

PATROLL Winning Submission

U.S. Patent No. 8,836,784

U.S. Patent No. 8,836,784 (“*Monument Peak*” or the “patent-at-issue”) was filed on October 27, 2010 and claims priority on the same date. Claim 1 of the patent-at-issue is generally directed to a system for automatically reporting exception events. The system comprises an image capture device having a first function to monitor operation of a motor vehicle. The image capture device comprises a digital camera configured to capture a video sequence of digital images. The system further comprises an image memory system configured to store digital images captured by the image capture device, an exception event detection mechanism configured to detect an exception event for the motor vehicle and process inputs received from a plurality of sensing devices, and a processing system configured to periodically use the image capture device in a second function different from the first function to capture digital images at a first capture frequency. The processing system is further configured to store the captured digital images in the image memory system, receive an input indicating a detection of the exception event from the exception event detection mechanism, determine a type of the exception event based on data captured by the image capture device in the second function, store metadata with the captured digital images that comprises the determined type of the exception event, and provide a response to the exception event.

The primary reference, U.S. Pat. App. No. 2012/0021386 (“*Airmax*”), was filed on July 29, 2008 and claims the benefit of United Kingdom Pat. App. No. 0714936.2, filed on August 1, 2007. The patent generally relates to a method and apparatus for providing information about a vehicle for training a driver. Vehicle data is received from a vehicle data gathering mechanism associated with a vehicle. Image data from an image data gathering mechanism associated with the vehicle is then received. The image data is then overlaid with contemporaneous vehicle data. The image data is then stored with the overlaid vehicle data in computer memory.

The primary reference, U.S. Pat. App. No. 2007/0132773 (“*SmartDrive1*”), was filed on December 8, 2005 and claims priority on the same date. The patent generally relates to vehicle event recorder systems arranged with three stage memories and special mechanism to manage those memories including transfer of data there between. A managed loop memory receives data from a video camera in real-time and continuously overwrites expired data implicitly determined no longer useful. Data in a managed loop memory is only passed to a more stable, high-capacity buffer memory in response to an event having occurred. An event trigger produces a signal, which causes data transfer between the managed loop memory and an on-board, high-capacity buffer memory. The high-capacity buffer memory is suitable for storing video series associated with a plurality of events. Finally, a permanent data store is arranged to receive data from the high-capacity buffer memory whenever the system returns and falls within a predetermined proximity of a download station.

The primary reference, U.S. Patent No 9,633,318 (“*SmartDrive2*”), was filed on December 8, 2006 and claims the benefit of U.S. Pat. App. Ser. No. 11/296,906, filed on December 8, 2005. The patent generally relates to a vehicle recorder system configured with a

video camera, a light weight memory system, and a radio communications facility suitable for use in conjunction with a moving vehicle. An automobile equipped with such video recorder system that is used throughout a day of service provides a video record of unusual events which may occur from time-to-time. For example, events such as accidents, near-misses, and excessive speed, among others, trigger a system to preserve video images collected before and after the moment of the event. Replaying these images provides information regarding the cause and true nature of the event. These systems are particularly suitable for vehicle fleets, or other groups of vehicles that can communicate with a common system.

Patent Owner is now on notice that claims of this patent are invalid; as a result, any new or continued assertion of this patent may be considered meritless or brought in bad faith. *Octane Fitness, LLC v. ICON Health & Fitness, Inc.*, 572 U.S. 545, 554 (2014). Such considerations are relevant to whether a case is deemed “exceptional” for purposes of awarding attorneys’ fees. 35 U.S.C. § 285; *see, e.g., WPPEM, LLC v. SOTI Inc.*, 2020 WL 555545, at *7 (E.D. Tex. Feb. 4, 2020), *aff’d*, 837 F. App’x 773 (Fed. Cir. 2020) (awarding fees for an exceptional case where plaintiff “failed to conduct an invalidity and enforceability pre-filing investigation”); *Energy Heating, LLC v. Heat On-The-Fly, LLC*, 15 F.4th 1378, 1383 (Fed. Cir. 2021) (affirming award of fees where, *inter alia*, the plaintiff knew “that its patent was invalid”).

A sample claim chart comparing claim 1 of *Monument Peak Ventures* to *Airmax*, *SmartDrive1*, and *SmartDrive2* is provided below.

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| <p>US8836784 (“<i>Monument Peak</i>”)</p> | <p>A. US20120021386 (“<i>Airmax</i>”) B. US20070132773 (“<i>SmartDrive1</i>”) C. US9633318 (“<i>SmartDrive2</i>”)</p> |
| <p>1.pre. A system for automatically reporting exception events, the system comprising:</p> | <p>A. US20120021386 “The stored image data with the overlaid vehicle data can be used to determine how well the driver is driving, and subsequently to train the driver, preferably by providing feedback to the driver. Feedback can be provided to the driver in the form of replaying the image data with the overlaid vehicle data to the driver, preferably replaying portions of the image data that correspond to one or more incidents. The feedback may be provided by feedback mechanism, for example a visual display.” <i>Airmax</i> at par. 0011</p> <p>“The determination of how well the driver has driven may be made automatically, for example by a computer program processing the data, and any feedback may also be provided to the driver automatically.” <i>Airmax</i> at par. 0014</p> <p>“In other embodiments, the invention can be considered as a driving incident capturing system, which may include a fault assessment system.” <i>Airmax</i> at par. 0019</p> <p>“Identification of an incident in itself may be capable of being used to provide feedback to the driver. For example, an incident that illustrates heavy breaking by a driver may indicate that the driver has left an insufficient stopping distance, and appropriate training may be provided.” <i>Airmax</i> at par. 0021</p> <p>“In some embodiments, the feedback may comprise a report, preferably a statistical report, that provides analysis of the driver. The analysis may be performed automatically by a computer program, or the analysis may be performed manually by a person.” <i>Airmax</i> at par. 0139</p> <p>B. US20070132773 “An ‘event trigger’ is a system devised to detect a prescribed physical condition and provide an electronic signal in response thereto; the electronic signal being coupled to another system which may be set into action as a result of having received the event trigger signal.” <i>SmartDrive1</i> at par. 0035</p> |

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1.pre. A system for **automatically reporting exception events**, the system comprising:

“When an event trigger occurs, **a memory transfer operation** is executed. **Data in the managed loop memory is transferred to a high-capacity buffer memory** in response to **an event** having been detected. Thus the relationship between the managed loop memory and the high-capacity buffer memory can be characterized in that they are coupled by way of the event trigger which causes **a transfer of data** therebetween.” *SmartDrive1* at par. 0045

“An event trigger is a system provided to sense and detect **occurrence of some event of interest**. **An event of interest** may be for example **an automobile traffic accident**. In this case accelerometers respond to **abrupt changes in motion** and provide the video event recorder with a signal to indicate that **video data should be preserved and transferred to the high capacity buffer memory**.” *SmartDrive1* at par. 0048

“Thus event triggers of these inventions may be **fully automated** such as accelerometers or may also include manual type event triggers such as those embodied as panic buttons.” *SmartDrive1* at par. 0051

“An event trigger is a mechanism which detects **a prescribed physical condition** and sets **a data transfer action** into motion in response thereto. An event trigger causes **a data transfer between a managed loop memory stage and an on-board buffer memory stage**. An event trigger may be arranged to detect **a condition such as an automobile crash**. When **a car crashes**, it generally suffers **an abrupt motion** detectable via motion transducers such as accelerometers. As such, an accelerometer can provide a signal to cause **a data transfer** in response to **a traffic accident**.” *SmartDrive1* at par. 0068

“It is possible to arrange an event trigger as responsive to **aggressive driving such as abrupt swerving motions**. Event triggers might be arranged in conjunction with **excessive braking maneuvers**. Thus, **not only accidents but other general vehicle misuse** might be captured in recorded video as various types of event triggers cause **data to be transferred to a buffer and preserved**.” *SmartDrive1* at par. 0069

C. US9633318

“It is an object of the present invention to provide **a fleet**

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1.pre. A system for **automatically reporting exception events**, the system comprising:

management system based upon **a vehicle event recording system.**" *SmartDrive2* at col. 3:53-55

"It is a further object of the present invention to provide a fleet management system, in which **automated reporting** is enabled, so that a fleet manager can take specific actions in response to **reports automatically generated** by the system." *SmartDrive2* at col. 3:61-64

"Event Trigger: A system devised to detect **a predetermined physical condition** and provide an electronic signal in response thereto, the electronic signal being coupled to another system that may be set into action by receiving the event trigger signal." *SmartDrive2* at col. 6:4-8

"Event triggers include means for sensing **an important event** and in response thereto activating the microprocessor to perform **save operations, preserving images associated with the detected important event.** Event triggers may be arranged about various systems including an on-board data bus, accelerometers, a panic button, or a time interval trigger. An onboard data bus may be arranged as an event trigger when some measured parameter exceeds a prescribed threshold to indicate **the occurrence of some condition.** When the threshold is exceeded, an electronic signal can be provided to the microprocessor queuing it to handle images accordingly." *SmartDrive2* at col. 12:43-54

"When a threshold is exceeded, the systems of the present invention can be arranged to **send an e-mail notice to roadway engineers**, notifying them of the dangerous condition." *SmartDrive2* at col. 17:40-43

"Another module of the server includes an e-mail server 710 system, which can be arranged to respond to **special conditions and events** occurring in related applications 711, whereby **e-mail messages can be sent on the internet.**" *SmartDrive2* at col. 20:57-60

1.a. **an image capture device** having a first function to monitor operation of a motor vehicle, wherein the image capture device comprises a digital camera configured to capture a video sequence of digital images;

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“The image recording mechanism 102 may be a camera, such as a video camera associated with the vehicle, preferably inside the vehicle and near a window of the vehicle, for example facing forwards out of the front windscreen of a vehicle.” *Airmax* at par. 0109

“In further embodiments still, an image recording mechanism that is already present in the vehicle, for example a video camera that is located near a back bumper of the vehicle in order to aid parking, may also be used to record image data for the present invention.” *Airmax* at par. 0115

“As discussed above, any number of video cameras may be fitted in or on the vehicle, and may point in any direction relative to the vehicle in which it is fitted.” *Airmax* at par. 0143

“An incident may be identified by monitoring the vehicle data that has been gathered by the vehicle data gathering mechanism and/or monitoring the image data recorded by the image recording mechanism 102 and comparing this data with a rule that defines one or more threshold values.” *Airmax* at par. 0126

“1. A method for training a driver, the method comprising the steps of:

...

receiving image data from an image data gathering mechanism associated with the vehicle;” *Airmax* at claim 1

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“The managed loop memory is arranged to continuously receive video data from a video camera and record this data in real-time.” *SmartDrive1* at par. 0016

“A managed loop memory is arranged to capture video data of very limited time periods. For example, a managed loop memory can be arranged to capture only 120 frames of video data captured at four frames per second. Thus, the capacity of a managed loop memory may only be associated with a video timeline of 30 seconds. When this memory is full, i.e. after thirty seconds of video, the old data in the memory is necessarily discarded and overwritten.” *SmartDrive1* at par. 0060

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1.a. **an image capture device having a first function to monitor operation of a motor vehicle**, wherein the image capture device comprises a digital camera configured to capture a video sequence of digital images;

“In particular with reference to FIG. 1, a three stage memory system suitable for vehicle event recorders is presented. A video camera 1, is arranged to capture video images and convert those images to electronic signals which may be processed by a computer and stored in electronic memories. The vehicle event recorder system is comprised of memory systems including: a managed loop memory 2, a high-capacity buffer memory embodied as a flash type device 3, and a durable, long-term, data store memory 4.” *SmartDrive1* at par. 0043

“A vehicle event recorder 81 is a system to be mounted within the vehicle and includes at least a connection manager 82, camera 83, microprocessor 84, memory 85, and a radio transmitter 86.” *SmartDrive1* at par. 0057

“In similar fashion, car 26 equipped with a vehicle event recorder and accelerometer type event trigger illustrates that video of single vehicle accidents are captured as well.” *SmartDrive1* at par. 0049

C. US9633318

“19. A method for monitoring a vehicle, the method comprising:
recording video images responsive to an event trigger exceeding a predetermined threshold,
wherein the recording is performed by a vehicle event recorder unit configured for mounting in a vehicle, the vehicle event recorder unit comprising:
a video camera having a field-of-view that includes an environment about the vehicle that is configured to detect the video images, the video images including video images of the environment about the vehicle; and” *SmartDrive2* at claim 19

“This type of video cameras is arranged to continuously capture video images both before and after an accident, should one occur.” *SmartDrive2* at col. 12:32-34

“While the embodiment described in detail herein is on that includes fleet members of the type characterized as ‘motor vehicles’, i.e. cars, motorcycles, trucks and buses operated on streets and highways, this embodiment is not limited to those kinds of vehicles, but can also serve vehicle systems which are not automobile-type vehicles.” *SmartDrive2* at col. 7:62-67

1.b. **an image memory system** configured to store **digital images** captured by **the image capture device**;

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“1. A method for training a driver, the method comprising the steps of:

...

receiving **image data** from **an image data gathering mechanism** associated with the vehicle;

...

storing **the image data** with the overlaid vehicle data in **computer memory.**” *Airmax* at claim 1

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“**The managed loop memory** is arranged to continuously receive **video data** from **a video camera** and record this **data** in real-time.” *SmartDrive1* at par. 0016

“**A managed loop memory** is arranged to capture **video data** of very limited time periods. For example, **a managed loop memory** can be arranged to capture only **120 frames of video data** captured at four frames per second. Thus, the capacity of a managed loop memory may only be associated with **a video timeline of 30 seconds**. When this memory is full, i.e. after **thirty seconds of video**, the old **data** in the memory is necessarily discarded and overwritten.” *SmartDrive1* at par. 0060

“In particular with reference to FIG. 1, **a three stage memory system** suitable for **vehicle event recorders** is presented. **A video camera** 1, is arranged to capture **video images** and convert those **images** to electronic signals which may be processed by a computer and stored in **electronic memories**. **The vehicle event recorder** system is comprised of **memory systems including: a managed loop memory** 2, **a high-capacity buffer memory embodied as a flash type device** 3, **and a durable, long-term, data store memory** 4.” *SmartDrive1* at par. 0043

“**A vehicle event recorder** 81 is a system to be mounted within **the vehicle** and includes at least a connection manager 82, **camera** 83, microprocessor 84, **memory** 85, and a radio transmitter 86.” *SmartDrive1* at par. 0057

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“**The vehicle event recorder** includes a camera, a microprocessor, **a memory**, a mobile wireless transceiver, a connection manager, and a proximity trigger. **Video images** captured by **the camera** are stored in **a specially arranged**

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| <p>(cont.) 1.b. an image memory system configured to store digital images captured by the image capture device;</p> | <p>memory buffer until the vehicle returns to a parking facility, where images are automatically transferred to a remote server.” <i>SmartDrive2</i> at col. 4:44-50</p> <p>“Particularly worthy of mention among these functions is ‘event handling’, wherein an event trigger causes execution of a computer routine and an image or image series collected by a camera is transferred from a temporary short-term buffer memory to a durable and lasting memory, where it may be stored for a considerable period of time.” <i>SmartDrive2</i> at col. 11:54-59</p> <p>“Vehicle event recorders in these embodiments include important memory systems. Preferred memory systems include those having a managed loop buffer, where images are temporarily stored for brief periods of time. When an event occurs, trigger toggle images are transferred to a second more durable memory from the managed loop buffer, thus preserving images associated with the event.” <i>SmartDrive2</i> at col. 13:3-9</p> |
| <p>1.c. an exception event detection mechanism configured to detect an exception event for the motor vehicle, wherein the exception event detection mechanism is configured to process inputs received from a plurality of sensing devices; and</p> | <p>A. US20120021386 “The method may further comprise comparing one, or both, of the image data and vehicle data with a rule to determine if an incident has occurred. Comparing one, or both, of the image data and vehicle data may be performed automatically using a computer.” <i>Airmax</i> at par. 0018</p> <p>“In other embodiments, the invention can be considered as a driving incident capturing system, which may include a fault assessment system.” <i>Airmax</i> at par. 0019</p> <p>“According to a further aspect of embodiments of the invention, there is provided a driving incident capturing system comprising: vehicle data gathering mechanism arranged to provide vehicle data associated with a vehicle;” <i>Airmax</i> at par. 0049-0050</p> <p>“As a non-exhaustive list of examples, an incident may comprise: an accident, a crash, a poorly executed driving manoeuvre, the activation of a warning light on the dashboard, the trigger of a diagnostic trouble code (DTC), an unexpected change in a vehicle parameter, for example the engine cutting-out while the vehicle is moving, a driver indicated incident, etc.” <i>Airmax</i> at par. 0020</p> |

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1.c. **an exception event detection mechanism** configured to detect **an exception event for the motor vehicle**, wherein the exception event detection mechanism is configured to process **inputs** received from **a plurality of sensing devices**; and

“A known interface for monitoring the status and performance of **a vehicle** engine in Europe is the EOBD. There is also an American equivalent on-board diagnostics standard, identified by the abbreviation OBD. Each **vehicle** manufacturer tailors a number of output ports of the EOBD socket to carry **data relating to a number of parameters of vehicle performance**. Such **data** can be derived from **sensors** throughout **the vehicle**, for example: **speed, distance, tachometer data, fuel consumption data, and electrical fault data**. Also, values outside of an acceptable range **trigger a diagnostic trouble code (DTC)**. These DTCs can be used to illuminate warning lamps or displays on **the vehicle's** dashboard.” *Airmax* at par. 0118

“In some embodiments, **the video camera** may be able to detect when **the vehicle is actually hit or damaged**, for example if the damage causes **the vehicle** to move this may be picked up by **a motion sensor** or by the video camera.”
Airmax at par. 0194

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“**An ‘event trigger’** is a system devised to detect **a prescribed physical condition** and provide an electronic signal in response thereto; the electronic signal being coupled to another system which may be set into action as a result of having received the event trigger signal.”
SmartDrive1 at par. 0035

“**An event trigger** is a system provided to sense and detect **occurrence of some event of interest**. **An event of interest** may be for example **an automobile traffic accident**. In this case **accelerometers** respond to **abrupt changes in motion** and provide the video event recorder with a signal to indicate that video data should be preserved and transferred to the high capacity buffer memory.”
SmartDrive1 at par. 0048

“**An event trigger** is a mechanism which detects **a prescribed physical condition** and sets a data transfer action into motion in response thereto. **An event trigger** causes a data transfer between a managed loop memory stage and an on-board buffer memory stage. **An event trigger** may be arranged to detect **a condition such as an automobile crash**. When **a car crashes**, it generally suffers **an abrupt motion** detectable via **motion transducers such**

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i.e. **an exception event detection mechanism** configured to detect **an exception event for the motor vehicle**, wherein the exception event detection mechanism is configured to process **inputs** received from **a plurality of sensing devices**; and

as accelerometers. As such, **an accelerometer** can provide **a signal** to cause a data transfer in response to **a traffic accident**.” *SmartDrive1* at par. 0068

“It is possible to arrange **an event trigger** as responsive to **aggressive driving such as abrupt swerving motions**. **Event triggers** might be arranged in conjunction with **excessive braking maneuvers**. Thus, **not only accidents but other general vehicle misuse** might be captured in recorded video as various types of **event triggers** cause data to be transferred to a buffer and preserved.” *SmartDrive1* at par. 0069

“4) A video memory management system of claim 2, said **event trigger** includes **a motion sensor** and a threshold, whereby when said threshold is exceeded **the trigger** is toggled and provides a binary output to indicate that state thus causing a data transfer.” *SmartDrive1* at claim 4

C. US9633318

“**Event Trigger**: A system devised to detect **a predetermined physical condition** and provide an electronic signal in response thereto, the electronic signal being coupled to another system that may be set into action by receiving the event trigger signal.” *SmartDrive2* at col. 6:4-8

“Particularly worthy of mention among these functions is **‘event handling’**, wherein **an event trigger** causes execution of a computer routine and an image or image series collected by a camera is transferred from a temporary short-term buffer memory to a durable and lasting memory, where it may be stored for a considerable period of time. Thus, the microprocessor is responsive to **an event trigger** such as **an accelerometer** and a predetermined threshold, which detects **abrupt movements** and sets the microprocessor into action to transfer stored data from one memory to another.” *SmartDrive2* at col. 11:54-59

“**Event triggers** include means for sensing **an important event** and in response thereto activating the microprocessor to perform save operations, preserving images associated with **the detected important event**. **Event triggers** may be arranged about various systems including an on-board data bus, accelerometers, a panic button, or a time interval trigger. An onboard data bus may be

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1.c. **an exception event detection mechanism** configured to detect **an exception event for the motor vehicle**, wherein the exception event detection mechanism is configured to process **inputs** received from **a plurality of sensing devices**; and

arranged as **an event trigger** when **some measured parameter** exceeds a prescribed threshold to indicate **the occurrence of some condition**. When the threshold is exceeded, an electronic signal can be provided to the microprocessor queuing it to handle images accordingly.” *SmartDrive2* at col. 12:43-54

“In addition to these subsystems, **the vehicle on-board data bus system or OBD** is also coupled to the vehicle event recorder microprocessor. An on-board data bus is an electronic system coupled to **a plurality of transducers and sensors** throughout **the vehicle**, each of which collects **data related to vehicle characteristics and performance**. The on-board data bus may include information about **drive train and transmission, engine operational status, brakes, lights, et cetera**. The on-board data bus is useful in vehicle event recorders for providing **additional data and information**, which relate to the status of **a vehicle**, subsystems and engine conditions at a particular time of interest, for example in association with a traffic accident.” *SmartDrive2* at col. 13:44-56

“1. A vehicle fleet management system comprising:

...

the vehicle event recorder unit configured to record video images responsive to **an event trigger** exceeding a predetermined threshold;
a vehicle on-board data system including **one or more sensors** configured to generate **output signals conveying vehicle feedback information, the vehicle feedback information including information related to one or more of vehicle lights, an engine of the vehicle, a drive train of the vehicle, a transmission of the vehicle, vehicle brakes, and/or vehicle steering**, **the vehicle event recorder unit** configured to record **vehicle feedback information that corresponds to the recorded video images;**” *SmartDrive2* at claim 1

1.d. **a processing system** configured to:

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“**The computer processor** and the computer memory may be located on the vehicle.” *Airmax* at par. 0037

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“Vehicle event recorder systems including: **a camera** arranged to convert optical signals to electronic signals, **memory, a radio transceiver, a connection manager, and a**

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| <p>(cont.) 1.d. a processing system configured to:</p> | <p>microprocessor. The microprocessor is connected to the camera to receive electronic image signals in video series. The microprocessor manages the memory whereby processed electronic signals are written to and stored. The microprocessor also transfers data stored in memory to external systems via the radio transceiver(s).” <i>SmartDrive1</i> at par. 0078</p> <p>C. US9633318 “Vehicle event recorder systems are built about a microprocessor suitable for use in computing platforms for self-contained electronic apparatus. In most cases, these microprocessors are not arranged as general computing platforms, but rather with application specific firmware directed to particular functions at hand. These processors support the ability to perform application-specific functions and drive complementary subsystems such as memory, input/output ports, network connections, video input, and event triggers, among others.” <i>SmartDrive2</i> at col. 11:44-53</p> |
| <p>1.e. periodically use the image capture device in a second function different from the first function to capture digital images at a first capture frequency;</p> | <p>A. US20120021386 “The image recording mechanism 102 may be a camera, such as a video camera associated with the vehicle, preferably inside the vehicle and near a window of the vehicle, for example facing forwards out of the front windscreen of a vehicle. The video camera may have a sampling rate that is high enough to accurately identify any incident that may occur near the vehicle. In some embodiments, the sampling rate may be 50 Hz. A similar, or the same, sampling rate may be used for recording vehicle data. In other embodiments the sampling rate may be reduced in order to make efficient use of the computer memory 108 within the vehicle 100. Such a sampling rate may be 1, 2, 4, 10, 20, or any other number, of samples per second.” <i>Airmax</i> at par. 0109</p> <p>“In some embodiments, the sampling rate may be variable, for example to make efficient use of the computer memory available. For example, whilst the vehicle is stationary (as determined from the vehicle data or by any other mechanism, for example vehicle location data), the sampling rate may be reduced to a lower value, or may be increasingly reduced over time whilst the vehicle is stationary until no samples are taken after the vehicle has been stationary for a certain amount of time. The sampling</p> |

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i.e. periodically use **the image capture device in a second function different from the first function** to capture **digital images at a first capture frequency**;

rate may be increased when the vehicle starts moving again. This can avoid wasting computer memory (which may be limited), as well as reducing unnecessary computer processing, by not recording data when the vehicle is not being used, for example when it is locked in a garage overnight.” *Airmax* at par. 0111

“Similarly, **the sampling rate of the image recording mechanism 102 may be increased when the car 100 is travelling at high speeds** in order to more accurately capture **details** when events happen faster.” *Airmax* at par. 0112

“Information that is gathered by the vehicle data gathering mechanism 104 can be used to determine if, when, and how often **images** should be recorded by **the image recording mechanism 102**. This may be achieved by altering **the sampling rate of the image recording mechanism 102**, and/or activating and deactivating **the image recording mechanism 102**. In some embodiments, sampling may only take place whilst the vehicle's engine is turned on. The processor 106 may use speed data from the vehicle data gathering mechanism 104 to control **the image recording mechanism 102**.” *Airmax* at par. 0113

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“The managed loop memory is arranged to **continuously receive video data from a video camera and record this data in real-time**.” *SmartDrive1* at par. 0016

“A managed loop memory is arranged to **capture video data of very limited time periods**. For example, a managed loop memory can be arranged to **capture only 120 frames of video data captured at four frames per second**. Thus, the capacity of a managed loop memory may only be associated with **a video timeline of 30 seconds**. When this memory is full, i.e. after **thirty seconds of video**, the old **data** in the memory is necessarily discarded and overwritten.” *SmartDrive1* at par. 0060

“Because of the special nature of **vehicle event recorder** systems, it is sometimes desirable to **capture video at various frame rates surrounding a particular event**. That is, at some point in time such as **when a vehicle accident occurs it is preferred that video is captured at a maximum frame rate**. **At times further from an event moment, it is**

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| <p>(cont.) i.e. periodically use the image capture device in a second function different from the first function to capture digital images at a first capture frequency;</p> | <p>acceptable to collect video at reduced frame rates. A non-FIFO managed loop system may be deployed with a special overwrite scheme to effect various frame rates to preserve data in an extended timeline fashion. This is particularly useful where managed loop memories are of limited size.” <i>SmartDrive1</i> at par. 0063</p> <p>C. US9633318 “19. A method for monitoring a vehicle, the method comprising: recording video images responsive to an event trigger exceeding a predetermined threshold, wherein the recording is performed by a vehicle event recorder unit configured for mounting in a vehicle, the vehicle event recorder unit comprising: a video camera having a field-of-view that includes an environment about the vehicle that is configured to detect the video images, the video images including video images of the environment about the vehicle; and” <i>SmartDrive2</i> at claim 19</p> <p>“This type of video cameras is arranged to continuously capture video images both before and after an accident, should one occur.” <i>SmartDrive2</i> at col. 12:32-34</p> |
| <p>1.f. store the captured digital images in the image memory system;</p> | <p>A. US20120021386 “1. A method for training a driver, the method comprising the steps of: ... receiving image data from an image data gathering mechanism associated with the vehicle; ... storing the image data with the overlaid vehicle data in computer memory.” <i>Airmax</i> at claim 1</p> <p>B. US20070132773 “The managed loop memory is arranged to continuously receive video data from a video camera and record this data in real-time.” <i>SmartDrive1</i> at par. 0016</p> <p>“A managed loop memory is arranged to capture video data of very limited time periods. For example, a managed loop memory can be arranged to capture only 120 frames of video data captured at four frames per second. Thus, the capacity of a managed loop memory may only be associated with a video timeline of 30 seconds. When this</p> |

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1.f. store **the captured digital images in the image memory system;**

memory is full, i.e. after **thirty seconds of video**, the old **data** in the memory is necessarily discarded and overwritten.” *SmartDrive1* at par. 0060

“In particular with reference to FIG. 1, **a three stage memory system** suitable for vehicle event recorders is presented. A video camera 1, is arranged to capture **video images** and convert those **images** to electronic signals which may be processed by a computer and stored in **electronic memories**. The vehicle event recorder system is comprised of **memory systems including: a managed loop memory 2, a high-capacity buffer memory embodied as a flash type device 3, and a durable, long-term, data store memory 4.**” *SmartDrive1* at par. 0043

“A vehicle event recorder 81 is a system to be mounted **within the vehicle and includes at least a** connection manager 82, camera 83, microprocessor 84, **memory** 85, and a radio transmitter 86.” *SmartDrive1* at par. 0057

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“The vehicle event recorder includes a camera, a microprocessor, **a memory**, a mobile wireless transceiver, a connection manager, and a proximity trigger. **Video images captured by the camera are stored in a specially arranged memory buffer** until the vehicle returns to a parking facility, where images are automatically transferred to a remote server.” *SmartDrive2* at col. 4:44-50

“Particularly worthy of mention among these functions is ‘event handling’, wherein an event trigger causes execution of a computer routine and **an image or image series** collected by a camera is transferred from **a temporary short-term buffer memory to a durable and lasting memory**, where it may be stored for a considerable period of time.” *SmartDrive2* at col. 11:54-59

“Vehicle event recorders in these embodiments include important **memory systems**. Preferred **memory systems** include those having **a managed loop buffer**, where **images** are temporarily stored for brief periods of time. When an event occurs, trigger toggle **images** are transferred to **a second more durable memory from the managed loop buffer**, thus preserving images associated with the event.” *SmartDrive2* at col. 13:3-9

1.g. receive **an input indicating a detection of the exception event** from the exception event detection mechanism;

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“The method may further comprise **comparing one, or both, of the image data and vehicle data with a rule to determine if an incident has occurred**. Comparing one, or both, of the image data and vehicle data may be performed automatically using a computer.” *Airmax* at par. 0018

“In other embodiments, **the invention can be considered as a driving incident capturing system, which may include a fault assessment system**.” *Airmax* at par. 0019

“According to a further aspect of embodiments of the invention, there is provided **a driving incident capturing system** comprising:

vehicle data gathering mechanism arranged to provide vehicle data associated with a vehicle;

image data gathering mechanism arranged to provide image data associated with the vehicle;” *Airmax* at par. 0049-0051

“As a non-exhaustive list of examples, **an incident may comprise: an accident, a crash, a poorly executed driving manoeuvre, the activation of a warning light on the dashboard, the trigger of a diagnostic trouble code (DTC), an unexpected change in a vehicle parameter, for example the engine cutting-out while the vehicle is moving, a driver indicated incident, etc**.” *Airmax* at par. 0020

“A known interface for monitoring the status and performance of a vehicle engine in Europe is the EOBD. There is also an American equivalent on-board diagnostics standard, identified by the abbreviation OBD. Each vehicle manufacturer tailors a number of output ports of the EOBD socket to carry data relating to a number of parameters of vehicle performance. Such data can be derived from sensors throughout the vehicle, for example: speed, distance, tachometer data, fuel consumption data, and electrical fault data. Also, **values outside of an acceptable range trigger a diagnostic trouble code (DTC)**. These DTCs can be used to illuminate warning lamps or displays on the vehicle's dashboard.” *Airmax* at par. 0118

“In some embodiments, **the video camera may be able to detect when the vehicle is actually hit or damaged, for example if the damage causes the vehicle to move** this may be picked up by a motion sensor or by the video camera.”

(cont.)

l.g. receive **an input indicating a detection of the exception event** from the exception event detection mechanism;

Airmax at par. 0194

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“An ‘**event trigger**’ is a system devised to detect a prescribed physical condition and provide **an electronic signal** in response thereto; **the electronic signal** being coupled to another system which may be set into action as a result of having received **the event trigger signal**.”

SmartDrive1 at par. 0035

“An **event trigger** is a system provided to sense and detect occurrence of some event of interest. An event of interest may be for example an automobile traffic accident. In this case accelerometers respond to abrupt changes in motion and provide the video event recorder with **a signal** to indicate that video data should be preserved and transferred to the high capacity buffer memory.”

SmartDrive1 at par. 0048

“An **event trigger** is a mechanism which detects a prescribed physical condition and sets a data transfer action into motion in response thereto. An **event trigger** causes a data transfer between a managed loop memory stage and an on-board buffer memory stage. An **event trigger** may be arranged to detect a condition such as an automobile crash. When a car crashes, it generally suffers an abrupt motion detectable via motion transducers such as accelerometers. As such, an accelerometer can provide **a signal** to cause a data transfer in response to a traffic accident.” *SmartDrive1* at par. 0068

“4) A video memory management system of claim 2, said **event trigger** includes a motion sensor and a threshold, whereby when said threshold is exceeded **the trigger** is toggled and provides **a binary output to indicate that state** thus causing a data transfer.” *SmartDrive1* at claim 4

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“**Event Trigger**: A system devised to detect a predetermined physical condition and provide **an electronic signal** in response thereto, **the electronic signal** being coupled to another system that may be set into action by receiving **the event trigger signal**.” *SmartDrive2* at col. 6:4-8

6:4-8

“Particularly worthy of mention among these functions is

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| <p>(cont.) 1.g. receive an input indicating a detection of the exception event from the exception event detection mechanism;</p> | <p>‘event handling’, wherein an event trigger causes execution of a computer routine and an image or image series collected by a camera is transferred from a temporary short-term buffer memory to a durable and lasting memory, where it may be stored for a considerable period of time. Thus, the microprocessor is responsive to an event trigger such as an accelerometer and a predetermined threshold, which detects abrupt movements and sets the microprocessor into action to transfer stored data from one memory to another.” <i>SmartDrive2</i> at col. 11:54-59</p> <p>“Event triggers include means for sensing an important event and in response thereto activating the microprocessor to perform save operations, preserving images associated with the detected important event. Event triggers may be arranged about various systems including an on-board data bus, accelerometers, a panic button, or a time interval trigger. An onboard data bus may be arranged as an event trigger when some measured parameter exceeds a prescribed threshold to indicate the occurrence of some condition. When the threshold is exceeded, an electronic signal can be provided to the microprocessor queuing it to handle images accordingly.” <i>SmartDrive2</i> at col. 12:43-54</p> |
| <p>1.h. determine a type of the exception event based on data captured by the image capture device in the second function;</p> | <p>A. US20120021386 “According to a further aspect of embodiments of the invention, there is provided a driving incident capturing system comprising: . . . image data gathering mechanism arranged to provide image data associated with the vehicle;” <i>Airmax</i> at par. 0049-0051</p> <p>“Similarly, the sampling rate of the image recording mechanism 102 may be increased when the car 100 is travelling at high speeds in order to more accurately capture details when events happen faster.” <i>Airmax</i> at par. 0112</p> <p>“An incident may be identified by monitoring the vehicle data that has been gathered by the vehicle data gathering mechanism and/or monitoring the image data recorded by the image recording mechanism 102 and comparing this data with a rule that defines one or more threshold values.” <i>Airmax</i> at par. 0126</p> |

(cont.)

1.h. determine a type of the exception event based on data captured by the image capture device in the second function;

“As a non-exhaustive list of examples, an incident may comprise: an accident, a crash, a poorly executed driving manoeuvre, the activation of a warning light on the dashboard, the trigger of a diagnostic trouble code (DTC), an unexpected change in a vehicle parameter, for example the engine cutting-out while the vehicle is moving, a driver indicated incident, etc.” *Airmax* at par. 0020

“In some embodiments, the video camera may be able to detect when the vehicle is actually hit or damaged, for example if the damage causes the vehicle to move this may be picked up by a motion sensor or by the video camera.” *Airmax* at par. 0194

“41. The apparatus of claim 39, wherein the computer processor is arranged to compare one, or both, of the image data and vehicle data with a rule to determine if an incident has occurred.” *Airmax* at claim 41

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“The managed loop memory is arranged to continuously receive video data from a video camera and record this data in real-time.” *SmartDrive1* at par. 0016

“A managed loop memory is arranged to capture video data of very limited time periods. For example, a managed loop memory can be arranged to capture only 120 frames of video data captured at four frames per second. Thus, the capacity of a managed loop memory may only be associated with a video timeline of 30 seconds. When this memory is full, i.e. after thirty seconds of video, the old data in the memory is necessarily discarded and overwritten.” *SmartDrive1* at par. 0060

“Because of the special nature of vehicle event recorder systems, it is sometimes desirable to capture video at various frame rates surrounding a particular event. That is, at some point in time such as when a vehicle accident occurs it is preferred that video is captured at a maximum frame rate. At times further from an event moment, it is acceptable to collect video at reduced frame rates. A non-FIFO managed loop system may be deployed with a special overwrite scheme to effect various frame rates to preserve data in an extended timeline fashion. This is particularly useful where managed loop memories are of limited size.”

(cont.)

1.h. **determine a type of the exception event based on data captured by the image capture device in the second function;**

SmartDrive1 at par. 0063

“With reference to FIG. 2, **a traffic accident** between two automobiles car 21 and car 22 equipped with **a vehicle event recorder** system 24 having accelerometers 25 arranged as an event trigger. When **a collision** 23 occurs, the accelerometer initiates a data transfer between managed loop memory and a buffer memory to preserve **video data** collected immediately before and after **the traffic accident**. In similar fashion, car 26 equipped with **a vehicle event recorder** and **accelerometer type event trigger** illustrates that **video of single vehicle accidents** are captured as well.” *SmartDrive1* at par. 0049

“It is possible to arrange an event trigger as responsive to **aggressive driving such as abrupt swerving motions**. Event triggers might be arranged in conjunction with **excessive braking maneuvers**. Thus, **not only accidents but other general vehicle misuse** might be captured in recorded **video** as **various types of event triggers** cause data to be transferred to a buffer and preserved.” *SmartDrive1* at par. 0069

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“1. A vehicle fleet management system comprising:

...

the vehicle event recorder unit configured to record video images responsive to an event trigger exceeding a predetermined threshold;
a vehicle on-board data system including one or more sensors configured to generate output signals conveying **vehicle feedback information, the vehicle feedback information including information related to one or more of vehicle lights, an engine of the vehicle, a drive train of the vehicle, a transmission of the vehicle, vehicle brakes, and/or vehicle steering, the vehicle event recorder unit configured to record vehicle feedback information that corresponds to the recorded video images;**” *SmartDrive2* at claim 1

“In addition to these subsystems, **the vehicle on-board data bus system or OBD is also coupled to the vehicle event recorder microprocessor**. An on-board data bus is an electronic system coupled to a plurality of transducers and sensors throughout the vehicle, each of which collects **data related to vehicle characteristics and performance**. The on-

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| <p>(cont.) 1.h. determine a type of the exception event based on data captured by the image capture device in the second function;</p> | <p>board data bus may include information about drive train and transmission, engine operational status, brakes, lights, et cetera. The on-board data bus is useful in vehicle event recorders for providing additional data and information, which relate to the status of a vehicle, subsystems and engine conditions at a particular time of interest, for example in association with a traffic accident.” <i>SmartDrive2</i> at col. 13:44-56</p> <p>“Alternatively, accelerometers can detect very strong movements such as a car swerving or breaking excessively hard, or a direct collision. In these situations, the events may be declared important and the accelerometer will provide the signal upon which the microprocessor will act to preserve images recently captured and those captured soon after the event.” <i>SmartDrive2</i> at col. 12:54-60</p> <p>“This type of video cameras is arranged to continuously capture video images both before and after an accident, should one occur.” <i>SmartDrive2</i> at col. 12:32-34</p> |
| <p>1.i. store metadata with the captured digital images, wherein the metadata comprises the determined type of the exception event; and</p> | <p>A. US20120021386 “According to a further aspect of embodiments of the invention, there is provided a driving incident capturing system comprising: . . . image data gathering mechanism arranged to provide image data associated with the vehicle; a computer processor arranged to overlay the image data with contemporaneous vehicle data; and a computer memory arranged to store the image data with the overlaid vehicle data.” <i>Airmax</i> at par. 0049-0053</p> <p>“Embodiments of the invention can be considered as an evidence gatherer/storer in order to provide proof of events related to an accident or bad driving.” <i>Airmax</i> at par. 0107</p> <p>“As a non-exhaustive list of examples, an incident may comprise: an accident, a crash, a poorly executed driving manoeuvre, the activation of a warning light on the dashboard, the trigger of a diagnostic trouble code (DTC), an unexpected change in a vehicle parameter, for example the engine cutting-out while the vehicle is moving, a driver indicated incident, etc.” <i>Airmax</i> at par. 0020</p> <p>“For example, once an incident has been analysed, the data</p> |

(cont.)

1.i. store **metadata** with **the captured digital images**, wherein the metadata comprises **the determined type of the exception event**; and

may be moved to a more permanent computer memory location in an off-vehicle computer, and the identifier that the data should not be deleted from vehicle memory can be removed.” *Airmax* at par. 0179

“48. The apparatus of claim 47, wherein **the computer processor is arranged to identify portions of the existing image data with overlaid data** in computer memory as not to be deleted from computer memory, that are associated with an incident.” *Airmax* at claim 48

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“**Data captured** at a video camera is continuously written to the managed loop memory until an event trigger causes a data transfer of **video information** associated with a **particular event** to the on-board buffer memory.” *SmartDrive1* at par. 0058

“A data transfer module includes a routine to flush the on-board data buffer and transmit **the video information** contained therein to a permanent data store. **Data** may also be uploaded to the vehicle recorder system including matters such as firmware updates, **traffic and road condition information**, et cetera.” *SmartDrive1* at par. 0073

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“1. A vehicle fleet management system comprising:

...

the vehicle event recorder unit configured to record video images responsive to an event trigger exceeding a predetermined threshold;
a vehicle on-board data system including one or more sensors configured to generate output signals conveying vehicle feedback information, the vehicle feedback information including information related to one or more of vehicle lights, an engine of the vehicle, a drive train of the vehicle, a transmission of the vehicle, vehicle brakes, and/or vehicle steering, the vehicle event recorder unit configured to record **vehicle feedback information that corresponds to the recorded video images;**” *SmartDrive2* at claim 1

“In addition to these subsystems, **the vehicle on-board data bus system or OBD is also coupled to the vehicle event recorder microprocessor. An on-board data bus is an electronic system coupled to a plurality of transducers and**

(cont.)

1.i. store **metadata** with **the captured digital images**, wherein the metadata comprises **the determined type of the exception event**; and

sensors throughout the vehicle, each of which collects **data related to vehicle characteristics and performance**. The on-board data bus may include **information about drive train and transmission, engine operational status, brakes, lights, et cetera**. The on-board data bus is useful in vehicle event recorders for providing **additional data and information, which relate to the status of a vehicle, subsystems and engine conditions at a particular time of interest, for example in association with a traffic accident**.” *SmartDrive2* at col. 13:44-56

“Alternatively, accelerometers can detect **very strong movements such as a car swerving or breaking excessively hard, or a direct collision**. In these situations, the events may be declared important and the accelerometer will provide the signal upon which the microprocessor will act to preserve **images recently captured and those captured soon after the event**.” *SmartDrive2* at col. 12:54-60

“A recorder unit may be equipped with GPS receiving system 510. At all times, a GPS receiving system can provide **a position signal** to the microprocessor for recording. **Position determination results** can be recorded by these versions of vehicle event recorders to associate **measured location** with **accident video**. Further, the system sometimes includes an electronic compass device, which can measure **the direction of a reference axis associated with the vehicle**. Thus, one can tell precisely **in which direction the vehicle is pointing at various recording intervals** and this **information** can be similarly recorded.” *SmartDrive2* at col. 15:4-14

“Push services may provide information to applications that process this type of information and respond thereto by amending or augmenting certain records maintained by the entire system. For example, **information from weather reporting agencies** may be transmitted to these applications. The applications then sort and process **the weather information**, taking important pertinent parts, for example, **weather conditions in certain areas at a certain time may be associated with a particular accident** recorded by a vehicle event recorder.” *SmartDrive2* at col. 21:20-29

1.j. provide a response to the exception event.

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“The stored image data with the overlaid vehicle data can be used to determine how well the driver is driving, and subsequently to train the driver, preferably by **providing feedback** to the driver. **Feedback can be provided to the driver in the form of replaying the image data with the overlaid vehicle data** to the driver, preferably replaying portions of the image data that correspond to **one or more incidents**. The feedback may be provided by feedback mechanism, for example a visual display.” *Airmax* at par. 0011

“Identification of **an incident** in itself may be capable of being used to **provide feedback** to the driver. For example, **an incident that illustrates heavy breaking by a driver** may indicate that the driver has left an insufficient stopping distance, and **appropriate training may be provided.**”
Airmax at par. 0021

“Occurrence of **an incident** may trigger the method to **transmit the image data with the overlaid vehicle data from the on-vehicle memory to an off-vehicle location**, other examples of triggers may include, a driver initiated trigger, a third party sending an interrogation signal to the vehicle, the expiry of a predefined period of time since the last transmission of data, etc.” *Airmax* at par. 0024

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“An ‘event trigger’ is a system devised to detect a **prescribed physical condition** and provide an electronic signal in response thereto; the electronic signal being coupled to another system which may be **set into action** as a result of having received the event trigger signal.”
SmartDrive1 at par. 0035

“When an event trigger occurs, **a memory transfer operation** is executed. **Data in the managed loop memory is transferred to a high-capacity buffer memory** in response to **an event** having been detected. Thus the relationship between the managed loop memory and the high-capacity buffer memory can be characterized in that they are coupled by way of the event trigger which causes **a transfer of data** therebetween.” *SmartDrive1* at par. 0045

“An event trigger is a system provided to sense and detect **occurrence of some event of interest**. **An event of interest** may be for example **an automobile traffic accident**. In this

(cont.)

1.j. provide a response to the exception event.

case accelerometers respond to **abrupt changes in motion** and provide the video event recorder with a signal to indicate that **video data should be preserved and transferred to the high capacity buffer memory.**”

SmartDrive1 at par. 0048

“An event trigger is a mechanism which detects a **prescribed physical condition** and sets a **data transfer action** into motion in response thereto. An event trigger causes a **data transfer between a managed loop memory stage and an on-board buffer memory stage**. An event trigger may be arranged to detect a **condition such as an automobile crash**. When a **car crashes**, it generally suffers an **abrupt motion** detectable via motion transducers such as accelerometers. As such, an accelerometer can provide a signal to cause a **data transfer** in response to a **traffic accident**.” *SmartDrive1* at par. 0068

“It is possible to arrange an event trigger as responsive to **aggressive driving such as abrupt swerving motions**. Event triggers might be arranged in conjunction with **excessive braking maneuvers**. Thus, **not only accidents but other general vehicle misuse** might be captured in recorded video as various types of event triggers cause **data to be transferred to a buffer and preserved**.” *SmartDrive1* at par. 0069

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“Event Trigger: A system devised to detect a **predetermined physical condition** and provide an **electronic signal** in response thereto, **the electronic signal being coupled to another system that may be set into action by receiving the event trigger signal**.” *SmartDrive2* at col. 6:4-8

“Particularly worthy of mention among these functions is ‘event handling’, wherein an event trigger causes **execution of a computer routine and an image or image series collected by a camera is transferred from a temporary short-term buffer memory to a durable and lasting memory**, where it may be stored for a considerable period of time. Thus, the microprocessor is responsive to an event trigger such as an accelerometer and a predetermined threshold, which detects **abrupt movements** and sets the microprocessor into action to **transfer stored data from one memory to another**.” *SmartDrive2* at col. 11:54-59

(cont.)

1.j. provide a response to the exception event.

“Event triggers include means for sensing an important event and in response thereto activating the microprocessor to perform save operations, preserving images associated with the detected important event. Event triggers may be arranged about various systems including an on-board data bus, accelerometers, a panic button, or a time interval trigger. An onboard data bus may be arranged as an event trigger when some measured parameter exceeds a prescribed threshold to indicate the occurrence of some condition. When the threshold is exceeded, an electronic signal can be provided to the microprocessor queuing it to handle images accordingly.”

SmartDrive2 at col. 12:43-54

“When a threshold is exceeded, the systems of the present invention can be arranged to send an e-mail notice to roadway engineers, notifying them of the dangerous condition.” *SmartDrive2* at col. 17:40-43

“Another module of the server includes an e-mail server 710 system, which can be arranged to respond to special conditions and events occurring in related applications 711, whereby e-mail messages can be sent on the internet.”

SmartDrive2 at col. 20:57-60