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(54) **Automatic multi-user system for localization, alarm and personal emergency, operating in multi-standard mode in aerial environment**

(57) The present invention concerns an automatic system for localization, alarm and personal emergency, operating in multi-standard mode, wherein the system comprises a remote control base and a remote sensing unit wherein the sensing unit comprises a GPRS/GSM modem (with a SIM card) and preferably a WiFi modem

(standard 802.11) and a WiMAX modem (standard 802.16) and wherein the unit is also provided with a screen for visualizing information received from the central unit.

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Description

[0001] The present invention relates to an automatic multi-user system for localization, alarm and personal emergency in aerial environment, operating in multi-standard mode.

[0002] Personal alarm systems operated in remote mode are well known in the art. US2007/0030156 discloses a personal alarm system including a monitoring base station and remote sensing units in two-way radio communication. The positioning of the user is performed using the Global Positioning System (GPS) and the transmission of the information takes place through a radio transmitter. However, GPS does not allow determination of the altitude and the use of a radio transmitter requires high power when moving far from the monitoring base.

[0003] The present invention relates to an automatic multi-user system which allows to localize and georefer in a continuous way and in any geographic area (national or international) both a single user and a group of users. It is possible to visualize the track on a digital map, on a projection of a portion of earth's surface obtained by a satellite, or a mixture of both.

[0004] The multi-user system of the present invention comprises a remote sensing unit and a remote control base. The sensing unit comprises a GPRS/GSM modem (with a SIM card) and preferably a WiFi modem (standard 802.11) and a WiMAX modem (standard 802.16).

[0005] In a preferred embodiment of the present invention, the positioning system is used for monitoring any type of air traffic. The position of each user (sensing unit) is received by the central unit. The central unit elaborates this information and returns to each individual user the position of any other user present in the surrounding area. The sensing unit transfers these data to a screen, more preferably on an LCD screen, to give to the user a virtual radar of the sky where the user is flying. Thus, the sensing unit according to the invention is also provided with a screen for visualizing information received from the central unit.

[0006] The sensing unit is therefore able to maintain a communication with the remote control base through the WEB, in a machine-to-machine connection by a data only communication system, using when necessary the DTM protocol and/or ASCII or GSM-R protocols.

[0007] This communication system operates through the GSM-GPRS/EDGE network, but also, in the absence of this signal, through other available communication network, such as UMTS, WiFi and WiMAX.

[0008] Furthermore, in a preferred embodiment of the present invention, the sensing unit is able to detect other signals such as GPS and Digital Terrestrial Television (DTT). The possibility of detecting these systems allows the determination of the position in three dimensions. In fact, GPS does not provide the altitude, but only latitude and longitude. Consequently, the altitude needs to be calculated by other means; e.g. DTT signal allows the determination of the position by triangulation of the dis-

tance with two DTT cells. Once the position of all DTT cells are known, the triangulation between two or three different cells allows a precise determination of the position of the user.

[0009] Furthermore, the sensing unit of the present invention preferably comprises a sensor for magnetic fields. In a preferred embodiment the sensor measures the magnetic field deriving from the electric distribution network. The sensitivity of the sensor defines the maximum altitude at which the magnetic field sensors can be used for the determination of the position of the user. At the present, magnetic sensors are able to determine the position of the electric network at an altitude equal to or lower than about 700 m. This sensor, together with the means previously defined, increases the precision in the determination of the position of the user.

[0010] Depending on the intended use, it is also possible to introduce in the sensing unit a variety of sensors which might be of use in the determination of potential alarms or hazards.

[0011] For example, it is possible to introduce in the sensing unit one or more of the following sensors: temperature, pressure, humidity, acceleration, light, etc.

[0012] The sensing unit will transfer all the measured data (position plus data from all sensors) to the remote control unit at regular intervals. The interval will be preferably not longer than 1 min, more preferably not longer than 30 seconds, most preferably not longer than 20 seconds. An example of a suitable interval is for example 15 seconds.

[0013] Analogously, the sensing unit will receive information from the central unit at regular intervals. The interval will be preferably not longer than 1 min, more preferably not longer than 30 seconds, most preferably not longer than 20 seconds. An example of a suitable interval is for example 15 seconds.

[0014] In a preferred embodiment the information received from the sensing unit concern the position of other planes or objects present in the space surrounding the sensing unit.

[0015] If the sensing unit is provided with meteo-sensors (pressure, humidity, etc.) the central unit is preferably provided with a software to determine the weather conditions in each area where users are present. In this way, in a preferred embodiment of the invention, the central unit is able to give not only the virtual radar to the users, but also the weather conditions on the route of the plane. Thus, the sensing unit preferably visualized also meteorological information.

[0016] The weather information can be further improved by the magnetic field sensor previously defined. In fact, the magnetic field sensor can also be used to detect thunderbolt and transmit this information to the central unit which elaborates the data coming from all users to define a map of the thunderbolts in a defined area.

[0017] In another preferred embodiment of the invention, in case of emergency, it is possible to activate an

audio channel to put the central unit and the local unit in state of communicating vocally.

[0018] Although the sensing unit has a variety of different means for communicating with the remote control unit, it is possible that, for a short period, the sensing unit is in a "dark" area, i.e. an area not covered by any communication network. In this case, the sensing unit has a memory which allows storage of the data. Preferably the memory of the sensing unit is able to store data for at least 4 h, more preferably for at least 12 h, most preferably for at least 24 h.

[0019] Once the connection with the central unit is re-established, the sensing unit will transfer all stored data to the central unit, allowing a complete reconstruction of the positioning of the user at any time.

[0020] In another preferred embodiment, the present invention relates to a method for the use of an automatic system for localization, alarm and personal emergency, operating in multi-standard mode, wherein the system comprises a remote sensing unit and a remote control base, wherein the sensing unit measures at regular intervals the position and the other parameters related to the sensor present in the unit, and transmits these data to a central unit which is connected to the sensing unit through a WEB connection established through the GSM-GPRS/EDGE network, but also, in the absence of this signal, through other available communication network, such as UMTS, WiFi and WiMAX; wherein the central unit is programmed in such a way that, when the values of the measured parameters overcome a threshold value, an alarm is activated.

[0021] In a preferred embodiment of the invention, the central unit is programmed with at least two different emergency procedures. A first emergency procedure will be activated automatically, for situations which always require intervention of emergency unit.

[0022] If the alarm is relating to a situation which does not always require intervention of emergency unit, then it will require the intervention of a human operator. One example of this type of alarm is, for example, when a user remains in a "dark" area for more than a fixed time. When the fixed time is lapsed, the central unit activates an alarm. This situation is potentially dangerous because the user might stay in the dark area as a consequence of an accident. However, it is also possible that the user stays in that area voluntarily. Thus, it will be up to the operator to ascertain whether it is necessary to alert the emergency unit. In fact, in case of ultra light planes, they normally fly at low altitudes, and are consequently within the reach of one or more communication networks as above defined. If the aeroplane goes for a short time at an altitude higher than the signal of existing networks, it will loose contact with the central unit. After a prefixed time, the operator will receive an alarm indicating that the unit is out of reach for a time higher than normal. The operator will verify if the emergency requires his intervention.

[0023] In another preferred embodiment of the inven-

tion, the system can be used for activating emergency procedures in case of accident. In this case, the sensing unit will contain an accelerometer. In case of important crash, the accelerometer will measure a high value of acceleration, which indicates without any doubt the emergency. This would activate the procedure for aid to the people involved with the crash in real time, without waiting for witnesses who call emergency numbers. Thanks to the positioning system, the exact position of the aeroplane at the time of crash will be determined helping to direct help to the right place.

[0024] It is apparent from the description given above that the system of the present invention represents an important improvement over existing systems for localization, alarm and personal emergency in the aerial environment. The present system also fulfils the requirements of the incoming European Emergency Number 112, making it possible to largely improve the time and the effectiveness of the relief or rescue effort after any emergency.

Claims

1. Sensing unit for use in an automatic multi-user system for localization, alarm and personal emergency, operating in multi-standard mode, wherein the sensing unit comprises a GPRS/GSM modem (with a SIM card) and preferably a WiFi modem (standard 802.11) and a WiMAX modem (standard 802.16) and wherein the unit is also provided with a screen for visualizing information received from the central unit.
2. Sensing unit according to claim 1 wherein the information received concern the position of other planes or objects present in the space surrounding the sensing unit.
3. Sensing unit according to claim 1 wherein the sensing unit is able to detect other signals such as GPS and Digital Terrestrial Television (DTT).
4. Sensing unit according to claims 1 and 2 wherein the sensing unit contains one or more of the following sensors: temperature, pressure, humidity, acceleration, light.
5. Sensing unit according to claims 1-4 wherein the sensing unit further comprises a magnetic field sensor.
6. Automatic system for localization, alarm and personal emergency, operating in multi-standard mode, wherein the system comprises a remote control base and a remote sensing unit according to claims 1-5.
7. Automatic system according to claim 6 wherein the sensing unit transfers all the measured data (position

plus data from all sensors) to the remote control unit at regular intervals.

8. Method for the use of the automatic system of claims 6-7 wherein the sensing unit measures at regular intervals the position and the other parameters related to the sensors present in the unit, and transmits these data to a central unit which is connected to the sensing unit through a WEB connection established through the GSM-GPRS/EDGE network, but also, in the absence of this signal, through other available communication network, such as UMTS, WiFi and WiMAX; wherein the unit is also provided with a screen for visualizing information received from the central unit.

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EUROPEAN SEARCH REPORT

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 14 January 2008	Examiner DE LA CRUZ VALERA, D
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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