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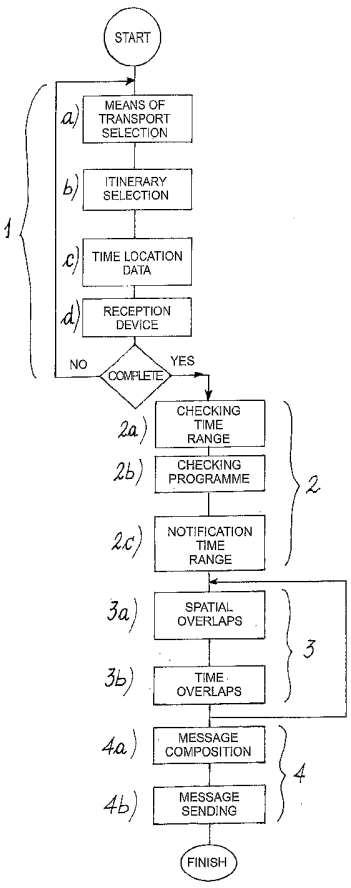
(54) Title: METHOD AND DEVICE TO NOTIFY THE TRAVELLERS OF EVENTS THAT COULD INTERFERE OR DISTURB THEIR TRAVEL



(57) Abstract: A method for notifying travellers of events that can interfere with and disturb their travel and a device for implementing this method are claimed.

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METHOD AND DEVICE TO NOTIFY THE TRAVELLERS OF EVENTS THAT COULD INTERFERE OR DISTURB THEIR TRAVEL

The present invention relates to a method and a device in accordance with the introduction to the main claim.

Systems exist in the state of the art which inform the travellers of events that can disturb their travel. For example on the radio, in particular on frequencies intended to be heard by motorists, updates are periodically given of the traffic situation, possible accidents or works underway which can make a determined route difficult or slower.

This information is given in a manner totally independent of the traveller's route and programmed travel times, hence the traveller has to select from the considerable information that which is useful to him.

Moreover this information is given in reference to a determined means of transport, for example the automobile or the train or the aeroplane, and normally no information relative to other different means of transport is added.

For example, while travelling in an automobile and listening to the radio, which transmits information for motorists, it is possible to know on which roads there are hold-ups, due for example to accidents, however if the automobile traveller is travelling to an airport to take a plane, he is certainly also interested in having detailed news for example of a possible flight controllers' strike.

An object of the present invention is therefore to provide a method and a device which enables the stated drawbacks to be overcome.

A particular object is to notify the user-traveller of news on events which

can disturb his travel, this news being selected on the basis of travel indications provided by the user.

Said object is attained by a method and a device the inventive characteristics of which are defined in the claims.

The invention will be more apparent from the following detailed description, provided by way of example only, and hence non-limitative, of a preferred embodiment illustrated in the accompanying drawings, in which:

Figure 1 shows a block diagram of a preferred embodiment of the method according to the invention;

Figure 2 shows an example of an itinerary between a starting point and an arrival point;

Figure 3 shows a data structure of the journey;

Figure 4 shows one and the same event with which areas of influence of different shape, one circular and one irregular, are associated;

Figure 5 shows the interference or overlap of the itinerary represented in Figure 2 with an event represented in Figure 4 with which a determined circular area of influence has been associated;

Figure 6 shows an embodiment of the device according to the invention.

The method according to the invention provides for the user to supply to the central unit all the information necessary to compare the programmed journey with a series of events, stored in a data bank and continuously updated, which can interfere with the journey by disturbing it.

Having identified such an interference, the central unit sends to the traveller in useful time a message on the remote reception device chosen by him.

With reference to Figure 1, it can be seen that the method of the

invention comprises the following steps, each containing a plurality of different stages operating in cascade.

1. communicating the travel data to the central unit by the user, comprising a) the means or all means of transport which will be used on the journey, b) the travel itinerary, c) time location data of the journey, such as the journey commencement time and its duration, d) data defining the central reception unit:
2. programming the time ranges for checking the events and for sending messages, in particular: 2a) establishing the checking time range, beginning at a time T_1 and finishing at a time T_2, during which it must be checked whether events have happened which can interfere with the journey (checking time range,), 2b) establishing a frequency with which to check events, 2c) establishing a time range for notification of messages;
3. checking possible spatial overlapping (3a) and time overlapping (3b) between the journey and the events in the events calendar, evidently also considering the respective areas of influence;
4. 4a) composition and 4b) sending of a message to the user, relative to events which could disturb the journey.

The afordescribed step 1 commences with the stage 1a) i.e. the selection of the means or all means of transport, for example a ferry, a train for long distances, a local train, an aeroplane, urban public transport, automobile.

In the preferred embodiment, the choice of the means or all means of transport is preliminary to the insertion of other journey information, as it serves to establish what parameters will be used to define the other attributes of the journey. The choice is made between a plurality of means tabulated

and stored in a suitable memory of the "system" of the central unit, the "system" comprising a microprocessor control unit connected to a memory unit, units receiving data and units for transmitting such data. This system will be described hereinafter.

It is however also possible that the means of transport are suggested by the system once the best itinerary has been defined, for example using known itinerary planning systems.

Stage b) of step 1 comprises, as stated, the choice of itinerary. The travel itinerary can be decided by the user for example with the aid of a known GIS system (Geographic Information System), which, by virtue of a series of very detailed maps present in the memory, and having inserted the starting point and the arrival point, enables the best itinerary between the two points to be defined (Figure 2).

In stage c) the time information of the journey is inserted. The journey time location information (i.e. the beginning and the end) is established on the basis of the type of means chosen.

Advantageously, the system comprises a data bank with timetables of trains, aeroplanes, ferries and public transport means, so that, if wishing to use one or other means, the user can choose the time of starting (and consequently of arrival) on the basis of those available. If however the user uses a private means, such as the automobile, the GIS can calculate an estimated time (duration) for the route and it is then possible, having established the starting time and the itinerary, to determine the estimated arrival time.

With reference to Figure 3, it can be seen that after the user sends the data relative to the ferry and the chosen means, and the data relative to the

journey time information, the system calculates on the basis of the transmitted data the so-called data structure of the journey, comprising at least one starting node NP and an arrival node NA and, possibly, different intermediate nodes (N1, N2, N3 in the figure), connected in succession by segments. In the figure under examination, on the left side of the journey data structure, the journey times are shown vertically (TP, TN1, TN2, TN3, TA).

In the example a journey is considered in which the means of transport is only the automobile, starting from NP and arriving at NA, passing through the points N1, N2, N3.

These points are nodes, and in the illustrated embodiment there are only three, however a greater number can be chosen, in accordance with known techniques. In particular, an itinerary node is a point in which the traveller can choose to change route (for example change road) or means of transport. In this case, for each means of transport used a schematization such as that illustrated will be made. For example, a traveller can reach NP by plane and then use an automobile.

The finishing stage is that in which the user supplies the data relative to his own information reception device, so that the necessary information can be passed to him in a form accessible to him. In the case in which the reception system is for example a cellular telephone, the information which the user must supply is the telephone number and the telephone type (only SMS or graphic information).

If all the data relative to step 1) have been communicated to the central unit (for example via internet or via gprs), the next step can follow, otherwise it returns to the data insertion of step 1).

It should be noted that the journey time parameters are also required to enable news which can disturb the travel to be notified in good time.

With reference to the aforelisted step 2), having received the data from the user the system calculates (stage 2a) the checking time range (T1; T2) for the events such that its starting moment T_1 anticipates the effective start of the journey (or of a part of the journey), to be able to advise the user, even before journey commencement, of events which can in some manner interfere with it.

The final moment T_2 of this time range is instead positioned after the end of the journey, so that account can be taken of any travel delays.

On the basis of the aforegoing, the calculated moment of arrival A can be written as:

$$TA = TP + C$$

where TP is the starting moment and C is the estimated journey duration.

The checking time range D = [T1; T2] during which a check is made on the occurrence of events which can interfere with the journey is:

$$D = [(TA + z); (TP - k)]$$

where z is a delay range and k is an advance range, to be defined on the basis of the chosen means of transport.

The initial moment T_1 of the time range D is then:

$$T_1 = TP - k$$

and the final moment T_2 of the time range D is:

$$T_2 = TA + z$$

In stage 2b of step 2) the time frequency (control programme) with which the stages of step 3) are to be carried out is set. In the example this is 5 minutes.

With reference to the notification time range, cited under step 2) stage 2c, this is determined such as to notify in good time any news regarding events which can interfere with the journey (for example every 10 minutes), however notification can also take place in real time.

These notifications must in any event reach the user in useful time to make choices such as a change of means of transport or an itinerary modification.

If for example the user is travelling in an automobile and news arrives of a blockage on the road being travelled, the user must be warned in time to be able to choose an alternative less congested route.

If instead the means of transport is a plane, the user must be informed long before the start of the journey, to have the possibility of choosing another flight.

Step 3) of the aforedescribed method regards the checking of possible space/time overlaps between the journey and events defined in an events calendar. An event is any situation which can generate interference with a journey; for example an event can be a football match. Said step 3) hence presupposes the existence of an events calendar, which can be drawn up by acquiring data relative to events, to their geographical location and to the moment (time) in which they occur. This calendar is stored in at least one of the memories of the central unit "system".

The events calendar is continuously updated and contains a plurality of known events relative to various geographical locations within a very wide time horizon. It also contains information relative to past events, in particular if they can still influence the present. With each event E_1 there are associated a spatial attribute (Lat, Long), such as for example the locality in which the

event will occur and the area of influence Zi, for example defined by a radius of action R, and time attributes E_1i (commencement of consequences of the event E_1), E_1f (end of consequences of the event E_1) relative to its duration, but especially to the duration of the influence which the event can have on transport conditions. For example, if a football match begins at 20 hours and ends at 22 hours, the traffic about the stadium zone (radius 2 km) will begin at 19 hours, which will be E_1i and finish at 23 hours, which will be E_1f.

It should be considered that the duration of the influence of an event can consist of time periods which are not adjoining. In fact, taking as an example the aforesaid football match, during the actual match it is evident that the traffic within the zone surrounding the stadium will not be influenced, but will be influenced only before the start of the game and after the end (i.e. when the spectators are going to and going from the stadium).

The events can be classified on the basis of type (cultural, sporting, commercial) and on the basis of the fact of being able to be predicted with sufficient anticipation (manifestations or fairs) or random (for example accidents or sudden strikes).

Step 3) is divided into two stages: in the first stage 3a any spatial overlap between the events and the travel itinerary inserted in step 1) is sought; in the second stage 3b any time overlap between the events and the travel itinerary is sought. Clearly spatial overlap or interference regards the itinerary and the event including its area of influence.

In the same manner, time overlap or interference is established by considering the table of journey times (considering any delays or anticipations) and comparing it with the time at which the consequences of the event commence and the time at which these consequences terminate.

Preferably stage 3a is firstly executed, in order to select from the events calendar only those events which can spatially interfere with the journey itinerary.

Figure 5 shows for example the interference or overlap between the itinerary represented in Figure 2 and an event represented in Figure 4 with which a determined area of influence has been associated. In this stage it has been found in practice that the area Zi overlaps the itinerary, and in particular the itinerary portion lying between the nodes N2 and N3.

This first operation enables the events to be taken into consideration for the time check to be considerably reduced. In fact, in the example only the event E_1, which interferes with the itinerary, is taken into consideration,

It is also simpler in nature than stage 3b in which time interference with the journey is checked.

As has been seen, time interference is more complicated to verify. In the example the traveller arrives at the node N2 indicatively at the moment TN2, but he could arrive at N2 with an anticipation K_2 or a delay Z_1. The calculation of the delays and anticipations is executed in a like manner to that described for the itinerary NP-NA, considering the stretches NP-N1 as independent sub-itineraries and hence able to suffer their own delays and anticipations.

The traveller instead arrives at the node N3 either with an anticipation of K_3 or a delay of Z_2. Consequently he travels the stretch between N2 and N3 within a time period of between ($TN2-K_2$) and ($TN3+Z_2$).

If the event E_1, considering the starting time E_1i and finishing time E_1f of the consequences of the event, at least partly overlaps the time period (aforedefined) within which the traveller travels the stretch N2-N3 there will also be time interference, otherwise there will be no time interference. This is

also valid in the case of non-adjoining time periods.

The check on time interference is preferably made following the check on spatial interference, in order to reduce the number of events on which to make it.

If for one and the same event both the spatial check and the time check are positive, this means that the journey can be influenced by this event and therefore probably disturbed by it. A possible interference must therefore be notified to the traveller.

If a spatial/time interference is verified step 4) is executed, which comprises the stage 4a) in which a message is generated (in known manner for an expert of the art) to be received by the user's reception device, then stage 4b) in which the message is sent. Whether an interference is verified or not, stages 3a) and 3b) are repeated, at the frequency established in stage 2c), until the final moment T_2 of the checking time range expires.

The characteristics of the user's reception device have been supplied by this latter in the initially indicated manner. In fact, on the basis of these characteristics, the message can be a simple written message or include graphic or other information.

After generating the message it is sent to the user's reception device.

The message is generated such as to comprise the following information:

- type of event that interferes with the journey;
- starting time of notified event;
- finishing time of notified event;
- spatial location and area of influence of the event;
- means of transport influenced by the event (in the case of itineraries with more than one means).

In an alternative embodiment of the method, the means of transport is equipped with a GPS system, which transmits in real time the position of the means to the central unit.

On the basis of the type of means used, the central unit determines a verification area substantially comprising the possible points reachable by the vehicle in a determined time period, by traversing any itinerary within the area.

For example this checking area can be a circle of radius 2 km and centred on the last position of the means of transport determined by the GPS system. Assuming that the means of transport is an automobile, it will traverse 2 km along a town road in indicatively a time period of 4 minutes.

For the definition of this checking area, the direction in which the automobile moves, or other parameters determined by the GPS system, or the average speed travelled by an automobile in town, on a motorway etc. can be taken into consideration.

The time period is also susceptible to adjustments due for example to the traffic conditions, etc.

Returning to the example, the central unit verifies if within the time period (the next 4 minutes) an event will take place within the checking area (2 km) which can disturb the traffic.

Essentially the central unit executes point 3, verifying whether there is at least one intersection between the area of influence of the event and the aforesaid checking area (the checking area is used instead of the itinerary).

If this spatial interference is positive, time interference is checked as previously. In practice it is checked whether the event, considering starting and finishing times of its consequences, at least partly overlaps the

aforedescribed time period (moment in which the GPS coordinates are determined + 4 minutes).

If this check is also positive, possible interference is notified (by the methods described above under point 4).

With reference to Figure 6, this shows a device for implementing the present invention defining the aforesaid central unit system.

In an illustrated embodiment, said device comprises a central calculating unit 100, in which there is preferably installed a UNIX operative system, for example LINUX, connected to a transmission means 200, in this case a usual cellular modem, able to connect to the user's reception device 300, which in this example is a cellular telephone. Said central unit 100 is connected to a data bank 600 containing the events contained in the events calendar, as initially described, updated in real time, and comprises the aforesaid memories containing for example the tables of the possible means of transport, their timetables etc.

To insert the travel data of step 1, the user can be connected to the central unit 100 by known data input means, for example by a processor connected to a TCP/IP network such as the internet, or via a telephone network, by means of a cellular device with a GPRS protocol etc.

The transmission means 200 can comprise for example two digital modems, one for the GSM/GPRS network and the other for the UMTS network, through which messages can be sent to the user.

More generally, the transmission means 200 can comprise a multi-channel system to be able to communicate between networks of different type, the multi-channel system being of type commonly available commercially.

The method is preferably implemented by a programme which presents to the user a schematic by which the user is guided towards the insertion of the data.

In a further embodiment the described method can be executed by a unit provided on the means of transport, for example integrated into a portable GPS system. Consequently the input of the itinerary could be exactly similar to that which currently happens in a portable GPS system. The best itinerary would be calculated by the GPS system itself. The unit would itself execute the steps 2-4 of the aforedescribed method and check spatial/time interference between the pre-chosen itinerary and events.

In this case the events for comparison would be supplied to the central unit by a remote station, for example connected to the unit provided on the means of transport via GPRS communication.

A static events file could also be arranged on the unit provided on the means of transport, for example by writing it on a DVD.

CLAIMS

1. Method for notifying travellers of events which can interfere with and disturb their journey, characterised in that said events are stored in a data bank, with each of which there being associated a locality in which it takes place, an area of action, at least one starting time of consequences related to said event and at least one finishing time of said consequences, with said journey there being associated an itinerary, at least one means of transport and a table of journey times, said method comprising the following steps:

- informing said central unit of at least one starting locality and one arrival locality for the journey;
- informing the central unit of at least one detail of time location to enable the journey to be located in terms of time;

and comprising the following further steps:

- establishing a checking time range which completely comprises within it the journey time and takes account of possible delays and advances;
- checking, with predetermined frequency, the spatial and time overlaps between the itinerary and the events in the events calendar, identifying any space time interferences disturbing the journey;
- composing a notification message to be received by the reception device of the user, this message comprising information relative to these possible interferences;
- sending the message to a display device.

2. Method as claimed in claim 1, characterised in that the central display unit is remote from the central unit and also comprises the following steps:

- informing the central unit of data which define the central display unit for notifications.

3. Method as claimed in claim 1, characterised in that the means of transport to be used in the journey are communicated to the central unit.

4. Method as claimed in claim 1, characterised in that the central unit, on the basis of one or more of the received details, determines the means of transport most convenient for implementing the journey.

5. Method as claimed in claim 1, characterised in that the itinerary to be followed is communicated to the central unit.

6. Method as claimed in claim 1, characterised in that the central unit, on the basis of one or more of the received details, determines the most convenient itinerary.

7. Method as claimed in claim 1, characterised in that the time location detail, communicated to the central unit to enable the journey to be located in time, comprises the journey starting time.

8. Method as claimed in claim 1, characterised in that the time location detail, communicated to the central unit to enable the journey to be located in time, comprises the journey finishing time.

9. Method as claimed in claims 7 or 8, characterised in that the journey duration is communicated to the central unit.

10. Method as claimed in claim 1, characterised in that a message notification time range is established, within which the message is notified to the user.

11. Method as claimed in claim 1, characterised in that the central unit firstly checks spatial overlaps and then, if spatial overlap exists, checks time overlaps between the journey and the events in the events calendar.

12. Method as claimed in claim 1, characterised in that the spatial and time data relative to the journey are communicated to the central unit by an

automatic positioning system of the vehicle.

13. Method as claimed in claim 1, characterised in that the journey starting locality is the locality in which the means of transport lie at a determined moment, and the journey arrival locality is an assembly of points reachable by the vehicle within a checking area, the itinerary hence coinciding with said checking area.

14. Device for notifying travellers of events from those present in an events calendar which can disturb their journey, comprising a central calculating unit (100) connected to a data base (600) and arranged to memorize an events calendar, in which with each event there is associated a locality, an area of action, at least one starting time for consequences of the event and at least one finishing time for these consequences, and comprising means for the input of journey data and means (2) for transmitting messages to one or more message display means (3).

15. Device as claimed in claim 14, characterised in that the transmission means (2) comprise a multi-channel system able to communicate between networks of different type.

16. Device as claimed in claim 14, characterised in that said data input means comprise an internet connection.

17. Device as claimed in claim 13, characterised in that the calculating unit (100) is installed on the means of transport and the message display means is a screen connected to the calculating unit.

18. Device as claimed in claim 13, characterised in that the calculating unit (100) is located in a position remote from the display unit.

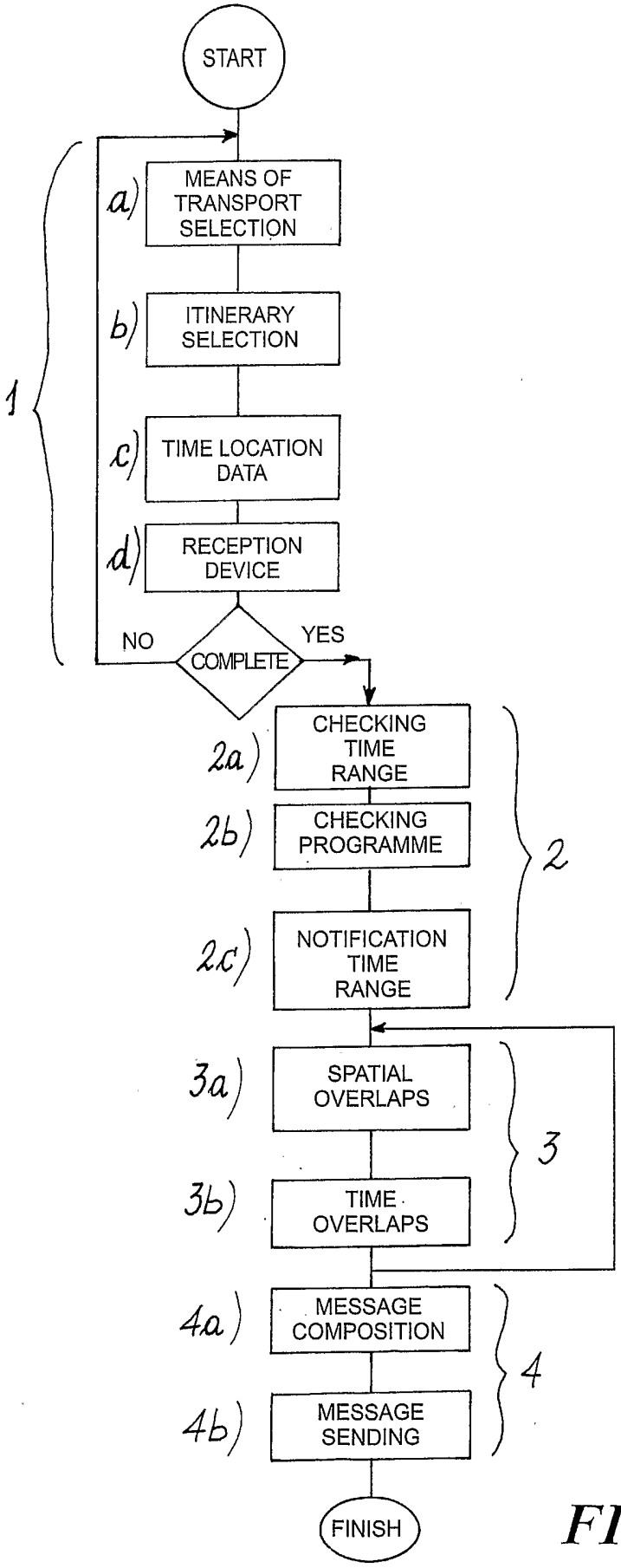
START
a)
MEANS OF TRANSPORT SELECTION
b)
ITINERARY SELECTION
c)
TIME LOCATION DATA
d)
RECEPTION DEVICE
1
NO
COMPLETE
YES
2a)
CHECKING TIME RANGE
2b)
CHECKING PROGRAMME
2c)
NOTIFICATION TIME RANGE
2
3a)
SPATIAL OVERLAPS
3b)
TIME OVERLAPS
3
4a)
MESSAGE COMPOSITION
4b)
MESSAGE SENDING
4
FINISH

FIG. 1

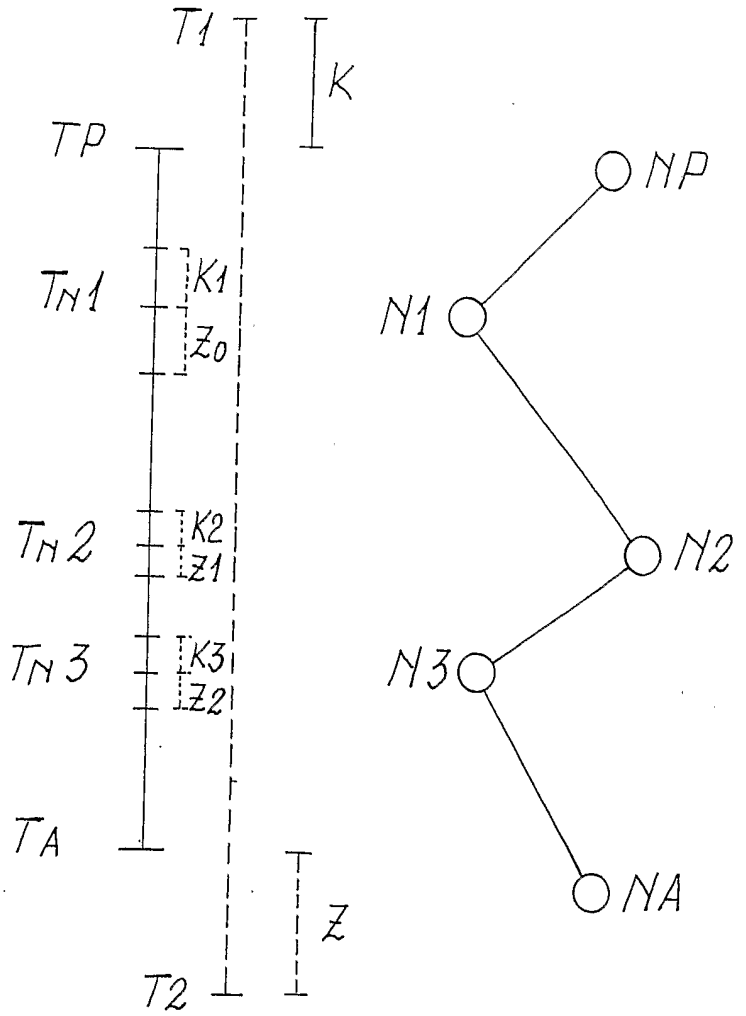
T1
K
TP
NP
TN1
K1
Z0
N1
TN2
K2
Z1
N2
TN3
K3
Z2
N3
TA
NA
Z
T2

FIG. 3

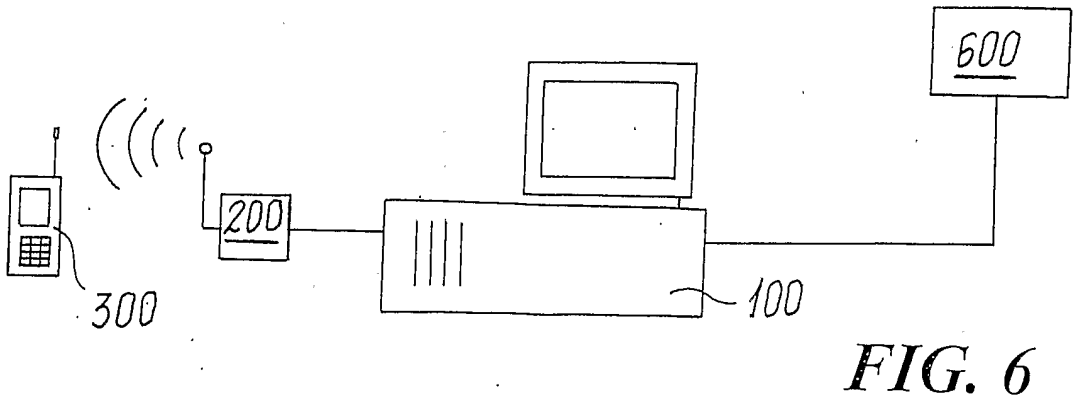
600
200
300
100

FIG. 6

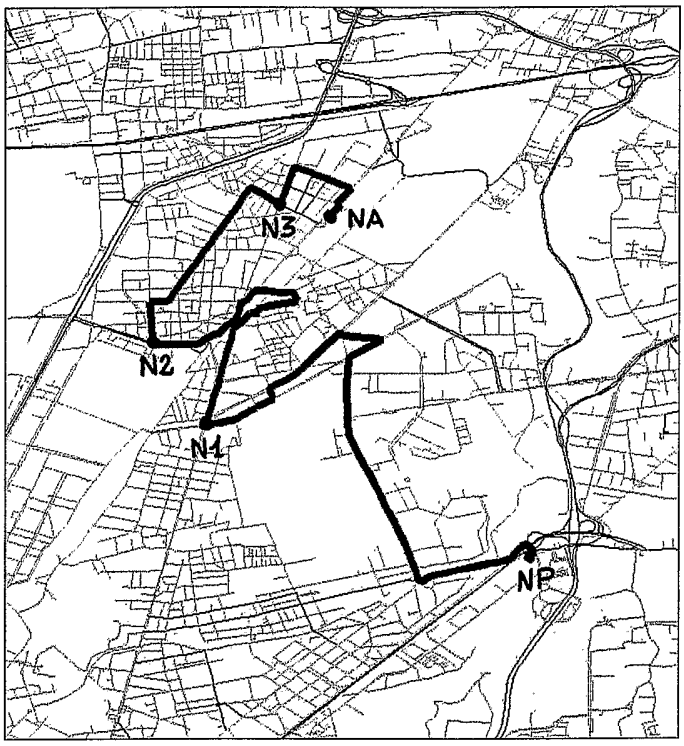

FIG. 2

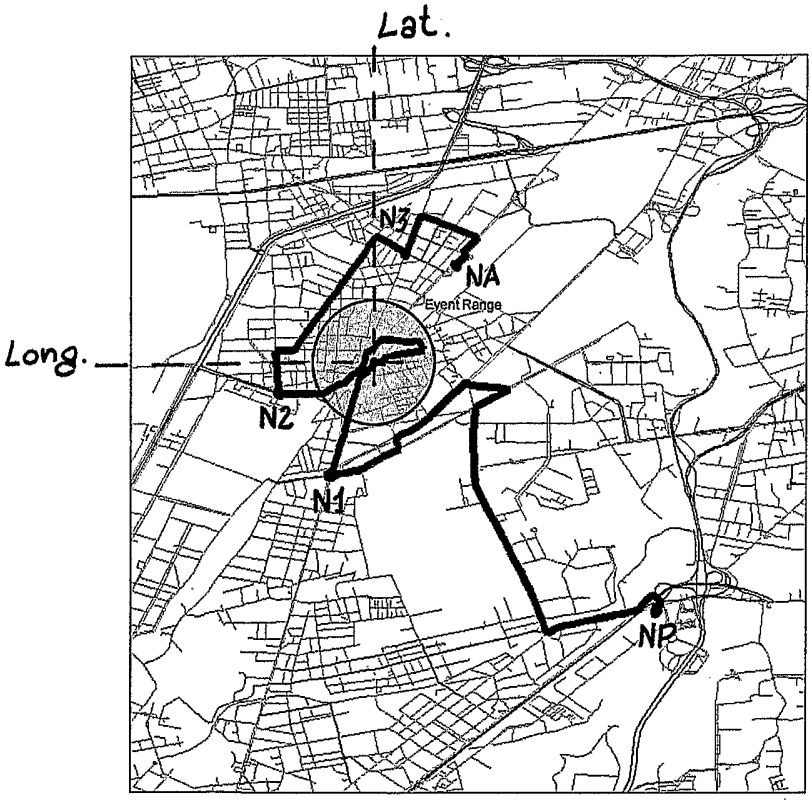

FIG. 5

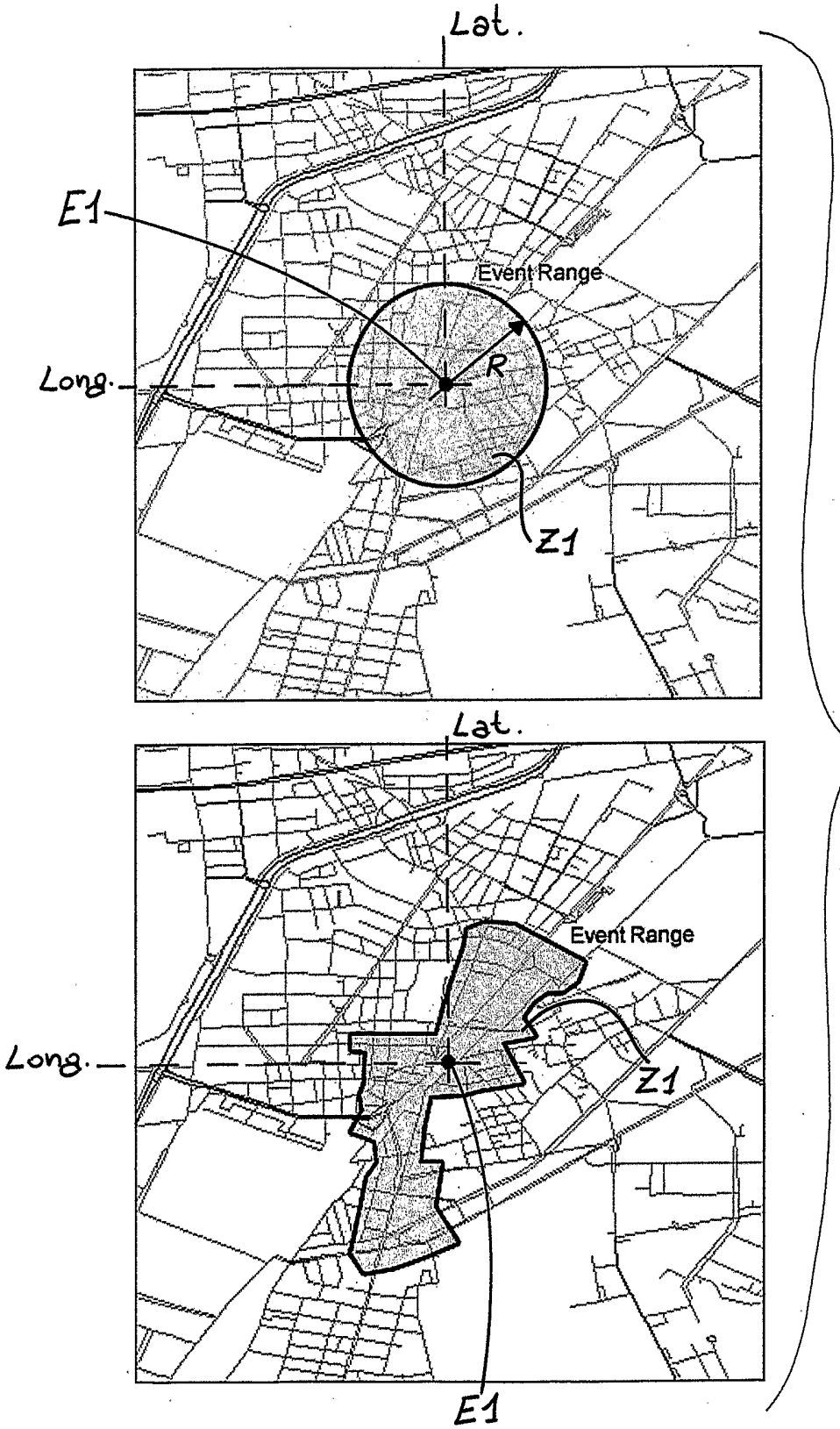

FIG. 4

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IT2005/000171

A. CLASSIFICATION OF SUBJECT MATTER
G06F17/60

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)
G08G G06F

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 practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 244 085 A (PIONEER CORPORATION) 25 September 2002 (2002-09-25) abstract figures 7a,7b,10a,12 paragraphs '0011! - '0014!, '0045!, '0049!, '0057!, '0130! - '0149!, '0157!, '0158!	1-18
X	US 6 539 302 B1 (BENDER RAYMOND ET AL) 25 March 2003 (2003-03-25) abstract figure 4 column 3, lines 35-55 column 4, lines 5-46 column 5, lines 11-26 column 6, lines 28-38	1-18

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"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

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Date of the actual completion of the international search	Date of mailing of the international search report
12 December 2005	20/12/2005

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