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(54) **SAFETY CONTROL SYSTEM FOR VEHICLES**

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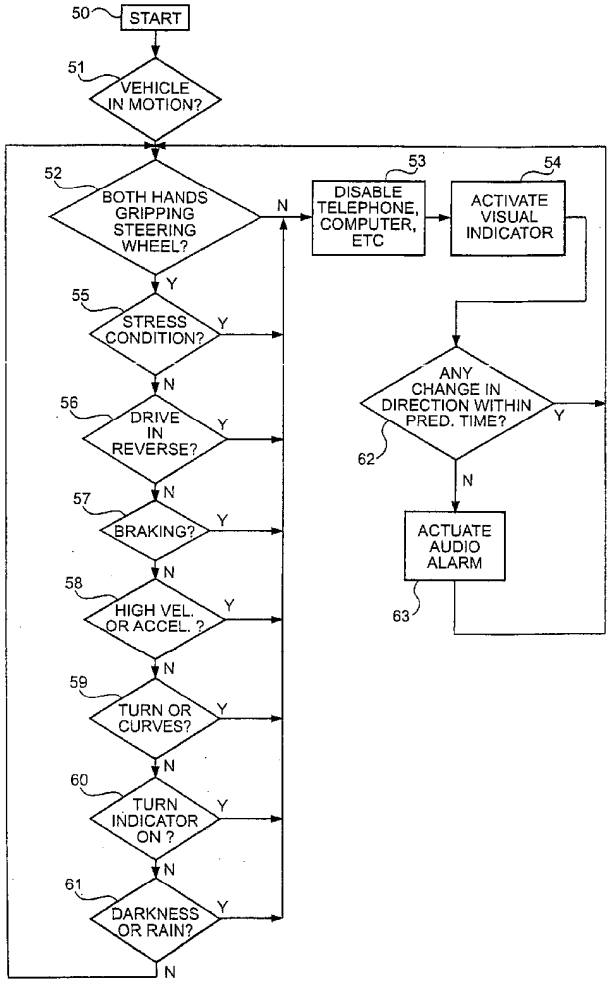
(57) **ABSTRACT**

According to one aspect of one embodiment of the present invention, a safety control system for vehicles, includes, a communication device having at least one of an input accessible from within the vehicle and an output communicated within the vehicle, at least one sensor operable to sense at least one condition related to vehicle operation, and a controller communicated with the sensor and the communication device to selectively suppress at least one of said input and said output in response to a sensed parameter of said at least one condition being outside of a threshold. When an input is suppressed, the driver is prevented from accessing or inputting information into the communication device. When an output is suppressed, communication between the device and the driver of a vehicle is suppressed to, among other things, avoid distracting the driver during certain driving situations or conditions relating to the driver, vehicle and/or environment.



making a turn, subsequent momentary pull up or momentary push down on the lever will move the corresponding mirror further out to scan the vehicle blind spot.

[0039] Other sensors may include sensor S4 sensing the condition of the gas pedal 7 and/or vehicle speed or acceleration; sensor S5 sensing the condition of the braking pedal 8; and sensor S6 sensing the condition of the transmission or other type torque converter 6.

[0040] Also schematically illustrated in FIG. 1 are sensors S7 and S8 carried to sense the proximity of the vehicle with respect to another vehicle; sensor S9 sensing darkness or alternatively sensing the activation of the headlight; and sensor Si0 sensing weather conditions rain, sleet, snow, ice, temperature and/or sensing the activation of the front or rear wipers or headlight wipers.

[0041] As will be described more particularly below, the foregoing sensors (or signals) are generally effective only when the vehicle is moving to sense their respective conditions and to execute certain control functions in order to decrease the possibility of an accident. One important control function is to disable an incoming call from ringing the telephone 10, and the computer or other telematics portable or built in 11 from accessing the Internet or announcing incoming signals, e.g. page, e-mail etc., and to indicate same by actuating a visual indicator and an audio feedback if a driver attempts to initiate telematics during an unsafe or a high risk condition, and may direct a driver to alternative driving habit to gain access to telematics. The system may also suppress delivery of unnecessary external signals such as certain vehicle warning lights or alarms, the system will restore function of the input/output devices when conditions are normalized and will notify driver of all missed activities. In some cases, such as where a drowsiness condition is sensed, an audio alarm 9 is actuated. Other possible alarms to overcome driver drowsiness would include vibration in the seat, changing HVAC temperature settings and blower speed to extremes, etc.

[0042] FIG. 2 more particularly illustrates the sensors S1, S2 mounted on the steering wheel 4. As shown in FIG. 2, the two sensors are mounted on or between the "two" and "ten" and the "three" and "nine" clock positions of the steering wheel 4; the "two" and "ten" positions are considered to be the most preferred ones for the two hands of the driver in order to manipulate the steering wheel, but other positions could be employed, such as "nine and fifteen", which provide more clearance for activated airbags. The two sensors S1, S2 thus sense the proper positioning of the two hands of the driver on the steering wheel 4.

[0043] The two sensors S1, S2, which may be attached to or embedded in the steering wheel, may be simple electrical switches that are actuated by the respective hand of the driver when properly placed on the steering wheel.

[0044] Preferably, however, one or both of the sensors S1, S2 or other sensors are also capable of sensing a physiological condition of the driver, such as the gripping force applied by the driver's hand, or the pulse rate, blood pressure, blood oxygen level, temperature and/or electrical skin conductivity of the driver's hand while gripping the steering wheel. For example, sensor S1 could include a transducer for converting pressure to an electrical signal, such as a spring-type, carbon-type transducer, optical type or semiconductor type. Sensor S2 could include one or more transducers, such as known in finger probes, for sensing pulse rate, temperature, and/or electrical skin conductivity, and for outputting an electrical signal corresponding to the magnitude of the sensed condition, as described for example in U.S. Pat. Nos. 6,319,205; 5,438,986; 5,065,749; 4,860,759; 6,415,176 or 5,897,505, the contents of which are incorporated herein by reference.

[0045] As will be described more particularly below, sensors S1 and S2 thus sense that both driver's hands are present on both sides of the steering wheel 4 to enable operation of the telephone 10 and the computer 11 or similar multi-function or standalone telematics or other devices. Thus, the telephone 10 can be permitting "hands free operation" or a telephone/telematics system that can be used as such with an adapter or when docked to the system gateway, as required by-many laws to avoid accidents, but also the driver is permitted to use the telephone only in a "hands free" manner, thereby precluding the driver from gripping a telephone to operate it even though the telephone or the telematics system may have a "hands free" capability. While the presently preferred implementation requires actuation of both sensors S1 and S2, the system could be modified to permit use with only one sensor. This will permit use by drivers having only one hand. Requiring presence of at least one hand on the steering member 3 reduces the likelihood of unintended system activation such as may occur, for example, with voice activated systems that can be activated by any sound within a given range or frequency.

[0046] In addition, by providing sensor S1 and/or sensor S2 with the capability of sensing a physiological condition of the driver while gripping the steering wheel, other conditions can be sensed to disable the telephone for further reducing the possibility of an accident. For example, the gripping force applied by one or both hands of the driver may indicate a stress condition of the driver. A stressed condition may be also indicated by the sensed pulse rate, temperature and/or electrical skin conductivity (the latter indicating perspiration) of the driver. If a stress condition is sensed, the telephone 10 is disabled so as to decrease the possibility that the ringing noise of an incoming telephone call will so distract the stressed driver as to create a hazardous condition, or that the making of an outgoing call by the driver will be so distracting to the stressed driver as to create a hazardous condition. Whereas as a matter of standard all alarms are designed to attract attention, e.g. buzzers, ringers, flashing lights, etc., all of these alarms are muted by the gateway and the gateway will communicate all alarms and notification to the driver via driver selected method, e.g. visual, audio or both.

[0047] The provision of a grip sensor on the steering wheel also enables the system to sense drowsiness or dozing of the driver, as in U.S. Pat. No. 4,485,375, incorporated herein by reference. Thus, if the gripping force sensed by sensor S1 and/or sensor S2 drops while the vehicle is in motion, this could indicate a drowsiness condition. If such a condition is sensed, the audio alarm 9, which may be a separate alarm or a radio volume control or hvac blower and temperature control, or alternatively a vibrator, may be activated, together with a visual indicator in an attempt to arouse the driver and to alert the driver to the drowsiness condition. When drowsiness is sensed, the telephone 10 would not be disabled since the ringing of an incoming call