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(54) **A WINDSHIELD DEFOGGING SYSTEM FOR A VEHICLE**

(57) A window defogging system for a vehicle comprising:
- a window including an electrical heating element;
- a power controller module configured to monitor the amount of electrical power provided to the electrical heating element of the window;
- a sensing module configured to sense at least one en-

vironmental parameter and trigger the power controller module upon the value of said environmental parameter;
- a switch module configured to maintain the sensing module and/or the power controller module in deactivated mode and to activate said sensing module and/or the power controller module upon input external triggering signal and/or after each iteration of a cycling time delay.

[Fig. 1]

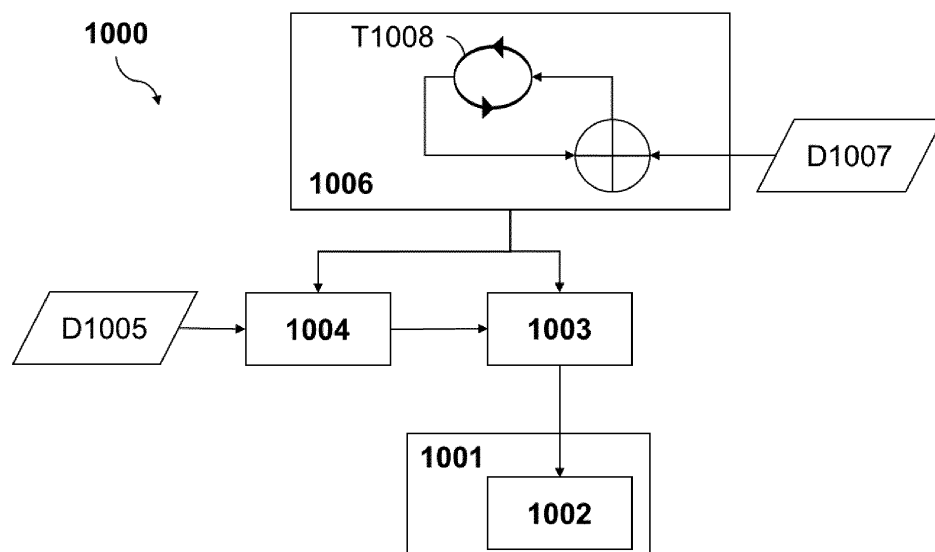


Fig. 1

Description

Technical field

[0001] The present disclosure pertains to defogging systems and methods for a vehicle, in particular for an automotive vehicle.

Technical background

[0002] Many vehicles are today equipped with defogging systems to remove and/or avoid formation of fog onto the surface of the vehicle windows, e.g., windshield.

[0003] The formation of fog on a vehicle window depends on the air temperature, both inside and outside of the vehicle, and the moisture content within the vehicle. When the temperature of the air close to the windows drops below a specific temperature water drops may form at their surface, at a temperature called the dew point the temperature below which water droplets begin to condense and dew forms.

[0004] Current vehicles are now often equipped with sensors, often mounted on windows, e.g., windshield, for detecting or predicting the presence of moisture or fog on their surface. The sensors may be resistive relative humidity sensors and/or infrared sensors. When moisture or fog is detected, a heating, ventilating, and air conditioning (HVAC) system is triggered and automatically activated to defog the window.

[0005] Most of current systems aim today to minimize the occurrence of windows fogging by a more accurate detection or anticipation of fog and/or by a better management of the defogging unit, e.g., heating, ventilating, and air conditioning systems, to remove humidity and/or avoid the formation of fog.

[0006] US 2007130972 A1 HYUNDAI MOTOR CO LTD [KR] 14.06.2007 discloses an automatic defogging system comprising humidity sensor installed on the inner surface of a window, a controller to operate an air conditioning system depending on the humidity degree measured by the humidity sensor. The controller may control an intake door and a blower to allow a regulated amount of outer dry air to flow in the vehicle to remove humidity. An air conditioner may also supply cool or hot air in the same goal.

[0007] CN 104470010 A FUYAO GLASS IND GROUP CO LTD 25.03.2015 discloses a defogging system comprising a heating windshield, a resistive humidity sensor arranged to measure the humidity within the vehicle, a current or resistance measuring device configured to measure the current or resistance of the heating windshield and control unit configured to control the power supply to the heating element depending on a predefined humidity-temperature-electrical resistance law.

[0008] US 2016052366 A1 FORD GLOBAL TECH LLC [US] 25.02.2016 discloses a windshield defogging system which comprises a windshield including a heating element, an air circulation system with a blower to provide

a stream of air over the surface of the windshield and a controller configured to select a duty cycle for the electrical heating element from predetermined data based upon air circulation system operating parameters and environmental conditions. The system allows to optimize the performance of the climate control system of the vehicle and minimize any possibility of the occurrence of windshield fogging.

[0009] US 2016361973 A1 FORD GLOBAL TECH LLC [US] 15.12.2016 discloses a method for avoiding misting on a windowpane by calculating a dew or frost point based on the air humidity and air temperature measured within the vehicle and activating an anti-misting mode of a ventilation and/or air-conditioning system based on said dew or frost point and the outside temperature.

[0010] US 2018117988 A1 HYUNDAI AMERICA TECHNICAL CT INC [US] 03.05.2018 describes a defogging system comprising at least one resistive humidity sensor disposed on a windshield, a defogging unit, e.g., heating, ventilating, and air conditioning, and a controller coupled to the at least one resistivity humidity sensor and configured to determine whether fog has formed on the window and actuate the defogging unit. The system may comprise a plurality of resistive humidity sensors disposed at different locations on the windows and the controller may be configured to identify the location of a sensor which detects fog.

[0011] US 2018319371 A1 ELECTRONICS & TELECOMMUNICATIONS RES INST [KR] 08.11.2018 discloses a fog-removing device which comprises a sensor configured to detect fog, a heater configured to generate heat to remove the fog and a control unit configured to supply power to the heater. The sensor is made of two electrodes arranged on an organic or inorganic transparent substrate and separated by a recess. The sensor is fixed onto the inner surface of the windshield via an adhesive layer. When fog appears on the windshield, the two electrodes may become electrically connected by water drops forming between them, and, in turn, activate the heater via the control unit. The aim of the device is to improve the accuracy of the fog detection.

[0012] US 6 112 807 A, DAGE GERHARD ALLAN [US], 05.09.2000 describes a method for preventing fogging of the windows of an automotive vehicle. The method operates the air conditioning system of the vehicle at temperatures where a high degree of probability of fogging exists. The method comprises steps of measuring the ambient temperature, the evaporator core temperature of the air conditioning system and operating the air conditioning compressor at specific duty cycles depending upon these temperatures.

Summary of the invention

Technical problem

[0013] As efficient as they may be, the current systems suffer the major drawback to require to be always active,

i.e., power to be always supplied to all or some of their elements for maintaining the continuous detection and/or anticipation of fog onto the surface of the vehicle windows. While the defogging unit, e.g., the heating, ventilation or air conditioning systems may be only activated upon request from the controller unit, and thus may be supplied with power only when they are on use, the controller unit and possibly the sensors must remain active and require continuous supply of power.

[0014] However, over the overall usage time of a vehicle, the risk of fogging remains relatively low, being only at its highest level in rainy or cold weathers which is considered, as general rule of thumb, to represent at most 10% of said usage time. The controller unit and possibly the sensors are unnecessarily and uselessly kept active outside this time and, over long periods, the cumulative amount of wasted electrical power may be significant.

[0015] Reducing the energy consumption of vehicles is now mandatory to reduce our gas emissions and other environmental impacts, to save costs and to extend the lifetime of batteries, in particular for electrical vehicles. Thus, there is a need for an optimized and more efficient management of the energy consumption of defogging systems.

Solution to the technical problem

[0016] In a first aspect of the disclosure, there is provided a window defogging system for a vehicle as described in claim 1, dependant claims being advantageous embodiments.

[0017] In a second aspect of these disclosure, there is provided a window defogging method for a vehicle as described in claim 13, dependant claims being advantageous embodiments.

Advantages of the invention

[0018] An outstanding advantage of the present invention is that the window defogging system is put on full operation only when it is needed, i.e., when a risk of window fogging may occur. The components, such as the sensing module and the power control module, which are in always-on mode in system from the prior art, are put on-hold or sleeping. The energy consumption is thus reduced.

[0019] Another advantage is that, as it will be further described in the detailed embodiments, the system may be easily adapted depending on the whole system architecture of the vehicle.

Brief description of drawings

[0020]

[Fig. 1] is a system diagram for a window defogging system according to the first aspect of the invention.

[Fig. 2] is a system diagram for a window defogging

system according to the first embodiments of the first aspect of the invention.

[Fig. 3] is a system diagram for a window defogging system according to the second embodiments of the first aspect of the invention.

[Fig. 4] is a system diagram for a window defogging system according to the third embodiments of the first aspect of the invention.

[Fig. 5] is a system diagram for a window defogging system according to the fourth embodiments of the first aspect of the invention.

[Fig. 6] is a system diagram for a window defogging system according to the fifth embodiments of the first aspect of the invention.

[Fig. 7] is a system diagram for a window defogging system according to the sixth embodiments of the first aspect of the invention.

[Fig. 8] is a system diagram for a window defogging system according to the seventh embodiments of the first aspect of the invention.

Detailed description of embodiments

[0021] In a first aspect of the invention, with reference to Fig. 1, there is provided a window defogging system 1000 for a vehicle comprising:

- a window 1001 including an electrical heating element 1002;
- a power controller module 1003 configured to monitor the amount of electrical power provided to the electrical heating element 1002 of the window 1001;
- a sensing module 1004 configured to sense at least one environmental parameter D1005 and trigger the power controller module upon the value of said environmental parameter D1005;
- a switch module 1006 configured to maintain the sensing module 1004 and/or the power controller module 1003 in disactivated mode and to activate said sensing module 1004 and/or the power controller module 1003 upon input external triggering signal D1007 and/or after each iteration of a cycling time delay T1008.

[0022] In the context of the present disclosure, the expression 'to monitor' should be understood according to its technical meaning, i.e., to check, to regulate and/or to control a signal which may be here the amount of electrical power provided to the electrical heating element of the window.

[0023] In the context of the present disclosure, a 'cycling time delay' T1008 should be understood as a time delay which occurs repeatedly, i.e., which starts again after it ends. In other word, the time delay reiterates continuously as a repetitive cycle or loop.

[0024] The defogging system 1000 according to the first aspect of the invention comprises at least one heating window, i.e., a window including an electrical heating

element which is ideally configured to heat said window. Any adapted heating window may be used. In a vehicle, the heating window may be either a heating windshield, a heating backlight or a heating sidelight. Preferably, the heating window may be a heating windshield. In certain embodiments, the defogging system 1000 may comprise several, i.e., more than one, e.g., two, three or four, heating windows.

[0025] In example embodiments, the heating windshield may be as those described in US 3 982 092 A LIBBEY OWENS FORD CO 21.09.1976, US 3 475 588 A PERMAGLASS 28.10.1969, US 1 758 703 A JOHNSON JACK A 13.05.1930, US 3 790 745 A SIERRACIN CORP 05.02.1974. The heating window may be a heating backlight such as those described in US 5 653 904 A ADLVAR SAM[US] 05.08.1997, US 2020 391 576 A1 FORD GLOBAL TECH LLC [US] 17.12.2020.

[0026] The switch module 1006 is configured to maintain the sensing module 1004 and/or the power controller module 1003 in disactivated mode and to activate said sensing module 1004 and/or the power controller module 1003 upon input external triggering signal D1007 and/or after each iteration of a cycling time delay T1008. In other words, the switch module 1006 is configured to keep the sensing module 1004 and/or the power controller module 1003 in sleeping mode, i.e., with minimal or no energy consumption. For instance, the switch module 1006 may be configured to switch off the sensing module 1004 and/or the power controller module 1003, e.g., by switching off the electrical power supply, and to switch them on upon input external triggering signal D1007 and/or after each iteration of a cycling time delay T1008.

[0027] In certain embodiments, the switch module 1006 may activate the sensing module 1004 and/or the power controller module 1003 upon input external triggering signal D1007. An external triggering D1007 signal may be, for instance, any electrical or electromagnetic signal in which information is encoded. This signal may be adapted to be received and decoded by the switch module 1006 which may activate, e.g., switch on electrically, the sensing module 1004 and/or the power controller module 1003 depending on the decoded information. The signal may be a simple electrical or electromagnetic impulsion or a more complex encode signal.

[0028] Independently from or in addition to the cycling time delay T1008, the switch module 1006 may receive, as an external triggering signal D1007, a signal informing it that a risk of fogging may occur so that it may activate the sensing module and/or the power controller module that are maintained in a disactivated mode. Example embodiments of the external triggering signal D1007 may be a signal from a weather forecasting system, an external or internal temperature sensor of the vehicle, an external or internal humidity sensor of the vehicle, or a combination thereof.

[0029] As illustrative example, an external weather forecasting system, e.g., a weather risk alert system from a government or non-government meteorological office,

may broadcast a signal to the vehicle informing of a risk of cold or rainy weather. This signal may be processed by the switch module 1006 to activate the sensing module 1004 and/or the power controller module 1003 to evaluate the risk of window fogging and start the defogging system if it is needed.

[0030] The sensing module 1004 is configured to sense at least one environmental parameter D1005 and triggers the power control module 1003 depending on the value of said parameter D1005. By the continuous or iterative sensing, e.g., measuring by means of one or several sensors, of at least one parameter D1005 from the surrounding environment of the driver of the vehicle, the switch module 1004 may trigger, e.g., activate, the power controller module 1003 if, for instance, the value of the sensed parameter D1005 reaches a defined threshold, e.g., a maximum value.

[0031] In advantageous embodiments, the at least one environment parameter D1005 may be the temperature within the cabin of the vehicle, the temperature outside the vehicle, the humidity of within cabin of the vehicle, the temperature of the windshield, or combination thereof.

[0032] As illustrative example, with reference to Fig. 2, the switch module may be configured to measure the temperature, T_w , of the window 1001, e.g., by means of temperature sensor within the window 1001 or in its vicinity, and to measure the temperature, T_c , within the cabin. If the temperature, T_w , of the window 1001 is below the temperature, T_c , of the cabin, a risk of condensation onto the window 1001 may occur and the sensing module 1004 may be configured to trigger the power control module 1003 which in turn provides electrical power to the heating element 1002 of the window 1001.

[0033] Alternatively, or complementarily, the sensing module 1004 may be configured to sense the humidity within the cabin, e.g., by means of a humidity sensor, and to trigger the power control module if the value of humidity is above a given threshold, e.g., 20%, 30% or 40%.

[0034] The sensing module 1004 may be integrated as an internal part of the defogging system, i.e., independent of the facilities of the vehicle itself. In particular, it may be independent of the whole system architecture of the vehicle.

[0035] In this context, in certain advantageous embodiments, the switch module 1006 may be configured to activate the sensing module 1004 after each iteration of the cycling time delay T1008, and to activate the power controller module 1003 if the sensing module 1004 triggers the power controller module 1003 upon the value of the environmental parameter D1005. Since the sensing module 1004 is maintained in a disactivated mode, e.g., a sleeping mode, and activated punctually after each iteration of the cycling time delay T1008, a continuous sensing, and thus a continuous supply of electrical power to the sensing module is avoided. Substantial amount of the energy may be saved.

[0036] Alternatively, with reference to Fig. 3, the sensing module 1004, although it is still part of the defogging system 1000, may be part of the facilities, i.e., integrated in the whole system architecture 3001 of the vehicle. In such case, the defogging system 1000 is adapted to retrieve signal from the so integrated sensing module 1004 for triggering the power control module 1003. Since the sensing module 1004 is part of the whole system architecture 3001 of the vehicle, e.g., part of the central unit of the vehicle, the switch module 1006 may not be able, e.g., for security and/or technical issues, to control the sensing module, i.e., to maintain the sensing module 1004 in a deactivated mode. For example, one reason for the unavailability of the sensing module 1004 for such control may be that it may be required for the operation of other components of the system architecture 3001 of the vehicle.

[0037] In this context, with reference to Fig. 3, in advantageous alternative embodiments, the sensing module 1004 may be part of the central unit of the vehicle and the switch module 1006 is configured to maintain the power controller module 1003 in deactivated mode and, after each iteration of the cycling time delay T1008, to activate said power controller 1003 if the sensing module 1004 triggers the power controller module 1003 upon the value of the environmental parameter D1005. After each iteration of the cycling time T1008, the power control module 1003 is only activated if the sensing module 1004 triggers it. Electrical power is provided to the electrical heating element 1002 of the window 1001 if needed. A better management of the electrical power is provided, and electrical energy may be saved.

[0038] In some embodiments, with reference to Fig. 4, where the sensing module 1004 is not part of the central unit of the vehicle, the switch module 1006 may be further configured to compare 4001 the input external triggering signal D1007 to a defined setpoint value D4001 and to activate the sensing module 1004 depending on the result of said comparison 4001. The setpoint value D4001 may be defined manually or automatically. It may also be defined as a standard setpoint value within the switch module 1006, in particular depending on the climate of the country in which the system according to the invention may be used.

[0039] In other embodiments, with reference to Fig. 5, where the sensing module 1004 may or may not be part of the central unit of the vehicle, the switch module 1006 may be further configured to compare 5001 the input external triggering signal D1007 to a defined setpoint value D5001 and to activate the power controller module 1003 depending on the result of said comparison 5001. As in the previous case, the setpoint value D5001 may be defined manually or automatically. It may also be defined as a standard setpoint value within the switch module 1006, in particular depending on the climate of the country in which the system according to the invention may be used.

[0040] In some embodiments, with reference to Fig. 6,

the switch module 1006 may further comprise a timer 6001 for automatically and/or manually defining the cycling time delay T1008. In an example embodiment, a manual timer 6001 may be provided to the driver of the vehicle for a manual adjustment of the cycling time delay T1008, i.e., the duration of one iteration of the cycling time delay T1008. More freedom is then provided to the driver for the frequency at which the switch module 1006 should activate the sensing module 1004 and/or the power controller module 1003. It may provide an alternative when the cycling time delay T1008 defined previously, e.g., as the standard value for the cycling time delay T1008, may appear inappropriate, for any reason, regarding the risk of window fogging.

[0041] Alternatively, or complementarily, the cycling time delay T1008 may be automatically defined depending on given criteria. In particular, the time may automatically extend or shorten depending on the value the at least one environmental parameter D1005 sensed by the sensing module 1004. In an example embodiment, if the environmental parameter D1005 is the external temperature of the vehicle, the cycling time delay may be extended when said external temperature is about 35°C since the risk of window fogging is very low. On the other hand, it may be shortened when the temperature is about 25°C or below.

[0042] In certain embodiments, the cycling time delay T1008 may be at least 1 minute, preferably at least 3 minutes, preferably at least 5 minutes. These values are provided as rule of thumb and may be adapted depending on the climate of the country in which the system according to the invention may be used.

[0043] With reference to Fig. 7, in certain vehicles, the central unit 7001 of the vehicle may be featured with its own weather forecasting system, with its own sensor system and/or with its own communication system linked with a remote weather forecasting service 7002. In this context, in certain advantageous embodiments, with reference to Fig. 7, the switch module 1006 may be wired or wirelessly 7003a, 7003b connected to the central unit 7001 of the vehicle, and the switch module 1006 may be configured to receive or retrieve the external triggering signal D1007 from the central unit 7001. The external triggering signal D1007 may be similar in nature as those mentioned above, i.e., a weather alert, external or internal temperature of the vehicle, or external or internal humidity of the vehicle, or a combination thereof. For the wired or wirelessly connection between the switch module 1006 and the central unit 7001 of the vehicle, the switch module 1006 may advantageously comprise a communication module 7003b.

[0044] The switch module 1006 may be implemented either as a hardware or as a software component. As a hardware, it may be implemented as a low-power programmable microcontroller unit, e.g., on-board system, e.g., low-power computer board such as single-board computer. As a software, it may be implemented as a computer program on a data processing device, e.g., part

of the central unit of the vehicle. Any kind of programming language, either compiled or interpreted, can be used.

[0045] With reference to Fig. 8, vehicles may be often equipped with an air conditioning system 8001. The air conditioning may help, as an additional system, to defog the window 1001. In certain embodiments, the switch module 1006 may be further configured to monitor, e.g., to check, to regulate and/or to control, said air conditioning system 8001 during its operation.

[0046] In a second aspect of the invention, with reference to Fig. 1, there is provided a window defogging method for a vehicle comprising the following steps:

- (a) providing a window 1001 including an electrical heating element 1002;
- (b) providing a power controller module 1003 configured to monitor the amount of electrical power provided to the electrical heating element 1002 of the window 1001;
- (c) providing a sensing module 1004 configured to sense at least one environmental parameter D1005 and trigger the power controller module 1003 upon the value of said environmental parameter D1005;
- (d) maintaining the sensing module 1005 and/or the power controller module 1003 in a disactivated mode;
- (e) activating said sensing module 1004 and/or power controller module 1003 upon input external triggering signal D1005 and/or after each iteration of a cycling time delay T1008.

[0047] In certain embodiments, the step (e) may be defined by the following steps:

- (e1) waiting for one iteration of the cycling time delay T1008 to lapse;
- (e2) activating the sensing module 1004;
- (e3) sensing an environmental value D1005 with the sensing module 1004;
- (e4) activating the power controller module 1003 depending on the value of said sensed environmental parameter D1005;
- (e5) iterating steps (e1) to (e4) over the cycling time delay T1008.

[0048] In further embodiments, with reference to Fig. 3, the sensing module 1004 may be part of the central unit 3001 of the vehicle, wherein the step (e) is defined by the following steps :

- (e1) waiting for one iteration of the cycling time delay T1008 to lapse;
- (e2) retrieve at least one environmental value D1005 sensed by the sensing module 1004;
- (e3) activating the power controller module 1003 depending on the value of said sensed environmental parameter D1005 if the sensing module 1004 triggers the power controller module 1003 upon the val-

ue of the environmental parameter D1005;

(e4) iterating steps (e1) to (e4) over the cycling time delay T1008.

[0049] Unless obviously technically incompatible, all features described in the context of the detailed embodiments of the first aspect of the invention may apply to the embodiments of the second aspect of the invention, with few or little modifications.

[0050] Although the invention has been described in connection with preferred embodiments and examples, it should be understood that various modifications, additions, and alterations may be made to the invention by one skilled in the art without departing from the spirit and scope of the invention as defined in claims.

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[0051]

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Claims

1. A window defogging system (1000) for a vehicle comprising:

- a window (1001) including an electrical heating element (1002);
- a power controller module (1003) configured to monitor the amount of electrical power provided to the electrical heating element (1002) of the window (1001);
- a sensing module (1004) configured to sense

- at least one environmental parameter (D1005) and trigger the power controller module (1003) upon the value of said environmental parameter (D1005);
 - a switch module (1006) configured to maintain the sensing module (1004) and/or the power controller module (1003) in disactivated mode and to activate said sensing module (1004) and/or the power controller module (1003) upon input external triggering signal (D1007) and/or after each iteration of a cycling time delay (T1008).
2. A window defogging system (1000) according to claim 1, wherein the switch module (1006) is configured to activate the sensing module (1004) after each iteration of the cycling time delay (T1008), and to activate the power controller module (1003) if the sensing module (1004) triggers the power controller module (1000) upon the value of the environmental parameter (D1005).
 3. A window defogging system (1000) according to claim 1, wherein the sensing module is part of the central unit (3001) of the vehicle and the switch module (1006) is configured to maintain the power controller module (1003) in disactivated mode and, after each iteration of the cycling time delay (T1008), to activate said power controller (1003) if the sensing module (1004) triggers the power controller module (1003) upon the value of the environmental parameter (D1005).
 4. A window defogging system (100) according to any of claims 1 to 2, wherein the switch module (1006) is further configured to compare (4001) the input external triggering signal (D1007) to a defined setpoint value (D4001) and to activate the sensing module (1004) depending on the result of said comparison (4001).
 5. A window defogging system (1000) according to claim 3, wherein the switch module (1006) is further configured to compare the input external triggering signal (1007) to a defined setpoint value (D5001) and to activate the power controller module (1003) depending on the result of said comparison (5001).
 6. A window defogging system (1000) according to any of claims 1 to 5, wherein the switch module (1006) comprises a timer (6001) for automatically and/or manually defining the cycling time delay (T1008).
 7. A window defogging system (1000) according to any of claims 1 to 6, wherein the time delay is at least 1 minutes, preferably at least 3 minutes, preferably at least 5 minutes.
 8. A window defogging system (1000) according to any of claims 1 to 7, wherein the external triggering signal (D1007) is a signal from a weather forecasting system, an external or internal temperature sensor of the vehicle, an external or internal humidity sensor of the vehicle, or a combination thereof.
 9. A window defogging system (1000) according to any of claims 1 to 8, wherein the environmental parameter (D1005) is the temperature within the cabin of the vehicle, the temperature outside the vehicle, the humidity of within cabin of the vehicle, the temperature of the windshield, or combination thereof.
 10. A window defogging system (1000) according to any of claims 1 to 9, wherein the vehicle comprises an air conditioning system (8001) and wherein the switch module (1006) is further configured to monitor said air conditioning system (8001) during its operation.
 11. A window defogging system (1000) according to any of claims 1 to 10, wherein the switch module (1006) is wired or wirelessly (7003a, 7003b) connected to the central unit (7001) of the vehicle, and wherein the switch module (1006) is configured to receive or retrieve the external triggering signal (D1007) from the central unit (7001).
 12. A window defogging system (1000) according to any of claims 1 to 11, wherein the switch module (1006) is a low power programmable microcontroller unit.
 13. A window defogging method for a vehicle comprising the following steps:
 - (a) providing a window (1001) including an electrical heating element (1002);
 - (b) providing a power controller module (1003) configured to monitor the amount of electrical power provided to the electrical heating element (1002) of the window (1001);
 - (c) providing a sensing module (1004) configured to sense at least one environmental parameter (D1005) and trigger the power controller module (1003) upon the value of said environmental parameter (D1005);
 - (d) maintaining the sensing module (1004) and/or the power controller module (1003) in a disactivated mode
 - (e) activating said sensing module (1004) and/or power controller module (1003) upon input external triggering signal (D1007) and/or after each iteration of a cycling time delay (T1008).
 14. A window defogging method according to claim 13, wherein the step (e) is defined by the following steps:

(e1) waiting for one iteration of the cycling time delay (T1008) to lapse;
(e2) activating the sensing module (1004);
(e3) sensing an environmental value (D1005) with the sensing module (1004); 5
(e4) activating the power controller module (1003) depending on the value of said sensed environmental parameter (D1005);
(e5) iterating steps (e1) to (e4) over the cycling time delay (T1008). 10

- 15.** A window defogging method according to claim 13, wherein the sensing module is part of the central unit of the vehicle, wherein the step (e) is defined by the following steps : 15

(e1) waiting for one iteration of the cycling time delay (T1008) to lapse;
(e2) retrieve at least one environmental value (D1005) sensed by the sensing module (1004); 20
(e3) activating the power controller module (1003) depending on the value of said sensed environmental parameter (D1005) if the sensing module (1004) triggers the power controller module (1003) upon the value of the environmental parameter (D1005); 25
(e45) iterating steps (e1) to (e4) over the cycling time delay (T1008).

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[Fig. 1]

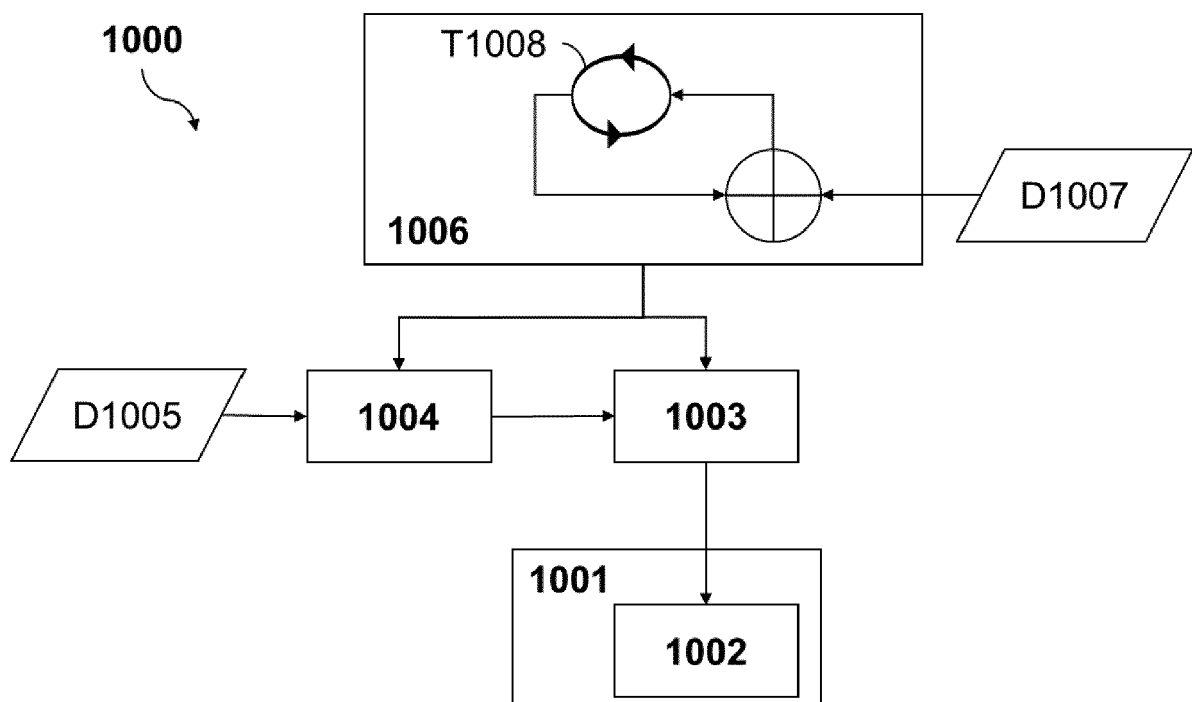


Fig. 1

[Fig. 2]

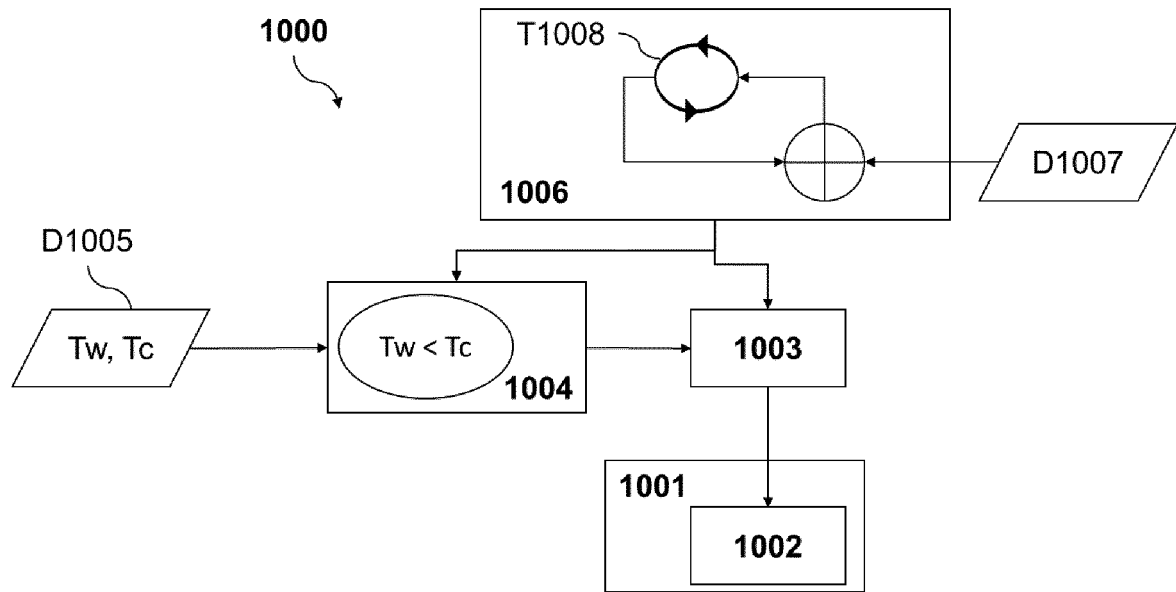


Fig. 2

[Fig. 3]

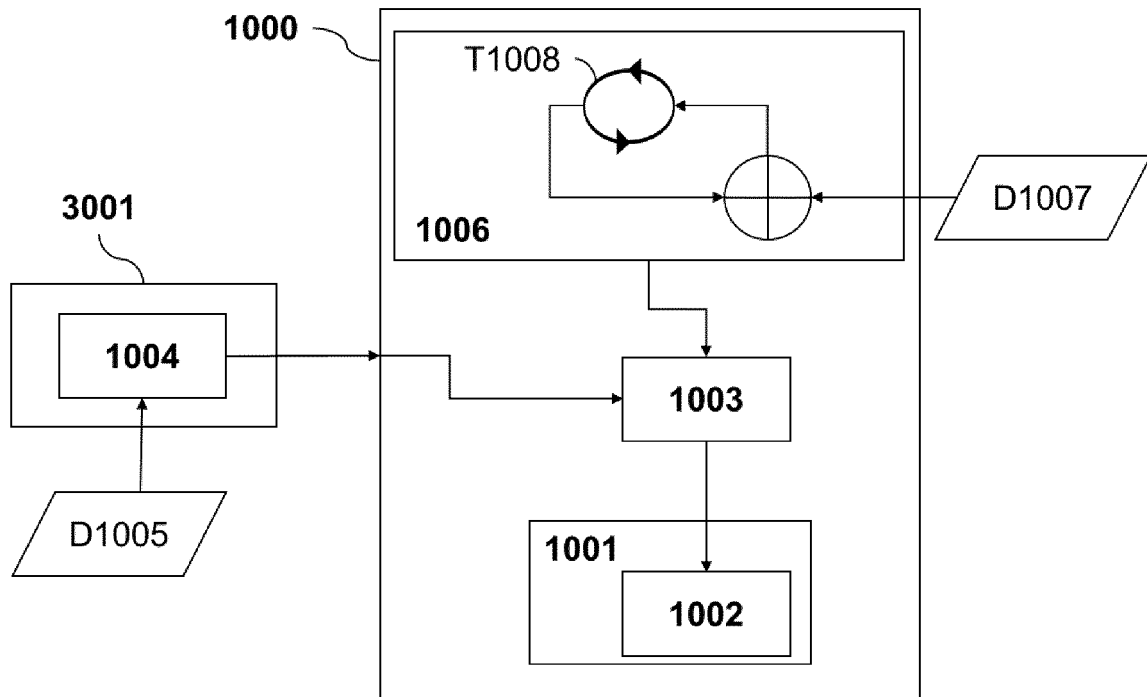


Fig. 3

[Fig. 4]

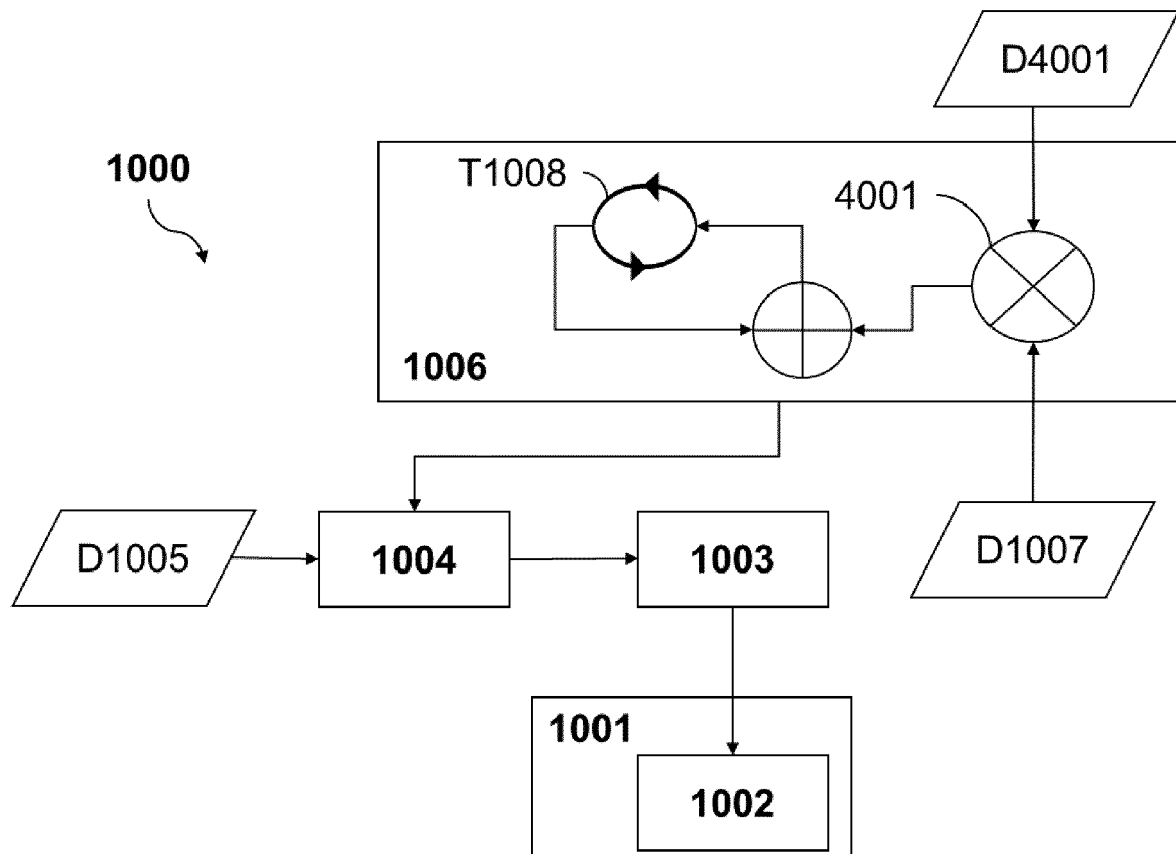


Fig. 4

[Fig. 5]

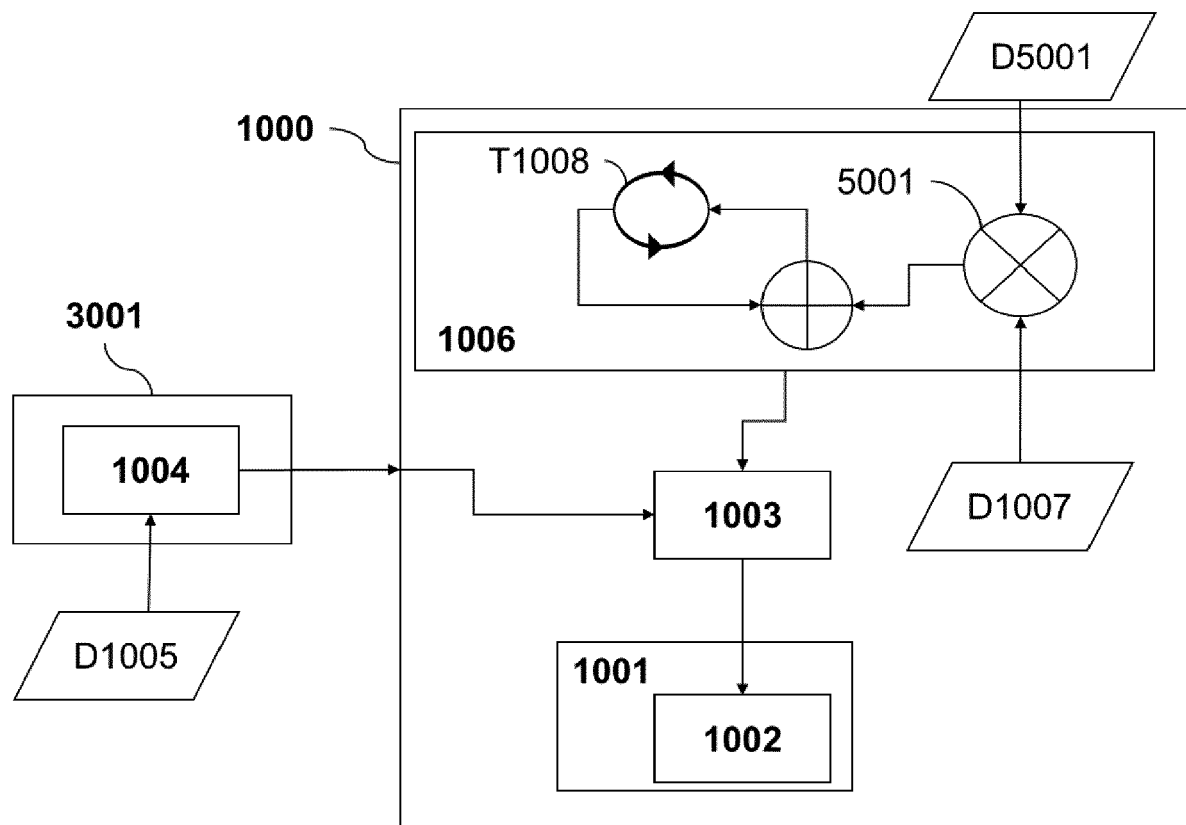


Fig. 5

[Fig. 6]

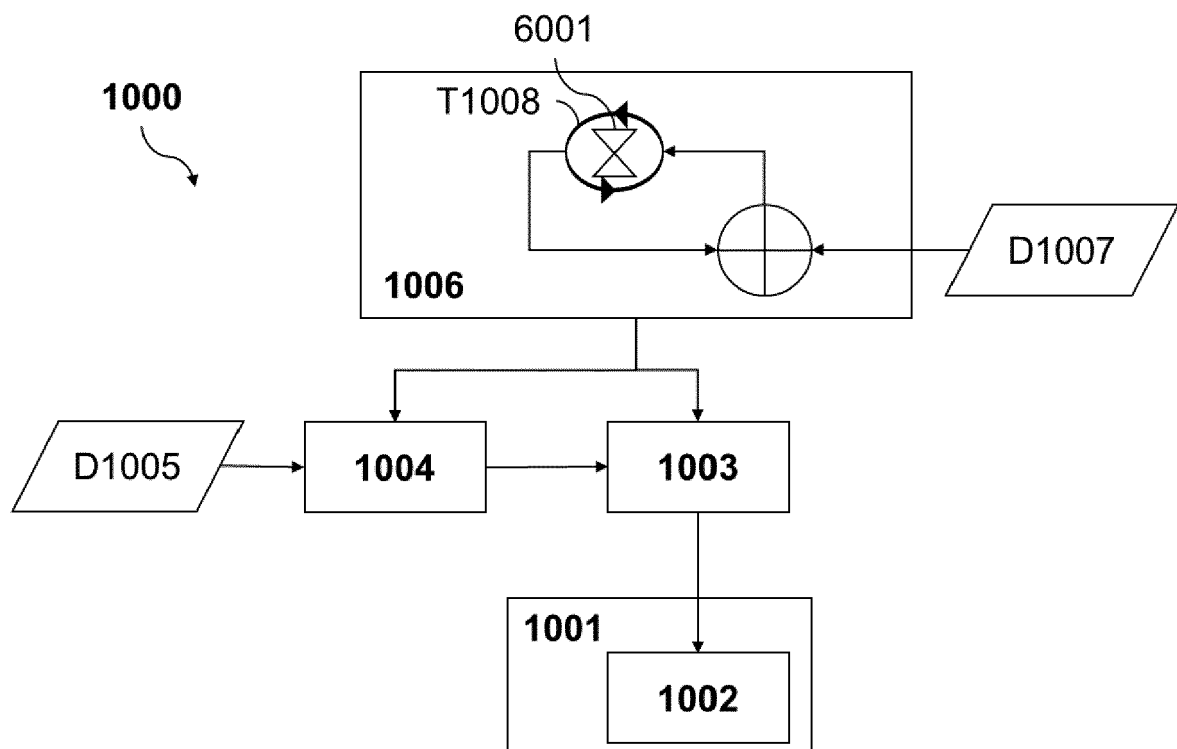


Fig. 6

[Fig. 7]

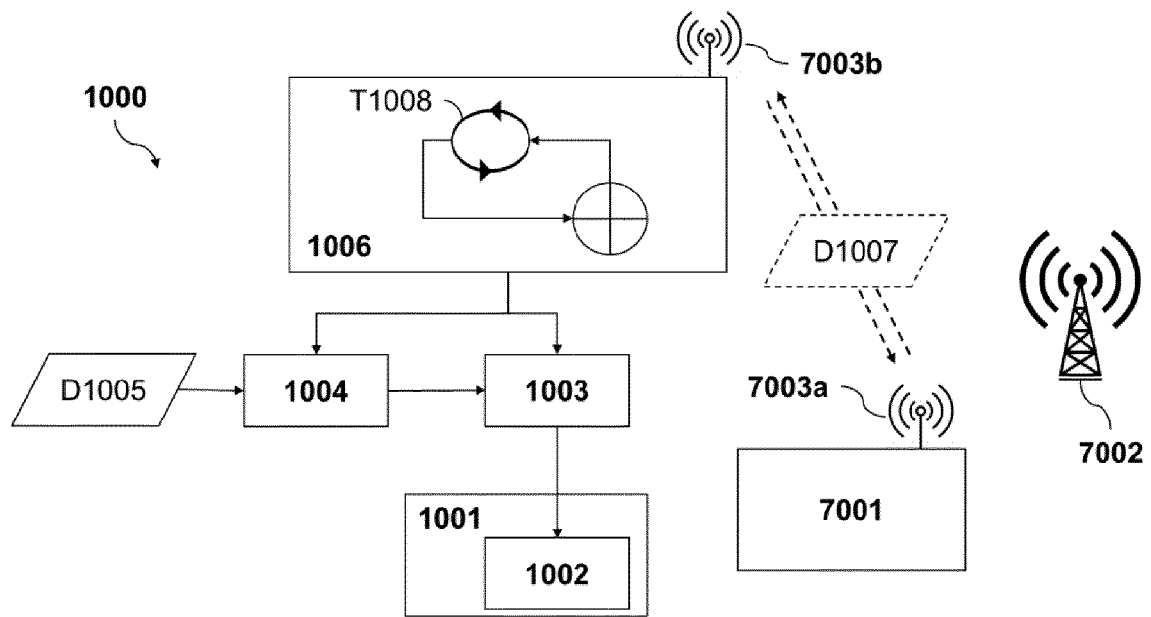


Fig. 7

[Fig. 8]

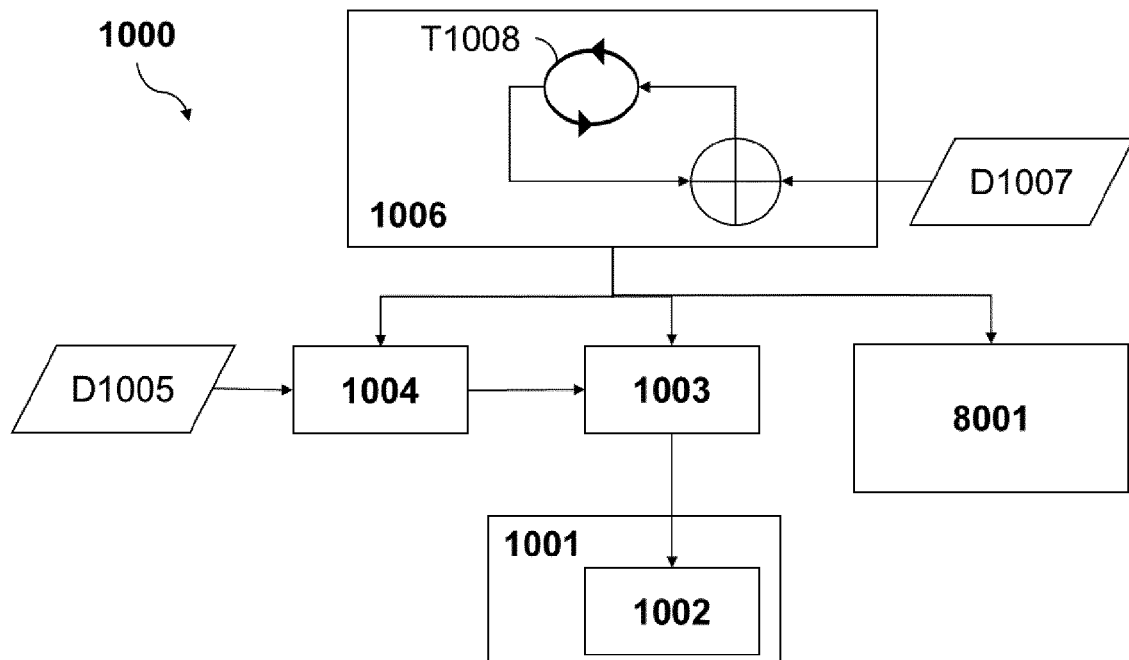


Fig. 8



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Application Number

EP 23 15 0450

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 16 June 2023	Examiner de la Tassa Laforgue
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