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(54) Title: FLIGHT INFORMATION SYSTEM AND METHOD

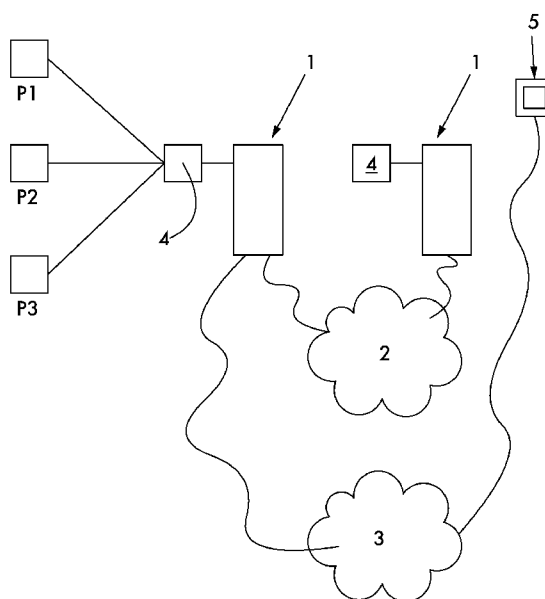


Fig. 1

(57) Abstract: The present invention relates to an aircraft information system and a method for providing passenger information, such as flight information or entertainment information, to the passengers in an aircraft by making use of communication between at least one passenger device and the aircraft information system, the aircraft information system comprising: - storage means for storing information thereon, - one or more processing units for performing information processing, - energy providing means for providing energy to the aircraft information system, - data communication means, such as wireless communication means, for communication with the at least one passenger device, - wherein the aircraft information system is configured as autonomous unit for autonomous functioning, such as independently of further systems in the aircraft, and wherein the aircraft information system comprises: - receiving means for receiving source information relating to the aircraft for forming on the basis of the source information respective passenger



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FLIGHT INFORMATION SYSTEM AND METHOD

The present invention relates to an aircraft information system for providing information, such as flight information or entertainment information, to the passengers in an aircraft by making use of communication between a passenger device and the aircraft information system. A passenger device is here a device used by the passenger to consume the information. Such a device can be provided by cabin crew, but can also be taken on board by the passenger him/herself. Examples hereof are mobile phones, tablets or laptops with screens on which applications or web browsers can show the information.

Information systems exist per se, such as entertainment systems for use on aircraft. Such systems are limited in the types of information they can provide to the passenger. The present invention has for its object to provide new, unknown types of information to the passenger in new and inventive manner.

The present invention provides for this purpose an aircraft information system for providing passenger information, such as flight information or entertainment information, to the passengers in an aircraft by making use of communication between at least one passenger device and the aircraft information system, the aircraft information system comprising:

- storage means for storing information thereon,
- one or more processing units for performing information processing,
- energy providing means for providing energy to the aircraft information system,
- data communication means, such as wireless communication means, for communication with the at least one passenger device,

- wherein the aircraft information system is configured as autonomous unit for autonomous functioning, such as independently of further systems in the aircraft, and wherein the aircraft information system comprises:

- 5 - receiving means for receiving source information relating to the aircraft for forming on the basis of the source information respective passenger information for transmission to the at least one passenger device.

An advantage of a system according to the present
10 invention is that, on the basis of the source information, aircraft-specific information can be formed for presentation thereof to passengers. It hereby becomes possible for instance to have the aircraft information system determine autonomously in which aeroplane it is present and/or under
15 which flight number it is flying. It becomes possible on the basis hereof to present information relating to the aircraft and/or the flight number to the passenger. It is for instance possible here to present external characteristics of the aircraft, such as colours, flags or symbols,
20 to the passenger.

According to a first preferred embodiment, the receiving means are configured for this purpose to receive ADS signals, such as ADS-B, ADS-A or ADS-C signals. ADS-B signals in particular are widely used and are specifically
25 suitable for application in the present invention.

The aircraft information system more preferably comprises means, such as program code means executable on a respective processing unit, for determining which ADS-B signals are related to the aircraft. This provides for a
30 practical implementation in determining in relation to which aircraft and/or flight number the aircraft information system is currently functioning.

The aircraft information system is more preferably

provided with sensors for detecting ambient variables, for providing measurement data such as movement by means of an accelerometer, air pressure by means of a pressure sensor, preferably for measuring an absolute air pressure, more preferably for measuring changes in air pressure. Such ambient variables can be applied in different preferred embodiments according to the present invention. Advantageous is that, on the basis of the accelerometer and air pressure gauge, determinations can be made relating to the different stages of a flight, such as detection of standstill at the gate, taxiing, take-off, flying at cruise speed, approach to the airport and landing. By making use of the characteristic measurements associated with and determinable at these stages it is for instance determined that the transmission function of a mobile telecommunication module such as GSM, 3G, 4G has to be switched off.

The aircraft information system is more preferably provided with a receiver for mobile telecommunication, such as GSM, 3G, 4G, preferably a transceiver therefor. Such a receiver is important in passive determination of the presence of such signals, since during the flight, and particularly during landing, the transmission of such signals is considered undesirable.

The aircraft information system more preferably comprises means for determining the presence of the aircraft on the ground, preferably relating to a landing event, more preferably comprising means for determining a departure and/or ending of the presence of an aircraft on the ground, more preferably relating to a take-off event. During presence on the ground the use of data communication via mobile data communication is advantageous in providing a connection between the aircraft information system and further information sources, update systems and the like.

The wireless communication means available for communication between different units of the aircraft information system and/or the passenger devices can also be applied for this purpose.

5 Individual units of the aircraft information system are more preferably housed in a holder, such as a closed holder, such as a case, canister or box. It hereby becomes possible to scale the system in advantageous manner. When for instance a unit of the aircraft information system is
10 suitable for operating 20 passenger devices, a total capacity of the aircraft information system can, by mutually coupling a plurality of such systems, realize a correspondingly larger processing capacity or coupling capacity to passenger devices. Provided for this purpose according
15 to a further embodiment is an aircraft information system comprising a number of the autonomous units which are mutually connected by means of the data communication means.

According to a further preferred embodiment, the means for forming the passenger information comprise
20 means, such as program code means executable on a processing unit, for forming graphically displayable information showing the location of the aircraft on a geographical background, such as a map or a photographic view of the earth's surface. A passenger can hereby receive on an
25 individual basis diverse flight data, including the current status of the flight, such as by watching a film of how the aircraft moves through the landscape.

The aircraft information system more preferably comprises means for showing, in addition to the location of a
30 user's own aircraft, further aircraft from which the receiving means receive respective information. It hereby becomes possible to augment the images of the flight of the aircraft over the landscape with graphic information

of other aircraft moving over the landscape. On the basis of information from the ADS-B systems the appearance of the aircraft can be adapted to this information. When the user has a holder suitable for this purpose, the images
5 are adapted for augmented reality display. Provision is made here that the graphic information on the screen is adapted to the direction in which the mobile device is held.

According to a further preferred embodiment, the
10 aircraft information comprises a server, such as a web server, for handling the communication with the at least one passenger device. The application of the web server provides the option of displaying the information for the passenger in a web browser instead of in a so-called app.
15 This is particularly important precisely when applying the autonomous aircraft information system because, once in an aircraft, the passenger usually no longer has the possibility of downloading a specific app for an aircraft information system from an App Store, which has to be ac-
20 cessed via the internet. Because the necessity of downloading an app from an App Store is obviated, the aircraft information system according to the present invention provides the advantage that all information which can be provided within the possibilities of the web browser and web
25 server can be shown. This relates to showing content to be further referred to below as well as showing the flight information and augmented reality described in the foregoing.

According to a further preferred embodiment, the
30 aircraft information system comprises gateway means for providing a data connection, speech connection and/or internet connection to the passenger device using a data communication system of the aircraft. When the system can

connect to a mobile network, such as comprising 3G and 4G, services can be provided at high speed.

When the aircraft information system can connect, such as via the gateway means, to a communication channel via the aircraft, slower services can be provided. The aircraft information system preferably comprises for this purpose adjusting means for adjusting the communication speed to the data connection of the data communication system of the aircraft and/or matching means for matching the communication speed of the data communication system of the aircraft to the passenger device.

According to a further preferred embodiment, the aircraft information system comprises a server for handling payment transactions in communication with the at least one passenger device.

For the purpose of increasing the safety thereof, the aircraft information system is equipped according to a further preferred embodiment with means for determining the temperature of predetermined components, such as the battery, more preferably comprising means for limiting and/or downward adjustment of the power consumption in order to prevent the temperature rising. This prevents components, such as the battery or a processing unit, reaching too high a temperature.

According to a further preferred embodiment, the energy providing means comprise a portable power source, such as a battery or portable generator for electrical energy, or a connector for electrical energy. The system can hereby function wholly autonomously of the aircraft.

The aircraft information system more preferably comprises a sensor arrangement for determining a stage of an aircraft flight, comprising a pressure sensor and an accelerometer. Using the sensor and the accelerometer dif-

ferent stages of the flight are determined by the characteristics of the measurements, such as a stationary presence at the gate, taxiing, take-off, flying at cruise speed, airport approach and landing. This is particularly
5 advantageous because the transmission function of the mobile network module, such as comprising 3G and 4G, can hereby be kept switched off at moments when they ought to be switched off, such as from the moment the take-off procedure begins and such as up to the moment of landing. The
10 system is hereby safe in wholly autonomous manner without intervention by for instance members of a crew.

A further aspect likewise provided in combination with the above stated embodiments relates to the aircraft information system comprising storage means for storing
15 content, such as audiovisual content, in coded manner therein, such as by applying DRM. The system more preferably comprises a web server suitable for displaying coded content, such as audiovisual content in a web browser of a mobile device of a person which is connected by means of a
20 wireless network connection to the aircraft information system so that the coded content from the web server is displayed in the web browser of the mobile device.

It hereby becomes possible in advantageous manner to provide a predetermined amount of content to users of a
25 mobile device connectable to the aircraft information system in a manner not possible heretofore, viz. directly from an aircraft information system to the mobile device of the user via a web server to a web browser connection. It hereby becomes possible to provide the content without
30 an application having to be available on the mobile device. The content can hereby be shown on all mobile devices with a suitable web browser.

Key information is more preferably exchanged here by

means of means between the web server and the web browser for the purpose of decrypting the content. The content is more preferably decoded in the mobile device. The key information is more preferably transferred using a Java
5 script. The key information and/or the content information is more preferably stored on a separately encrypted or access-secure partition of a memory of the aircraft information system.

A further aspect according to the present invention
10 relates to a method for identifying, with an aircraft information system, the aircraft in which the aircraft information system is present, comprising steps for:

- receiving ADS information, such as ADS-B, ADS-A and/or ADS-C information,
- 15 - determining a signal strength, such as the absolute and/or relative strength of the received ADS information,
- identifying on the basis of this information the aircraft and/or the current flight number of the aircraft
20 in which the aircraft information system is present.

It is possible by applying this aspect of the invention to provide source information which can be further processed to passenger information, this source information relating to the aircraft and the flight number.

25 Further advantages, features and details of the present invention will be described in greater detail hereinbelow on the basis of one or more preferred embodiments with reference to the accompanying figures. Similar, though not
30 necessarily identical components of different preferred embodiments are designated with the same reference numerals.

Fig. 1 is a schematic representation of an aircraft

information system according to the first preferred embodiment.

Fig. 2 is a schematic representation of a unit of an aircraft information system as according to Fig. 1.

5 A first preferred embodiment (Fig. 1) according to the present invention relates to an aircraft information system 1. This is arranged as module for providing an aircraft information system consisting of a number of such modules 1. Mutual communication between different units of
10 the aircraft information system is performed via a wireless network 2, such as a WiFi network.

Module 1 comprises a receiver 4 for receiving ADS-B signals from aircraft in the vicinity thereof, including the aircraft in which the aircraft information system is
15 located. The aircraft information system is an autonomous module which functions on the basis of its own battery. The modules are therefore freely placeable in any aircraft so that it can function in any aircraft. It is advantageous for this purpose that the module can itself determine in which aircraft it is located. This determination
20 is carried out from the moment the module is switched on.

If different modules are present in the same aircraft, they will set up the network connection 2 between them and mutually exchange relevant information. Provision
25 is made here that information from a first module is transferred to a second module for the purpose of delivering such information to a passenger device. The communication with passenger device 5 is performed via a WiFi network 3. Provision is made that WiFi networks 2 and 3 are
30 separate networks with separate antennas in the modules. Provision is likewise made that WiFi networks 2, 3 are embodied as a physical network. The passenger devices will in this case obtain access rights other than modules 1.

Fig. 2 shows components of a module in accordance with a preferred embodiment according to the present invention. The module is provided with energy by means of battery 21. A processing unit is connected to a working memory 12 and a storage memory, such as a disc memory, 13. The ADS-B receiver 4 provides the processing unit with data relating to received ADS-B signals which can be temporarily stored in working memory 12 or on disc memories 13.

Provided for communication with external data sources is a GSM module, such as also suitable for 3G, 4G. In the case it is not firmly established that the aircraft is present on the ground, or has landed and has not yet taken off, the transmission option of the GSM module is switched off and is set only to receive.

The module further comprises a sensor 17 for measuring the air pressure, and a sensor for measuring movement. Applying such sensors and for instance the presence of GSM signals, a determination is made as to whether the aircraft is present on the ground, and has thus landed and not yet taken off. The transmission option of the GSM module is controlled as described on the basis hereof.

The module also comprises a WiFi module 15 for communication with network 2 for mutual communication between two or more aircraft information systems in the same aircraft, and a WiFi module 16 for communication with network 3 for transferring information to the passengers.

As aspect, the invention comprises an aircraft information system for providing passenger information, such as flight information or entertainment information, to the passengers in an aircraft by making use of communication between at least one passenger device and the aircraft information system, the aircraft information system comprising storage means for storing information thereon, one or

more processing units for carrying out information processing, energy providing means for providing energy to the aircraft information system, data communication means, such as wireless communication means, for communication
5 with the at least one passenger device, wherein the aircraft information system is configured as autonomous unit for autonomous functioning, such as independently of further systems in the aircraft, and wherein the aircraft information system comprises sensors for detecting ambient
10 variables, for providing measurement data such as movement by means of an accelerometer, air pressure by means of a pressure sensor, preferably for measuring an absolute air pressure, more preferably for measuring changes in air pressure, preferably combinable with any individual measure
15 ure in accordance with this description. A transceiver for making a connection to a network operational in the aircraft, preferably a network system for cabin systems, such as ARINC bus or an ARINC 429, is more preferably provided.

The present invention has been described in the
20 foregoing on the basis of several preferred embodiments. Different aspects of different embodiments are deemed described in combination with each other, wherein all combinations which can be deemed by a skilled person in the field as falling within the scope of the invention on the
25 basis of reading of this document are included. These preferred embodiments are not limitative for the scope of protection of this document. The rights sought are defined in the appended claims.

CLAIMS

1. Aircraft information system for providing passenger information, such as flight information or entertainment information, to the passengers in an aircraft by making use of communication between at least one passenger device and the aircraft information system, the aircraft information system comprising:

10 - storage means for storing information thereon,
- one or more processing units for performing information processing,

- energy providing means for providing energy to the aircraft information system,

15 - data communication means, such as wireless communication means, for communication with the at least one passenger device,

- wherein the aircraft information system is configured as autonomous unit for autonomous functioning, such as independently of further systems in the aircraft, and
20 wherein the aircraft information system comprises:

- receiving means for receiving source information relating to the aircraft for forming on the basis of the source information respective passenger information for transmission to the at least one passenger device.

25

2. Aircraft information system as claimed in claim 1, wherein the receiving means are configured to receive ADS signals, such as ADS-B, ADS-A or ADS-C signals.

30 3. Aircraft information system as claimed in one or more of the foregoing claims, comprising means, such as program code means executable on a respective processing unit, for determining which ADS-B signals are related to

the aircraft.

4. Aircraft information system as claimed in one or more of the foregoing claims, comprising sensors for detecting ambient variables, for providing measurement data such as movement by means of an accelerometer, air pressure by means of a pressure sensor, preferably for measuring an absolute air pressure, more preferably for measuring changes in air pressure.

10

5. Aircraft information system as claimed in one or more of the foregoing claims, comprising a receiver for mobile telecommunication, such as GSM, 3G, 4G, preferably a transceiver therefor.

15

6. Aircraft information system comprising means for determining the presence of the aircraft on the ground, preferably relating to a landing event, more preferably comprising means for determining a departure and/or ending of the presence of an aircraft on the ground, more preferably relating to a take-off event.

20

7. Aircraft information system as claimed in one or more of the foregoing claims housed in a holder, such as a closed holder, such as a case, canister or box.

25

8. Aircraft information system as claimed in one or more of the foregoing claims formed by a number of the autonomous units which are mutually connected by means of the data communication means.

30

9. Aircraft information system as claimed in one or more of the foregoing claims, wherein the means for form-

ing the passenger information comprise means, such as program code means executable on a processing unit, for forming graphically displayable information showing the location of the aircraft on a geographical background, such as
5 a map or a photographic view of the earth's surface.

10. Aircraft information system as claimed in claim 9, comprising means for showing, in addition to the location of a user's own aircraft, further aircraft from which
10 the receiving means receive respective information.

11. Aircraft information system as claimed in one or more of the foregoing claims, comprising a server, such as a web server, for handling the communication with the at
15 least one passenger device.

12. Aircraft information system as claimed in one or more of the foregoing claims, comprising gateway means for providing a data connection, speech connection and/or internet connection to the passenger device using a data
20 communication system of the aircraft.

13. Aircraft information system as claimed in claim 12, comprising adjusting means for adjusting the communication speed to the data connection of the data communication system of the aircraft.
25

14. Aircraft information system as claimed in claim 12 or 13, comprising matching means for matching the communication speed of the data communication system of the
30 aircraft to the passenger device.

15. Aircraft information system as claimed in one or

more of the foregoing claims, comprising a server for handling payment transactions in communication with the at least one passenger device.

5 16. Aircraft information system as claimed in one or more of the foregoing claims, comprising means for determining the temperature of predetermined components, such as the battery, more preferably comprising means for limiting and/or downward adjustment of the power consumption
10 in order to prevent the temperature rising.

 17. Aircraft information system as claimed in one or more of the foregoing claims, wherein the energy providing means comprise a portable power source, such as a battery
15 or portable generator for electrical energy, or a connector for electrical energy.

 18. Aircraft information system as claimed in one or more of the foregoing claims, comprising a sensor arrangement for determining a stage of an aircraft flight, comprising a pressure sensor and an accelerometer.
20

 19. Aircraft information system as claimed in one or more of the foregoing claims, comprising storage means for
25 storing content, such as audiovisual content, in coded manner therein, such as by applying DRM.

 20. Aircraft information system which functions autonomously in an aircraft, comprising a web server suitable for displaying coded content, such as audiovisual content in a web browser of a mobile device of a person which is connected by means of a wireless network connection to the aircraft information system so that the coded content
30

from the web server is displayed in the web browser of the mobile device.

21. Aircraft information system as claimed in claim
5 20, wherein key information is exchanged between the web server and the web browser for the purpose of decrypting the content.

22. Aircraft information system as claimed in claim
10 20 or 21, wherein the content is decoded in the mobile device.

23. Aircraft information system as claimed in claims
15 20-22, wherein the key information is transferred using a Java script.

24. Aircraft information system as claimed in claims
20-23, wherein the key information is stored on a separately encrypted or access-secure partition of a memory of
20 the aircraft information system.

25. Method for identifying, with an aircraft information system, the aircraft in which the aircraft information system is present, comprising steps for:
25 - receiving ADS information, such as ADS-B, ADS-A and/or ADS-C information,
 - determining a signal strength, such as the absolute and/or relative strength of the received ADS information,
30 - identifying on the basis of this information the aircraft and/or the current flight number of the aircraft in which the aircraft information system is present.

26. Method as claimed in claim 25, wherein the steps for determining the signal strength comprise steps for determining from which aircraft signal the relatively largest number of data packets has been received.

5

27. Method as claimed in claim 25 or 26, wherein the steps for determining the signal strength comprise steps for determining the strength of the radio signal.

10 28. Method as claimed in one or more of the claims 25-27, comprising steps for determining predetermined aircraft parameters, such as movement parameters, air pressure parameters and/or functional availability of mobile telecommunication signals for use thereof in the steps for
15 identifying the aircraft and/or the current flight number.

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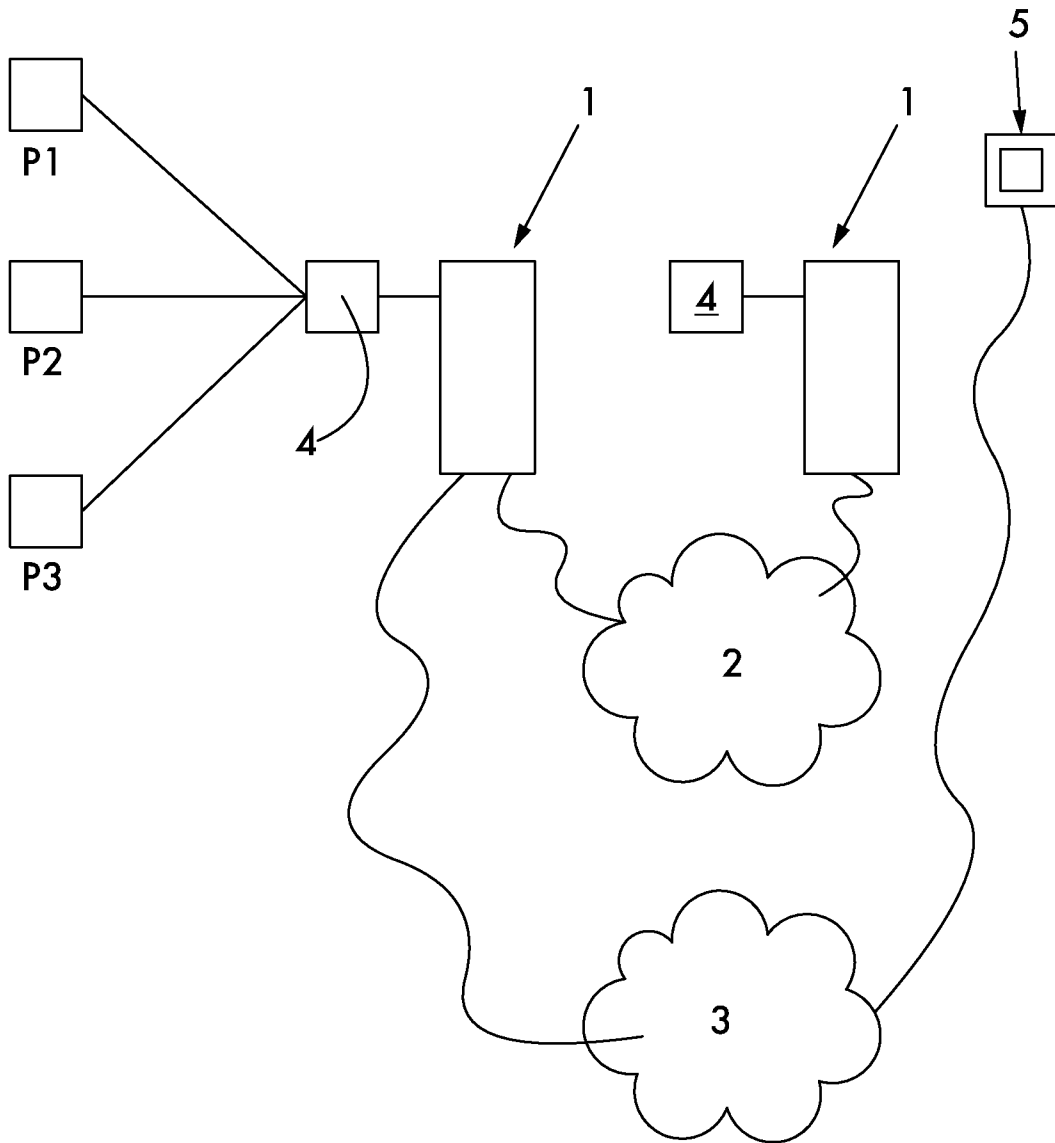


Fig. 1

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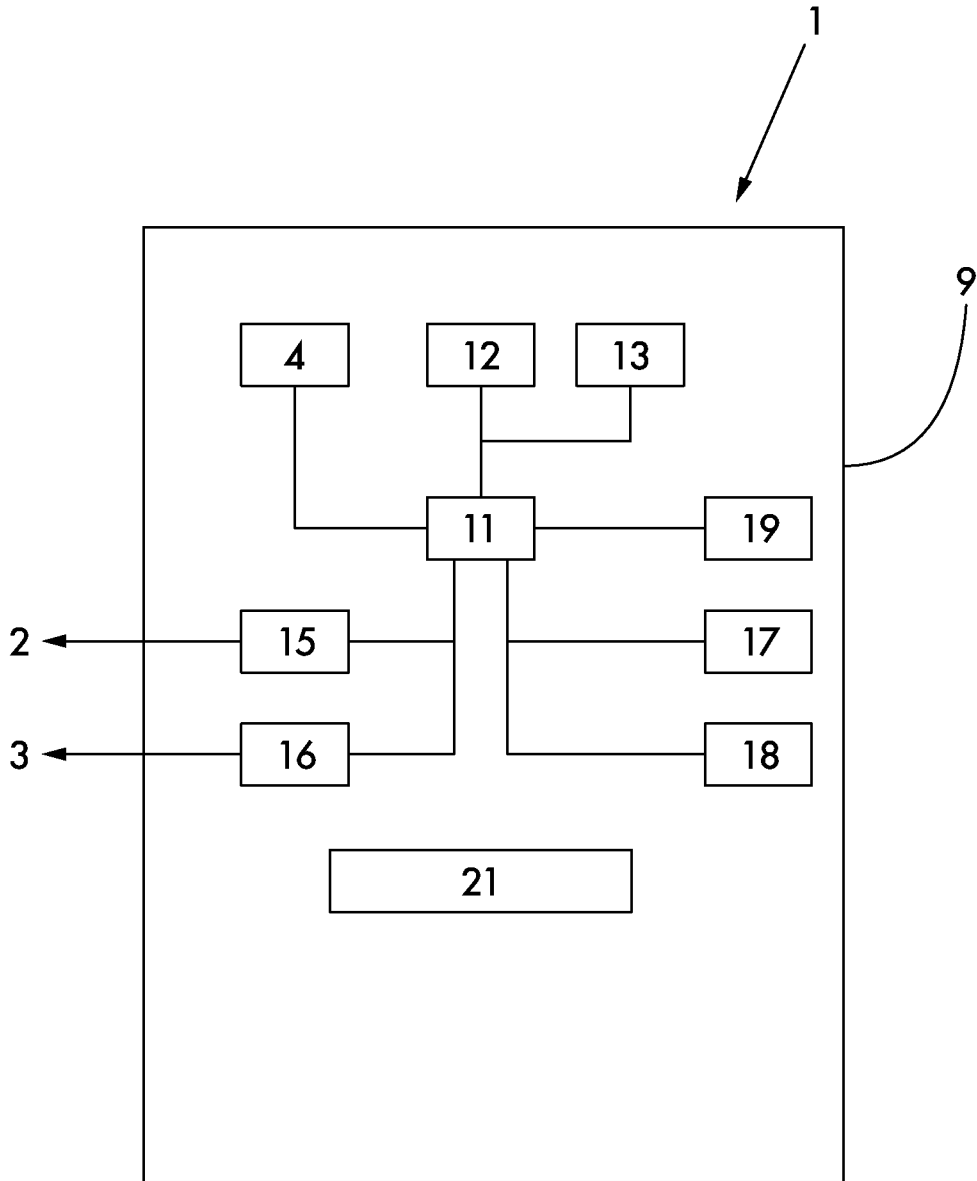


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
 INV. G06Q50/30 G08G5/00 B64D11/00 H04N21/214
 ADD.
 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)
 G06Q G08G B64D H04N

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)
 EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	WO 2013/185886 A1 (LUFTHANSA TECHNIK AG [DE]) 19 December 2013 (2013-12-19) the whole document -----	1-28
X	GB 2 514 393 A (RETAIL IN MOTION [IE]) 26 November 2014 (2014-11-26) the whole document -----	1-28
A	US 2016/133137 A1 (RENCHER ROBERT J [US] ET AL) 12 May 2016 (2016-05-12) the whole document ----- -/--	4

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	"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
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"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer van der Weiden, Ad
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INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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X	US 2014/282747 A1 (RICHMAN RUSSELL MARK [US] ET AL) 18 September 2014 (2014-09-18) the whole document -----	1-28
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Information on patent family members

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