AUTOMOTIVE ACCIDENT RECORDAL SYSTEM

The present invention relates to a system which may be installed in a vehicle, in particular, an automobile, to record visual data leading up to the event of a dangerous situation requiring sharp braking or an accident.

It is known in the aircraft industry to provide sealed data recorders, commonly known as "black boxes", which record data signals during an aircraft's flight. These data signals include information from the aircraft's controls, such as altitude and air speed as well as audio signals, such as the pilots' voices. In the event of an accident, the "black box" may be recovered and examined to determine the nature and cause of the accident. Such "black boxes" are, however, expensive and bulky. They also require expert analysis before any useful information can be recovered. For these reasons they are unsuitable for use in automobiles.

It is also known to provide video recording devices in automobiles. For example, police patrol automobiles may be equipped with video cameras to record evidence of motoring offences. However, the video recording devices are relatively expensive and take up a significant space in the passenger compartment of the automobile. In addition, the video recording devices require a skilled operator to be used effectively and require regular maintenance, for example, the exchange of video cassettes when full.

It is an object of the present invention to provide a recordal system for a vehicle, which is compact, easy to use and relatively inexpensive.

According to the present invention, there is provided a recording system, for installation in or on

a vehicle, comprising a system controller, at least one optical recorder, at least one sensor and an ignition monitor, the ignition monitor providing means to send a signal to the system controller on detection of an ignition voltage, the system controller being connected to the at least one optical recorder to switch on operation thereof on receiving said ignition monitor signal, wherein the at least one sensor is provided to send a signal to the system controller on detection of a deceleration or impact, the system controller providing means to switch off the at least one optical recorder after a fixed interval after receiving the sensor signal.

According to the present invention, there is also provided a vehicle provided with a recording system as previously claimed, said ignition monitor being connected to the vehicle ignition system.

According to the present invention, there is also provided a process for recording at least the events leading up to a vehicular accident comprising the steps of monitoring the ignition system of a vehicle, providing a signal on detection of a voltage in the ignition system to switch on operation of at least one optical recorder, said at least one optical recorder being programmed to record pictures of at least a portion of the exterior surroundings of the vehicle at fixed intervals of time, providing a signal on detection of a deceleration or impact of the vehicle to thus switch off operation of the at least one optical recorder after a fixed interval.

Operation of the system is thus automatic and does not require a skilled operator. In addition, the recorded data is provided in a ready to use form. The resultant pictures may be used as evidence for insurance or legal proceedings.

An embodiment of the present invention will now be described, by way of example only, with reference to the accompanying drawing in which Figure 1 shows a schematic diagram of a system according to the present invention.

As shown in Figure 1, the recordal system generally comprises a system control unit 1, operatively connected to a ignition monitor unit 2, an impact sensor 3, a standby power supply 4 and a digital camera 5.

The system control unit 1 comprises a microprocessor or other computing device capable of receiving a plurality of input voltage signals, and in turn, outputting a plurality of output voltage signals.

An input 6 of the ignition monitor unit 2 is connected to the ignition system of the vehicle, which is connected to the vehicle's battery, which provides the DC power supply. An output 7 of the ignition monitor unit 2 is connected to an input 12 of the system control unit 1. The ignition monitor unit 2 monitors the amplitude of the DC voltage in the ignition system. When the unit 2 detects a DC voltage in excess of a threshold value, i.e. when the vehicle's ignition system is activated to start the vehicle, a signal is sent from output 7 to the system control unit 1. The threshold value is preferably between 10 and 15 volts. Preferably the ignition monitor unit 2 only outputs a signal to the system control unit 1 when the detected signal in the ignition system exceeds the threshold value for a time period greater than 5 seconds, so as to avoid the outputting of signals in response to erratic voltage spikes in the ignition system.

In one embodiment of the invention, the system

control unit 1 may incorporate the ignition monitor unit 2.

The standby power supply 4 comprises a 9 volt DC battery and a timer switch. The timer switch is connected to input 9. When a signal is received on input 9 the timer switch is operated to connect the battery to the digital camera 5. After a fixed time interval of between 5 and 10 seconds, the timer switch disconnects the battery from the camera 5.

The digital camera 5 is mounted either internally or externally of the vehicle. The camera 5 is orientated so as to be able to take pictures of the exterior surroundings of the vehicle. The camera 5 may be pointed directly in front of the vehicle or, alternatively, directly behind or to either side of the vehicle.

An input 10 of the digital camera 5 is connected to an output 11 of the system control unit 1. The system control unit 1 supplies power to the camera 5 via output 11.

The digital camera 5 is provided with an internal memory capable of storing a number of images in a digital format. Preferably the pictures are stored in a compressed format, such as JPEG or GIF. Typically, a digital camera 5 is used which is capable of storing up to 40 individual pictures on a removable magnetic disc or flash chip.

Alternatively, the camera 5 may be connected to an external memory store, housed separately in the vehicle, which is capable of storing a greater number of pictures.

Once operating, the digital camera 5 is programmed to record a series of pictures at fixed time intervals until a subsequent signal is received from the system control unit 1. The time interval

between successive pictures may be varied depending on the operators' preference.

The digital camera 5 is programmed to operate whenever sufficient power is supplied to it. The camera 5 is programmed to then continuously record pictures at a fixed time interval until the power supply is terminated. The time interval between pictures may be varied as determined by the camera's programming. Typically , the camera 5 is programmed to record one picture per second. The digital camera's internal memory is limited. Thus, the camera 5 is programmed to record in a cyclical fashion such that once the internal memory of the camera 5 is full, pictures are recorded over the earlier recorded pictures such that only the most recent pictures are stored. For example, a camera 5 having a memory capable of storing 40 individual pictures will initially record pictures 1 to 40 in its memory. Picture 41 will then be recorded over picture 1, picture 42 over picture 2 and so on. At any time, the most recent 40 pictures are stored in memory and are retrievable.

More than one camera 5 may be used to provide a greater coverage of the exterior surroundings. For example, one camera 5 may be pointed in front of the vehicle and another camera 5 pointed directly behind the vehicle. Other cameras 5 could be used to cover the surroundings visible by a driver when looking left or right. Each camera may have its own internal memory, or alternatively the cameras 5 may be linked to a single separate memory store.

The impact sensor 3 comprises an accelerometer mounted either internally or externally of the vehicle. An output 8 of the impact sensor 3 is connected to an input 13 of the system control unit 1

and an input 9 of the standby power supply 4. The impact sensor 3 responds to a sudden deceleration of the vehicle, as occurs typically during sudden breaking of the vehicle or collision with another object, by sending a signal from impact sensor output 8 to both the system control unit 1 and the standby power supply 4. The deceleration must exceed a threshold value programmed into the impact sensor 3 before a signal will be sent. In this way, false signals from braking of the vehicle in normal operation are avoided. Alternatively, a contact-sensitive impact sensor may be utilised, which outputs a voltage signal in response to an impact. The sensor may be mounted in a surface of the vehicle which is likely to be impacted in any accident. For example, a sensor could be mounted in the front or rear bumpers.

More than one impact sensor 3 may be mounted in the vehicle to provide redundancy in the system in the event of malfunction of any one sensor or to provide a more sensitive system. For example, two sensors may be used to detect decelerations in axis parallel to, and perpendicular to the direction of travel of the vehicle.

In operation, a driver of the vehicle operates the ignition system to start the engine. As a result, a voltage is produced in the ignition system which is detected by the ignition monitor unit 2. As soon as a stable DC voltage of between 10 and 15 volts is detected for more than five seconds, the ignition monitor unit 2 sends a signal on output 7 to input 12 of the system control unit 1.

In response, the system control unit 1 switches output 11 to supply power to the digital camera 5. As a result the digital camera 5 begins to record pictures according to its programming.

In normal operation of the vehicle no accidents will occur. At the end of the journey the ignition system will be turned off. The ignition monitor unit 2 detects the resultant drop in DC voltage in the ignition system and sends a signal on output 7 to the system control unit 1. System control unit 1 switches output 11 to turn off the power supply to the camera 5. The recordal of pictures is terminated and the system is then re-set ready for the next operation of the ignition system of the vehicle.

However, if during operation of the vehicle an accident occurs, the impact sensor 3 will be triggered if a deceleration in excess of the sensor's threshold value is experienced. A signal is sent on output 8 to the system control unit 1 and the standby power supply 4. In response, the system control unit 1 switches output 11 to turn off the main power supply to the camera 5. At the same time, the timer switch of the standby power supply 4 is switched on by the signal from the impact sensor 3. As a result power is supplied to the camera 5 for an additional 5 to 10 seconds after termination of the main power supply from the system control unit 1. When the standby power supply 4 is switched off the camera 5 terminates the recording of pictures. At this point the most recently recorded pictures are stored in memory. The provision of the standby power supply 4 ensures that the recorded pictures cover the period before and immediately after any accident.

The pictures in the camera 5 may now be accessed and analysed by viewing on a computer or other known manner.

The system control unit 1 may be provided with a reset switch for manually reenabling the system after any accident, or it may have an automatic reset

system.

Optionally, the system may include a visual indicator, such as a lamp on the vehicle's indicator panel, to indicate to a driver of the vehicle when recordal has been initiated. Preferably, the indicator lamp is arranged to blink on and off in synchronism with the operation of the camera 5. Each time the camera 5 records a picture, the indicator lamp blinks on.

Preferably, the system comprises an automatic checking procedure wherein the system control unit 1 monitors the status of the impact sensor 3 and ignition monitor unit 2. In the event of a malfunction in either component, the system control unit 1 will not operate the camera 5 but instead operates a warning indicator on the vehicle's indicator panel to alert the driver to the malfunction.

The digital camera 5 of the present invention may be replaced by another optical recorder, such as a digital camcorder or video recorder programmed to record still images.

It is to be understood that the system of the present invention may be used in many types of vehicle, including lorries, motor bicycles, trains and the like.

Claims

1. A recording system, for installation in or on a vehicle, comprising a system controller, at least one optical recorder, at least one sensor and an ignition monitor, the ignition monitor providing means to send a signal to the system controller on detection of an ignition voltage, the system controller being connected to the at least one optical recorder to switch on operation thereof on receiving said ignition monitor signal, wherein the at least one sensor is provided to send a signal to the system controller on detection of a deceleration or impact, the system controller providing means to switch off the at least one optical recorder after a fixed interval after receiving the sensor signal.

2. A recording system as claimed in claim 1 further comprising a standby power supply and a timer switch connected to the at least one sensor, the standby power supply being connectable to the at least one optical recorder on operation of the timer switch.

3. A recording system as claimed in claim 1 or claim 2 wherein the at least one optical recorder is provided with an internal memory store.

4. A recording system as claimed in claim 1 or claim 2 wherein the at least one optical recorder is connected to a separate memory store.

5. A recording system as claimed in any preceding claim wherein the at least one sensor is an accelerometer.

6. A recording system as claimed in any one of claims 1 to 4 wherein the at least one sensor is an impact detector.

7. A recording system as claimed in any preceding claim wherein the at least one optical recorder is a digital camera.

8. A recording device as claimed in any of claims 1 to 6 wherein the at least one optical recorder is a digital camcorder.

9. A vehicle provided with a recording system as claimed in any preceding claim, said ignition monitor being connected to the vehicle ignition system.

10. A vehicle as claimed in claim 9 wherein one of the at least one optical recorders is pointed in the direction of travel of the vehicle.

11. A vehicle as claimed in claim 9 or claim 10 wherein one of the at least one optical recorders is pointed in a direction opposing the direction of travel of the vehicle.

12. A vehicle as claimed in any of claims 9 to 11 wherein one of the at least one optical recorders is pointed in a direction perpendicular to the direction of travel.

13. A process for recording at least the events leading up to a vehicular accident comprising the steps of monitoring the ignition system of a vehicle, providing a signal on detection of a voltage in the ignition system to switch on operation of at least one

optical recorder, said at least one optical recorder being programmed to record pictures of at least a portion of the exterior surroundings of the vehicle at fixed intervals of time, providing a signal on detection of a deceleration or impact of the vehicle to thus switch off operation of the at least one optical recorder after a fixed interval.

14. A process as claimed in claim 13 further involving storing pictures from the optical recorder cyclically in a memory store.

15. A process as claimed in claim 14 involving storing between 35 and 40 pictures in each cycle.

16. A process as claimed in any of claims 13 to 15 wherein pictures are recorded at a rate of one per second.

17. A process as claimed in any of claims 13 to 16 in which the at least one optical recorder is switched off between 5 and 10 seconds after detection of a deceleration or impact of the vehicle.

18. A process as claimed in any of claims 13 to 17 involving outputting a signal on detection of a voltage of sufficient magnitude for longer than a pre-programmed threshold value in the ignition system.

19. A process as claimed in claim 18 wherein the threshold value is between 5 and 10 seconds.

20. A process as claimed in claim 18 or claim 19 wherein a voltage of sufficient magnitude is between 10 and 15 volts.

21. A system substantially as hereinbefore described with reference to and as shown in the accompanying drawing.

22. A process substantially as hereinbefore described with reference to and as shown in the accompanying drawing.