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Machine translation

1. [20200379083](#) RADAR AND ANTENNA BUILT IN RADAR

US - 03.12.2020

Int.Class [G01S 7/03](#) Appl.No 16829638 Applicant BITSENSING INC. Inventor Jae Eun LEE

A radar includes a transmitter antenna unit that includes multiple transmitter antennas arranged at first horizontal distances and first vertical distances from each other, a receiver antenna unit that includes multiple receiver antennas arranged at second horizontal distances and second vertical distances from each other, a transceiver that transmits transmission signals through the transmitter antenna unit and receives return signals reflected from a target object through the receiver antenna unit, and a processing unit that derives information about the target object by processing the received return signals.

2. [WO/2020/009370](#) SECURITY DEVICE, SYSTEM, AND METHOD FOR FORMING VIRTUAL SECURITY SPACE

WO - 09.01.2020

Int.Class [G01S 13/88](#) Appl.No PCT/KR2019/007745 Applicant BITSENSING INC. Inventor LEE, Jae Eun

A security device for forming a virtual security space includes a radar sensor for transmitting and receiving signals and a reflector for reflecting signals output by a radar sensor of another security device adjacent to the security device, wherein the security device forms a virtual security space between the security device and the other security device by transmitting a signal to a reflector of the other security device adjacent to the security device through the radar sensor and receiving a signal reflected by the reflector of the other security device.

3. [1020180081026](#) STRUCTURE DEFORMATION SENSING SYSTEM USING RADAR AND REFLECTORS

KR - 13.07.2018

Int.Class [G01S 13/89](#) Appl.No 1020180077687 Applicant BITSENSING INC. Inventor LEE JAE EUN

An objective of the present invention is to provide a structure deformation sensing system using radar and reflectors which can continuously monitor a deformation state of a structure without direct measurement by a person. Also, an objective of the present invention is to provide a technique which reduces concern that a sensor instead of a structure is affected by a weather change to reduce error problems and facilitate construction in providing the structure deformation sensing system. In order to measure deformation of the exterior, namely the surface of a structure, the structure deformation sensing system attaches a plurality of radio wave reflectors to the surface of the structure, installs radio wave radar to sense the attached reflectors to measure distances, angles, and reflection amounts by the radar to digitize measured data, constructs a database to store the measured data in the database, and then continuously analyzes a change amount of data with respect to initial data to determine deformation of the structure. In other words, if the radar and the reflectors are used, a change degree of the surface of the structure can be analyzed in real time. COPYRIGHT KIPD 2018

4. [20200072956](#) RADAR AND ANTENNA BUILT IN RADAR

US - 05.03.2020

Int.Class [G01S 13/08](#) Appl.No 16673202 Applicant BITSENSING INC. Inventor Jae Eun LEE

A radar includes a transmitter antenna unit that includes multiple transmitter antennas; a receiver antenna unit that includes a first receiver antenna group including multiple first receiver antennas and multiple second receiver antennas arranged at a first horizontal interval and a second receiver antenna group including multiple third receiver antennas arranged at one or more second horizontal intervals; a transceiver that transmits sending signals through the transmitter antenna unit and receives returning signals reflected from a target object through the receiver antenna unit; and a processing unit that derives information about the target object by processing the received returning signals.

5. [20200225343](#) VEHICLE RADAR SYSTEM FOR DETECTING DANGEROUS GOODS

US - 16.07.2020

Int.Class [G01S 13/931](#) Appl.No 16830786 Applicant BITSENSING INC. Inventor Jae Eun LEE

The present disclosure provides a vehicle radar system capable of detecting the appearance of dangerous objects with higher reliability. Further, the present disclosure provides a vehicle radar system that can provide both safety and convenience of a driver by combining a radar sensor with a black box or a navigation device which is almost a necessity for vehicles. Accordingly, the present disclosure provides a vehicle radar system in which a radar sensor is installed in a vehicle to calculate the speed of the host vehicle during driving, detect an object appearing ahead of the vehicle, calculate a relative speed between the host vehicle and the object, link the radar sensor to a user device, such as a smartphone of the driver, or a navigation device through near-field communication and issue a warning through the user device or the navigation device depending on the distance to the appearing object.

6. [1020200047411](#) RADAR APPARATUS AND ANTENNA DEVICE USED IN RADAR APPARATUS

KR - 07.05.2020

Int.Class [G01S 7/03](#) Appl.No 1020190133244 Applicant BITSENSING INC. Inventor LEE, JAE EUN

Provided is a radar apparatus which comprises: a transmission antenna unit including a plurality of transmission antennas arranged at a first horizontal interval and a first vertical interval; a reception antenna unit including a plurality of reception antennas arranged at a second horizontal interval and a

second vertical interval; a transception unit transmitting a transmission signal through the transmission antenna unit and receiving a reflection signal reflected from an object through the reception antenna unit; and a processing unit processing the received reflection signal and deriving information on the object. The angular resolution in horizontal and vertical directions in medium and long distance detection can be increased. COPYRIGHT KIPO 2020

7. [1020180041834](#) VIRTUAL GUARD SYSTEM USING ELECTROMAGNETIC WAVE REFLECTOR

KR - 25.04.2018

Int.Class [G01S 13/88](#) Appl.No 1020160134042 Applicant BITSENSING INC. Inventor LEE, SUNG JIN

The present invention provides a virtual fence which measures and records receiving sensitivity of an electromagnetic wave received in a radar sensor to make the receiving sensitivity as a reference value since a radar and a reflector separated from the radar by a predetermined distance are arranged and the reflector reflects an electromagnetic wave transmitted by the radar, and then takes an action including a notification by determining that an invasion occurs in a guard region when a rapid decrease in the receiving sensitivity of the electromagnetic wave reflected from the reflector occurs. Since reliable invasion surveillance is impossible by reducing the amount of reflection of the electromagnetic wave as a distance between the radar and the reflector increases in the virtual fence, the present invention enlarges a size of the reflector to arrange according to the distance between the radar and the reflector. COPYRIGHT KIPO 2018

8. [3614166](#) RADAR DEVICE AND ANTENNA DEVICE USED FOR RADAR DEVICE

EP - 26.02.2020

Int.Class [G01S 7/03](#) Appl.No 19794862 Applicant BITSENSING INC Inventor

A radar includes a transmitter antenna unit that includes multiple transmitter antennas; a receiver antenna unit that includes a first receiver antenna group including multiple first receiver antennas and multiple second receiver antennas arranged at a first horizontal interval and a second receiver antenna group including multiple third receiver antennas arranged at one or more second horizontal intervals; a transceiver that transmits sending signals through the transmitter antenna unit and receives returning signals reflected from a target object through the receiver antenna unit; and a processing unit that derives information about the target object by processing the received returning signals.

9. [1020200001534](#) RADAR APPARATUS AND ANTENNA DEVICE USED FOR RADAR APPARATUS

KR - 06.01.2020

Int.Class [G01S 7/03](#) Appl.No 1020190075666 Applicant BITSENSING INC. Inventor LEE JAE EUN

Provided is a radar apparatus, which comprises: a transmission antenna unit including a plurality of transmission antennas; a reception antenna unit including a first reception antenna group including a plurality of first reception antennas and a plurality of second reception antennas arranged at a first horizontal interval, and a second reception antenna group including a plurality of third reception antennas arranged at one or more second horizontal intervals; a transmission and reception unit transmitting a transmission signal through the transmission antenna unit, and receiving a reflection signal reflected by a target body through the reception antenna unit; and a processing unit processing the received reflection signal and deriving information on the target body. COPYRIGHT KIPO 2020

10. [20200143673](#) REAL-TIME TRAFFIC INFORMATION COLLECTION

US - 07.05.2020

Int.Class [G08G 1/09](#) Appl.No 16443409 Applicant Bitsensing Inc. Inventor Jae Eun Lee

System, method, and non-transitory computer-readable storage medium, including: a sensor installed on a section of a road and configured to collect traffic data related to movements of vehicles on the section of the road, wherein the sensor samples the traffic data at a certain interval long enough to substantially reduce the amount of the collected traffic data; a plurality of narrowband network towers configured to relay the collected traffic data received from a plurality of sensors installed on a designated area encompassing multiple sections; and a central server configured to receive and process the collected traffic data from the plurality of narrowband network towers to generate traffic information sufficient to provide accurate real-time traffic information of the designated area.

11. [1020180064951](#) LINEAR VIRTUAL FENCE SYSTEM USING RADAR AND REFLECTOR

KR - 15.06.2018

Int.Class [G01S 13/88](#) Appl.No 1020170005809 Applicant BITSENSING INC. Inventor LEE, SUNG JIN

The present invention provides a lineal virtual fence. The lineal virtual fence includes a radar and a reflector arranged at a certain distance from the radar. The reflector reflects an electromagnetic wave emitted from the radar, measures and records the reception sensitivity of the electromagnetic wave received from a radar sensor, and sets it as a reference value. After that, it determines that an intrusion is occurred in a boundary area when there is a sudden change in the reception sensitivity of the electromagnetic wave reflected from the reflector, and takes measures such as an alarm. As a distance between the radar and the reflector in a lineal virtual fence is increased, the reflection level of the electromagnetic wave is reduced and reliable intrusion monitoring cannot be performed. Therefore, the size of the reflector is increased as the distance between the radar and the reflector is increased. COPYRIGHT KIPO 2018

12. [WO/2020/004942](#) RADAR DEVICE AND ANTENNA DEVICE USED FOR RADAR DEVICE

WO - 02.01.2020

Int.Class [G01S 7/03](#) Appl.No PCT/KR2019/007747 Applicant BITSENSING INC. Inventor LEE, Jae Eun

A radar device may comprise: a transmission antenna unit including a plurality of transmission antennas; a reception antenna unit comprising a first reception antenna group including a plurality of first reception antennas and a plurality of second reception antennas that are arranged in a first horizontal interval, and a second reception antenna group including a plurality of third reception antennas arranged in at least one second horizontal interval; a transceiver unit for transmitting a transmission signal through the transmission antenna unit and receiving a reflection signal reflected from an object through the reception antenna unit; and a processing unit for processing the received reflection signal to derive information on the object.

13. [20180364350](#) LINEAR VIRTUAL FENCE SYSTEM USING RADAR AND REFLECTOR

US - 20.12.2018

Int.Class [G01S 13/88](#) Appl.No 15833904 Applicant Lobeye Co., Ltd. Inventor Sung Jin Lee



A system, including: a radar including a transmitter and a receiver, the transmitter configured to transmit an electromagnetic wave; a reflector placed a predetermined distance away from the radar, the reflector configured to reflect the transmitted electromagnetic wave back to the receiver; and a control unit coupled to the radar and configured to measure a magnitude of the reflected electromagnetic wave received at the receiver from the reflector by measuring Doppler signal corresponding to the predetermined distance, wherein the control unit is configured to measure a reference value of the magnitude of the reflected electromagnetic wave when no intrusions are occurring, and wherein the control unit is configured to trigger an alarm when the magnitude of the reflected electromagnetic wave changes from the reference value.

14. [1020180100293](#) VIRTUAL GUARD SYSTEM USING ELECTROMAGNETIC WAVE REFLECTOR

KR - 10.09.2018

Int.Class [G01S 13/88](#) Appl.No 1020180104390 Applicant 주식회사 비트센싱 Inventor LEE JAE EUN

The present invention relates to a virtual fence. A radar and a reflector at a constant distance from the radar are located. An electromagnetic wave transmitted from the radar is reflected by the reflector and a reception sensitivity of the electromagnetic wave received from a radar sensor is measured and recorded as a reference value. When the reception sensitivity of the electromagnetic wave reflected from the reflector is significantly dropped, the virtual fence takes an action including an alarm by determining that an intrusion is occurred in a guard region. As a distance between the radar and the reflector in the virtual fence increases, an amount of reflection of the electromagnetic wave is reduced and reliable intrusion monitoring cannot be performed, so that the present invention increases a size of the reflector according to the distance between the radar and the reflector. The present invention comprise: the radar sensor; the reflector; and a control module. COPYRIGHT KIPO 2018

15. [1020200069127](#) TRAFFIC MANAGEMENT SERVER, TRAFFIC MANAGEMENT METHOD USING SAME, AND COMPUTER PROGRAM

KR - 16.06.2020

Int.Class [G08G 1/01](#) Appl.No 1020180156308 Applicant BITSENSING INC. Inventor LEE, JAE EUN

The present invention relates to a traffic management server, which comprises: a reception unit receiving a radar detection result from a radar attached to a plurality of vehicles; a road boundary derivation unit deriving road boundary information from the received radar detection result; a lane information derivation unit deriving lane information on which lanes the plurality of vehicles are located based on the derived road boundary and predetermined lane spacing information; a classification unit using the derived lane information to classify the received radar detection result; and a calculation unit using the classified radar detection result to calculate vehicle speed information for each lane. COPYRIGHT KIPO 2020

16. [WO/2020/218808](#) RADAR DEVICE AND ANTENNA DEVICE USED IN RADAR DEVICE

WO - 29.10.2020

Int.Class [G01S 13/00](#) Appl.No PCT/KR2020/005290 Applicant BITSENSING INC. Inventor LEE, Jae Eun

A radar device comprises: a transmitting antenna unit comprising a plurality of transmitting antennas; a receiving antenna unit comprising a plurality of receiving antennas; a transmitting/receiving unit for transmitting a transmission signal through the transmitting antenna unit and receiving, through the receiving antenna unit, a reflected signal reflected from an object; and a processing unit for processing the received reflected signal and thereby deriving information regarding the object, wherein the processing unit selects at least one from among the plurality of transmitting antennas and thereby sets the at least one transmitting antenna to one of a medium to long-term detection mode or a short-term detection mode, and one of the transmitting antenna unit or the receiving antenna unit has a vertical step.

17. [20200278443](#) LINEAR VIRTUAL FENCE SYSTEM USING RADAR AND REFLECTOR

US - 03.09.2020

Int.Class [G01S 13/88](#) Appl.No 16874918 Applicant BITSENSING INC. Inventor Sung Jin Lee

A system, including: a radar including a transmitter and a receiver, the transmitter configured to transmit an electromagnetic wave; a reflector placed a predetermined distance away from the radar, the reflector configured to reflect the transmitted electromagnetic wave back to the receiver; and a control unit coupled to the radar and configured to measure a magnitude of the reflected electromagnetic wave received at the receiver from the reflector by measuring Doppler signal corresponding to the predetermined distance, wherein the control unit is configured to measure a reference value of the magnitude of the reflected electromagnetic wave when no intrusions are occurring, and wherein the control unit is configured to trigger an alarm when the magnitude of the reflected electromagnetic wave changes from the reference value.

18. [1020190000355](#) LINEAR VIRTUAL FENCE SYSTEM BY USING RADAR AND REFLECTOR

KR - 02.01.2019

Int.Class [G01S 13/88](#) Appl.No 1020180167945 Applicant BITSENSING INC. Inventor LEE SUNG JIN

The present invention provides a linear virtual fence which has a radar and a reflector disposed to be a certain distance apart from each other, to make the reflector reflect an electromagnetic wave radiated from the radar and measure and record the sensitivity of reception of the electromagnetic wave received by a radar sensor as a reference value, and determines, when a sudden change in the sensitivity of the electromagnetic wave reflected from the reflector occurs, that an intrusion has occurred in a boundary zone to take measures such as an alarm. As a distance between the radar and the reflector in the linear virtual fence increases, an amount of reflection of the electromagnetic wave is reduced, so reliable monitoring for an intrusion is unable to be performed. Therefore, in the present invention, as the distance between the radar and the reflector increases, the size of the reflector is increased to be arranged. COPYRIGHT KIPO 2019

19. [1020180116749](#) METHOD TO COLLECT LARGE SCALE TRAFFIC INFORMATION IN REAL-TIME AND OPERATION METHOD THEREOF

KR - 25.10.2018

Int.Class [G08G 1/01](#) Appl.No 1020180040869 Applicant BITSENSING INC. Inventor LEE JAE EUN

An objective of the present invention is to collect traffic information with a radar or light detection and ranging (LiDAR) sensor, and provide required traffic information customized to each road and each lane while lowering expenses required for installation and information collection. According to the present invention, the radar or LiDAR sensor is installed at a predetermined position of a road to measure the speed of a vehicle in a predetermined section within coverage of the sensor, store measured transfer information data, and transmit the speed of the vehicle (each or all lanes), the number of vehicles (each or all lanes), vehicle type information (each or all lanes), and position information, such as a distance and an angle of the vehicle (each or all lanes), and each

arithmetic average information to a central server through an Internet of things (IoT) network by using the traffic information accumulated by each predetermined time unit. The central server analyzes large scale traffic information collected from each sensor to display a real-time traffic situation on a traffic situation signboard of a corresponding road position, interlocks with a traffic sign to adjust a signal cycle, and transmits the transfer information to a navigation provider server so that the transfer information is provided to navigation users. COPYRIGHT KIPO 2018

20. [20180293885](#) REAL-TIME TRAFFIC INFORMATION COLLECTION

US - 11.10.2018

Int.Class [G08G 1/09](#) Appl.No 15949894 Applicant Bitsensing Inc. Inventor Jae Eun Lee

System, method, and non-transitory computer-readable storage medium, including: a sensor installed on a section of a road and configured to collect traffic data related to movements of vehicles on the section of the road, wherein the sensor samples the traffic data at a certain interval long enough to substantially reduce the amount of the collected traffic data; a plurality of narrowband network towers configured to relay the collected traffic data received from a plurality of sensors installed on a designated area encompassing multiple sections; and a central server configured to receive and process the collected traffic data from the plurality of narrowband network towers to generate traffic information sufficient to provide accurate real-time traffic information of the designated area.

21. [1020190101909](#) VEHICLE RADAR SYSTEM FOR SENSING DANGEROUS OBJECT

KR - 02.09.2019

Int.Class [G01S 13/93](#) Appl.No 1020190021399 Applicant BITSENSING INC. Inventor LEE JAE EUN

The purpose of the present invention is to provide a vehicle radar system capable of detecting the appearance of a dangerous object with higher reliability. Further, the purpose of the present invention is to provide a vehicle radar system capable of providing both safety and convenience of the driver by combining a black box, a navigation device and a radar sensor which are almost essential to a vehicle. To this end, the vehicle radar system has a radar sensor mounted thereon, enables the radar sensor itself to calculate the speed of the vehicle running, detects an object appearing in front of the vehicle to calculate the relative speed between the vehicle and the object, connects a user terminal such as a smartphone possessed by the driver or a navigation device with the radar sensor through near-field communications, and warns the user through the user terminal or the navigation device according to the distance from the appeared object. COPYRIGHT KIPO 2020

22. [1020200008347](#) ANTENNA AND COMMUNICATION DEVICE

KR - 28.01.2020

Int.Class [H01Q 1/38](#) Appl.No 1020180082384 Applicant 주식회사 비트센싱 Inventor LEE JAE EUN

Provided is an antenna including a plurality of substrates. The plurality of substrates are respectively divided into an internal region and an outer region, and the internal region of each substrate is formed in a normal direction with respect to a moving direction of radio waves. The plurality of substrates are stacked so that the internal region of each substrate is adjacent along the moving direction of radio waves, and a waveguide may be formed by the adjacent internal region. COPYRIGHT KIPO 2020

23. [111183367](#) VEHICLE RADAR SYSTEM FOR DETECTING DANGEROUS GOODS

CN - 19.05.2020

Int.Class [G01S 13/931](#) Appl.No 201980004792.0 Applicant BITSENSING INC. Inventor LEE JAE EUN

The purpose of the present invention is to provide a vehicle radar system capable of detecting the appearance of dangerous goods with higher reliability. Moreover, the purpose of the present invention is to provide a vehicle radar system which combines a black box or a navigation device, which is almost essentially installed in vehicles, with a radar sensor so as to provide both safety and convenience for a driver. According to the purpose, the present invention provides a vehicle radar system which comprises a radar sensor mounted to a vehicle, calculates the speed of the vehicle during driving by means of the radar sensor, detects an object appearing ahead of the vehicle during driving so as to calculate the relative speed between the vehicle and the object, links a user terminal, such as a smart phone or a navigation device, in a driver's possession with the radar sensor by short range communication, and issues an alert through the user terminal or navigation device according to the distance from the appearing object.

