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(54) Title: POSITION AND ACTUATION SENSING DEVICE FOR A HANDLE BAR OF A VEHICLE

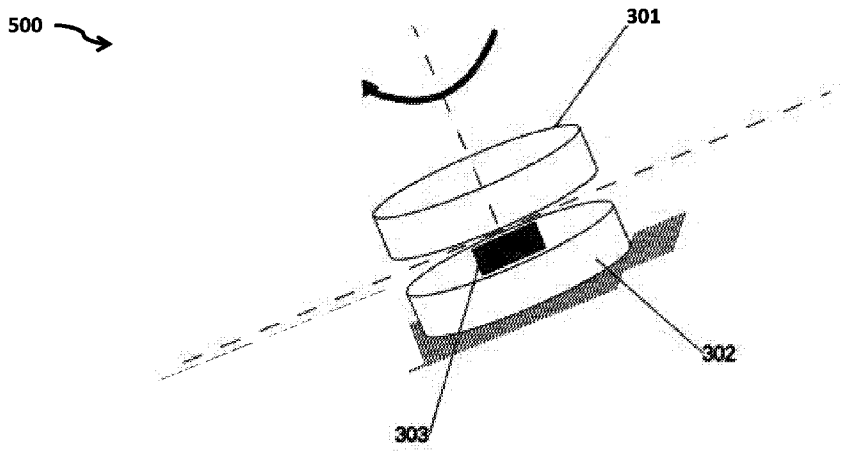

Figure 5

(57) Abstract: The present subject matter relates to a position and actuation sensing device for a handlebar (101) of a vehicle (100). A handlebar angle sensor (500) comprising a sensor control unit (302) and rotatable magnet (301).The handlebar angle sensor (500) senses the change in the position of the handlebar (101) and triggers the security system of the vehicle, establishes the correct position of the handlebar (left-hand side / right-hand side) to enable the locking or unlocking electronically, actuating the vehicle turn indicator through automatic detection of the user intention to change a lane or take a turn and de- actuation of vehicle turn indicator by detecting vehicleDs straight path position after a lane change and/or a turn.

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POSITION AND ACTUATION SENSING DEVICE FOR A HANDLE BAR OF A VEHICLE

TECHNICAL FIELD

[0001] The present subject matter relates generally to a vehicle. More particularly but not exclusively the present subject matter relates to a position and actuation sensing device for a handlebar of a vehicle.

BACKGROUND

[0002] A security system in the vehicle which is based on Radio Frequency communication starts searching for the "key" (which in turn is also based on Radio Frequency communication) in its field, i.e. within some specified radius of the vehicle. In case, there is no key in the vehicle's field, the security system which is activated by one of the triggering mechanisms doesn't activate the Engine control unit to enable the engine to start. Whereas, when there is a key found (this means the security system has sent some data, and the electronic key has replied back with some acknowledgement) in the specified radius of the vehicle, a particular authentication sequence of data transmission between the key and the vehicle runs over radio frequency, thereby the security system on the vehicle identifies the key as unique or improper, thereby activating or deactivating the ECU(Engine control unit) to enable engine start and lock/unlock the handlebar by electronic means.

[0003] Vehicle security system is used for preventing theft and also helps the rider when the vehicle is in motion. Vehicle anti-theft systems prevent the starting and moving of the vehicle. During riding, the rider can forget to "ON" or "OFF" the turn signal lamp which can create problems. Cases 1 and 2, given below discuss the various anti-theft systems and case 3 discusses the need for a sensor to ensure the security of both the vehicle and the rider, during the riding.

[0004] CASE 1: A vehicle security system is an important technology of the vehicle anti-theft systems. Through communication like radio frequency between the key of the vehicle and the electronic control unit (ECU) placed inside the vehicle, the system identifies the improper keys and enables a system which prevents a vehicle from starting. Thus, protects the vehicle

from theft. Immobilization devices usually have both the mechanical and electronic means of preventing or resisting the movement of a vehicle.

[0005] For the purposes of the present subject matter, a security system is a system installed on vehicle which prevents unauthorized access of the vehicle by any person other than the one having the unique electronic key which works with only the predefined vehicle. The security system works in integration with the engine control unit, so, in case someone wants the start a vehicle, he has to start the engine which is controlled by the engine control unit, which in turn is controlled by security system, so for the ECU to start prior the security system has to start, now this security system can be started by several means such as a switch.

[0006] Some of the popular vehicle security systems available today are Remote keyless entry systems, Passive keyless entry system, and Passive keyless go systems used in cars or trucks or motorcycles. In the Remote Keyless Entry (RKE) systems, a remote attached to the mechanical key can be used to lock or unlock the vehicle which is at a distance away from the owner assisting him with an ease of access to the vehicle without using the key for opening the doors.

[0007] The state of art vehicle security system presently used in most of the cars or trucks or motorcycles is the Passive keyless entry system which unlocks the doors while the owner touches the door handle in case of cars or trucks; this happens without the interventions like remote press of button by the owner, but just based on the distance of the key (present in the owners pocket) from the vehicle.

[0008] In a motorcycle, the starting mechanism is based on the integrated ignition cum mechanical lock present at the dashboard. Ultimately, even in the presence of such advanced keyless system in a motorcycle. The user has to perform an action of inserting the ignition key in the ignition lock to unlock the ignition as well as the handlebar of the vehicle. Even in the presence of an electronic lock system, there is a need for the user to make some actuation deliberately to enable the security system operation.

[0009] To avoid or to prevent the user from performing the above mentioned actions on the vehicle, there is always a need for triggering system to actuate or to wake-up the security

system, unlike conventional operation of the vehicle by the user and without the requirement of extra effort to put into to unlock the vehicle.

[00010] CASE 2: With respect to the above-mentioned case in which, in presence of an Electronic handlebar lock system in a vehicle to facilitate a user to lock the handlebar based on electronic means; there is always a need for the electronic lock mechanism to know if the position at which it actuates itself to lock or unlock the handlebar is the right one for several safety reasons. Also, the false actuation of the electronic lock mechanism under driving condition can be avoided if the position/angle of the handlebar is sensed.

[00011] CASE 3: Today, vehicle turn indication is done in two ways; first, by manual switching of the turn signal control switch on the handlebar/steering assembly of the vehicle. Second, by sensing the leaning angle of the vehicle while making a turn.

[00012] In the manual actuation of the turn switch by the user, there is always a chance that the user might forget to switch ON the turn signal, or the user might switch ON but forget to switch OFF. In the case of sensing the lean angle of the vehicle, many times while making a turn or while changing a lane the user might not lean, which results in non-actuation of the sensor.

[00013] Hence, to solve the problems stated in both the manual switching of a turn signal and automatic lean sensing based switching of the turn signal, there is a need of an alternate sensor which can sense the intention of the user to take a turn and get back to the straight path in an effective manner.

BRIEF DESCRIPTION OF THE DRAWINGS

[00014] **Fig. 1** shows the reference positions of a handlebar in a motorcycle type of vehicle.

[00015] **Fig. 2** shows the location of a sensor magnet in a front fork assembly of a motorcycle type of vehicle.

[00016] **Fig. 3** shows the location of a sensor unit fitted to the immovable/non-rotatable frame assembly of a motorcycle type of vehicle.

[00017] **Fig. 4** shows the detailed view of a sensor and magnet placement.

[00018] **Fig. 5** shows the proposed location of the magnet part of the sensor unit under the front fork assembly.

[00019] **Fig. 6** shows the process diagram of the proposed solution.

[00020] **Fig. 7** shows the flowchart indicating the sequence of control for the actuation of a handlebar lock.

DETAILED DESCRIPTION

[00021] The present subject matter matter relates to a position and actuation sensing device and method for handlebar of a vehicle. The present subject matter also executes locking and unlocking mechanism of the handlebar of a two-wheeled vehicle by electronic means with assistance from the proposed handlebar angle sensor. This handlebar angle sensor always monitors the position of the handlebar (either in vehicle ON state or vehicle OFF state) and communicates the same for any change caused in the position. When the change in position of the handlebar is available to the electronic lock control unit (ECU), it checks if the vehicle is actually in a locked or un-locked state. For the locked state, examines for a considerable change in the angle position with respect to a pre-determined data stored in a controller. A change in the position is an indication to the electronic lock control unit that a user is trying to unlock the handlebar by providing a small movement with a small margin under the locked condition. Hence, the electronic lock control unit requests the vehicle security system to check for the provision of an authentic key from the user who is trying to unlock the vehicle. Upon successful authentication, the electronic lock control unit sends a message to a lock actuator unit to unlock the handlebar electronically. Otherwise, the system does not respond. But a potential theft attempt will include multiple attempts irrespective of non-authentic access. The number of attempts is being recorded by the security system and when the threshold count of attempts is attained, alerts the owner by blaring of siren.

[00022] In this subject matter, under an unlocked state of the handlebar the electronic lock control unit checks for several inputs from other vehicle electronics including vehicle security system, vehicle movement sense and other safety-related parameters. If the checks are satisfied, then the orientation of the handlebar is verified (Left-Hand or Right-Hand end) of its limit. The desired location of the handlebar enables the lock to engage electronically, else an audible or visual alert is provided to the user to check and align the position of the handlebar to facilitate a proper lock engage.

[00023] The present subject matter employs a handlebar angle sensor installed in a specified combination to the immovable and movable component of the vehicle frame and handle (or steering) for sensing the angle or position of the handlebar (or steering). The said handlebar position sensor functions as a triggering mechanism for the security system of the vehicle, establishes the right position of the handlebar (left-hand side / right-hand side) to enable the locking or unlocking electronically, actuating the vehicle turn indicator through automatic detection of the user intention to change a lane or take a turn and de-actuation of vehicle turn indicator by detecting vehicle's straight path position after a lane change and/or a turn. Further, prevention of continuous drainage of the battery due to the 24x7 working of the security system on a two-wheeler, as the security system wakes up from low power mode to running mode only on the operation of the handlebar movement. Thus, avoids unnecessary draining of the battery even when the vehicle is parked for a longer time. The system facilitates the owner of the vehicle to start the vehicle without any manual operation of the vehicle other than the conventional unnoticeable action on the vehicle like the one stated above.

[00024] This invention is illustrated with reference to a two-wheeler, whereas the same can be applied to any vehicle platform like a scooter, motor cycle, three-wheeler, and four-wheeler.

[00025] With respect to the problems, mentioned in the background section of this document. For all the three cases (1, 2 and 3) already discussed, the present subject matter proposes a handlebar position and angle sensing mechanism as a most suitable solution positioned with a specified combination of the placement of sensor with respect to fixed and rotatable parts of a vehicle.

[00026] In an embodiment of the present subject matter, in order to achieve the desirable position or orientation of the handlebar, it is proposed to use a handlebar angle sensor which is usually based on Hall Effect sensor or magneto resistive sensor technology, which uses magnetic fields to conduct the measurement of information between the sensor and the physical value, i.e. angle or linear position. The contactless operating principle allows the isolation of all rotating components, making the entire sensing system robust with respect to environmental influences and mechanical wear. The sensor evaluates the direction of the magnetic field and not the strength of the field. As a result, the magnetic field based sensors are very tolerant with respect

to variations in field strength caused by aging of the magnet, its temperature sensitivity or mechanical fluctuations.

[00027] In an embodiment the proposed solution consists of a rotatable part; a rotatable magnet **(301)** which is diametrically magnetized is placed in proximity longitudinally to the sensor control unit **(302)** which is a non-rotatable part fixed to the frame of a vehicle, which is depicted in **Figure 5**.

[00028] In an another embodiment of the present arrangement of the sensor in the vehicle is to track the position and orientation of the handlebar at repeated intervals of time to assist the handlebar electronic lock system to check if the handlebar is positioned at the right orientation to activate the lock / unlock means in the first embodiment. To provide a signal to the vehicle security system indicating a probable action (movement of handlebar by a very small angle) by the user to unlock the handlebar electronically when it is in a locked condition in the second embodiment.

[00029] In an embodiment the handlebar angle sensor for continuous tracking of the orientation of the handlebar to activate the turn signal mechanism in the vehicle during the vehicle movements including changing lanes, taking a turn and getting back to the straight path.

[00030] The present illustrated positions of the sensor elements can be realized in the same way with other vehicle body structures like scooter type of vehicle or an auto-rickshaw or a four-wheeled vehicle.

[00031] Cases 1 and 2, given herein below, discuss the various anti-theft systems and case 3 discusses the need for a sensor to ensure the security of both the vehicle and the rider, during riding.

[00032] **In one embodiment: (CASE 1):** In any conventional vehicle access by a user, a common procedure followed first is unlocking the handle before he/she uses it for any purpose. Taking this as an inception to the idea of possible triggering mechanisms; the following disclosure discusses a sensor which senses the slightest change in the angle of the position of the handlebar, thereby sends a wake-up signal to the vehicle security system. This initiates the authentication process if the person causing the change in angle of the handlebar has an authentic key if the authentication fails; wake-up mechanism goes unnoticed or upon multiple similar consecutive fails may cause a vehicle alarm actuation indicating theft. In the case of an authentic key, once the authentication happens successfully, the vehicle electronics checks if the handlebar

is positioned at the right required angle with respect to the reference for proper unlocking. In the case of which an actuation of the electronic lock mechanism to unlock the handlebar can occur successfully without any faults.

[00033] **In second embodiment: (CASE 2):** In the case of performing locking of the handlebar either intentionally by the rider of a vehicle or automatically by the vehicle electronics (under pre-defined conditions), there is always a need of the handlebar to be at one of the ends of its orientation angle range for proper automatic locking. The proposed sensor exactly determines the exact position of the handlebar for performing the required actions at the desired times.

[00034] **Figure 1** illustrates the possible orientations of a vehicle **(100)** handlebar **(101)** during standstill as well as in the running conditions. The maximum angle to which the handlebar can be oriented in either of the left-hand and right-hand side is denoted by "Θ" with the reference axis shown.

[00035] Considering a motorcycle type of vehicle **(100),** its front fork assembly **(201)** is a rotating part at the axis of the fork tube, and main frame **(206)** of the vehicle is the immovable/rotatable part. Taking into account, the principle of operation of a magnetic field based rotation sensor, there is a need of a fixed sensor control unit **(302)** and a rotatable magnet **(301)** placed in close proximity to each other for the sensor control unit **(302)** to precisely measure a fraction of change in the orientation of the rotatable magnet **(301)** at its axis of rotation. The sensor control unit **(302)** consists of a sensor IC **(303)** being powered by the power supply of the vehicle **(100)** .The sensor IC **(303)** interfaces with other control units via any of the communication protocols like CAN, LIN, etc.

[00036] **Figures 2** illustrates the front fork assembly **(201)** of a motorcycle type of vehicle **(100)**, with a location of the rotatable magnet **(301)** placed in an orifice provided in a supporting frame **(300)**. The orifice provided in the supporting frame **(300)** provides protection to the rotatable magnet **(301)** from external factors like direct impact due to dirt, water, air.

[00037] **Figure 3** illustrates the rotation of the handlebar **(101)** and the movement of the handlebar **(101)** is continuously monitored for any change of angle or position of the handlebar **(101)** which is sensed by the sensor control unit **(302)**. The rotatable magnet**(301)** rotates when the there is any movement in the handlebar**(101)** which is ,in turn, sensed by the sensor IC **(303)** mounted on the sensor control unit **(302)**. The rotation of handlebar **(101)** is along the head tube **(202)** axis.

[00038] **Figure 4** illustrates the main frame **(206)** of a motorcycle type of the vehicle **(100)** with an arrangement for placement of the sensor control unit **(302)**, hence making it non-rotatable as per the requirement of angle sensing principle. The sensor control unit **(302)** is an integrated sensor unit with signal conditioning electronics and sensor IC **(303)** which takes care of the sensing and thereby the signal conditioning of the sensed signal to further communicate with the electronic lock control unit through a data communication line. The sensor control unit **(302)** is mounted on a mounting plate **(309)** fastened on the main frame **(206)** of the vehicle **(100)** through holes **(308)** provided on the mounting plate **(309).** The mounting plate **(309)** allows reducing the gap between the sensor control unit **(302)** and rotatable magnet **(301)** for improved results.

[00039] **Fig. 5** illustrates the handlebar angle sensor **(500).**The handlebar angle sensor **(500)** comprises two parts. One part is a fixed part which comprises a sensor control unit **(302)** mounted on the mounting plate **(309)** where the mounting plate **(309)** is fastened on the main frame **(206)** of the vehicle **(100).**The second part is a moving part where the rotatable magnet **(301)** is aligned longitudinally, along the same axis of rotation as that of sensor control unit **(302)**. The sensor control unit **(302)** is provided with a sensor IC **(303)** to sense any change of angle or position of the handlebar **(101)**. Sensor control unit **(302)** is kept at close proximity with the rotatable magnet **(301).** The distance between the sensor control unit **(302)** and rotatable magnet **(301)** is in the range 1mm to 2mm. The sensor control unit **(302)** is stationary with respect to rotatable magnet **(301)**. The sensor control unit **(302)** is fixed onto the fixed/non-moving part of the vehicle **(100)** and the rotatable magnet **(301)** is mounted on moving part of the vehicle **(100)**.

[00040] With respect to **Figure 6**, the power supply unit **(304)** which is a battery, supplies power to all vehicle electronics of which handlebar angle sensor **(500)** where rotatable magnet **(301)** is a moving part and sensor control unit **(302)** is fixed part, an electronic lock control unit **(305)** are the parts for consideration in this proposal. With respect to the continuous reporting of the status of handlebar position by the sensor to the electronic lock control unit **(305)** coupled with various other inputs **(307)** (vehicle security system is one of them) from other electronics of the vehicle, the electronic lock control unit **(305)** takes a decision whether it is the right time to lock / unlock the handlebar by electronic means using a mechanism of lock actuation **(306)**.

[00041] **Figure 7** indicates the flow of control to execute the handlebar **(101)** lock / unlock by electronic means with assistance from the proposed handlebar angle sensor **(500)**. The entire process of the present subject matter has been show in steps **S1** to **S12**. Step **S1** involves handle bar position sensing where the sensor control unit **(302)** always monitors the position of the handlebar **(101)** (either in vehicle ON condition or vehicle OFF condition) and tries to communicate the same to the electronic lock control unit **(305)** in the case of any change in the same. Once the position/ change in position of the handlebar are available to the electronic lock control unit **(305)**; electronic lock control unit **(305)**, in step **S2**, checks if the vehicle is actually in the locked or un-locked state. In step **S3**, under condition of locked state, electronic lock control unit **(305)** checks if the change in angle position is considerable with respect to predetermined data and predetermined angle stored in the controller; under which it is an indication to the control unit that user is trying to unlock the handlebar by giving a small movement with a small margin which every vehicle has under locked condition. Hence, the electronic lock control unit **(305)** requests the vehicle security system to check if the user trying to unlock the vehicle has an authentic key with him/her in step **S4**. In case authentication is successful or unsuccessful depending on the key and vehicle security system decides the authentication in step **S5**. In step **S6** the control unit sends a message to lock actuator unit to unlock the handlebar electronically if the authentication is successful. Otherwise the system doesn't respond in step **S7**. But a potential theft attempt can include multiple attempts irrespective of non-authentic access, which the security system keeps a record of and alerts with a siren upon reaching a threshold count of attempts.

[0001] Under condition of unlocked state of handlebar **(101)** in step **S2**, electronic lock control unit **(305)** checks for several inputs in step **S8** from other vehicle electronics including vehicle security system, vehicle movement sense and other safety related parameters upon satisfaction of all of them, checks if the orientation of the handlebar is actually either at Left-Hand or Right-Hand end in step **S10** of its limit. Also, it is checked whether the vehicle is in standstill condition in step **S9**. In case, it is at the desired location, sends a message to lock the handlebar **(101)** through lock actuation in step **S11** to engage the lock electronically, otherwise alerts the user to check the position of handlebar **(101)** and align accordingly for a proper lock engage by audible or visual means in step **S12.** When vehicle **(100)** is not in standstill condition **(A)** in step **S9** the electronic lock control unit **(305)** senses the intention of the user while driving and checks for the

position of the handlebar **(101)** and if not shifted from the reference axis then there is response otherwise if there is shift in the position of the handlebar **(101)** and the direction of shift is right then electronic lock control unit **(305)** will look for the time elapsed and if the time elapsed is greater than predetermined time then right turn indicator actuates. Similarly, if there is shift of handlebar **(101)** in left hand side for a time period greater than predetermined time then the left turn indicator gets actuated. When the handlebar **(101)** aligns along reference axis ,turn off indicator actuates .In the vehicle **(100)** standstill condition the user has predetermined number of attempts to unlock the vehicle **(100)** in **S8** otherwise siren goes off to alert the owner by audible or visual means. During owner authentication step accepting key for said authentication process is in the range 1m to 1.2m.The vehicle will switch off ignition if it remains in standstill condition for predetermined period of time.

[0002] Many modifications and variations of the present subject matter are possible in the light of above disclosure. Therefore, within the scope of claims of the present subject matter, the present disclosure may be practiced other than as specifically described.

We claim:

1. A position and actuation sensing device for a handlebar (101) of a vehicle (100),said vehicle(100) comprising :
   one or more fixed parts;
   one or more movable parts; and
   a handlebar angle sensor (500) for detecting change in the position of said handlebar (101), said handlebar angle sensor (500) comprising a sensor control unit (302) fixedly attached to at least one part of said one or more fixed parts, and said handlebar angle sensor (500) comprising a sensor IC (303) and a rotatable magnet (301) mounted to at least one part of said one or more movable parts.
2. The position and actuation sensing device for a handlebar (101) of a vehicle (100) as claimed in claim 1, wherein said fixed parts comprises a head tube (202), a main frame (206), a mounting plate (309).
3. The position and actuation sensing device for a handlebar (101) of a vehicle (100) as claimed in claim 1,wherein said movable parts comprises a front fork assembly (201), said front fork assembly (201) includes a pair of fork legs (205) extending in the downward direction from said head tube (202) of said main frame (206).
4. The position and actuation sensing device for a handlebar (101) of a vehicle (100) as claimed in claim 1, wherein the distance between the said sensor control unit (302) and said rotatable magnet (301) is in the range 1mm to 2mm and said sensor control unit (302) is a Hall Effect sensor, magneto resistive sensor.
5. The position and actuation sensing device for a said handlebar (101) of a vehicle (100) as claimed in claim 1, wherein vehicle turn indicator gets actuated through automatic detection of the user intention to change a lane or take a turn.
6. The position and actuation sensing device for a said handlebar (101) of a vehicle (100) as claimed in claim 1, wherein vehicle turn indicator gets de-actuated by detecting said vehicle□s (100) straight path position after a lane change or take a turn.
7. A position and actuation sensing method for a handlebar (101) of a vehicle (100) comprising:
   continuously monitoring said handlebar (101) position by said electronic lock control unit (305);

detecting any change of position by said electronic lock control unit (305); checking of lock condition of said vehicle (100) by said electronic lock control unit (305),

initiating owner authentication process by said electronic lock control unit (305) during said lock condition; unlocking of said handlebar (101) after successful said owner authentication process;

checking vehicle standstill condition and vehicle running condition in an unlocked condition of said vehicle(100);

checking position of said handlebar (101) for left hand position and right hand position;

locking of said handlebar (101) on correct said position of said handlebar (101) with respect to predetermined position; and

alerting the owner upon mismatch of said position of said handle bar (101) with respect to said predetermined position

8. The position and actuation sensing method for a handlebar (101) of a vehicle (100) as claimed in claim 7, wherein the said owner authentication process accepts key from user and the distance from said vehicle (100) for accepting key for said owner authentication process is in the range 1m to 1.2m.
9. The position and actuation sensing method for a handlebar (101) of a vehicle (100) as claimed in claim 7, wherein number of attempts to unlock or lock said handlebar (101) for said checking of position of said handlebar (101) is predetermined and siren goes off if the number of attempts crosses the predetermined number of attempts and wherein during said vehicle standstill condition if said owner authentication fails then ignition gets off after predetermined time.
10. The position and actuation sensing method for a handlebar (101) of a vehicle (100) as claimed in claim 7, wherein said handlebar angle sensor (500) continuously monitors the position of said handlebar (101) and compares with the predetermined position.

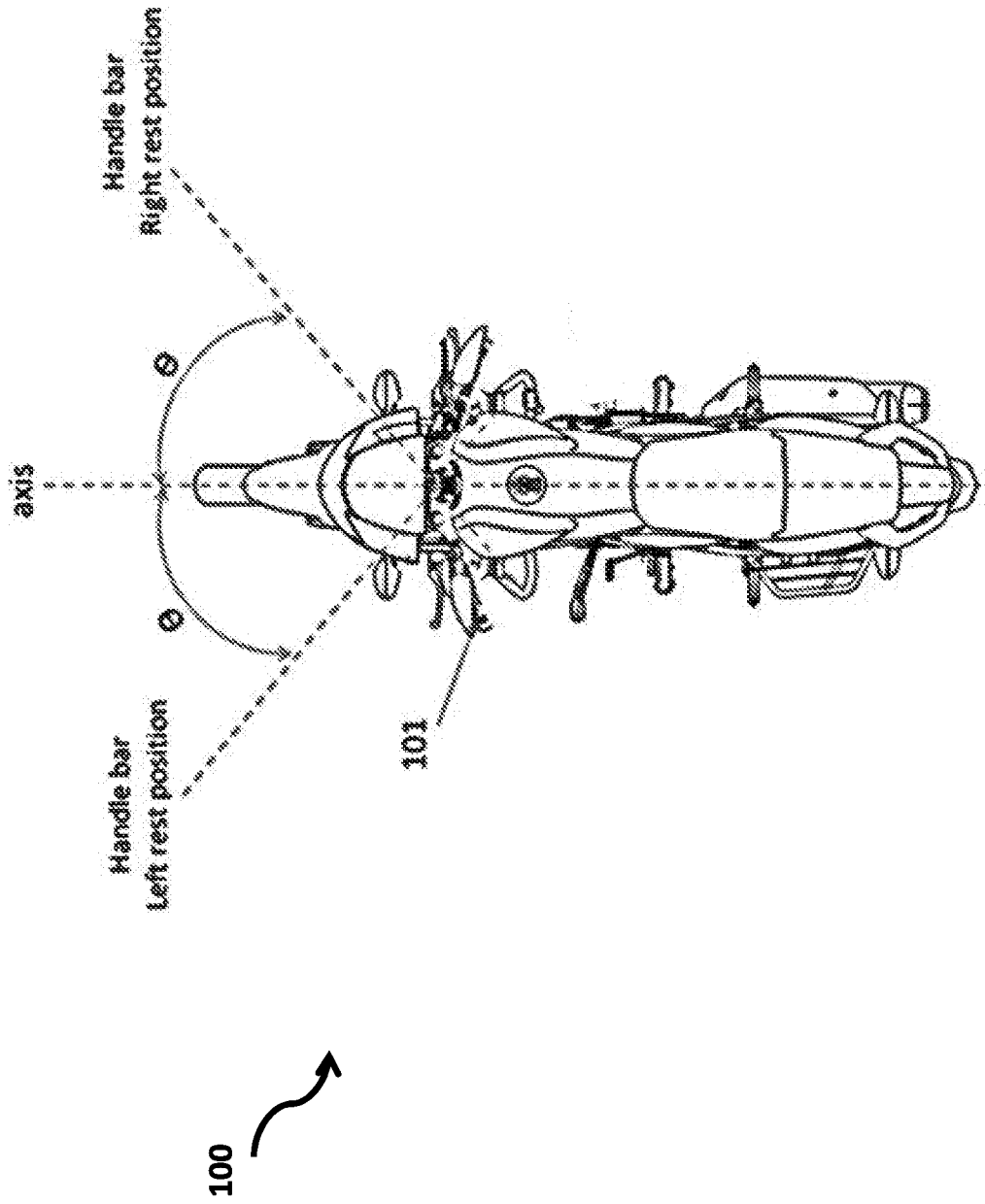
Handle bar
Right rest position
axis
θ
θ
Handle bar
Left rest position
101
100

Figure 1

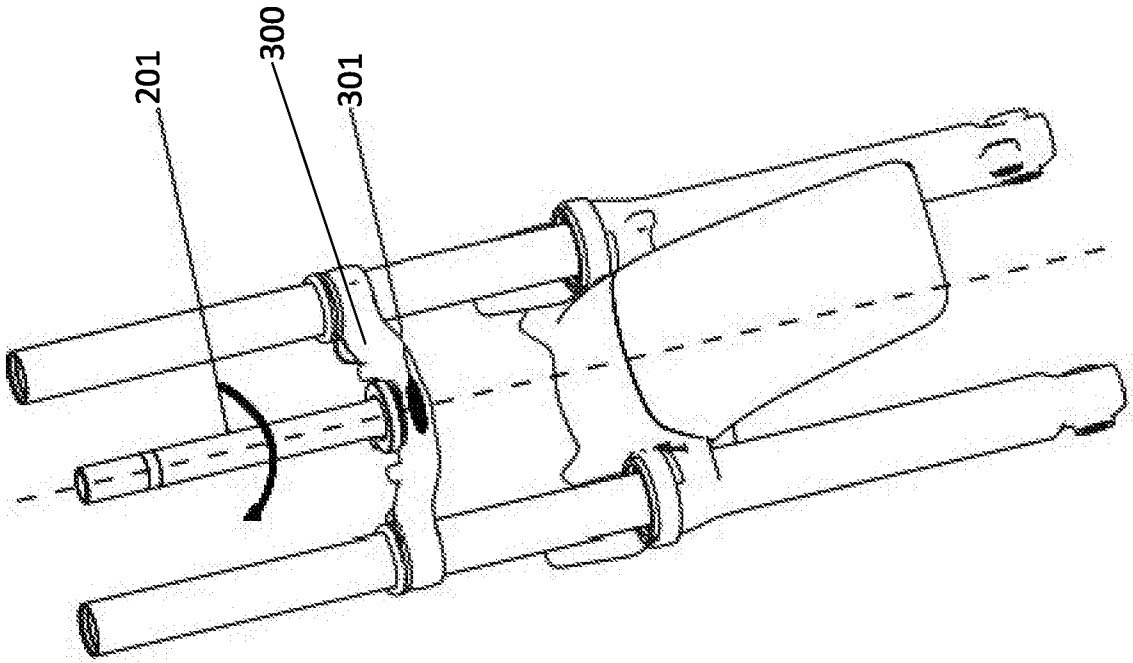

Figure 2

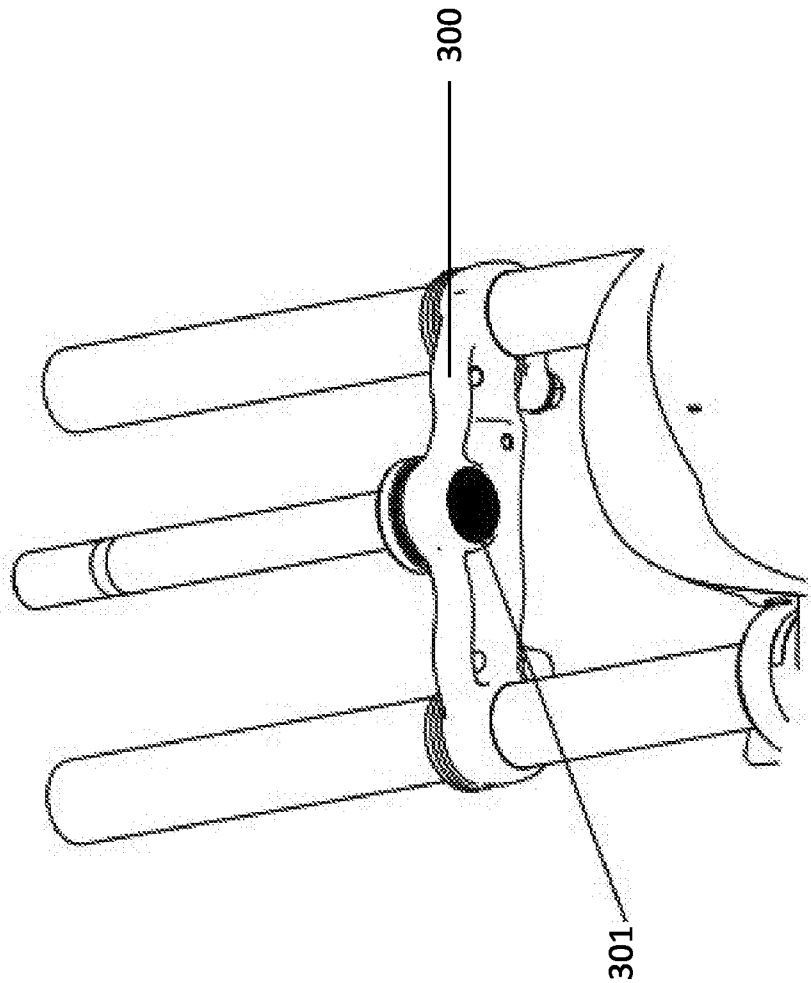

Figure 3

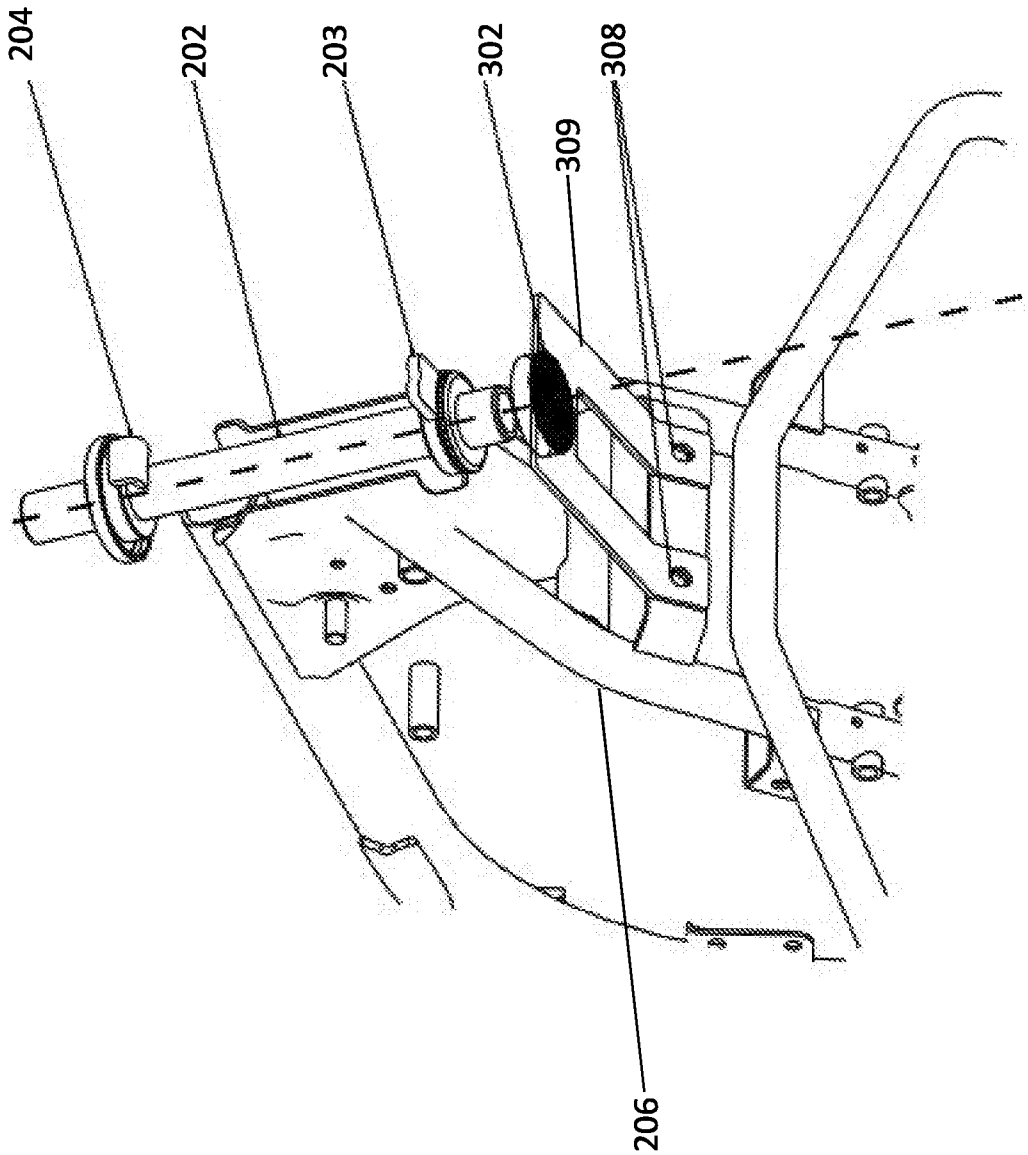

Figure 4

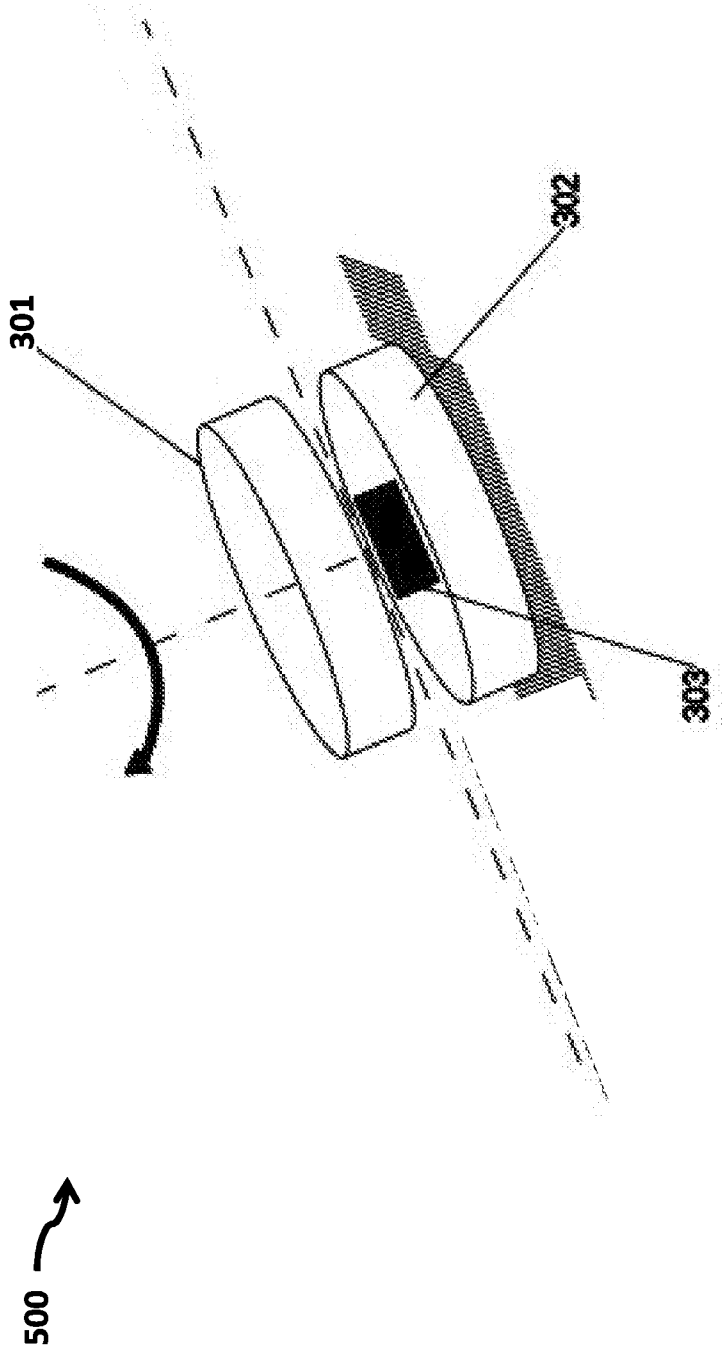

Figure 5

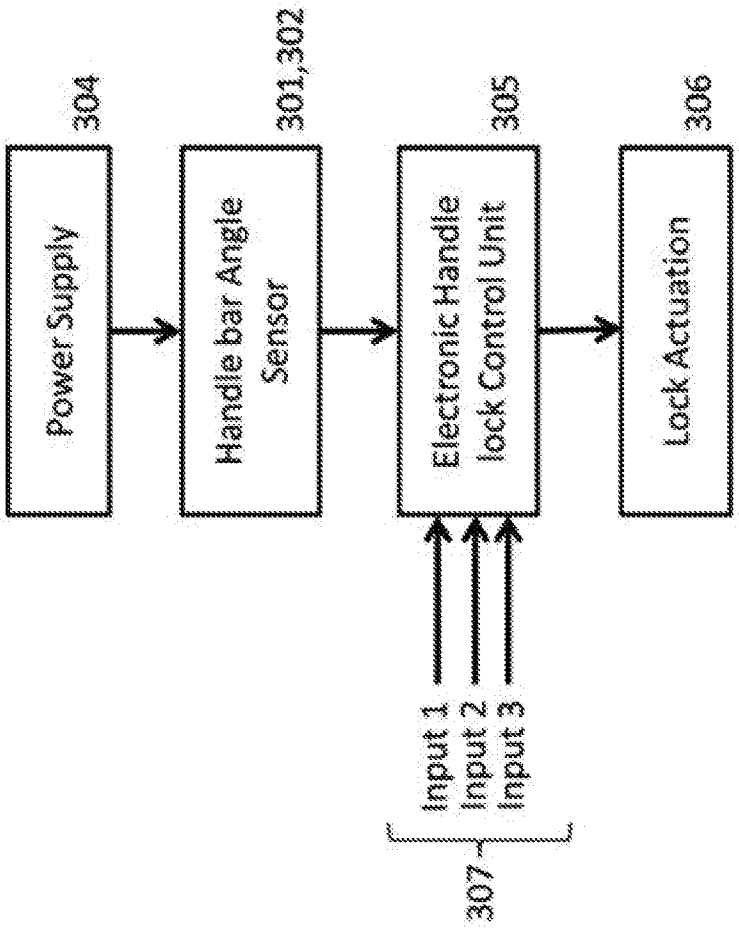
304
Power Supply
301,302
Handle bar Angle Sensor
305
Electronic Handle lock Control Unit
306
Lock Actuation
Input 1
Input 2
Input 3
307

Figure 6

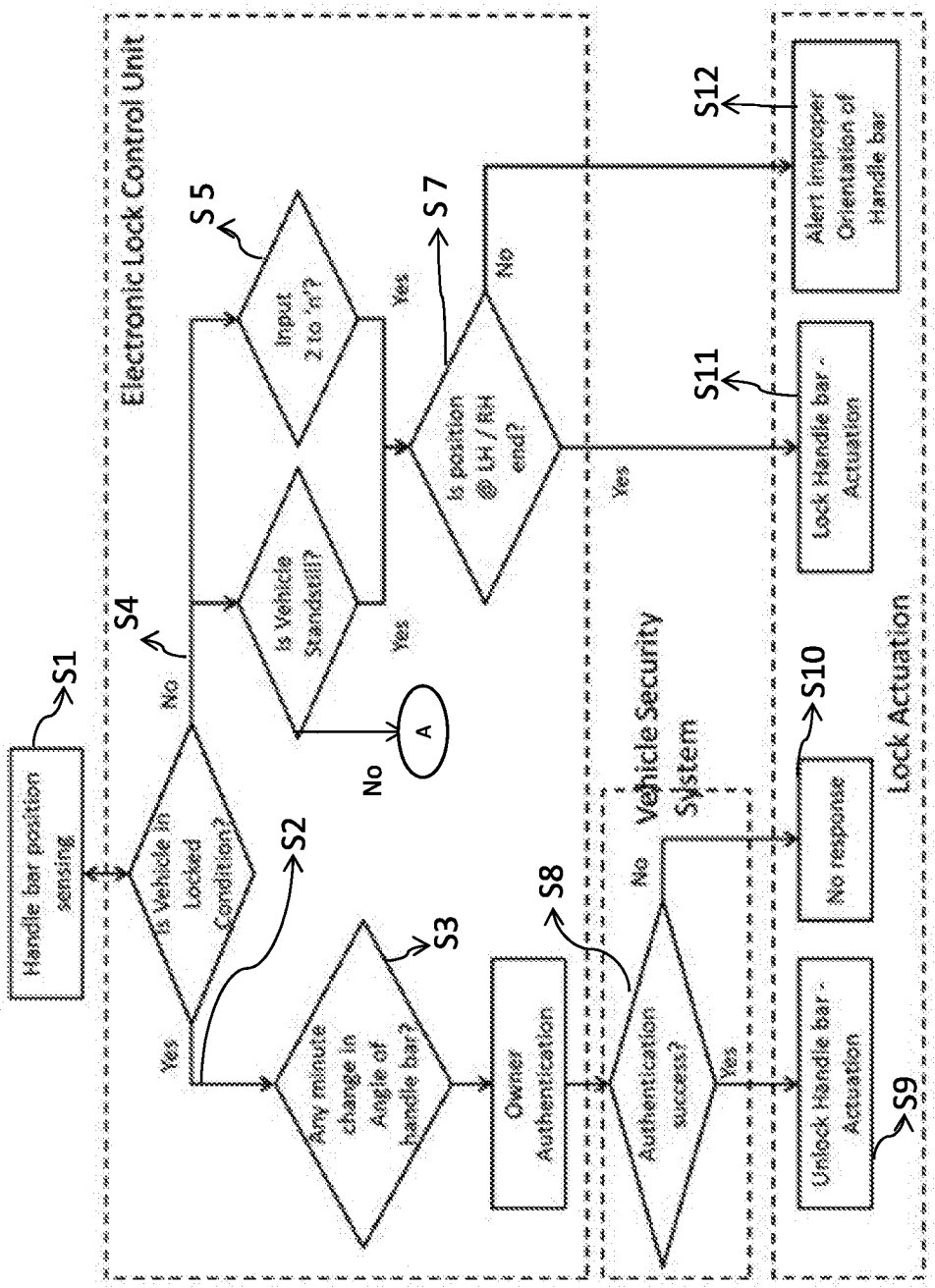
Electronic Lock Control Unit
Vehicle Security System
Lock Actuation
Handle bar position sensing
S1
Is Vehicle in Locked Condition?
S2
Any minute change in Angle of handle bar?
S3
Is Vehicle Standstill?
S4
Input 2 to 'n'?
S5
Is position @ LH / RH end?
S7
Owner Authentication
S8
Authentication success?
No response
S10
Unlock Handle bar - Actuation
S9
Lock Handle bar - Actuation
S11
Alert Improper Orientation of Handle bar
S12
Yes
No
A

Figure 7

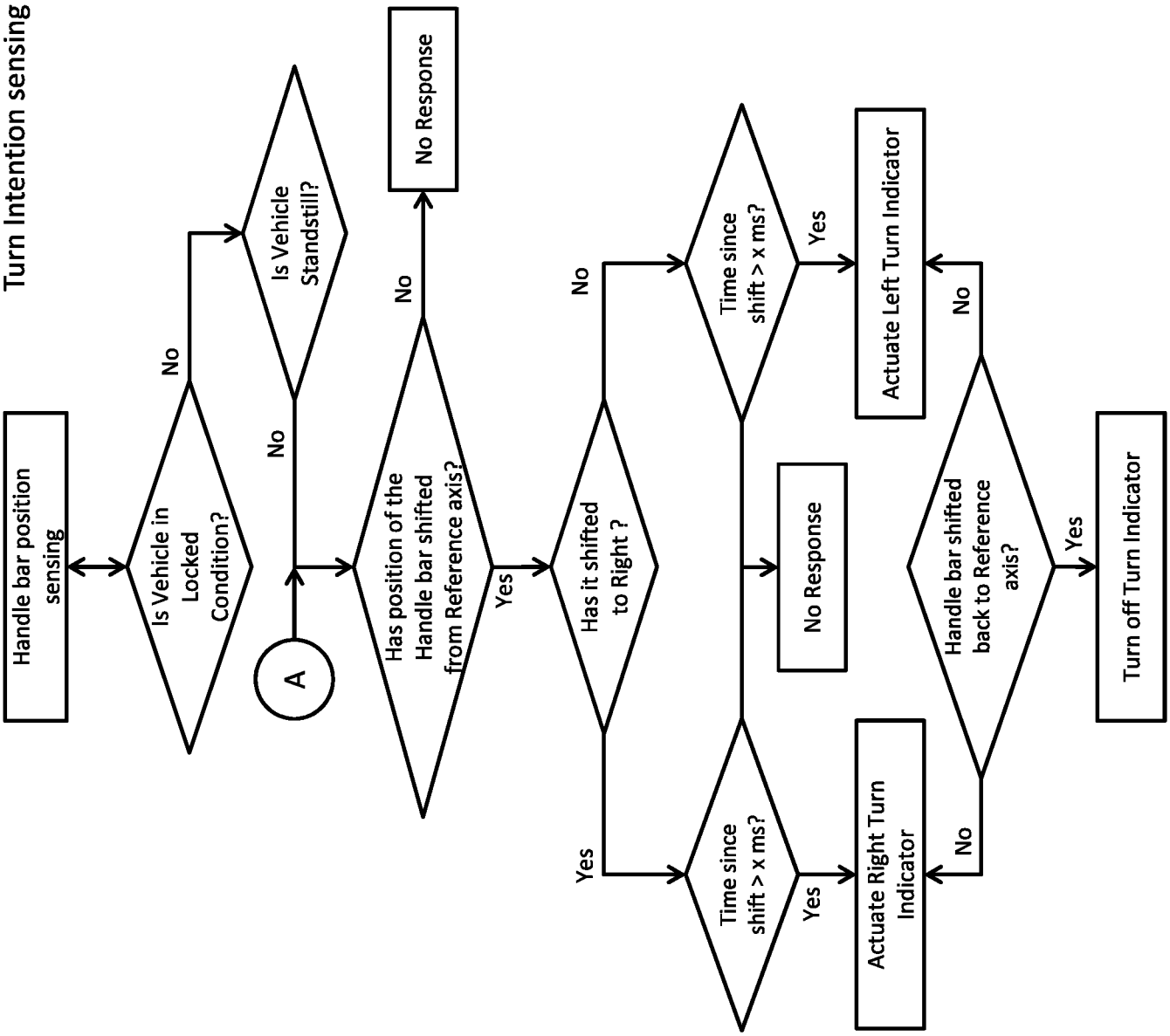
Turn Intention sensing
Handle bar position sensing
Is Vehicle in Locked Condition?
No
Is Vehicle Standstill?
No
A
Has position of the Handle bar shifted from Reference axis?
No
No Response
Yes
Has it shifted to Right ?
No
Time since shift > x ms?
Yes
Actuate Left Turn Indicator
No Response
Yes
Time since shift > x ms?
Yes
Actuate Right Turn Indicator
No
Handle bar shifted back to Reference axis?
Yes
Turn off Turn Indicator

Figure 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2017/056391

A. CLASSIFICATION OF SUBJECT MATTER
B60Q1/42,B62H5/02,B60R25/00,B60R25/10,B60R25/102,B60Q1/34,B60Q1/40
Version=2018.01
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)

B60Q, B62H, B60R

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)

Patseer, IPO Internal Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO2008/012836 A2 (BAJAJ AUTO LIMITED, 31 Jan 2008) Page 6: Para 2-5; Page 7: Para 3; Page 8: Para 1; Page 9: Para 2; Page 10: Para 7; Page 11: Para 1, 5; Figs. 1-3; 4-5.	1-4,6
Y	---do---	5, 7-10
Y	KR20110006498 A (LEE CHOUL KYUN et al., 20 Jan 2011) Full Description: Para. 10-11	5
Y	US 2010/0229611 A1 (HONDA MOTOR CO. LTD.; 16 Sep 2011) Abstract; Figs. 1,11; Para [0008], [0013], [0027], [0028], [0054], [0055]	7-10

☐ 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
"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	Date of mailing of the international search report
11-01-2018	11-01-2018
Name and mailing address of the ISA/ Indian Patent Office Plot No.32, Sector 14,Dwarka,New Delhi-110075 Facsimile No.	Authorized officer Divyanshu Mishra Telephone No. +91-1125300200

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2017/056391

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

The given set of claims essentially relates to two different set of the alleged invention not necessarily linked with single inventive concept viz.

Group 1: Claims 1-6: 'A position and actuation sensing device for a handlebar of a vehicle'; in this particular group, the applicant proposes a system/arrangement of sensors and auxiliary units within the handlebar region of a vehicle (preferably two-wheeler) that enable the automatic actuation (i.e. on/off operation) of side/turn

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☒ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

Continuation of Observations where unity of invention is lacking(Box III)

indicators of the vehicle, based on the rotation of the handlebar and the time parameters of such rotation. As such, it offers a solution to the problem of additional effort and alertness required on the part of the rider to manually switch them on and off during vehicle operation.

Group 2: Claims 7-10: 'A position and actuation sensing method for a handlebar of a vehicle'; in this particular group, though preamble of the claim might appear to convey a method of operation of the apparatus disclosed in claims 1-6, but effectively, the subject matter of these 7-10 claims deal with the provision of an automatic locking/unlocking of handlebar with the actuation been provided wirelessly through a key in the predefined vicinity, and to alert the owner in case of multiple incorrect attempts, thereby providing an anti-theft feature therein, and a method for operation of such a system. This, on the contrary to the claim set 1-6, solves an utterly different problem or rather offer an improved solution with reference to automatic un/locking of two-wheeler handlebars and a safety feature along with.

As such, the given set of claims is not in compliance with Rule 13.1 of Regulations under the PCT.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IB2017/056391

Citation	Pub.Date	Family	Pub.Date
WO 2008/012836 A2	31-01-2008	IN CHE200601280 A	28-11-2008
		WO 2008/012836 A8	02-10-2008
		WO 2008/012836 A3	13-03-2008
		TW 200823084 A	01-01-2008
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		US 8193921 B2	05-06-2012
		VN 10010214000 B1	25-05-2012
		VN 20803 A	25-09-2009
		VN 10010214000 A1	25-09-2009
		JP 4801580 B2	26-10-2011
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		KR 20090016690 A	17-02-2009
		TW I315273 B	01-10-2009
		TW 200842059 A	01-11-2008
		IN DELNP200809053 A	29-05-2009