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(72) Feltaláló(k):
SCHIEFER, Martin, A-3100 St. Pölten (AT)
JAHN, Martin, A-3862 Eisgarn (AT)

(73) Jogosult(ak):
Siemens Aktiengesellschaft, 80333 München (DE)

(74) Képviselő:
SBGK Szabadalmi Ügyvivői Iroda, Budapest

(54) **Rendszer tárgyak helyének meghatározására**

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Rendszer tárgyak helyének meghatározására

Description

The invention relates to a system for determining the location of objects over a limited area.

One essential task when managing fleets is determining the location of the vehicles particularly also during their stay in a support centre such as a depot or garage. Only when the exact position of each vehicle is known can measures such as fuelling, maintenance or repair work, as well as departures, be efficiently carried out.

Known localization determination systems use electromagnetic waves, sound or optical methods to determine the position.

One example of the use of electromagnetic waves are radar systems. Radar devices emit a primary signal and receive the echo, also referred to as the secondary signal. In this way it is possible not only to detect reflective targets but also to identify when, for instance, the secondary signal has a unique identifier by means of modulation. Such targets, also referred to as transponder tags, can be configured as active or passive transponders.

Passive transponders obtain their energy from the electromagnetic field of the transmitter, which is why their range is relatively small. However active transponders have a separate power supply (e.g. battery), with the aid of which the modulated secondary signal can be registered over a larger distance.

One further option is the use of the secondary radar principle. Here, aside from fixed radar base stations, the objects to be identified are also provided with mobile radar modules. The radar base stations now communicate with the mobile radar modules by way of synchronised frequency-modulated continuous wave (FMCW) frequency ramps for instance.

This means that the position determination can now take place and that all objects are

provided with transponders and each parking place is monitored with a separate transmit-receive system, known as readers. The effort involved in this is significant however and the flexibility of the system is minimal since only defined parking places are registered.

A more efficient method of position determination uses what is known as the lateration principle, in which the distances from at least three transmitters with a known position are ascertained by way of propagation time measurement of electromagnetic signals and the position of the object is determined therefrom. In particular what are known as satellite navigation systems (GPS, Glonass, Galileo) are known for this.

The use of this method presupposes the unhindered propagation of the electromagnetic signals. This is not the case however in significantly reflective environments such as in depots or garages, so that the reliable use of these systems is not ensured there.

Document US 2002/089434 A1 describes a system for determining the location of vehicles, pallets or persons.

The object underlying the invention is therefore to specify a reliable method for determining the location of objects over a limited area.

In accordance with the invention this object is achieved with a method according to claim 1.

The inventive system for determining the location of objects permits a robust and unique position determination with minimal effort.

Advantageous embodiments emerge from the subclaims.

The invention is explained in more detail on the basis of an exemplary embodiment shown in the figures, in which, by way of example:

Fig. 1 shows the exemplary arrangement of positioning surfaces and objects.
Fig. 2 shows the exemplary localization of vehicles.
Fig. 3 shows the detection of objects in a database of a central processing system

Fig. 1 shows by way of example the arrangement of parking lanes as positioning surfaces

P1, P2, P3, P4, P5. In each case a number of vehicles F1, F2, F3 can be parked on the parking lanes, which can be located on the premises of a logistics company for instance. Each parking lane has a defined arrival area E1, E2, E3, E4, E5 and a departure area A1, A2, A3, A4, A5, each of which is provided with a transponder T.

The front of each vehicle F1, F2, F3 is provided with a reader R and the rear of each vehicle with a transponder T.

Readers R and transponders T are based on the RFID (Radio Frequency Identification) principle known from the prior art.

The invention is however not restricted to this technology, and the secondary radar principle could also be used for instance and thus, aside from identifying the transponder T, a distance could also be determined for instance. By measuring the distance between the reader R and transponder T, the localization accuracy of the inventive system could advantageously also be increased.

It would also be conceivable to provide the readers R with an additional position determination unit in accordance with the lateration principle, in order thus to be able to perform a (rough) position determination outside of the predetermined parking lanes for instance.

One example of RFID systems are the systems according to ISO 18000-1 ff.

The mode of operation of the inventive system is explained in more detail on the basis of Fig. 2.

The vehicles F1, F2, F3 to be located park on the premises exclusively on parking lanes, as positioning surfaces P1, P2, P3, P4, P5, specific thereto.

When entering a specific parking lane, the reader R on the front of the vehicle F1, F2, F3 registers the transponder T assigned to the respective arrival area E1, E2, E3, E4, E5 and stores its identifier. By means of the unique assignment of the transponder T to the arrival areas, the information relating to which parking lanes are used as positioning surfaces P1, P2, P3, P4, P5 for the vehicle is now available in the vehicle.

The vehicle now drives forwards on the parking lane until it either reaches the departure

area A1, A2, A3, A4, A5 or another vehicle which is already parked there.

In both cases the reader R of the vehicle registers the previously located transponder T, which is either assigned to the departure area, if it is the first parked vehicle F1 in this parking lane P1, or identifies a further already parked vehicle.

On account of the information relating to the parking lanes P1, P2, P3, P4, P5 collected by way of the readers, the arrival and departure areas E1, E2, E3, E4, E5, A1, A2, A3, A4, A5 and the adjacent vehicles, the unique position of all vehicles can now be determined in a central processing unit SRV.

Therefore it is immediately apparent from the data registered by the associated reader R for instance that the third vehicle F3 has passed through the arrival area E1 of the first parking lane P1 and is therefore located on this parking lane P1. Furthermore, the second vehicle F2 is registered as a frontmost vehicle in the row on this parking lane by way of the associated transponder T.

By linking the data registered by the readers R of all vehicles F1, F2, F3 in a central processing unit SRV, the position of the third vehicle F3 can now also be determined as a third vehicle in the row on the first parking lane P1.

To this end the readers R send their registered data via a wireless link to the central processing unit SRV in which the data is prepared, linked to information relating to the vehicles F1, F2 F3 and displayed.

This display can take place in accordance with the diagram shown in Fig. 3 for instance, whereby each vehicle display comprises a vehicle identity FID 1, FID 2, FID 3, and information relating to the vehicle lengths L1, L2, L3, the vehicle positions P1, P2, P3 and relating to the information registered on the fronts of the vehicles F1F, F2F, F3F, and the transponder H1F, H2F, H3F located at the rear of the vehicle.

The inventive system for determining the location of objects thus permits a robust, unique position determination with minimal effort.

The use in vehicles in garages or on the premises of transport companies is particularly advantageous, it is however also conceivable to use the system to determine the location of other objects, such as, for instance containers in ports of embarkation, rail vehicles in

switching stations etc.

In such cases it would also be expedient to attach readers R and transponders T on several sides of the objects, thereby permitting a two- or three-dimensional position determination.

List of reference characters

P1, P2, P3, P4, P5	positioning surfaces
F1, F2, F3	vehicles
E1, E2, E3, E4, E5	arrival areas
A1, A2, A3, A4, A5	departure areas
FID 1, FID 2, FID 3	vehicle identities
L1, L2, L3	vehicle lengths
P1, P2, P3	vehicle positions
F1F, F2F, F3F	vehicle fronts
H1F, H2F, H3F	
SRV	central processing unit
T	transponder
R	reader

Szabadalmi igénypontok

1. Rendszer tárgyak helyének meghatározására egy korlátozott területen adóvevők és a helyszínen található adóvevőket érzékelő olvasóeszközök segítségével, azzal jellemezve, hogy a terület előre meghatározott pozicionálási területeket (P1, P2, P3, P4, P5) tartalmaz, ahol több tárgy (F1, F2, F3) elhelyezhető, az egyes tárgyak legalább egyik oldalán legalább egy olvasóeszközzel (R) és legalább egy másik oldalán legalább egy adóvevővel (T) rendelkeznek, mindegyik pozicionálási területhez (P1, P2, P3, P4, P5) tartozik egy behajtási terület (E1, E2, E3, E4, E5) és egy kihajtási terület (A1, A2, A3, A4, A5), a behajtási- és kihajtási terület legalább egy-egy adóvevővel (T) van ellátva, és az olvasóeszközök (R) össze vannak kötve egy központi számítógépes egységgel (SRV), és a központi számítógépes egység (SRV) az olvasóeszközök (R) átvitt adataiból meghatározza a tárgyak (F1, F2, F3) helyét a pozicionálási területen (P1, P2, P3, P4, P5).

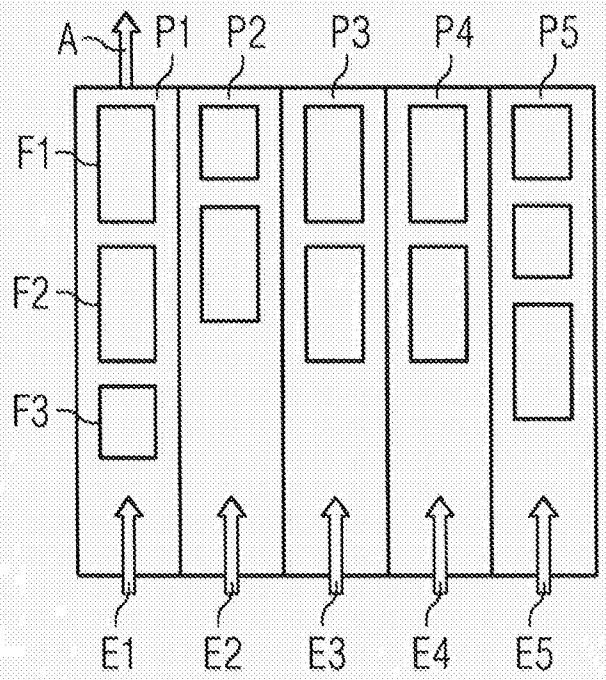
2. Az 1. igénypont szerinti rendszer, azzal jellemezve, hogy a pozicionálási területek (P1, P2, P3, P4, P5) hosszúkás kialakításúak, ahol több tárgy (F1, F2, F3) egymás mögött sorban elrendezhető, és a tárgyak elöl egy olvasóeszközzel (R) és hátul egy adóvevővel rendelkeznek.

3. A 2. igénypont szerinti rendszer, azzal jellemezve, hogy a tárgyak gépjárművek (F1, F2, F3) és a pozicionálási területek (P1, P2, P3, P4, P5) parkolósávként vannak kialakítva.

4. Az 1 - 3. igénypontok egyike szerinti rendszer, azzal jellemezve, hogy az olvasóeszközök (R) és az adóvevők (T) RFID-elven működnek.

5. Az 1 - 4. igénypontok egyike szerinti rendszer, azzal jellemezve, hogy az olvasóeszközök (R) további, laterációs elven működő helymeghatározó egységet tartalmaznak.

FIG 1



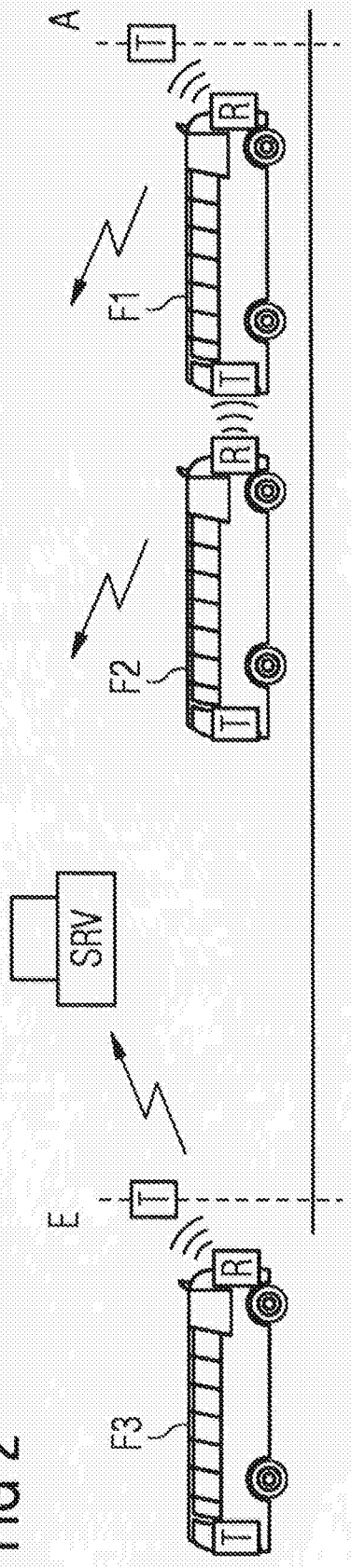

A
T
R
F1
T
R
F2
T
SRV
E
T
R
F3
T

FIG 2

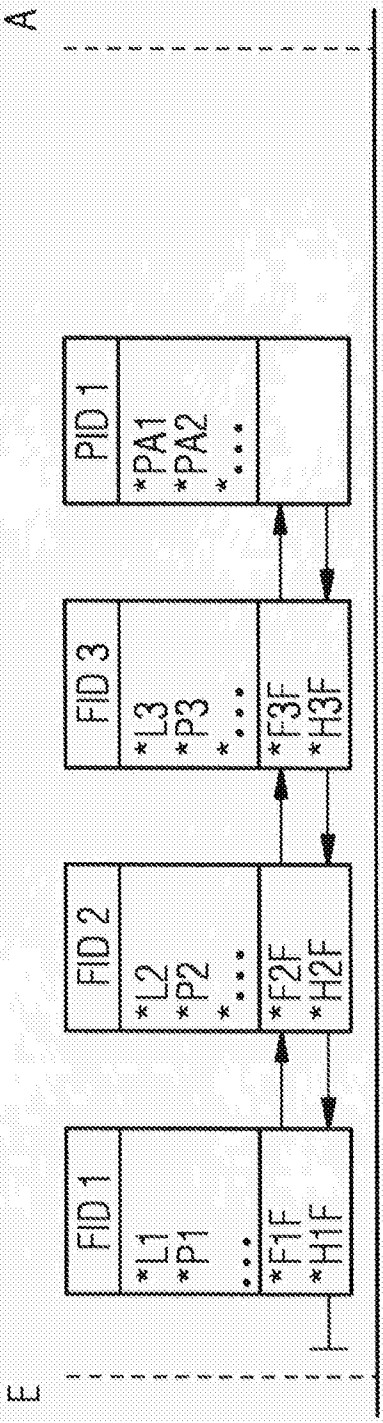

A
PID 1
*PA1
*PA2
*...
FID 3
*L3
*P3
*...
*F3F
*H3F
FID 2
*L2
*P2
*...
*F2F
*H2F
FID 1
*L1
*P1
*...
*F1F
*H1F
E

FIG 3