



(51) International Patent Classification:

G01F 23/00 (2006.01)

G01D 1/00 (2006.01)

B60K 15/077 (2006.01)

(21) International Application Number:

PCT/IN2020/051072

(22) International Filing Date:

30 December 2020 (30.12.2020)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

202041045874

21 October 2020 (21.10.2020)

IN

(71) Applicant: TVS MOTOR COMPANY LIMITED

[IN/IN]; TVS Motor Company Limited, "Chaitanya", No. 12, Khader Nawaz Khan Road, Nungambakkam, Chennai 600006 (IN).

(72) Inventors: VAIDYANATHAN, Hemavathy; TVS Motor Company Limited, "Chaitanya", No. 12, Khader Nawaz Khan Road, Nungambakkam, Chennai 600006 (IN). GU-NASEKARAN, Gayathri; TVS Motor Company Limited, "Chaitanya", No. 12, Khader Nawaz Khan Road, Nungambakkam, Chennai 600006 (IN).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(54) Title: LOW FUEL DETECTION SYSTEM IN A VEHICLE

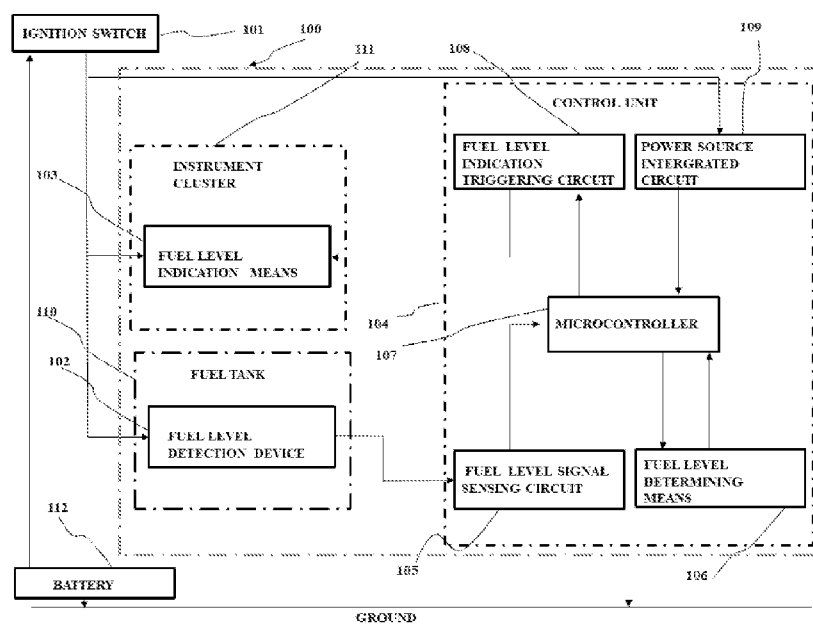


Fig. 1

(57) Abstract: The present invention related to low fuel level indication system (100) comprising of a low fuel level detection device (102); at least one low fuel indication means (103); and at least one control unit (104). The control unit (104) capable of receiving one or more real time operating state parameter values from said low fuel level detection device (102), comparing said one or more real time operating state parameter values with predetermined operating state parameter values, determining consistency of said one or more real time operating state parameter values for a pre-determined time, and activating or de-activating low fuel warning indication by means of said low fuel indication means (103) based on said determination of consistency of said one or more real time operating state parameter values. Therefore, the reliability is improved due to elimination of flickering issues in the fuel indication means (103) without use of additional circuits.



(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to the identity of the inventor (Rule 4.17(i))*
- *of inventorship (Rule 4.17(iv))*

Published:

- *with international search report (Art. 21(3))*

LOW FUEL DETECTION SYSTEM IN A VEHICLE

TECHNICAL FIELD

[0001] The present subject matter relates to a vehicle. More particularly, to a saddle type vehicle.

5

BACKGROUND

[0002] Automotive vehicles are nowadays equipped with a significant number of advanced vehicle control systems. The control systems make it possible for vehicles to meet the demands for customer's comfort and environment protection. Further, it is always anticipated that implementing new features will improve customer satisfaction and confidence on vehicle reliability. Implementing a greater number of features in a product often necessitates a greater number of controls, more wiring etc. However, it becomes a challenge for a designer to eliminate numerous circuits comprising of bulky wiring and complex controls and at the same time improve customer satisfaction.

10 [0003] The above information disclosed in this background section is only for enhancement of understanding of the background of the disclosure and therefore it may contain information that does not form the prior art that is already known in this country to a person of ordinary skill in the art.

20

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] The present invention is described with reference to an exemplary embodiment of a vehicle configured to have an internal combustion engine receiving fuel from a fuel tank, based on activation of an electronic fuel injector provided with a fuel pump. The fuel pump is providing metered fuel to electronic fuel injector from the fuel tank. The same numbers are used throughout the drawings to reference like features and components. Further, the inventive features of the invention are set forth in the appended claims. The invention itself however, as well as a preferred mode of use, further objects and advantages thereof, will best be understood by reference to

the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, therein:

[0005] **Figure 1** illustrates a block diagram showing low fuel level indication system (100) for a vehicle, as per embodiment, in accordance with one example of
5 the present subject matter.

[0006] **Figure 2** illustrates a flow chart depicting a method of activation and deactivation of low fuel level indication system (100), as per embodiment, in accordance with one example of the present invention.

[0007] **Figure 3** illustrates a time chart showing improved reliability of low fuel
10 level indication system (100), as per embodiment, in accordance with one example of the present invention.

DETAILED DESCRIPTION

[0008] Various features and embodiments of the present subject matter here will be discernible from the following further description thereof, set out hereunder.

15 [0009] Typically, a fuel tank is configured to have means for maintaining a reserve supply of fuel. The reserve supply of fuel is supplied to an engine when fuel in the fuel tank reaches a reserve fuel level. Therefore, a fuel level detecting device is provided for determining amount of fuel in the fuel tank and present the information to a user through a fuel level indicator. Generally, the fuel level indicator starts
20 blinking when the fuel level reaches the reserve fuel level to indicate that the user is driving the vehicle in a reserve mode. In other words, it indicates that the fuel quantity is low and the fuel tank should be refilled as soon as possible before vehicle runs out of fuel.

[00010] Various types of fuel level detection devices are used based with numerous
25 design constraints. Typically, the fuel detection device includes a circuit board comprising of one or more reed switches and fuses. The circuit board is encapsulated by a protective housing. The housing is surrounded by a float having a magnetic element. The change in fuel level causes the float to move up and down along with the circuit board. As the magnet carrying float moves up and down along the circuit
30 board, accordingly the reed switches are activated and deactivated.

[00011] Precisely, the known fuel indicator is intended to be activated when the fuel level reaches the reserve fuel level. However, it is observed that the fuel level indicator starts flickering due to fluctuations in fuel level of the fuel tank even when the fuel level is above reserve fuel level. The fluctuation in fuel level of the fuel tank
5 is due to shaking of the fuel tank as vehicle drives over unmetalled or rugged roads. The fuel level indicator flickering is caused when the fuel level detection device is directly connected to the fuel level indicator. Further, directly connecting fuel level detection device to fuel level indicator is disadvantageous, as the fuel level indicator flickering affects its durability and misleads the user about true fuel level in the fuel
10 tank and such erroneous indication is due to false warning signals. Moreover, it also causes an unpleasant driving experience. Therefore, the known systems are less durable and reliable.

[00012] Alternatively, in order to address said flickering issue of fuel level indicator, a delay or filtering circuit can be used. However, additional delay or
15 filtering circuit adds to part count and requires additional electronic drivers which further leads to increased cost and packaging constraints.

[00013] Therefore, there is a need to provide low fuel level indication system to overcome the above-stated problems, which eliminates the flickering issues of fuel indicator and other problems of known art.

20 [00014] To this end, it is an object of the present invention to provide a compact, cost effective and reliable low fuel level indication system which improves user's comfort.

[00015] According to the present subject matter to attain the above-mentioned objectives, a first characteristic of the present invention is a low fuel level indication
25 system for a vehicle. The low fuel level indication system comprising: at least one low fuel level detection device, at least one low fuel indication means, and at least one control unit. The control unit is capable of receiving one or more real time operating state parameter values from said at least one low fuel level detection device , comparing the received one or more said real time operating state parameter values
30 with predetermined operating state parameter values, determining consistency of said received one or more real time operating state parameter values for a pre-determined

time, and activating or de-activating low fuel warning indication by means of said at least one low fuel indication means based on said determination of consistency of said one or more real time operating state parameter values.

[00016] In addition to the first characteristic, a second characteristic of the present invention is a low fuel level indication system, wherein said control unit includes at least one fuel level signal sensing circuit for sensing the status of received one or more real time operating state parameter values from said low fuel detection device.

[00017] In addition to the first characteristic, a third characteristic of the present invention is a low fuel level indication system, wherein said control unit includes at least one fuel level determining means for monitoring and determining consistency of said received one or more real time operating state parameter values of being consistent for a pre-determined time.

[00018] In addition to the first characteristic, a fourth characteristic of the present invention is a low fuel level indication system, wherein said control unit includes at least one microcontroller for receiving signals from said fuel level signal sensing circuit and executing activation or de-activation of fuel level indication means.

[00019] In addition to the first characteristic, a fifth characteristic of the present invention is a low fuel level indication system, wherein said control unit includes at least one low fuel level indication triggering circuit for activation or de-activation of low fuel level indication means.

[00020] In addition to the first characteristic, a sixth characteristic of the present invention is a low fuel level indication system, wherein said control unit is an engine management system ECU.

[00021] In addition to the first characteristic, a seventh characteristic of the present invention is a low fuel level indication system, wherein said control unit is an Integrated Starter Generator (ISG) controller.

[00022] According to the present subject matter to attain the above-mentioned objectives, an eighth characteristic of the present invention is a method for activating low fuel indication in a vehicle. The method comprising: At step (S101), determining as a first event, whether ignition switch input is more than predetermined value; At step (S102), based on affirmative determination of ignition being ON at step (S101),

receiving, by at least one control unit, signal pertaining to one or more real time operating state parameter values from at least one fuel detection device of a fuel tank of said vehicle, At step (S103), comparing by said control units, said one or more real time operating state parameter values signals with a predetermined operating state parameter values; determining as a second event, whether said real time operating state parameter values of the vehicle is more than the said predetermined operating state parameter values of the vehicle; at step (S104), based upon affirmative determination at said second event, determining consistency of said one or more real time operating state parameter values signal for predetermined time by said control unit; wherein based upon affirmative determination of consistency at step (S104); at step (S105) activating low fuel warning indication by means of said at least one low fuel indication means.

[00023] In addition to the eighth characteristic, a ninth characteristic of the present invention is a method for activating low fuel level indication in a vehicle, wherein on negative determination at step (103) and (104), the processing returns to step (102).

[00024] According to the present subject matter, a tenth characteristic of the present invention is a method for de-activating low fuel level indication in a vehicle, said method comprising: At step (S102), receiving, by at least one control unit, one or more real time operating state parameter values from at least one low fuel detection device of a fuel tank of said vehicle, At step (S106), comparing, by said control units, said one or more real time operating state parameter value with a predetermined operating state parameter value; determining as a third event, whether one or more said real time operating state parameter values is less than said predetermined operating state parameter values and; at step (S107), based upon affirmative determination at said third event, determining consistency of said one or more said real time operating state parameter values for predetermined time by said control unit; wherein based upon affirmative determination of consistency at step (S107); at step (S108) de activating low fuel warning indication by said at least one low fuel indication means, and at step (S109), determining as a fourth event, whether ignition switch input is less than predetermined value and, based on affirmative determination, ending the control sequence else retuning to step S102.

- [00025] In addition to the tenth characteristic, an eleventh characteristic of the present invention is a method for deactivating low fuel level indication in a vehicle, wherein, at step (S107), on negative determination of consistency of real time operating state parameter value, the processing returns to step (S106).
- 5 [00026] In addition to the tenth characteristic, a twelfth characteristic of the present invention is a method for deactivating low fuel level indication in a vehicle, wherein, at step (S109), on negative determination of ignition switch input being less than predetermined value, the processing returns to step (S102).
- [00027] In addition to the any of the preceding characteristic, a thirteen
10 characteristic of the present invention is a two wheeled saddled type vehicle comprising of one or more batteries; an ignition switch; a fuel tank capable of storing fuel; an internal combustion engine receiving fuel from said fuel tank, wherein based on activation of an electronic fuel injector; a fuel pump is capable of providing metered fuel to said electronic fuel injector from said fuel tank; and being configured
15 with a low fuel level indication system.
- [00028] The present subject matter is further described with reference to accompanying figures. It should be noted that the description and figures merely illustrate principles of the present subject matter. Various arrangements may be devised that, although not explicitly described or shown herein, encompass the
20 principles of the present subject matter. Moreover, all statements herein reciting principles, aspects, and examples of the present subject matter, as well as specific examples thereof, are intended to encompass equivalents thereof.
- [00029] The foregoing disclosure is not intended to limit the present disclosure to the precise forms or particular fields of use disclosed. As such, it is contemplated that
25 various alternate embodiments and/or modifications to the present disclosure, whether explicitly described or implied herein, are possible in light of the disclosure. Having thus described embodiments of the present disclosure, a person of ordinary skill in the art will recognize that changes may be made in form and detail without departing from the scope of the present disclosure. Thus, the present disclosure is
30 limited only by the claims.

[00030] In the foregoing specification, the disclosure has been described with reference to specific embodiments. However, as one skilled in the art will appreciate, various embodiments disclosed herein can be modified or otherwise implemented in various other ways without departing from the spirit and scope of the disclosure.

5 Accordingly, this description is to be considered as illustrative and is for the purpose of teaching those skilled in the art the manner of making and using various embodiments of the disclosure. It is to be understood that the forms of disclosure herein shown and described are to be taken as representative embodiments. Equivalent elements, materials, processes or steps may be substituted for those

10 representatively illustrated and described herein. Moreover, certain features of the disclosure may be utilized independently of the use of other features, all as would be apparent to one skilled in the art after having the benefit of this description of the disclosure. Expressions such as “including”, “comprising”, “incorporating”, “consisting of”, “have”, “is” used to describe and claim the present disclosure are

15 intended to be construed in a non-exclusive manner, namely allowing for items, components or elements not explicitly described also to be present. Reference to the singular is also to be construed to relate to the plural.

[00031] Further, various embodiments disclosed herein are to be taken in the illustrative and explanatory sense, and should in no way be construed as limiting of

20 the present disclosure. All joinder references (e.g., attached, affixed, coupled, connected, etc.) are only used to aid the reader's understanding of the present disclosure, and may not create limitations, particularly as to the position, orientation, or use of the systems and/or methods disclosed herein. Therefore, joinder references, if any, are to be construed broadly. Moreover, such joinder references do not

25 necessarily infer that two elements are directly connected to each other.

[00032] Additionally, all numerical terms, such as, but not limited to, “first”, “second”, “third”, “primary”, “secondary”, “main” or any other ordinary and/or numerical terms, should also be taken only as identifiers, to assist the reader's understanding of the various elements, embodiments, variations and/or modifications

30 of the present disclosure, and may not create any limitations, particularly as to the

order, or preference, of any element, embodiment, variation and/or modification relative to, or over, another element, embodiment, variation and/or modification.

[00033] It will also be appreciated that one or more of the elements depicted in the drawings/figures can also be implemented in a more separated or integrated manner, or even removed or rendered as inoperable in certain cases, as is useful in accordance with a particular application. Additionally, any signal hatches in the drawings/figures should be considered only as exemplary, and not limiting, unless otherwise specifically specified.

[00034] The embodiments of the present invention will now be described in detail with reference to the accompanying drawings.

[00035] **Figure 1** illustrates a block diagram showing low fuel level indication system (100) for a vehicle, as per embodiment, in accordance with one example of the present subject matter. The low fuel level indication system (100) comprises of at least one fuel level detection device (102), at least one fuel level indication means (103) and at least one control unit (104). The control unit (104) comprises of a microcontroller (107), a fuel level indication triggering circuit (108), a power source integrated circuit (109), a fuel level signal sensing circuit (105) and a fuel level determining means (106). As per preferred embodiment the control unit (104) is an Electronic Control Unit (ECU). Further, an ignition switch (101) is connected to one or more batteries (112) which supplies power to the power-source integrated circuit (109) of the control unit (104), fuel level detection device (102) and fuel level indication means (103). More specifically, the power-source integrated circuit (109) regulates the supply of power in the control unit (104). Furthermore, at least one prong of control unit (104) and batteries (112) are connected to a ground terminal. During operation, when ignition switch (101) is turned ON, the low fuel level indication system (100) is activated wherein the fuel level detection device (102) detects the fuel level in a fuel tank (110) and sends inputs to the microcontroller (107) through the fuel level signal sensing circuit (105) of the control unit (104). The microcontroller (107) processes the received one or more real time operating state parameter values from fuel level detection device (102) and sends corresponding signals to the fuel level determining means (106). The fuel level determining means

(106) determines the consistency of received one or more said real time operating state parameter value for a predetermined time. Based on said determination, the microcontroller (107) generates an output command to fuel level indication triggering circuit (108) to turn on the fuel level indication means (103). As per preferred embodiment, the fuel level indication means (103) is provided in an instrument cluster (111). As per alternative embodiment, the control unit (104) is configured to work additionally as an ISG control unit. The ISG control unit controls an integrated starter generator that acts both as a motor for cranking the engine and as a generator for generating power required for operating vehicle loads.

10 [00036] **Figure 2** illustrates a flow chart depicting a method of activation and deactivation of low fuel level indication system (100), as per embodiment, in accordance with one example of the present invention. When the ignition switch is turned ON then at step (S101), the control unit determines as a first event, whether ignition switch input is more than predetermined value. As per one implementation,

15 the predetermined value includes voltage signal equal to or more than 12 volts. Based on affirmative determination at step (S101), in next step (S102), one or more real time operating state parameter values (RTOSPV's) is received from at least one low fuel detection device by at least one control unit. At step (S103), the control unit compares said one or more real time operating state parameter values (RTOSPV's)

20 with a predetermined operating state parameter values (OSPV's) and determines as a second event whether said real time operating state parameter values (RTOSPV's) is more than said predetermined operating state parameter values (OSPV's). When affirmative determination is made at step (S103), the processing proceeds to step (S104). Consistency of said one or more real time operating state parameter values

25 (RTOSPV's) is monitored for predetermined time at step (S104). Based on affirmative determination of consistency in the real time operating state parameter values (RTOSPV's) at step (S104), at step (S105) fuel level indication means is turned ON. When a negative determination is made at step (S104) or (S103), the processing returns to step (S102).

30 [00037] Further, the control unit continuously receives said one or more real time operating state parameter values (RTOSPV's) from the fuel level detection device to

determine any change in fuel level. As per one implementation, when the fuel is refueled in the fuel tank then at step (S106), the control unit compares said one or more real time operating state parameter values (RTOSPV's) and determines as a third event, whether, the received one or more real time state parameter values (RTOSPV's) is less than said predetermined operating state parameter values (OSPV's). When an affirmative determination is made at step (S106), the processing proceeds to step (S107). Consistency of said one or more real time operating state parameter values (RTOSPV's) is monitored for predetermined time at step (S107). When affirmative determination of consistency in the RTOSPV at step (S107), the fuel level indication means is turned off at step (S108). However, when a negative determination is made at step (S107), the processing returns to step (S106). At step (S109), the control unit determines as a fourth event, whether ignition switch input is less than predetermined value. Based on affirmative determination at step (S109) that the ignition switch input is less than predetermined value, the control sequence is then ended. When a negative determination is made at step (S109), the processing return to step (S102). As per preferred embodiment, the real time operating state parameter values (RTOSPV's) includes electric signal comprising of two states. The two states include active low state and active high state. Further, the predetermined state operating parameter includes electric signal of predetermined range.

[00038] Figure 3 illustrates a time chart showing improved reliability of low fuel level indication system (100), as per embodiment, in accordance with one example of the present invention. When the user switches ON the ignition switch (101), at time t1, a logic level signal 'Z' from ignition switch changes to high active state that implies that vehicle is in start condition. During driving condition, a logic input signal 'Y' from the fuel level detection device (102) changes randomly due to sloshing of fuel in the fuel tank (110) as represented by input signal amplitude disturbances A, B. However, a logic input signal 'X' to the fuel level indication triggering circuit (108) remains unchanged based on negative determination by the control unit (104). At time t2 when fuel level is less than predetermined level, the logic input signal 'Y' from the fuel level detection device (102) changes to high active state. The control unit (104) between time t2 to t3 determines the consistency

of the logic input signal received from fuel level detection device (102) for predetermined delta interval time ($t_3 - t_2$). As per preferred embodiment, the predetermined time ranges from 1 to 7 seconds. Based on affirmative determination, at time t_3 , the logic input signal 'X' to fuel level indication triggering circuit (108) is
5 changed to active high state from active low state condition to turn ON fuel level indication means (103). As per one implementation, the fuel is refilled in the fuel tank (110). In fuel refilled condition, at time t_4 , the logic input signal 'X' from the fuel level detection device (102) is changed to active low state condition wherein the control unit (104) monitors and determines the consistency of the logic input signal
10 received from the fuel level detection device (102) between a time t_4 to t_5 . At t_5 based on affirmative determination of consistency of the signal, the logic input signal 'X' to the fuel level indication triggering circuit (108) is changed to active low state condition from active high state condition, thereby the fuel level indication means (103) is turned into OFF condition.

15 [00039] According to above architecture, one of the primary efficacies of the present invention is the improved user comfort due to stable operation of fuel indication means.

[00040] According to above architecture, one of the primary efficacies of the present invention is the improved reliability of fuel level system. The reliability is
20 improved due to elimination of flickering issues in the fuel indication means without use of additional circuits thereby reducing the part count and overall cost of the low fuel level indication system.

[00041] According to above architecture, one of the primary efficacies of the present invention is the cost effective low fuel level indication system. The low fuel
25 level indication system can be connected with existing control units controlling various components like integrated starter generator, display member or the like.

[00042] The above-described embodiments, and particularly any "preferred" embodiments, are possible examples of implementations and merely set forth for a clear understanding of the principles of the invention. It will be apparent to those
30 skilled in the art that changes in form, connection, and detail may be made therein without departing from the spirit and scope of the invention.

List of References:

- 100 – Low fuel level indication system
- 101 – Ignition switch
- 102 – Fuel level detection device
- 5 103 – Fuel level indication means
- 104 – Control unit
- 105 – Fuel level signal sensing circuit
- 106 – Fuel level determining means
- 107 – Microcontroller
- 10 108 – Fuel level indication triggering circuit
- 109 – Power source integrated circuit
- 110 – Fuel tank
- 111 – Instrument cluster
- 112 - Batteries

15

We Claim:

1. A low fuel level indication system (100) for a vehicle comprising:
 - at least one low fuel level detection device (102);
 - at least one low fuel indication means (103); and
 - 5 at least one control unit (104) capable of receiving one or more real time operating state parameter values from said at least one low fuel level detection device (102), comparing said one or more real time operating state parameter values with predetermined operating state parameter values, determining consistency of said one or more real time operating state
 - 10 parameter values for a pre-determined time, and activating or de-activating low fuel warning indication by means of said at least one low fuel indication means (103) based on said determination of consistency of said one or more real time operating state parameter values.
- 15 2. The low fuel level indication system (100) as claimed in claim 1, wherein said control unit (104) includes at least one fuel level signal sensing circuit (105) for sensing the status of received one or more real time operating state parameter values from said low fuel detection device (102).
- 20 3. The low fuel level indication system (100) as claimed in claim 1, wherein said control unit (104) includes at least one fuel level determining means (106) for monitoring and determining consistency of said received one or more real time operating state parameter values of being consistent for a pre-determined time.
- 25 4. The low fuel level indication system (100) as claimed in claim 1, wherein said control unit (104) includes at least one microcontroller (107) for receiving signals from said fuel level signal sensing circuit (105) and executing activation or de-activation of fuel level indication means (103).

30

5. The low fuel level indication system (100) as claimed in claim 1, wherein said control unit (104) includes at least one low fuel level indication triggering circuit (108) for activation or de-activation of low fuel level indication means (103).
- 5
6. The low fuel level indication system (100) as claimed in claim 1, wherein said control unit (104) is an engine management system ECU.
7. The low fuel level indication system (100) as claimed in claim 1, wherein said control unit (104) includes is an Integrated Stator Generator (ISG) controller.
- 10
8. A method for activating low fuel indication in a vehicle, said method comprising:
- 15
- at step (S101), determining as a first event, whether ignition switch input being more than predetermined value;
- at step (S102), based on affirmative determination of ignition being ON at step (S101), receiving, by at least one control unit, signal pertaining to one or more real time operating state parameter values from at least one fuel
- 20
- detection device of a fuel tank of said vehicle;
- at step (S103), comparing, by said control units, said one or more real time operating state parameter values signals with a predetermined operating state parameter values;
- determining as a second event, whether said real time operating state
- 25
- parameter values being more than the said predetermined operating state parameter values;
- at step (S104), based upon affirmative determination at said second event, determining consistency of said one or more real time operating state parameter values for predetermined time by said control unit; wherein based
- 30
- upon affirmative determination of consistency at step (S104);

at step (S105) activating low fuel warning indication by means of said at least one low fuel indication means.

- 5 9. The method for activating low fuel level indication in a vehicle as claimed in claim 8, wherein on negative determination at step (103) or step (104), the processing returns to step (102).
10. A method for de-activating low fuel level indication in a vehicle, said method comprising:
- 10 at step (S102), receiving, by at least one control unit, one or more real time operating state parameter values from at least one low fuel detection device of a fuel tank of said vehicle;
- at step (S106), comparing, by said control units, said one or more real time operating state parameter values with a predetermined operating state parameter value;
- 15 determining as a third event, whether one or more said real time operating state parameter values being less than said predetermined operating state parameter values and;
- at step (S107), based upon affirmative determination at said third event,
- 20 determining consistency of said one or more said real time operating state parameter values for predetermined time by said control unit; wherein based upon affirmative determination of consistency at step (S107);
- at step (S108) de-activating low fuel warning indication by said at least one low fuel indication means, and
- 25 at step (S109), determining as a fourth event, whether ignition switch input being less than predetermined value and based on affirmative determination, ending the control sequence else returning to step (S102).
11. The method for de-activating low fuel level indication in a vehicle as claimed in claim 10, wherein, at step (S107), on negative determination of
- 30

consistency of real time operating state parameter value, the processing returns to step (S106).

5 12. The method for de-activating low fuel level indication in a vehicle as claimed in claim 10, wherein, at step (S109), on negative determination of ignition switch input being less than predetermined value, the processing returns to step (S102).

10 13. A two wheeled saddled type vehicle comprising of
one or more batteries (112);
an ignition switch (101);
a fuel tank (110) capable of storing fuel;
an internal combustion engine receiving fuel from said fuel tank (110),
wherein based on activation of an electronic fuel injector;
15 a fuel pump being capable of providing metered fuel to said electronic fuel injector from said fuel tank (110); and
being configured with a low fuel level indication system (100) as claimed in any of the preceding claims.

20

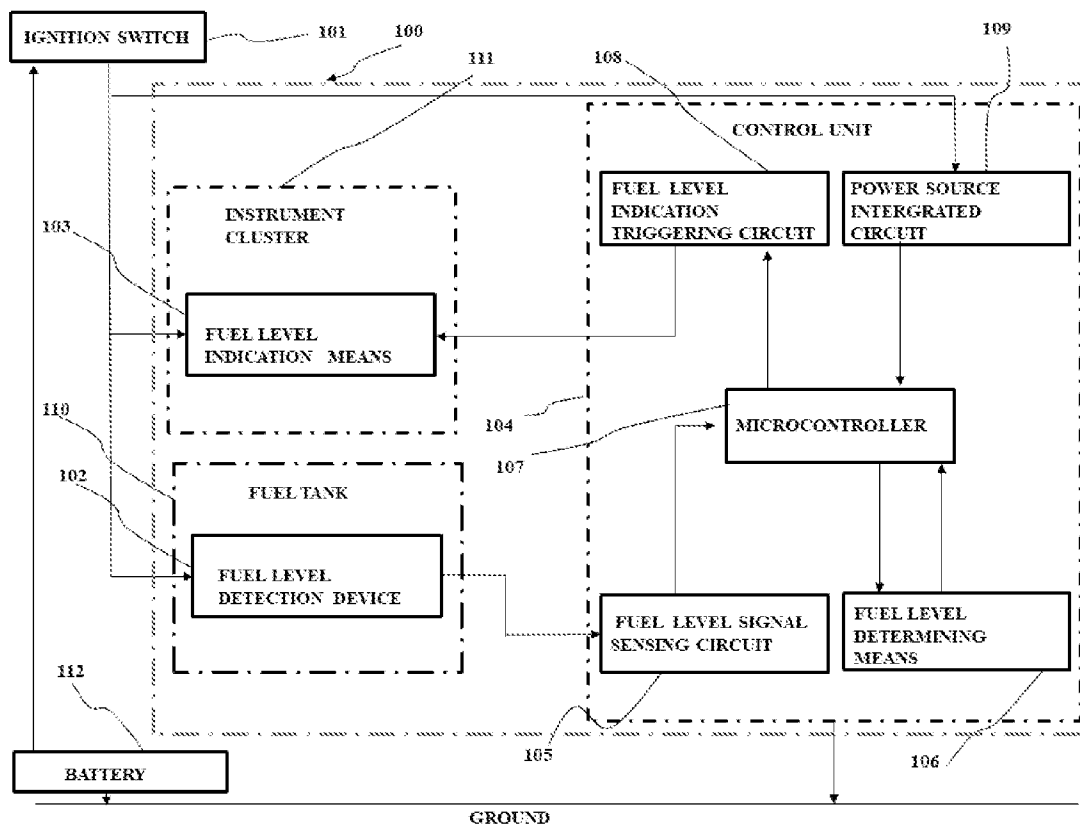


Fig. 1

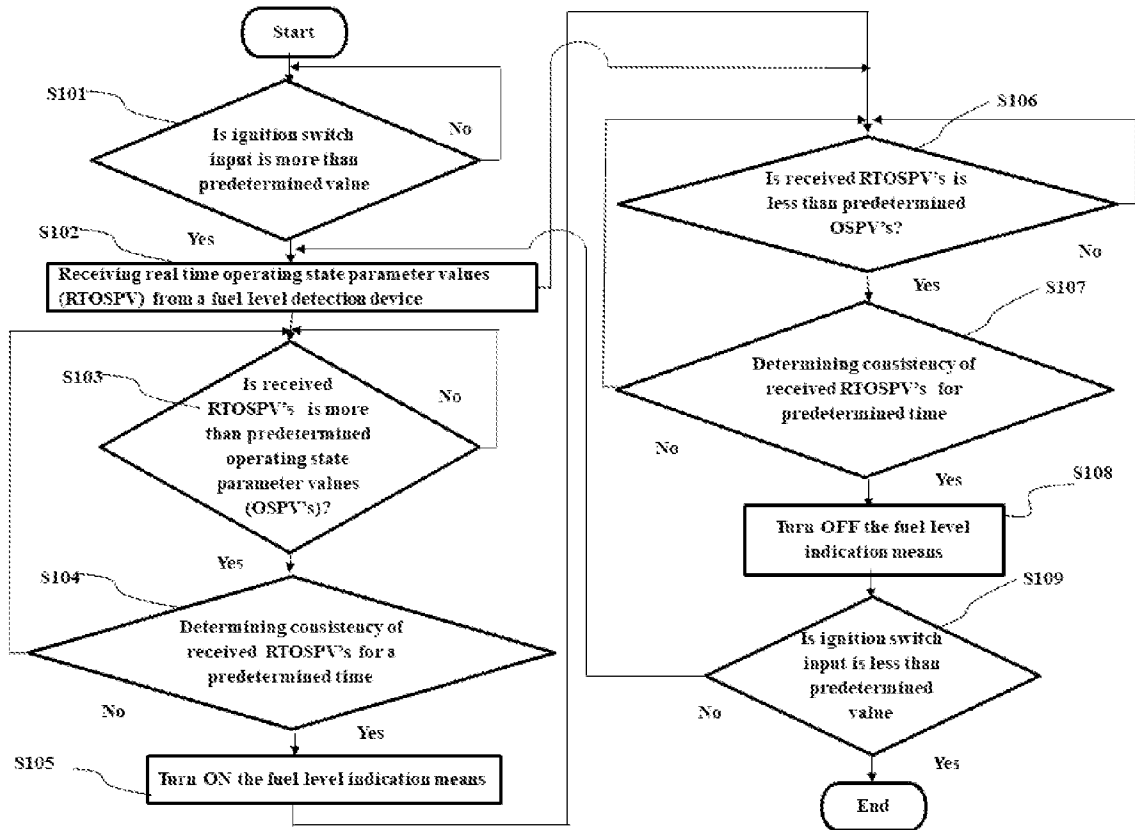


Fig. 2

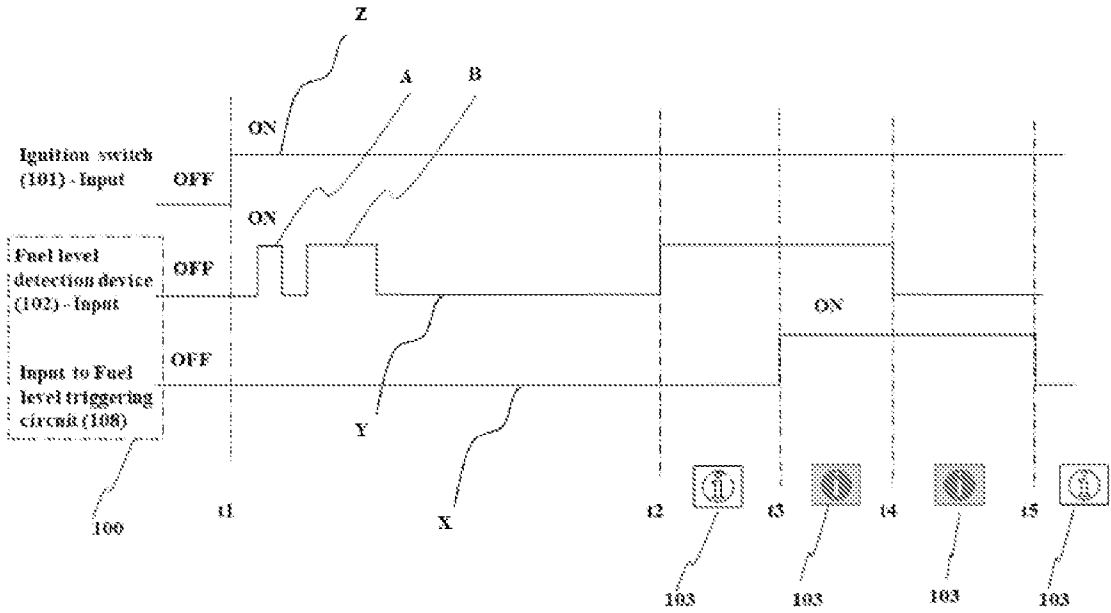


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2020/051072

A. CLASSIFICATION OF SUBJECT MATTER

G01F23/00, B60K15/077, G01D1/00 Version=2021.01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G01F; B60K; G01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Search Databases: TotalPatent One, IPO Internal Database

Keywords: fuel detection, indicator, ignition switch

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US7091629B2 (DETROIT DIESEL CORPORATION) 15-08-2006 (15 August 2006) figures 1, 3, 4B; column 4, line 60 - column 5, line 5	1-13
Y	US4513277A (DELCO ELECTRONICS OVERSEAS CORPORATION) 23-04-1985 (23 April 1985) figure 1, column 3, line 1-column 4, line 58, column 5, lines 25-65	1-13



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

23-03-2021

Date of mailing of the international search report

23-03-2021

Name and mailing address of the ISA/

Indian Patent Office

Plot No.32, Sector 14, Dwarka, New Delhi-110075

Facsimile No.

Authorized officer

Rahul Kumar Jaiswal

Telephone No. +91-1125300200

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IN2020/051072

Citation	Pub.Date	Family	Pub.Date
US 7091629 B2	15-08-2006	US 20040262995 A1	30-12-2004
US 4513277 A	23-04-1985	JP S58206928 A	02-12-1983
		FR 2523297 B1	15-05-1987
		GB 2116721 B	03-04-1986
		DE 3308180 A1	22-09-1983
		ES 8501524 A1	16-11-1984