed the contradictions with relevant Inventive Principles from Table II, not included in the Recommended Solution. The 3 most relevant are shown below.

IP.6. Universality (Pos.5) ***	PI. Tác.	[Par.35][Par.1][IP(s) : 1,6,15,8] - [Par.32][Par.37][IP(s) : 6,28,11,1] - [Par.28][Par.32][IP(s) : 6,35,25,18] -

IP.13. Reverse or Indirect Action (Pos.8) ***	PI. Estr.	[Par.37][Par.1][IP(s) : 27,26,28,13] - [Par.28][Par.35][IP(s) : 13,35,2,0] - [Par.32][Par.35][IP(s) : 2,13,15,0] - [Par.35][Par.32][IP(s) : 1,13,31,0] -
IP.2. Taking out/ Adding (Pos.11) ***	PI. Estr.	[Par.28][Par.35][IP(s) : 13,35,2,0] - [Par.32][Par.35][IP(s) : 2,13,15,0] -

PRIORITIZED INFORMATION TO DEVELOP A SPECIFIC SOLUTION FROM THE RECOMMENDED SOLUTION

To develop a Specific Solution based on the contradictions provided in Table V, where S1: FACIAL RECOGNITION INSPECTOR interacts with S2: PEOPLE TO RECOGNITION, the Innovation Team must analyze the recommended innovation concepts for each selected inventive principle listed below. At least one concept from each principle that is applicable to the challenge under evaluation should be chosen.
Once the concepts are selected per inventive principle, it is essential to conduct an 'integrated reading' of the contradictions indicated in Table V. If this 'integrated reading' can demonstrate a coherent logical thread for each selected contradiction and as a whole, then it can be considered that there is a potential innovation solution.
To complete the definition of the specific solution, it is necessary to review the relevant inventive principles from Table II that were not included in the Recommended Solution in Table V, which are presented above.
For more details on the selected contradictions, you can review the complete descriptions of the inventive principles by contradiction, as shown in Table IX.
In the Starting Manual, Fundamentals of Aatrizinventor, Point 11, an example is provided for developing the Specific Solution based on the Recommended Solution by the Aatrizinventor algorithm, based on the 'Language of Nature Innovation.' The identification of a specific solution is a systematic and iterative process involving multiple concepts, aiming to determine a comprehensive solution with minimal implementation costs and maximum benefit-to-cost ratio.
It's important noting that an asterisk (*) has been added to the name of the object under evaluation to remind that the descriptions of the inventive principles may consider that FACIAL RECOGNITION INSPECTOR can be in its current physical and functional state, or in a modified state, or even in a new state, as needed to achieve the desired objective. Please, make the most of your relational thinking skills.

SUMMARY DESCRIPTION OF THE RECOMMENDED SOLUTION

SELECTED CONTRADICTIONS FROM TABLE II, DETAILED IN TABLE III.
Includes name of inventive principle, type and order of relevance in Table II (Pos.n)
Contradiction N°1 Improve: (+) 1. Heaviness of moving object and Attenuate or Preserve: (-) 28. Measurement accuracy - PI [28, 27, 35, 26]
IP.28. Mechanics Substitution - strategic type (Pos.2)
a. Replace a direct or manual action in, or for, FACIAL RECOGNITION INSPECTOR*, with a mechanical action or a tool.

b. Replace a mechanical means in, or for, FACIAL RECOGNITION INSPECTOR*, with sensory (optical, acoustic, vibration, taste, smell, feelings or other sensory fields) means.
c. Use mechanical, pneumatic, hydraulic, electric, magnetic, and electromagnetic, chemical, biological, psychological or other fields gto improve action of FACIAL RECOGNITION INSPECTOR*.
d. Change from static fields in, or for, FACIAL RECOGNITION INSPECTOR* to moving fields, from unstructured fields to those with structure, or vice versa.
e. Use fields in conjunction with field-activated parts, components, or particles (e.g., magnetic field and ferromagnetic particles) in, or for, FACIAL RECOGNITION INSPECTOR*.

IP.27. Cheap Short-Living Objects - strategic type (Pos.4)
a. Replace or divide (either fully or partially) FACIAL RECOGNITION INSPECTOR* or its action with multiple inexpensive or short-living objects, actions, or sub-parts, which compress or simplify its characteristics and properties, and/or are limited but sufficient to achieve the desired objective.
b. Compress certain qualities of FACIAL RECOGNITION INSPECTOR* (e.g., the degree of participation, complexity, or lifetime), with no loss of functionality, to achieve the desired objective.

IP.35. Transformation / Parameter Changes - strategic type (Pos.6)
a. Change FACIAL RECOGNITION INSPECTOR*'s physical or chemical state (e.g., in shape, in composition, to a gas, liquid, solid or plasma).
b. Change the composition or condition of FACIAL RECOGNITION INSPECTOR* by adding or removing components.
c. Change the concentration or consistency; change the degree of flexibility; change the temperature or the level of internal activity of FACIAL RECOGNITION INSPECTOR*.

IP.26. Copying/ Replicating - strategic type (Pos.3)
a. Instead of using FACIAL RECOGNITION INSPECTOR*, or any of its unavailable, expensive, fragile parts or properties, use simpler and inexpensive copies or replicates to perform the desired function and, if possible, do so with improved characteristics and properties, while disregarding the harmful, undesirable, or unnecessary ones.
b. Imitate FACIAL RECOGNITION INSPECTOR*, or any of its parts or properties, leveraging the relevant available environment.
c. If simple copies, or replicates are already being used, apply copies, or replicates of a higher level or technical

Contradiction N°2 Improve: (+) 1. Heaviness of moving object and Attenuate or Preserve: (+) 37. Difficulty of detecting and measuring - PI [28, 29, 26, 32]

IP.28. Mechanics Substitution - strategic type (Pos.2)
a. Replace a direct or manual action in, or for, FACIAL RECOGNITION INSPECTOR*, with a mechanical action or a tool.
b. Replace a mechanical means in, or for, FACIAL RECOGNITION INSPECTOR*, with sensory (optical, acoustic, vibration, taste, smell, feelings or other sensory fields) means.
c. Use mechanical, pneumatic, hydraulic, electric, magnetic, and electromagnetic, chemical, biological, psychological or other fields gto improve action of FACIAL RECOGNITION INSPECTOR*.
d. Change from static fields in, or for, FACIAL RECOGNITION INSPECTOR* to moving fields, from unstructured fields to those with structure, or vice versa.
e. Use fields in conjunction with field-activated parts, components, or particles (e.g., magnetic field and ferromagnetic particles) in, or for, FACIAL RECOGNITION INSPECTOR*.

IP.29. Controllable Soft Variables - *tactical type* (Pos.7)

a. Use external, controllable soft variables (manual, physical, mechanical, pneumatic, hydraulic, electrical, magnetic, electromagnetic, digital, chemical, biological, social, psychological, physiological , etc.) to interact with FACIAL RECOGNITION INSPECTOR* facilitating goal fulfillment of the function performed with Object S2.
b. Make easier FACIAL RECOGNITION INSPECTOR* interact with Object S2 using internal, controllable soft variables (manual, physical, mechanical, pneumatic, hydraulic, electrical, magnetic, electromagnetic, digital, chemical, biological, social, psychological, physiological , etc.) available in S1 and / or S2, facilitating goal fulfillment.
IP.26. Copying/ Replicating - strategic type (Pos.3)
a. Instead of using FACIAL RECOGNITION INSPECTOR*, or any of its unavailable, expensive, fragile parts or properties, use simpler and inexpensive copies or replicates to perform the desired function and, if possible, do so with improved characteristics and properties, while disregarding the harmful, undesirable, or unnecessary ones.
b. Imitate FACIAL RECOGNITION INSPECTOR*, or any of its parts or properties, leveraging the relevant available environment.
c. If simple copies, or replicates are already being used, apply copies, or replicates of a higher level or technical
IP.32. Perception/ Appearance/ Color Changes - strategic type (Pos.10)
a. Change how is perceived, the appearance or shape of FACIAL RECOGNITION INSPECTOR* in relation to the object S2 with which it interacts.
b. Change the color, or appearance, of FACIAL RECOGNITION INSPECTOR* or its external environment.
c. Change the transparency of FACIAL RECOGNITION INSPECTOR* or its external environment.

Contradiction N°3 Improve: (+) 37. Difficulty of detecting and measuring and Attenuate or Preserve: (-) 28. Measurement accuracy - PI [26, 24, 32, 28]
IP.26. Copying/ Replicating - strategic type (Pos.3)
a. Instead of using FACIAL RECOGNITION INSPECTOR*, or any of its unavailable, expensive, fragile parts or properties, use simpler and inexpensive copies or replicates to perform the desired function and, if possible, do so with improved characteristics and properties, while disregarding the harmful, undesirable, or unnecessary ones.
b. Imitate FACIAL RECOGNITION INSPECTOR*, or any of its parts or properties, leveraging the relevant available environment.
c. If simple copies, or replicates are already being used, apply copies, or replicates of a higher level or technical
IP.24. Intermediary - *tactical type* (Pos.13)
a. for FACIAL RECOGNITION INSPECTOR*, use an intermediary carrier article or intermediary process.
b. Merge FACIAL RECOGNITION INSPECTOR* temporarily with another object (which can be easily removed or removed by itself).
IP.32. Perception/ Appearance/ Color Changes - strategic type (Pos.10)
a. Change how is perceived, the appearance or shape of FACIAL RECOGNITION INSPECTOR* in relation to the object S2 with which it interacts.
b. Change the color, or appearance, of FACIAL RECOGNITION INSPECTOR* or its external environment.

c. Change the transparency of FACIAL RECOGNITION INSPECTOR* or its external environment.
IP.28. Mechanics Substitution - strategic type (Pos.2)
a. Replace a direct or manual action in, or for, FACIAL RECOGNITION INSPECTOR*, with a mechanical action or a tool.
b. Replace a mechanical means in, or for, FACIAL RECOGNITION INSPECTOR*, with sensory (optical, acoustic, vibration, taste, smell, feelings or other sensory fields) means.
c. Use mechanical, pneumatic, hydraulic, electric, magnetic, and electromagnetic, chemical, biological, psychological or other fields gto improve action of FACIAL RECOGNITION INSPECTOR*.
d. Change from static fields in, or for, FACIAL RECOGNITION INSPECTOR* to moving fields, from unstructured fields to those with structure, or vice versa.
e. Use fields in conjunction with field-activated parts, components, or particles (e.g., magnetic field and ferromagnetic particles) in, or for, FACIAL RECOGNITION INSPECTOR*.

Contradiction N°4 Improve: (+) 1. Heaviness of moving object and Attenuate or Preserve: 32. Ease of achieving desired outcome - PI [27, 28, 1, 36]
IP.27. Cheap Short-Living Objects - strategic type (Pos.4)
a. Replace or divide (either fully or partially) FACIAL RECOGNITION INSPECTOR* or its action with multiple inexpensive or short-living objects, actions, or sub-parts, which compress or simplify its characteristics and properties, and/or are limited but sufficient to achieve the desired objective.
b. Compress certain qualities of FACIAL RECOGNITION INSPECTOR* (e.g., the degree of participation, complexity, or lifetime), with no loss of functionality, to achieve the desired objective.
IP.28. Mechanics Substitution - strategic type (Pos.2)
a. Replace a direct or manual action in, or for, FACIAL RECOGNITION INSPECTOR*, with a mechanical action or a tool.
b. Replace a mechanical means in, or for, FACIAL RECOGNITION INSPECTOR*, with sensory (optical, acoustic, vibration, taste, smell, feelings or other sensory fields) means.
c. Use mechanical, pneumatic, hydraulic, electric, magnetic, and electromagnetic, chemical, biological, psychological or other fields gto improve action of FACIAL RECOGNITION INSPECTOR*.
d. Change from static fields in, or for, FACIAL RECOGNITION INSPECTOR* to moving fields, from unstructured fields to those with structure, or vice versa.
e. Use fields in conjunction with field-activated parts, components, or particles (e.g., magnetic field and ferromagnetic particles) in, or for, FACIAL RECOGNITION INSPECTOR*.
IP.1. Segmenting/ Integrating - strategic type (Pos.1)
a. Divide FACIAL RECOGNITION INSPECTOR* into existing and/or new parts, shapes, phases, states, or conditions.
b. Integrate different existing or new parts, forms, phases, states or conditions of FACIAL RECOGNITION INSPECTOR* in a single entity.
c. Make FACIAL RECOGNITION INSPECTOR* easy to disassemble or assemble.
d. Increase or reduce the degree of fragmentation or segmentation of FACIAL RECOGNITION INSPECTOR*.
IP.36. Phase, State or Condition Transitions - *operative type* (Pos.20)
a. Use the phenomena occurring during state, dimension, or condition transitions of OBJECT S1 to influence its interaction with object S2.
b. Use phenomena occurring during phase transitions associated with FACIAL RECOGNITION INSPECTOR* (e.g., volume changes, loss, or absorption of heat, etc.) to influence its interaction with

object S2.

Contradiction N°5 Improve: (-) 35. Adaptability or versatility and Attenuate or Preserve: (-) 28. Measurement accuracy - PI [35, 5, 1, 10]

IP.35. Transformation / Parameter Changes - strategic type (Pos.6)

a. Change FACIAL RECOGNITION INSPECTOR*'s physical or chemical state (e.g., in shape, in composition, to a gas, liquid, solid or plasma).

b. Change the composition or condition of FACIAL RECOGNITION INSPECTOR* by adding or removing components.

c. Change the concentration or consistency; change the degree of flexibility; change the temperature or the level of internal activity of FACIAL RECOGNITION INSPECTOR*.

IP.5. Merging/ Separating - *operative type* (Pos.9)

a. Bring FACIAL RECOGNITION INSPECTOR* closer or merge with other objects with similar or identical operations or functions.

b. Bring FACIAL RECOGNITION INSPECTOR* closer or merge with other objects with similar operations or functions for them to act together at the same time.

c. Merge different shapes or actions into FACIAL RECOGNITION INSPECTOR*.

d. If there are objects fused to FACIAL RECOGNITION INSPECTOR, and if necessary, apply a separation action.

IP.1. Segmenting/ Integrating - strategic type (Pos.1)

a. Divide FACIAL RECOGNITION INSPECTOR* into existing and/or new parts, shapes, phases, states, or conditions.

b. Integrate different existing or new parts, forms, phases, states or conditions of FACIAL RECOGNITION INSPECTOR* in a single entity.

c. Make FACIAL RECOGNITION INSPECTOR* easy to disassemble or assemble.

d. Increase or reduce the degree of fragmentation or segmentation of FACIAL RECOGNITION INSPECTOR*.

IP.10. Preliminary Action - strategic type (Pos.22)

a. Perform the required change in, or for, FACIAL RECOGNITION INSPECTOR*, before it is needed (either fully or partially).

b. Pre-arrange FACIAL RECOGNITION INSPECTOR* and other objects, if necessary, in such a way that they can come into action from the most convenient place and without losing time for their delivery.

SELECTED CONTRADICTIONS FROM TABLE IV, WHICH INCLUDE INVENTED PRINCIPLES NOT CONTAINED IN TABLE II, MAXIMUM 3 CONTRADICTIONS.

Includes name of inventive principle, type and order of relevance if it participates in Table II (marked as Pos.n). If this does not participate (marked as Pos.), it requires more attention.

Contradiction N°6 Improve: 32. Ease of achieving desired outcome and Preserve: 15. Duration of action of moving object - PI [27, 1, 4, 0]

IP.27. Cheap Short-Living Objects - strategic type (Pos.4)

a. Replace or divide (either fully or partially) FACIAL RECOGNITION INSPECTOR* or its action with multiple inexpensive or short-living objects, actions, or sub-parts, which compress or simplify its characteristics and properties, and/or are limited but sufficient to achieve the desired objective.

b. Compress certain qualities of FACIAL RECOGNITION INSPECTOR* (e.g., the degree of

participation, complexity, or lifetime), with no loss of functionality, to achieve the desired objective.
IP.1. Segmenting/ Integrating - strategic type (Pos.1)
a. Divide FACIAL RECOGNITION INSPECTOR* into existing and/or new parts, shapes, phases, states, or conditions.
b. Integrate different existing or new parts, forms, phases, states or conditions of FACIAL RECOGNITION INSPECTOR* in a single entity.
c. Make FACIAL RECOGNITION INSPECTOR* easy to disassemble or assemble.
d. Increase or reduce the degree of fragmentation or segmentation of FACIAL RECOGNITION INSPECTOR*.
IP.4. Asymmetry/ Symmetry - *operative type* (Pos.)
a. Change the shape of FACIAL RECOGNITION INSPECTOR* from symmetrical to asymmetrical, permanent, or variable in time, or vice versa.
b. If FACIAL RECOGNITION INSPECTOR* is asymmetrical, increase its degree of asymmetry, or vice versa.

Contradiction N°7 Improve: 32. Ease of achieving desired outcome and Preserve: 34. Ease of change, repair or maintain - PI [35, 1, 11, 9]
IP.35. Transformation / Parameter Changes - strategic type (Pos.6)
a. Change FACIAL RECOGNITION INSPECTOR*'s physical or chemical state (e.g., in shape, in composition, to a gas, liquid, solid or plasma).
b. Change the composition or condition of FACIAL RECOGNITION INSPECTOR* by adding or removing components.
c. Change the concentration or consistency; change the degree of flexibility; change the temperature or the level of internal activity of FACIAL RECOGNITION INSPECTOR*.
IP.1. Segmenting/ Integrating - strategic type (Pos.1)
a. Divide FACIAL RECOGNITION INSPECTOR* into existing and/or new parts, shapes, phases, states, or conditions.
b. Integrate different existing or new parts, forms, phases, states or conditions of FACIAL RECOGNITION INSPECTOR* in a single entity.
c. Make FACIAL RECOGNITION INSPECTOR* easy to disassemble or assemble.
d. Increase or reduce the degree of fragmentation or segmentation of FACIAL RECOGNITION INSPECTOR*.
IP.11. Beforehand Cushioning - *tactical type* (Pos.14)
a. Prepare emergency means, beforehand, to compensate for the relatively low reliability of FACIAL RECOGNITION INSPECTOR*.
IP.9. Preliminary Anti-action - *operative type* (Pos.)
a. If FACIAL RECOGNITION INSPECTOR* needs to perform an action with harmful and useful effects, this action should be replaced with anti-actions to control harmful effect.
b. Create beforehand actions in FACIAL RECOGNITION INSPECTOR* that will oppose known undesirable working stresses later.

Contradiction N°8 Improve: and Preserve: - PI [, , ,]

RELEVANT INVENTIVE PRINCIPLES FROM TABLE II NOT INCLUDED IN RECOMMENDED SOLUTION

IP.6. Universality - *tactical type* (Pos.5)
a. Make a part or the whole of FACIAL RECOGNITION INSPECTOR* perform multiple functions.
b. Eliminate the need of FACIAL RECOGNITION INSPECTOR* for others parts.
IP.13. Reverse or Indirect Action - strategic type (Pos.8)
a. Inverse the applied action or apply an indirect action to perform the current function of FACIAL RECOGNITION INSPECTOR* to interact with object S2 It should be identified how FACIAL RECOGNITION INSPECTOR* currently performs an action with Object S2 and from there evaluate an inverse or indirect action.
b. Make moving parts of FACIAL RECOGNITION INSPECTOR* (or the external environment) fixed, and fixed parts moving.
c. Turn FACIAL RECOGNITION INSPECTOR* (or process) 'upside down', 'change the position', 'change the condition'.
IP.2. Taking out/ Adding - strategic type (Pos.11)
a. Separate an interfering part or a property from FACIAL RECOGNITION INSPECTOR*, or single out the only necessary part (or property) of FACIAL RECOGNITION INSPECTOR*. **b.** Add new parts or properties to FACIAL RECOGNITION INSPECTOR*.

TABLE VI. RESULTS OF SENSITIVITY ANALYSIS FOR THE EVALUATED OBJECT FACIAL RECOGNITION INSPECTOR
CHALLENGE: Improve Facial recognition by a Facial Recognition Inspector affected by identification difficulties and poor performance

Coverage obtained for the current evaluation to compare with sensitivity analysis

Order	Par.1	Par.2	Par.3	Par.4	Par.5	Cob. NS (%)	Cob. EC (%)	Cob. GL (%)
#	1	28	35	37	32. Ease of achieving desired outcome	97.84	100	98.38

Table VI presents the 10 most favorable parameter combinations recommended by the Aatrizinventor algorithm. It is suggested to evaluate the 2 or 3 most relevant ones. Practice teaches that they often contain the best solution for the evaluated challenge.

(E) Combination of TRIZ innovation parameters evaluated in this Aatrizinventor Solution is prioritized here

A. PRIORITISED CONTRADICTIONS BY GLOBAL COVERAGE (Cob.GL)
Par.5 is automatically selected

Order	Par.1	Par.2	Par.3	Par.4	Par.5	Cob. NS (%)	Cob. EC (%)	Cob. GL (%)
I.a	1	35	37	12	13. Stability	98.22	100	98.66

II.a	1	28	35	37	32. Ease of achieving desired outcome **(E)**	97.84	100	98.38
III.a	35	37	7	12	32. Ease of achieving desired outcome	97.84	100	98.38
IV.a	1	37	7	12	13. Stability	97.83	100	98.37
V.a	1	28	37	7	33. Ease of operation	97.58	100	98.18

B. PRIORITIZATION OF CONTRADICTIONS BY COVERAGE OF NEEDS TO SATISFY (Cob.NS)
Par.5 is automatically selected

Order	Par.1	Par.2	Par.3	Par.4	Par.5	Cob. NS (%)	Cob. EC (%)	Cob. GL (%)	Table VI.A
I.b	1	28	35	7	33. Ease of operation	100	11.08	77.77	-
II.b	1	35	37	7	13. Stability	99.11	36.47	83.45	-
III.b	1	37	7	12	32. Ease of achieving desired outcome	99.11	27.59	81.23	-
IV.b	1	35	37	12	13. Stability	98.22	100	98.66	I.a
V.b	1	28	35	26	33. Ease of operation	97.92	9.19	75.74	-

TABLE VII ESSENTIAL CONTRADICTIONS MATRIX FOR NEEDS TO SATISFY (NS) FOR THE SAME UNDESIRABLE EFFECTS EVALUATED OF: FACIAL RECOGNITION INSPECTOR
CHALLENGE: Improve Facial recognition by a Facial Recognition Inspector affected by identification difficulties and poor performance
Evaluated need to satisfy in this report: **32. Ease of achieving desired outcome**
UDEs: (+) 1. Heaviness of moving object// (-) 28. Measurement accuracy// (-) 35. Adaptability or versatility// (+) 37. Difficulty of detecting and measuring

This table allows the Innovation Team to compare the coverages obtained for the evaluated need to satisfy with those of the other defined needs, for the same undesirable effects. This way, they can decide whether to choose any of the suggested innovation parameter combinations here that offer better coverage.

Need to Satisfy	Parameter to improve	Parameter to attenuate or preserve	Contradict. Essential	Cob. NS (%)	Cob. between EC (%)	Cob. GL (%) 3/1
32. Ease of achieving desired outcome	(+) 1. Heaviness of moving object	(-) 28. Measurement accuracy	[28,27,35,26]	97.84	100	98.38

34. Ease of change, repair or maintain	(+) 1. Heaviness of moving object	(-) 28. Measurement accuracy	[28,27,35,26]	93.29	100	94.96
39. Productivity	(+) 1. Heaviness of moving object	(-) 28. Measurement accuracy	[28,27,35,26]	90.53	100	92.9
13. Stability	(-) 28. Measurement accuracy	(+) 1. Heaviness of moving object	[32,35,26,28]	96.93	78.51	92.33
33. Ease of operation	(+) 1. Heaviness of moving object	(-) 28. Measurement accuracy	[28,27,35,26]	88.8	100	91.6
19. Use of energy by moving object	(-) 28. Measurement accuracy	(+) 1. Heaviness of moving object	[32,35,26,28]	95.13	78.51	90.98
27. Reliability	(+) 1. Heaviness of moving object	(-) 28. Measurement accuracy	[28,27,35,26]	85.84	100	89.38
38. Extent of automation/ autonomy	(+) 1. Heaviness of moving object	(-) 28. Measurement accuracy	[28,27,35,26]	84.99	100	88.74
35. Adaptability or versatility	(+) 1. Heaviness of moving object	(-) 28. Measurement accuracy	[28,27,35,26]	77.43	100	83.07
15. Duration of action of moving object	(+) 37. Difficulty of detecting and measuring	(+) 1. Heaviness of moving object	[27,26,28,13]	80.59	20.98	65.69

Table VII shows the essential contradictions obtained for each of the defined Needs to Satisfy, taking into account the same undesirable effects that have been evaluated. This table is based on the calculation of a global coverage (Cob.GL), which is determined by combining two values: the coverage from Table IV (Cob.NS) already explained, and a relative coverage (Cob. between EC) that is obtained in this table VII, when each other comparing the essential contradictions identified for the 10 parameters of Needs to Satisfy.

This global coverage (GL) is based on expert weighting criteria to prioritize the solutions for the different Needs to Satisfy. Experience with aatrizinventor indicates that the most effective solutions are those with higher global coverage, preferably exceeding 90%, if possible.

The Innovation Team may decide if it is appropriate to carry out a new evaluation with another Need to Satisfy, selected from the results provided in Table VII. This decision will be primarily made when the evaluated Need to Satisfy is not ranked in the first position of Table VII. In this table, the position of the evaluated Need to Satisfy is highlighted: 32. Ease of achieving desired

outcome.

TABLE VIII. ORDER OF INCIDENCE OF INVENTIVE PRINCIPLES (POS.n)
CHALLENGE: Improve Facial recognition by a Facial Recognition Inspector affected by identification difficulties and poor performance
Participation analysis of inventive principles in TABLE II SPECIFIC CONTRADICTION MATRIX.
Evaluated parameters for Object FACIAL RECOGNITION INSPECTOR:
Par. UDEs:
(+) 1. Heaviness of moving object
(-) 28. Measurement accuracy
(-) 35. Adaptability or versatility
(+) 37. Difficulty of detecting and measuring
Par. NS: 32. Ease of achieving desired outcome

***: Inventive Principles from the Specific Contradiction Matrix (Table II) not described in the Recommend Solution (Table IX). It is recommended to perform an additional review following the order of position.

Inventive principles of Table II	IP type	Tables	Contradictions
IP.1. Segmenting/ Integrating (Pos.1)	PI. Estr.	II / III / IV	[Par.35][Par.1][IP(s) : 1,6,15,8] - [Par.35][Par.28][IP(s) : 35,5,1,10] - [Par.32][Par.28][IP(s) : 1,35,12,18] - [Par.37][Par.35][IP(s) : 1,15,0,0] - [Par.35][Par.37][IP(s) : 1,0,0,0] - [Par.32][Par.37][IP(s) : 6,28,11,1] - [Par.1][Par.32][IP(s) : 27,28,1,36] - [Par.35][Par.32][IP(s) : 1,13,31,0] -
IP.28. Mechanics Substitution (Pos.2)	PI. Estr.	II / III / IV	[Par.28][Par.1][IP(s) : 32,35,26,28] - [Par.37][Par.1][IP(s) : 27,26,28,13] - [Par.32][Par.1][IP(s) : 28,29,15,16] - [Par.1][Par.28][IP(s) : 28,27,35,26] - [Par.37][Par.28][IP(s) : 26,24,32,28] - [Par.1][Par.37][IP(s) : 28,29,26,32] - [Par.28][Par.37][IP(s) : 26,24,32,28] - [Par.32][Par.37][IP(s) : 6,28,11,1] - [Par.1][Par.32][IP(s) : 27,28,1,36] - [Par.37][Par.32][IP(s) : 5,28,11,29] -
IP.26. Copying/ Replicating (Pos.3)	PI. Estr.	II / III / IV	[Par.28][Par.1][IP(s) : 32,35,26,28] - [Par.37][Par.1][IP(s) : 27,26,28,13] - [Par.1][Par.28][IP(s) : 28,27,35,26] - [Par.37][Par.28][IP(s) : 26,24,32,28] - [Par.1][Par.37][IP(s) : 28,29,26,32] - [Par.28][Par.37][IP(s) : 26,24,32,28] -
IP.27. Cheap Short-Living Objects (Pos.4)	PI. Estr.	II / III / IV	[Par.37][Par.1][IP(s) : 27,26,28,13] - [Par.1][Par.28][IP(s) : 28,27,35,26] - [Par.1][Par.32][IP(s) : 27,28,1,36] -
IP.6. Universality (Pos.5) ***	PI. Tác.	II /	[Par.35][Par.1][IP(s) : 1,6,15,8] - [Par.32][Par.37][IP(s) : 6,28,11,1] - [Par.28][Par.32][IP(s) : 6,35,25,18] -

IP.35. Transformation / Parameter Changes (Pos.6)	PI. Estr.	II / III / IV	[Par.28][Par.1][IP(s) : 32,35,26,28] - [Par.1][Par.28][IP(s) : 28,27,35,26] - [Par.35][Par.28][IP(s) : 35,5,1,10] - [Par.32][Par.28][IP(s) : 1,35,12,18] - [Par.28][Par.35][IP(s) : 13,35,2,0] - [Par.28][Par.32][IP(s) : 6,35,25,18] -
IP.29. Controllable Soft Variables (Pos.7)	PI. Tác.	II / III /	[Par.32][Par.1][IP(s) : 28,29,15,16] - [Par.1][Par.35][IP(s) : 29,5,15,8] - [Par.1][Par.37][IP(s) : 28,29,26,32] - [Par.37][Par.32][IP(s) : 5,28,11,29] -
IP.13. Reverse or Indirect Action (Pos.8) ***	PI. Estr.	II / IV	[Par.37][Par.1][IP(s) : 27,26,28,13] - [Par.28][Par.35][IP(s) : 13,35,2,0] - [Par.32][Par.35][IP(s) : 2,13,15,0] - [Par.35][Par.32][IP(s) : 1,13,31,0] -
IP.5. Merging/ Separating (Pos.9)	**PI. Oper.**	II / III / IV	[Par.35][Par.28][IP(s) : 35,5,1,10] - [Par.1][Par.35][IP(s) : 29,5,15,8] - [Par.37][Par.32][IP(s) : 5,28,11,29] -
IP.32. Perception/ Appearance/ Color Changes (Pos.10)	PI. Estr.	II / III /	[Par.28][Par.1][IP(s) : 32,35,26,28] - [Par.37][Par.28][IP(s) : 26,24,32,28] - [Par.1][Par.37][IP(s) : 28,29,26,32] - [Par.28][Par.37][IP(s) : 26,24,32,28] -
IP.2. Taking out/ Adding (Pos.11) ***	PI. Estr.	II / IV	[Par.28][Par.35][IP(s) : 13,35,2,0] - [Par.32][Par.35][IP(s) : 2,13,15,0] -
IP.15. Dynamics (Pos.12) ***	PI. Estr.	II / IV	[Par.35][Par.1][IP(s) : 1,6,15,8] - [Par.32][Par.1][IP(s) : 28,29,15,16] - [Par.1][Par.35][IP(s) : 29,5,15,8] - [Par.37][Par.35][IP(s) : 1,15,0,0] - [Par.32][Par.35][IP(s) : 2,13,15,0] -
IP.24. Intermediary (Pos.13)	PI. Tác.	II / III /	[Par.37][Par.28][IP(s) : 26,24,32,28] - [Par.28][Par.37][IP(s) : 26,24,32,28] -
IP.11. Beforehand Cushioning (Pos.14)	PI. Tác.	II / IV	[Par.32][Par.37][IP(s) : 6,28,11,1] - [Par.37][Par.32][IP(s) : 5,28,11,29] -
IP.31. Using/ Removing Unused Parts (Pos.15) ***	**PI. Oper.**	II /	[Par.35][Par.32][IP(s) : 1,13,31,0] -
IP.25. Self-service (Pos.16) ***	**PI. Oper.**	II /	[Par.28][Par.32][IP(s) : 6,35,25,18] -
IP.12. Equipotentiality (Pos.17) ***	PI. Tác.	II /	[Par.32][Par.28][IP(s) : 1,35,12,18] -
IP.18. Mechanical Vibrations/ Energy Variations (Pos.18) ***	PI. Tác.	II /	[Par.32][Par.28][IP(s) : 1,35,12,18] - [Par.28][Par.32][IP(s) : 6,35,25,18] -

IP.8. Anti-Weight/ Compensation (Pos.19) ***	PI. Tác.	II / IV	[Par.35][Par.1][IP(s) : 1,6,15,8] - [Par.1][Par.35][IP(s) : 29,5,15,8] -
IP.36. Phase, State or Condition Transitions (Pos.20)	**PI. Oper.**	II / III /	[Par.1][Par.32][IP(s) : 27,28,1,36] -
IP.16. Partial or Excessive Actions (Pos.21) ***	**PI. Oper.**	II / IV	[Par.32][Par.1][IP(s) : 28,29,15,16] -
IP.10. Preliminary Action (Pos.22)	PI. Estr.	II / III / IV	[Par.35][Par.28][IP(s) : 35,5,1,10] -

TABLE IX. RECOMMENDED SOLUTION ACCORDING TO THE MOST RELEVANT CONTRADICTIONS IDENTIFIED FOR THE EVALUATED OBJECT: FACIAL RECOGNITION INSPECTOR
CHALLENGE: Improve Facial recognition by a Facial Recognition Inspector affected by identification difficulties and poor performance

This table displays the relevant contradictions identified by the algorithm, which are crucial for determining the direction and scope of the solution to the innovation challenge under evaluation. The specific solution will be obtained by applying the updated inventive principles detailed below.

It is essential to bear in mind that we are evaluating FACIAL RECOGNITION INSPECTOR when it interacts with PEOPLE TO RECOGNITION and there is an affected function: Facial recognition by a Facial Recognition Inspector affected by identification difficulties and poor performance, in a specific space and time. FACIAL RECOGNITION INSPECTOR may require changes in space, time, its physical composition, or its functional characteristic, as well as partial or total replacement with another object or other recommended changes. To emphasize this concept, we mark FACIAL RECOGNITION INSPECTOR with an asterisk. Do not read the name of the evaluated object literally; associate it with a possible solution for FACIAL RECOGNITION INSPECTOR*.

Each inventive principle described here may contain more than one innovation concept recommended by TRIZ, identified as a, b, c, ..., not all of which are applicable to a specific case under evaluation. The Innovation Team must select those innovation concepts that best relate to the evaluated innovation challenge, based on their own knowledge and the analysis of relational thinking that they must carry out.

Additionally, technological research may be necessary for its solution, as the specific solution recommended by the inventive principles described here likely already exists somewhere in the world.
The interpretation of the inventive principles, to apply them specifically to the evaluated case, is a recursive process that generally ranges from strategic to tactical and operational levels. We

recommend completing the reading of the inventive principles described below to envision a possible solution and then rereading the principles to reinforce the coherence of the emerging solution. As a result of the finally determined innovation solution, there will be a change in FACIAL RECOGNITION INSPECTOR, in a new context guided by the inventive principles, probably not previously imagined.

The Language of Nature's Innovation provides speed and focus for guided and systematic innovation thinking for individuals. The foundation for innovation is a profound understanding of the current situation.

IX.A BASE SOLUTION FOR INNOVATION CHALLENGE FOR THE EVALUATED OBJECT FACIAL RECOGNITION INSPECTOR NEED TO SATISFY: 32. Ease of achieving desired outcome
Strategic inventive principles: Str. IP
Tactical inventive principles: Tac. IP
Operative inventive principles: Oper. IP
Pos.n : Order of importance n of an inventive principle included in Table II.

ESSENTIAL CONTRADICTION
Contradiction order wt.1

Parameter to improve: (+) 1. Heaviness of moving object
TO IMPROVE (UDE): FACIAL RECOGNITION INSPECTOR has More Heaviness, value, cost, or restriction, whether physical or figurative interacting with S2
Parameter to attenuate or preserve: (-) 28. Measurement accuracy
TO ATTENUATE OR PRESERVE (UDE): FACIAL RECOGNITION INSPECTOR has Less Measurement accuracy interacting with S2
Inventive principles IP(s) : [28,27,35,26]
28. Mechanics Substitution, Str. IP (Pos.2):
a. Replace a direct or manual action in, or for, FACIAL RECOGNITION INSPECTOR*, with a mechanical action or a tool.
b. Replace a mechanical means in, or for, FACIAL RECOGNITION INSPECTOR*, with sensory (optical, acoustic, vibration, taste, smell, feelings or other sensory fields) means.
c. Use mechanical, pneumatic, hydraulic, electric, magnetic, and electromagnetic, chemical, biological, psychological or other fields to improve action of FACIAL RECOGNITION INSPECTOR*.
d. Change from static fields in, or for, FACIAL RECOGNITION INSPECTOR* to moving fields, from unstructured fields to those with structure, or vice versa.
e. Use fields in conjunction with field-activated parts, components, or particles (e.g., magnetic field and ferromagnetic particles) in, or for, FACIAL RECOGNITION INSPECTOR*.
Separation principle for FACIAL RECOGNITION INSPECTOR* : Separation by condition
Solution strategy for FACIAL RECOGNITION INSPECTOR* : Improving attributes
27. Cheap Short-Living Objects, Str. IP (Pos.4):
a. Replace or divide (either fully or partially) FACIAL RECOGNITION INSPECTOR* or its action with multiple inexpensive or short-living objects, actions, or sub-parts, which compress or simplify its characteristics and properties, and/or are limited but sufficient to achieve the desired objective.

b. Comprising certain qualities of FACIAL RECOGNITION INSPECTOR* (e.g., the degree of participation, complexity, or lifetime), with no loss of functionality, to achieve the desired objective.
Separation principle for FACIAL RECOGNITION INSPECTOR* : Separation in subsystem
Solution strategy for FACIAL RECOGNITION INSPECTOR* : Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security)
35. Transformation/ Parameter Changes, Str. IP (Pos.6):
a. Change FACIAL RECOGNITION INSPECTOR*'s physical or chemical state (e.g., in shape, in composition, to a gas, liquid, solid or plasma).
b. Change the composition or condition of FACIAL RECOGNITION INSPECTOR* by adding or removing components.
c. Change the concentration or consistency; change the degree of flexibility; change the temperature or the level of internal activity of FACIAL RECOGNITION INSPECTOR*.
Separation principle for FACIAL RECOGNITION INSPECTOR* : Separation by condition / Separation alternative
Solution strategy for FACIAL RECOGNITION INSPECTOR* : Improving attributes; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security)
26. Copying/ Replicating, Str. IP (Pos.3):
a. Instead of using FACIAL RECOGNITION INSPECTOR*, or any of its unavailable, expensive, fragile parts or properties, use simpler and inexpensive copies or replicates to perform the desired function and, if possible, do so with improved characteristics and properties, while disregarding the harmful, undesirable, or unnecessary ones.
b. Imitate or replicate FACIAL RECOGNITION INSPECTOR*, or any of its parts or properties, leveraging the relevant available environment.
c. If simple copies, or replicates are already being used, apply copies, or replicates of a higher level or technical complexity.
Separation principle for FACIAL RECOGNITION INSPECTOR* : Separation in space
Solution strategy for FACIAL RECOGNITION INSPECTOR* : Improving if a solution has not yet emerged

COMPLEMENTARY CONTRADICTION 1
Contradiction order wt.4

Parameter to improve: (+) 1. Heaviness of moving object
TO IMPROVE (UDE): FACIAL RECOGNITION INSPECTOR has More Heaviness, value, cost, or restriction, whether physical or figurative interacting with S2
Parameter to attenuate or preserve: (+) 37. Difficulty of detecting and measuring
TO ATTENUATE OR PRESERVE (UDE): FACIAL RECOGNITION INSPECTOR has More Difficulty in detection and measurement interacting with S2
Inventive principles IP(s) : [28,29,26,32]
28. Mechanics Substitution, Str. IP (Pos.2):
a. Replace a direct or manual action in, or for, FACIAL RECOGNITION INSPECTOR*, with a mechanical action or a tool.
b. Replace a mechanical means in, or for, FACIAL RECOGNITION INSPECTOR*, with sensory (optical, acoustic, vibration, taste, smell, feelings or other sensory fields) means.
c. Use mechanical, pneumatic, hydraulic, electric, magnetic, and electromagnetic, chemical,

biological, psychological or other fields to improve action of FACIAL RECOGNITION INSPECTOR*.
d. Change from static fields in, or for, FACIAL RECOGNITION INSPECTOR* to moving fields, from unstructured fields to those with structure, or vice versa.
e. Use fields in conjunction with field-activated parts, components, or particles (e.g., magnetic field and ferromagnetic particles) in, or for, FACIAL RECOGNITION INSPECTOR*.
Separation principle for FACIAL RECOGNITION INSPECTOR* : Separation by condition
Solution strategy for FACIAL RECOGNITION INSPECTOR* : Improving attributes
29. Controllable Soft Variables, Tac. IP (Pos.7):
a. Use external, controllable soft variables (manual, physical, mechanical, pneumatic, hydraulic, electrical, magnetic, electromagnetic, digital, chemical, biological, social, psychological, physiological , etc.) to interact with FACIAL RECOGNITION INSPECTOR* facilitating goal fulfillment of the function performed with S2 Object.
b. Make easier FACIAL RECOGNITION INSPECTOR* interact with S2 Object using internal, controllable soft variables (manual, physical, mechanical, pneumatic, hydraulic, electrical, magnetic, electromagnetic, digital, chemical, biological, social, psychological, physiological , etc.) available in S1 and / or S2, facilitating goal fulfillment.
Separation principle for FACIAL RECOGNITION INSPECTOR* : Separation in time
Solution strategy for FACIAL RECOGNITION INSPECTOR* : Improving if a solution has not yet emerged
26. Copying/ Replicating, Str. IP (Pos.3):
a. Instead of using FACIAL RECOGNITION INSPECTOR*, or any of its unavailable, expensive, fragile parts or properties, use simpler and inexpensive copies or replicates to perform the desired function and, if possible, do so with improved characteristics and properties, while disregarding the harmful, undesirable, or unnecessary ones.
b. Imitate or replicate FACIAL RECOGNITION INSPECTOR*, or any of its parts or properties, leveraging the relevant available environment.
c. If simple copies, or replicates are already being used, apply copies, or replicates of a higher level or technical complexity.
Separation principle for FACIAL RECOGNITION INSPECTOR* : Separation in space
Solution strategy for FACIAL RECOGNITION INSPECTOR* : Improving if a solution has not yet emerged
32. Perception/ Appearance/ Color Changes, Str. IP (Pos.10):
a. Change how is perceived, the appearance or shape of FACIAL RECOGNITION INSPECTOR* in relation to the object (S2) with which it interacts.
b. Change the color, or appearance, of FACIAL RECOGNITION INSPECTOR* or its external environment.
c. Change the transparency of FACIAL RECOGNITION INSPECTOR* or its external environment.
Separation principle for FACIAL RECOGNITION INSPECTOR* : Separation by condition
Solution strategy for FACIAL RECOGNITION INSPECTOR* : Improving if a solution has not yet emerged

COMPLEMENTARY CONTRADICTION 2
Contradiction order wt.6

Parameter to improve: (+) 37. Difficulty of detecting and measuring

TO IMPROVE (UDE): FACIAL RECOGNITION INSPECTOR has More Difficulty in detection and measurement interacting with S2

Parameter to attenuate or preserve: (-) 28. Measurement accuracy

TO ATTENUATE OR PRESERVE (UDE): FACIAL RECOGNITION INSPECTOR has Less Measurement accuracy interacting with S2

Inventive principles IP(s) : [26,24,32,28]

IX.B SOLUTION TO MORE RELEVANT CONTRADICTIONS BETWEEN NEEDS TO SATISFY (Cob.NS)

Included in each inventive principle described below is the incidence level or position number it occupies in Table II. If it is not shown, it means that it only appears in Table IV. and requires attention.

CONTRADICTION BETWEEN NEEDS TO SATISFY N° 1

Parameter to improve 32. Ease of achieving desired outcome

IMPROVE: FACIAL RECOGNITION INSPECTOR has Ease of achieving desired outcome interacting with S2

Parameter to preserve 15. Duration of action of moving object

PRESERVE (DE): FACIAL RECOGNITION INSPECTOR has more ease to preserve desirable effect of parameter 15. Duration of action of moving object

Inventive principles IP(s) : [27,1,4,0]

27. Cheap Short-Living Objects, Str. IP (Pos.4):

a. Replace or divide (either fully or partially) FACIAL RECOGNITION INSPECTOR* or its action with multiple inexpensive or short-living objects, actions, or sub-parts, which compress or simplify its characteristics and properties, and/or are limited but sufficient to achieve the desired objective.

b. Comprising certain qualities of FACIAL RECOGNITION INSPECTOR* (e.g., the degree of participation, complexity, or lifetime), with no loss of functionality, to achieve the desired objective.

Separation principle for FACIAL RECOGNITION INSPECTOR* : Separation in subsystem

Solution strategy for FACIAL RECOGNITION INSPECTOR* : Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security)

1. Segmenting/ Integrating, Str. IP (Pos.1):

a. Divide FACIAL RECOGNITION INSPECTOR* into existing and/or new parts, shapes, phases, states, or conditions.

b. Integrate different parts, shapes, phases, states, or existing or new conditions of a FACIAL RECOGNITION INSPECTOR* into a single entity..

c. Make FACIAL RECOGNITION INSPECTOR* easy to disassemble or assemble.

d. Increase or reduce the degree of fragmentation or segmentation of FACIAL RECOGNITION INSPECTOR*.

Separation principle for FACIAL RECOGNITION INSPECTOR* : Separation in space / Separation in subsystem

Solution strategy for FACIAL RECOGNITION INSPECTOR* : Improving attributes; Improving performance; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

4. Asymmetry/ Symmetry, Str. IP (Pos.):

a. Change the shape of FACIAL RECOGNITION INSPECTOR* from symmetrical to asymmetrical, permanent, or variable in time, or vice versa.

b. If FACIAL RECOGNITION INSPECTOR* is asymmetrical, increase its degree of asymmetry, or vice versa.
Separation principle for FACIAL RECOGNITION INSPECTOR* : Separation in space
Solution strategy for FACIAL RECOGNITION INSPECTOR* : Improving attributes; Improving performance; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged

CONTRADICTION BETWEEN NEEDS TO SATISFY N° 2
Parameter to improve 32. Ease of achieving desired outcome
IMPROVE: FACIAL RECOGNITION INSPECTOR has Ease of achieving desired outcome interacting with S2
Parameter to preserve 34. Ease of change, repair or maintain
PRESERVE (DE): FACIAL RECOGNITION INSPECTOR has more ease to preserve desirable effect of parameter 34. Ease of change, repair or maintain
Inventive principles IP(s) : [35,1,11,9]
35. Transformation/ Parameter Changes, Str. IP (Pos.6):
a. Change FACIAL RECOGNITION INSPECTOR*'s physical or chemical state (e.g., in shape, in composition, to a gas, liquid, solid or plasma).
b. Change the composition or condition of FACIAL RECOGNITION INSPECTOR* by adding or removing components.
c. Change the concentration or consistency; change the degree of flexibility; change the temperature or the level of internal activity of FACIAL RECOGNITION INSPECTOR*.
Separation principle for FACIAL RECOGNITION INSPECTOR* : Separation by condition / Separation alternative
Solution strategy for FACIAL RECOGNITION INSPECTOR* : Improving attributes; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security)
1. Segmenting/ Integrating, Str. IP (Pos.1):
a. Divide FACIAL RECOGNITION INSPECTOR* into existing and/or new parts, shapes, phases, states, or conditions.
b. Integrate different parts, shapes, phases, states, or existing or new conditions of a FACIAL RECOGNITION INSPECTOR* into a single entity..
c. Make FACIAL RECOGNITION INSPECTOR* easy to disassemble or assemble.
d. Increase or reduce the degree of fragmentation or segmentation of FACIAL RECOGNITION INSPECTOR*.
Separation principle for FACIAL RECOGNITION INSPECTOR* : Separation in space / Separation in subsystem
Solution strategy for FACIAL RECOGNITION INSPECTOR* : Improving attributes; Improving performance; Improving 7 quality factors (Quality, Reliability, Maintainability, Supportability, Human Factors, Safety, Security); Improving if a solution has not yet emerged
11. Beforehand Cushioning, Tac. IP (Pos.14):
a. Prepare emergency means, beforehand, to compensate for the relatively low reliability of FACIAL RECOGNITION INSPECTOR*.
Separation principle for FACIAL RECOGNITION INSPECTOR* : Separation in time
Solution strategy for FACIAL RECOGNITION INSPECTOR* : Improving 7 quality factors (Quality,

Reliability, Maintainability, Supportability, Human Factors, Safety, Security)

9. Preliminary Anti-action, Oper. IP (Pos.):

a. If FACIAL RECOGNITION INSPECTOR* needs to perform an action with harmful and useful effects, this action should be replaced with anti-actions to control harmful effect.

b. Create beforehand actions in FACIAL RECOGNITION INSPECTOR* that will oppose known undesirable working stresses later.

Separation principle for FACIAL RECOGNITION INSPECTOR* : Separation in time

Solution strategy for FACIAL RECOGNITION INSPECTOR* : Improving performance

Anexo

List of applicable Inventive Principles for Innovation Solutions

IP.1. Segmenting/ Integrating	IP.21. Skipping/ Avoiding
IP.2. Taking out/ Adding	IP.22. Convert harm in benefit
IP.3. Local Quality	IP.23. Feedback
IP.4. Asymmetry/ Symmetry	IP.24. Intermediary
IP.5. Merging/ Separating	IP.25. Self-service
IP.6. Universality	IP.26. Copying/ Replicating
IP.7. Nesting/ Dispersing	IP.27. Cheap Short-Living Objects
IP.8. Anti-Weight/ Compensation	IP.28. Mechanics Substitution
IP.9. Preliminary Anti-action	IP.29. Controllable Soft Variables
IP.10. Preliminary Action	IP.30. Simple Shapes/ Ways to Interact
IP.11. Beforehand Cushioning	IP.31. 31.Using/ Removing Unused Parts
IP.12. Equipotentiality	IP.32. Perception/ Appearance/ Color Changes
IP.13. Reverse or Indirect Action	IP.33. Homogeneity / Compatibility
IP.14. Spheroidality - Curvature - Angle	IP.34. Discarding and Recovering
IP.15. Dynamics	P.35. Transformation / Parameter Changes
IP.16. Partial or Excessive Actions	IP.36. Phase, State or Condition Transitions
IP.17. Another Dimension or Field	IP.37. Useful Perceptible Change
IP.18. Mechanical Vibrations/ Energy Variations	IP.38. Strong or Quick Reactions
IP.19. Time-Varying Action/ Periodic or Pulsating	IP.39. Inert Atmosphere / Environment
IP.20. Continuity of Useful Action	IP.40. Composite Materials/ Conditions

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