(54) Title: DETECTION PROCEDURE FOR BREACHES AND VIOLATIONS OF RULES, LAWS, REGULATIONS IN FORCE AND THE LIKE AND RELATED VEHICLE-MOUNTED DETECTION KIT

(57) Abstract: A detection procedure for breaches and violations of rules, laws, regulations in force and the like and related vehicle-mounted detection kit (1). The method according to the invention consists of the following steps: a) taking of images of vehicles, present along a road, square and the like, by way of an image acquisition apparatus (2); b) transfer of the images acquired by the apparatus (2), optionally converted preliminarily to analog and/or digital signals, to a control and management module; c) comparison of a plurality of data which can be gleaned from the images with preset reference data strings contained in an adapted memory unit which is controlled by the control and management module; d) display, by way of a user interface module (3), of the results of such comparison which constitute points of correspondence between the preset reference data strings and the images acquired.
DETECTION PROCEDURE FOR BREACHES AND VIOLATIONS OF RULES, LAWS, REGULATIONS IN FORCE AND THE LIKE AND RELATED VEHICLE-MOUNTED DETECTION KIT

The present invention relates to a detection procedure for breaches and violations of rules, laws, regulations in force and the like and a related vehicle-mounted detection kit.

As is known, law enforcement corps, such as for example highway patrol, gendarmerie and the like, in the activity of detection of breaches or violations of the code, in particular of the highway code, use various different computer apparatuses and technologies to assist in their activity.

In fact in Italy, according to the provisions of Article 200 of Legislative Decree no. 285 of 1992 and subsequent enactments, regarding the notification and ticketing of violations, "The ticket, which can be produced with the assistance of computer systems, contains the summary description of the ascertained event, the essential elements for the identification of the offender and the registration plate of the vehicle with which the violation was committed", and of Article 13 paragraph 1 of Law no. 689/1981 and subsequent enactments, "it is the faculty of law enforcement bodies to proceed with taking identificative, descriptive and photographic details and with any and every other technical operation" (Ministry of Transport opinion no. 4719 of 20 September 2011).

These apparatuses, however, have the limitation of being specific to detecting a determined type of offence.

For example, speed measurement devices make it possible to identify the exceeding of speed limits, but not other types of breach.

Moreover, conventional devices are generally complex and their use can be performed only by specialist personnel.

The aim of the present invention is to solve the above mentioned drawbacks, by providing a procedure for detecting breaches and violations of rules, laws, regulations in force and the like, which is highly versatile.
Within this aim, an object of the invention is to provide a vehicle-mounted kit for detecting breaches and violations of rules, laws, regulations in force and the like, which is capable of performing the detection of breaches of different types.

Another object of the invention is to provide a vehicle-mounted kit for detecting breaches and violations of rules, laws, regulations in force and the like, which is capable of operating autonomously without assistance from specialist personnel.

A further object of the invention is to provide a procedure for detecting breaches and violations of rules, laws, regulations in force and the like, and a related vehicle-mounted detection kit, which is simple and immediate to apply and use.

Another object of the invention is to provide a procedure for detecting breaches and violations of rules, laws, regulations in force and the like, and a related vehicle-mounted detection kit, which is low cost, easily and practically implemented and safely applied.

This aim and these and other objects which will become better apparent hereinafter are all achieved by a detection procedure for breaches and violations of rules, laws, regulations in force and the like, which consists of the following steps:

a) taking of images of vehicles, present along a road, square and the like, by way of an image acquisition apparatus;

b) transfer of said images acquired by said apparatus, optionally converted preliminarily to analog and/or digital signals, to a control and management module;

c) comparison of a plurality of data which can be gleaned from said images with preset reference data strings contained in an adapted memory unit which is controlled by said control and management module;

d) display, by way of a user interface module, of the results of such comparison which constitute points of correspondence between the preset
reference data strings and the images acquired.

This aim and these objects are also achieved by a vehicle-mounted detection kit, characterized in that it comprises at least one control and management module which is associated with at least one memory unit, at least one interface module and at least one image acquisition apparatus for the taking of images of vehicles to be transferred to said control and management module, said interface module being adapted to display the results, processed by said control module, which constitute points of correspondence between preset reference data strings, stored in said unit, and the images acquired.

This aim and these objects are moreover achieved by a vehicle characterized in that it comprises a vehicle-mounted kit which is provided with at least one control and management module which is associated with at least one memory unit, at least one interface module and at least one image acquisition apparatus for the taking of images of vehicles to be transferred to said control and management module, said interface module being adapted to display the results, processed by said control module, which constitute points of correspondence between preset reference data strings, stored in said unit, and the images acquired.

Further characteristics and advantages of the invention will become better apparent from the description of a preferred, but not exclusive, embodiment of the procedure for detecting breaches and violations of rules, laws, regulations in force and the like, and a related vehicle-mounted detection kit according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a schematic diagram of some steps of the procedure provided, using the kit according to the invention;

Figure 2 is a view of a vehicle provided with the vehicle-mounted kit, according to the invention;

Figure 3 is a view of the driver/passenger compartment of a vehicle
provided with the vehicle-mounted kit, according to the invention.

With reference to the figures, the reference numeral 1 generally designates a vehicle-mounted detection kit for applying a procedure for detecting breaches and violations of rules, laws, regulations in force and the like.

According to the procedure, first images are taken of vehicles, present along a road, square and the like, by way of an image acquisition apparatus 2.

In a subsequent step b), it is necessary to transfer the images acquired by the apparatus 2, optionally converted preliminarily to analog and/or digital signals, to a control and management module.

In a further step c), the control and management module compares a plurality of data that can be gleaned from the images with preset reference data strings, which are contained in an adapted memory unit which is controlled by the control and management module.

The images can, in fact, be associated with information relating to the date and time, GPS position, registration plate of the offending vehicle, make and model of the vehicle.

At this point, by way of a user interface module 3, the results of such comparison will be displayed which constitute points of correspondence between the preset reference data strings and the images acquired.

According to an embodiment of undoubted practical and applicative interest, the data strings comprise, stored in the memory unit, the prescriptions in force in the exact place of acquisition of each image.

In this manner the presence of unauthorized vehicles can be detected in restricted traffic areas (for example certain streets in the city center), in preferential lanes, or double-parked, or in no-parking areas.

According to a further embodiment, of particular simplicity and effectiveness, the data strings comprise, stored in the memory unit, lists of registration plate numbers corresponding to predefined vehicles.
Such vehicles can be of the type of stolen vehicles, or vehicles barred from circulation, or owned by repeat offenders or persons in arrears with payments and the like.

The possibility is not excluded of using the memory unit to store other lists of registration plate numbers referring to vehicles of other types according to necessity.

According to a solution of particular effectiveness and utility, the procedure according to the invention, after the step d), comprises a step e) which comprises a step e1) of analysis and validation, by the user by way of the interface module 3, of the results relating to each image displayed.

The user can immediately verify that the results are correct and identify any errors in the reports, which may be caused for example by an incorrect extrapolation of the data by the control and management module, or the incorrect correlation thereof with the preset data strings.

Moreover, the user, by way of observation of the images taken by the image acquisition apparatus 2, will verify that the offence has actually been committed by the vehicle and the type of offence committed.

The above step e) also comprises a subsequent step e2) which involves the transfer of the results to a centralized processing facility.

The validated reports will then be sent, for example, to the databank of the ticket and penalty office of the municipal police department, for preparation of the ticket for the offence which will subsequently be served, as stipulated by law and according to normal procedures, on the owner of the offending vehicle.

According to a solution of particular efficiency and practicality, the procedure 1 according to the invention, after step d), comprises a step f) which comprises a step f1) of transferring the results to a centralized processing facility.

The reports will then be sent, for example, to the databank of the ticket and penalty office of the municipal police department.
The above step f) also comprises a subsequent step £2) of analysis and validation, by the user of the centralized processing facility, of the data for each image displayed.

The user can verify that the results transferred to the centralized processing facility are correct and identify any errors in the reports, which may be caused for example by an incorrect extrapolation of the data by the control and management module, or the incorrect correlation thereof with the preset data strings.

Moreover, the user, by way of observation of the transferred images, will verify that the offence has actually been committed by the vehicle and the type of offence committed.

The user will then proceed to prepare, for each validated report, the ticket for the offence which will subsequently be served, as stipulated by law and according to normal procedures, on the owner of the offending vehicle.

The vehicle-mounted kit 1 for detecting breaches and violations of rules, laws, regulations in force and the like, according to the invention, can comprise at least one control and management module which is associated with at least one memory unit, at least one interface module 3 and at least one apparatus 2 for acquiring images.

The apparatus 2 makes it possible to take images of vehicles, to be transferred to the control and management module.

The interface module 3 is adapted to display the results, processed by the control module, which constitute points of correspondence between preset reference data strings, stored in the unit, and the images acquired.

The results can be displayed in one or more tables containing, for example, the image taken by the image acquisition apparatus 2, the enlargement of the detail of the registration plate, the date and time the image was taken, the GPS cartographic position, and the like.

The interface module 3 can, in such case, be of the type which is
preferably chosen from among a portable computer, a tablet computer, a smartphone and the like.

The image acquisition apparatus 2 can be of the type which is preferably chosen from among an infrared video camera, an IP (Internet Protocol) video camera, a dual lens video camera, a still camera and the like.

More specifically the image acquisition apparatus 2 can be provided with coupling means for removable mating with a vehicle.

Such means can be suction cups which make it possible to mate the apparatus 2 on any type of car, motor vehicle, van, or 2-wheeled or 3-wheeled motor vehicle.

In this manner, the installation can be immediate without any type of specific cabling, thus allowing an easy installation of the apparatus 2.

The kit 1, according to the invention, can moreover be provided with an acoustic signaling device which is controlled by the control and management module.

The signaling device will be activated the moment the control and management module identifies a correspondence between the registration plate of the vehicle in the image taken and the registration plates of predefined vehicles, stored in the memory unit.

Activation of the signaling device will thus enable the user to immediately identify a vehicle that is, for example, stolen or barred from circulation.

The possibility is not excluded of providing a vehicle 4 that comprises a vehicle-mounted kit 1 which is provided with at least one control and management module which is associated with at least one memory unit, at least one interface module 3 and at least one image acquisition apparatus 2.

The apparatus 2 makes it possible to take images of vehicles, to be transferred to the control and management module.

The interface module 3 is adapted to display the results, processed by the control module, which constitute points of correspondence between
preset reference data strings, stored in the unit, and the images acquired.

According to the preferred solution shown in Figures 2 and 3, the vehicle 4 is provided with two video cameras, one a dual lens video camera 6 positioned on the roof, and an IP video camera 7 installed in the driver/passenger compartment of the vehicle 4.

The dual lens video camera 6 comprises an integrated system of dual video cameras, one color and one infrared (IR), which make it possible to take images even if the vehicle 4, or the vehicle to be fined, or both, are in motion.

The IP video camera 7, on the other hand, generates a signal video in digitalized form, ready for direct transmission to the control and management module, without requiring analog-to-digital conversion.

On patrols, the vehicles 4 of traffic wardens and/or officers of local police, provincial police and the like, which are equipped with the vehicle-mounted kit 1, can rapidly and substantially autonomously conduct the detection, in particular by way of availing of the acquisition apparatus 2, of breaches and violations of rules, laws, regulations in force and the like.

The kit 1 according to the invention can be used to perform a targeted capture: in this case the user, once an offending vehicle is identified, directs the image acquisition apparatus 2 toward that vehicle, actuates it, and takes an image thereof.

The detection can also be performed autonomously: in this case, while the vehicle 4 is in motion, the kit 1 will take images of the vehicles present along a road, square and the like, and will check if they are in violation of rules, laws, regulations in force and the like.

The images of the vehicles detected by the image acquisition apparatus can be used to identify the persons responsible for illegal acts or possible witnesses.

Advantageously, the procedure for detecting breaches and violations of rules, laws, regulations in force and the like is highly versatile.
Conveniently, the vehicle-mounted kit 1 for detecting breaches and violations of rules, laws, regulations in force and the like is capable of performing the detection of breaches of different types.

Positively, the vehicle-mounted detection kit 1, according to the invention, is capable of operating autonomously without assistance from specialist personnel.

Conveniently, the procedure for detecting breaches and violations of rules, laws, regulations in force and the like, and the corresponding vehicle-mounted detection kit, are simple and immediate to apply and use.

In practice it has been found that the procedure for detecting breaches and violations of rules, laws, regulations in force and the like and the corresponding vehicle-mounted detection kit according to the invention fully achieve the intended aim and objects, in that they are highly versatile, being capable of performing the detection of breaches of different types.

The invention, thus conceived, is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims. Moreover, all the details may be substituted by other, technically equivalent elements.

In the embodiments illustrated, individual characteristics shown in relation to specific examples may in reality be interchanged with other, different characteristics, existing in other embodiments.

In practice, the materials employed, as well as the dimensions, may be any according to requirements and to the state of the art.

Where the technical features mentioned in any claim are followed by reference numerals and/or signs, those reference numerals and/or signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference numerals and/or signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference numerals and/or signs.
CLAIMS

1. A detection procedure for breaches and violations of rules, laws, regulations in force and the like, which consists of the following steps:
   a) taking of images of vehicles, present along a road, square and the like, by way of an image acquisition apparatus (2);
   b) transfer of the images acquired by said apparatus (2), optionally converted preliminarily to analog and/or digital signals, to a control and management module;
   c) comparison of a plurality of data which can be gleaned from said images with preset reference data strings contained in an adapted memory unit which is controlled by said control and management module;
   d) display, by way of a user interface module (3), of the results of such comparison which constitute points of correspondence between the preset reference data strings and the images acquired.

2. The method according to claim 1, characterized in that said data strings comprise, stored in said memory unit, the prescriptions in force in the exact place of acquisition of each image.

3. The method according to claim 1, characterized in that said data strings comprise, stored in said memory unit, lists of registration plate numbers corresponding to predefined vehicles.

4. The method according to claim 1, which consists, subsequently to said step d), of a step e) which consists of:
   e1) analysis and validation, by the user by way of said interface module (3), of the data for each image displayed;
   e2) transfer of said results to a centralized processing facility.

5. The method according to claim 1, which consists, subsequently to said step d), of a step f) which consists of:
   f1) transfer of said results to a centralized processing facility;
   f2) analysis and validation, by the user of said centralized processing facility, of the data for each image displayed.
6. A vehicle-mounted detection kit, characterized in that it comprises at least one control and management module which is associated with at least one memory unit, at least one interface module (3) and at least one image acquisition apparatus (2) for the taking of images of vehicles to be transferred to said control and management module, said interface module (3) being adapted to display the results, processed by said control module, which constitute points of correspondence between preset reference data strings, stored in said unit, and the images acquired.

7. The vehicle-mounted kit according to claim 6, characterized in that said interface module (3) is of the type which is preferably chosen from among a portable computer, a tablet computer, a smartphone and the like.

8. The vehicle-mounted kit according to one or more of claims 6 and 7, characterized in that said image acquisition apparatus (2) is of the type preferably chosen from among an infrared video camera, an IP (Internet Protocol) video camera, a dual lens video camera, a still camera and the like.

9. The vehicle-mounted kit according to one or more of claims 6 to 8, characterized in that said image acquisition apparatus (2) is provided with coupling means (5) for removable mating with a vehicle.

10. A vehicle, characterized in that it comprises at least one vehicle-mounted kit which is provided with at least one control and management module which is associated with at least one memory unit, at least one interface module (3) and at least one image acquisition apparatus (2) for the taking of images of vehicles to be transferred to said control and management module, said interface module being adapted to display the results, processed by said control module, which constitute points of correspondence between preset reference data strings, stored in said unit, and the images acquired.
A. CLASSIFICATION OF SUBJECT MATTER

INV. G06Q50/10 G06Q50/26 G08G1/00

ADD.

According to International Patent Classification (IPC) onto both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06Q G08G

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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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

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Authorized officer

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### DOCUMENTS CONSIDERED TO BE RELEVANT

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