A COLLISION WARNING SYSTEM AND METHODS THEREOF

FIELD OF THE INVENTION

[1] The present invention pertains to collision warning systems, modules and IOTs, and to methods thereof.

BACKGROUND OF THE INVENTION

[2] Rear-end collisions account for almost 30% of automotive crashes. Rear-end collision avoidance systems (RECASs) may offer a promising approach to help drivers avoid these crashes. An early RECAS warning reduced the number of collisions by 80.7%. Assuming collision severity is proportional to kinetic energy, the early warning reduced collision severity by 96.5%. In contrast, the late warning reduced collisions by 50.0 % and the corresponding severity by 87.5%, see Lee, John D., et al. "Collision warning timing, driver distraction, and driver response to imminent rear-end collisions in a high-fidelity driving simulator." *Human factors* 44.2 (2002): 314-334.

[3] Likewise, effectiveness of a forward collision warning (FCW) was evaluated and found to reduced front-to-rear crash rates 27% and front-to-rear injury crash rates 20%, see Cicchino, Jessica B. "Effectiveness of forward collision warning systems with and without autonomous emergency braking in reducing police-reported crash rates." *Arlington, VA: Insurance Institute for Highway Safety* (2016).

[4] Currently, the collision warning systems configured to alert only one party of a potential bi-party or multi-party accident. Namely, one collision warning system is configured to alert one driver, for example, an FCW is configured to alert the driver onboard the same vehicle as the system, a warning triangle is configured to alert only an approaching vehicle's driver. Hence, designing a system configured to alert and alarm multiple potential parties of a potential car accident, will have a synergistic effect, resulting in a further and substantial increase of prevention and reduction of severity of car accidents and a corresponding drop in a car accidents rate. In addition, configuring such a system to also alert and inform a third party, may result in a more efficient emergency assistance, and informing supervisors and family members. It is this feature of alerting and alarming multiple potential parties of a potential car accident and possibly a third party simultaneously constitutes the essence of this collision warning system invention.

[5] Hence, a collision warning system for use onboard a rear portion of a vehicle, configured to concurrently alarming both the driver of the first vehicle and drivers in the rear before collisions and possibly recording the event is still a long felt need.

SUMMARY OF THE INVENTION

[6] It is an object of the invention to disclose a collision warning system for use onboard a rear portion of a vehicle, wherein the system comprising a housing, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with the sensors and alarms, with possibly one or more members of a group consisting of the first vehicle audio-video system, the first vehicle onboard horn, and the first vehicle onboard cameras; the processor configured for continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and possibly, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), recording without alarming.

[7] It is another object of the invention to disclose a collision warning system for use onboards a rear portion of a vehicle. The system comprising a housing, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and a processor, interconnected with the sensors and alarms, with possibly one or more members of a group consisting of the first vehicle audio-video system, the first vehicle onboard horn, and the

first vehicle onboard cameras; wherein the processor configured for; continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; possibly, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), recording without alarming.

[8] It is another object of the invention to disclose a collision warning system for use onboards a rear portion of a vehicle. The system comprising a housing, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with the sensors and alarms, with possibly one or more members of a group consisting of the first vehicle audio-video system, the first vehicle onboard horn, and the first vehicle onboard cameras; the processor configured for continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; wherein the processor is provided, if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, for alarming and recording; and possibly, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), recording without alarming.

[9] It is another object of the invention to disclose a collision warning for use onboards a rear portion of a vehicle. The system comprising: a housing, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with the sensors and alarms, with possibly one or more members of a group consisting of the first vehicle audio-video system, the first vehicle onboard horn, and the first vehicle onboard cameras; the processor configured for continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; wherein the processor is provided, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), for recording without alarming.

[10] It is another object of the invention to disclose an anti-collision system for use onboards a rear portion of a vehicle. The system comprising: a housing, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with the sensors and alarms, with possibly one or more members of a group consisting of the first vehicle audio-video system, the first vehicle onboard horn, and the first vehicle onboard cameras; the first vehicle onboard HUD (Heads-Up Display), the first vehicle onboard GPS navigation software application, the processor configured for; continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion

of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; possibly, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), than recording without alarming.

[11] It is another object of the invention to disclose the system as defined in any of the above, wherein the processor is configured for alarming driver of the first vehicle and/or autonomous driving system thereof by means of the onboard HUD, the onboard GPS navigation software application and any combination thereof.

[12] It is another object of the invention to disclose the system as defined in any of the above, wherein the processor is configured identifying a second vehicle driving license by means vehicle's rear camera and/or GPS navigation software application.

[13] It is another object of the invention to disclose the system as defined in any of the above, wherein the display is selected from a group consisting of helmet mounted display (HMD), add-on HUD, HUD navigation system and any surface display system thereof.

[14] It is another object of the invention to disclose an anti-collision warning triangle for use onboard a rear portion of a vehicle, comprising: a housing, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with the sensors and alarms, configured for continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and if TTC $\geq C_{t+}D_t$,

namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), than recording without alarming.

[15] It is another object of the invention to disclose a vehicle, comprising vehicle body; a housing; characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with the sensors and alarms, configured for continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and possibly, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), than recording without alarming.

[16] It is another object of the invention to disclose an anti-collision safety protective gear, wherein the protective gear comprising an outer shell; in connection with the shell, an collision warning system, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with the sensors and alarms, with possibly one or more members of a group consisting of the first vehicle audio-video system, the first vehicle onboard horn, and the first vehicle onboard cameras; the processor configured for continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining,

based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and possibly, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), recording without alarming.

[17] It is another object of the invention to disclose the system as defined in any of the above, wherein protective gear is selected from a group consisting of hamlet, riding jacket, wearable items, gloves, shoos, watch, eyes protectors and any combination thereof.

[18] It is another object of the invention to disclose an anti-collision taillight, wherein the taillight comprising: lamp's body, in connection with the body, a collision warning system comprising a housing, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with the sensors and alarms, configured for continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (Dt), than recording without alarming.

[19] It is another object of the invention to disclose a vehicle, comprising: vehicle body; a taillight wherein at least one the taillight comprising a lamp a housing an anti-collision system; comprising a housing, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording

camera; an audio alarm; and light alarm; and, a processor, interconnected with the sensors and alarms, configured for continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (Dt), than recording without alarming.

[20] It is another object of the invention to disclose an anti-collision vehicular warning beacon for use onboard a top portion of a vehicle, wherein the beacon comprising: beacon's body; interconnected with the beacon's body is a collision warning system comprising a housing, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with the sensors and alarms, configured for continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (Dt), than recording without alarming.

[21] It is another object of the invention to disclose the system as defined in any of the above, wherein the lamp is one or more members of a group consisting of rear flashlight, license plate light, center

high mount stop-lamp (CHMSL); emergency stop signal (ESS), side blinkers and any combination thereof.

[22] It is another object of the invention to disclose the system as defined in any of the above, wherein shape of the rim is selected from a group consisting of triangular, warning triangle, pyramid, triangular pyramid, polygonal shape having *n* facets, *n* is ranging 3 to 18, a curved figure, a palm of hand-like figure, baby-like figure, text, figures, including seconds or meters to collusion, clock, stopper, animated figure(s) and any combination thereof.

[23] It is another object of the invention to disclose the system as defined in any of the above, wherein sensors and alarms are located within the rim portion, the core portion, both or therebetween.

[24] It is another object of the invention to disclose the system as defined in any of the above, wherein the alarm is selected from a group consisting audio alarm (e.g., emitting voice or sound); light alarm (e.g., emitting light); vibrating alarm and any combination thereof.

[25] It is another object of the invention to disclose the system as defined in any of the above, wherein the rim and the core interconnected with the rear portion of the first vehicle by means selected from a group consisting of a clamp, fastener, Velcro™, suction cup, sticker, magnet, clippers and any combination thereof.

[26] It is another object of the invention to disclose the system as defined in any of the above, wherein the sensor is selected from one or more members of a group consisting of radar, radar distance sensor, laser, phase radar, lidar device, laser distance meter, accelerometer(s) including MEMS accelerometer and any combination, array, arrangement, and spatial configuration thereof.

[27] It is another object of the invention to disclose the system as defined in any of the above, wherein the sensors and alarms are integratable into, onto, adjacent or in connection with the first vehicle's one or more members of a group consisting of rear flashlight, license plate, center high mount stop lamp (CHMSL); emergency stop signal (ESS) rear window, and any combination thereof.

[28] It is another object of the invention to disclose the system as defined in any of the above, wherein the processor and alarm are configured for alarming the first vehicle driver and/or autonomous driving system by means selected from a group consisting of the audio alarm; the onboard audio-video system; the onboard HUD; the onboard the first vehicle GPS navigation software application and any combination thereof.

[29] It is another object of the invention to disclose the system as defined in any of the above, wherein the processor and sensor(s) are configured for identifying the second vehicle driving license by

means selected from a group consisting of first vehicles' a rear camera, the system's camera, GPS navigation software application and any combination thereof.

[30] It is another object of the invention to disclose the system as defined in any of the above, wherein the processor and sensor(s) are configured for alarming driver and/or autonomous driving system of the at least one second vehicle by means selected from a group consisting of the light alarms, first vehicle onboard horn, the GPS navigation software application and any combination thereof.

[31] It is another object of the invention to disclose the system as defined in any of the above, wherein the processor is configured for recording the at least one second vehicle approaching the rear portion of the first vehicle and storing the data by means selected from a group consisting of the system's camera, the first vehicle onboard rear and side cameras and any combination thereof.

[32] It is another object of the invention to disclose the system as defined in any of the above, wherein by means of a rear or side cameras, identifying second vehicle driving license, hence, by cellular communication, alerting the at least one second vehicle's driver and/or autonomous driving system and/or a third party, including the at least one second vehicle's owner thereof, supervisor thereof, police, road managers, car fleet manager, emergency forces and any combination thereof.

[33] It is another object of the invention to disclose the system as defined in any of the above, wherein at a time period being a member of a group consisting of real time, beforehand and after a suspected collision, and by means of the processor provided in communication with at least one communication module, e.g., a mobile phone, sending the hereto recorded video-audio data to a remote third party.

[34] It is another object of the invention to disclose the system as defined in any of the above, wherein the third party is selected from a group consisting of the first vehicle, and/or the at least one second vehicle's owners, supervisors thereof, insurance companies, police, emergency forces, road managers, car fleet manager, and any combination thereof.

[35] It is another object of the invention to disclose the system as defined in any of the above, wherein the processor interconnected with the sensors and alarms by means selected from a group consisting of wires, wireless communication, including BT, Blu-Ray, Radio, UV, IR and any combination thereof.

[36] It is another object of the invention to disclose the system as defined in any of the above, wherein the vehicular beacon's body is a vehicle mounted beacon, vehicle mounted lamp, vehicle mounted light, vehicle mounted light bar vehicle mounted illuminated sing or any combination thereof.

[37] It is another object of the invention to disclose for warning before collision, the methods comprising steps of providing a housing, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; providing a processor, interconnected with the sensors and alarms, with possibly one or more members of a group consisting of the first vehicle audio-video system, the first vehicle onboard horn, and the first vehicle onboard cameras; and configuring the processor for; continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and possibly, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), recording without alarming.

[38] It is another object of the invention to disclose for warning before collision, the methods comprising steps of providing a housing, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; providing a processor, interconnected with the sensors and alarms, with possibly one or more members of a group consisting of the first vehicle audio-video system, the first vehicle onboard horn, and the first vehicle onboard cameras; the first vehicle onboard HUD (Heads-Up Display), the first vehicle onboard GPS navigation software application, and, providing the processor configured for; continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at

least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and possibly, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), than recording without alarming.

[39] It is another object of the invention to disclose the method as defined above, wherein it comprising step of configuring the processor for alarming driver of the first vehicle and/or autonomous driving system thereof by means of the onboard HUD, the onboard GPS navigation software application and any combination thereof.

[40] It is another object of the invention to disclose the method as defined in any of the above, wherein the method further comprising step of configuring the processor for identifying a second vehicle driving license by means vehicle's rear camera and/or GPS navigation software application.

[41] It is another object of the invention to disclose the method as defined in any of the above, wherein the display is selected from a group consisting of helmet mounted display (HMD), add-on HUD, HUD navigation system and any surface display system thereof.

[42] It is another object of the invention to disclose for providing a vehicle with collision warning system, the methods comprising steps of providing a vehicle with a vehicle body; a housing; characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with the sensors and alarms, configuring the processor for continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than

alarming and recording; and possibly, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), than recording without alarming.

[43] It is another object of the invention to disclose for providing protective gear with an anti-collision system; the method comprises steps of providing a protective gear comprising an outer shell; in connection with the shell, providing an collision warning system, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with the sensors and alarms, with possibly one or more members of a group consisting of the first vehicle audio-video system, the first vehicle onboard horn, and the first vehicle onboard cameras; configuring the processor for continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and possibly, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), recording without alarming.

[44] It is another object of the invention to disclose the method as defined in any of the above, wherein the gear is selected from a group consisting of hamlet, riding jacket, wearable items, gloves, shoos, watch, eyes protectors and any combination thereof.

[45] It is another object of the invention to disclose for providing a taillight with anti-collision system. The method comprises steps of providing lamp's body, providing in connection with the body, a collision warning system comprising a housing, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; providing a

processor, interconnected with the sensors and alarms, and configuring the professor for continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq TTC$, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and if $TTC \geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (Dt), than recording without alarming.

[46] It is another object of the invention to disclose for warning before collision, the methods comprising steps of providing a vehicle with vehicle body; a taillight wherein at least one the taillight comprising a lamp a housing an anti-collision system; comprising a housing, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, providing a processor, interconnected with the sensors and alarms, configured for continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq TTC$, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and if $TTC \geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (Dt), than recording without alarming.

[47] It is another object of the invention to disclose for warning before collision, the methods comprising steps of providing an anti-collision vehicular warning beacon for use onboard a top portion of a vehicle, wherein the method comprising steps of providing a beacon with beacon's body; interconnecting the same with the beacon's body is a collision warning system comprising a housing, characterized by pre-shaped rim portion, and a core portion; the housing further comprises sensors and alarms, including a radar for measuring time resolved distance between the first vehicle and at least one second vehicle approaching the first vehicle's rear; a video recording camera; an audio alarm; and light alarm; providing a processor, interconnected with the sensors and alarms, and configuring the same for continuously calculating movement parameters of the first vehicle and the at least one second vehicle's; the movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of the second vehicles, relative velocities of the first and at least a portion of the second vehicles, accelerating of the vehicle, relative accelerations of the first and at least a portion of the second vehicles and any combination thereof; determining, based on the time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle; if $C_t \geq TTC$, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and if $TTC \geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (Dt), than recording without alarming.

[48] It is another object of the invention to disclose the method as defined in any of the above, wherein the method further comprising steps of providing the rim with a shape selected from a group consisting of triangular, warning triangle, pyramid, triangular pyramid, polygonal shape having *n* facets, *n* is ranging 3 to 18, a curved figure, a palm of hand-like figure, baby-like figure, text, figures, including seconds or meters to collusion, clock, stopper, animated figure(s) and any combination thereof.

[49] It is another object of the invention to disclose the method as defined in any of the above, wherein the method further comprising steps of locating the sensors and alarms within the rim portion, the core portion, both or therebetween.

[50] It is another object of the invention to disclose the method as defined in any of the above, wherein the method further comprising steps of selecting the alarm from a group consisting audio alarm

(e.g., emitting voice or sound); light alarm (e.g., emitting light); vibrating alarm and any combination thereof.

[51] It is another object of the invention to disclose the method as defined in any of the above, wherein the method further comprising steps of interconnecting the rim and the core interconnected with the rear portion of the first vehicle by means selected from a group consisting of a clamp, fastener, Velcro™, suction cup, sticker, magnet, clippers and any combination thereof.

[52] It is another object of the invention to disclose the method as defined in any of the above, wherein the method further comprising steps of selecting the sensor from one or more members of a group consisting of radar, radar distance sensor, laser, phase radar, lidar device, laser distance meter, accelerometer(s) including MEMS accelerometer and any combination, array, arrangement, and spatial configuration thereof.

[53] It is another object of the invention to disclose the method as defined in any of the above, wherein the method further comprising steps of integrating the sensors and alarms into, onto, adjacent or in connection with the first vehicle's one or more members of a group consisting of rear flashlight, license plate, center high mount stop lamp (CHMSL); emergency stop signal (ESS) rear window, and any combination thereof.

[54] It is another object of the invention to disclose the method as defined in any of the above, wherein the method further comprising steps of configuring the processor and alarm are for alarming the first vehicle driver and/or first vehicle autonomous driving system by means selected from a group consisting of the audio alarm; the onboard audio-video system; the onboard HUD; the onboard the first vehicle GPS navigation software application and any combination thereof.

[55] It is another object of the invention to disclose the method as defined in any of the above, wherein the method further comprising steps of configuring processor and sensor(s) for identifying the second vehicle driving license by means selected from a group consisting of first vehicles' a rear camera, the system's camera, GPS navigation software application and any combination thereof.

[56] It is another object of the invention to disclose the method as defined in any of the above, wherein the method further comprising steps of configuring the processor and sensor(s) for alarming first vehicle driver and/or first vehicle autonomous driving system of the at least one second vehicle by means selected from a group consisting of the light alarms, first vehicle onboard horn, the GPS navigation software application and any combination thereof.

[57] It is another object of the invention to disclose the method as defined in any of the above, wherein the method further comprising steps of configuring the processor for recording the at least one second vehicle approaching the rear portion of the first vehicle and storing the data by means selected from a group consisting of the system's camera, the first vehicle onboard rear and side cameras and any combination thereof.

[58] It is another object of the invention to disclose the method as defined in any of the above, wherein the method further comprising steps of identifying second vehicle driving license by means of a rear or side cameras, hence, by cellular communication, alerting the at least one second vehicle's driver and/or first vehicle autonomous driving system and/or a third party, including the at least one second vehicle's owner thereof, supervisor thereof, police, road managers, car fleet manager, emergency forces and any combination thereof.

[59] It is another object of the invention to disclose the method as defined in any of the above, wherein at a time period being a member of a group consisting of real time, beforehand and after a suspected collision, and by means of the processor provided in communication with at least one communication module, e.g., a mobile phone, sending the hereto recorded video-audio data to a remote third party.

[60] It is another object of the invention to disclose the method as defined in any of the above, wherein the third party is selected from a group consisting of the first vehicle, and/or the at least one second vehicle's owners, supervisors thereof, insurance companies, police, emergency forces, road managers, car fleet manager, and any combination thereof.

[61] It is another object of the invention to disclose the method as defined in any of the above, wherein the method further comprising steps of interconnecting the processor with the sensors and alarms by means selected from a group consisting of wires, wireless communication, including BT, Blu-Ray, Radio, UV, IR and any combination thereof.

[62] It is another object of the invention to disclose the method as defined in any of the above, wherein vehicular beacon's body is a vehicle mounted beacon, vehicle mounted lamp, vehicle mounted light, vehicle mounted light bar vehicle mounted illuminated sing or any combination thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[63] The invention will now be described with reference to the drawings, wherein **FIG. 1** to **Fig. 14** are schematic depictions of several non-limiting embodiments of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[64] The present invention thus discloses a synergistic warning system for use onboard a rear portion of a vehicle. The system *inter alia* comprises a housing, and a processor. In one embodiment of the invention, at least a portion of the system is enabled in or in a connection with a wearable IOT. In another embodiment of the invention, non-transitory computer-readable storage device is in connection or in an online communication with the processor. Processor is configured for continuously calculating movement parameters of first vehicle and at least one second vehicle's parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of second vehicles, relative velocities of said first and at least a portion of second vehicles, accelerating of vehicle, relative accelerations of said first and at least a portion of second vehicles and any combination thereof. The processor is further configured for determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between first vehicle and at least one second vehicle. The processor is further configured, if Ct ≥ TTC, namely TTC equals or lower than critical time (Ct) required to avoid a collision, for alarming and recording. The processor is optionally configured for, if TTC ≥ Ct+Dt, namely TTC equals or lower than critical time (Ct) required to avoid a collision plus additional possibly dangerous time period (Dt), for recording without alarming.

[65] The term "**vehicle**" refers in a non-limiting manner to any machine that transports people, or cargo. Vehicles include wagons, bicycles, motor vehicles (motorcycles, cars, trucks, buses), railed vehicles (trains, trams), watercraft (ships, boats), amphibious vehicles (screw-propelled vehicle, hovercraft), aircraft (airplanes, helicopters) etc.

[66] The term '**time-to-collision**" (TTC) used herein much similarly to terms utilized in the literature, see Vagnoni, Eleonora, et al. "Semantic modulation of time-to-collision judgments." *Neuro-psychologia* 147 (2020): 107588.; Li, Ye, et al. "Analysis of the transition condition of rear-end collisions using time-to-collision index and vehicle trajectory data." *Accident Analysis & Prevention* 144 (2020): 105676.; and Shin, Donghoon, et al. "Development of Deep Learning Based Human-Centered Threat Assessment for Application to Automated Driving Vehicle." *Applied Sciences* 10.1 (2020): 253.

[67] The term "**critical time**" refers in a non-limiting manner to a plurality of seconds, meaning e.g., 1, 2 or 4 seconds, or fractions thereof (milliseconds), depending on velocities and accelerations.

The term "**dangerous time period**" similarly refers in a non-limiting manner to a plurality of seconds, meaning e.g., 1, 2 or 4 seconds or fractions thereof (milliseconds), depending on velocities and accelerations.

[68] Reference is now made to **Figure 1**, disclosing an anti-collision warning system [embodiment 1]; and to **Figure 2**, disclosing an anti-collision warning system [embodiment 2].

[69] In this spirit, an anti-collision system for use onboards a rear portion of a vehicle. A housing characterized by pre-shaped rim portion, and a core portion (**Fig. 1** and **Fig. 2**). The housing comprises processor, sensor(s), alarm(s), video camera and an attachment apparatus, located in the rim (**Fig**. **1**), the core (**Fig 2**) or therebetween. Said rim shape is selected from a group consisting of triangular, warning triangle, pyramid, triangular pyramid, polygonal shape having *n* facets, *n* is ranging 3 to 18, a curved figure, a palm of hand-like figure, baby-like figure, text, figures, including seconds or meters to collusion, clock, stopper, animated figure(s) and any combination thereof.

[70] Reference is now made to **Figure 1**, disclosing an anti-collision warning triangle system. Here is disclosed an anti-collision warning triangle. A pre-shaped triangular rim 3,4 and a core comprising sensor, specifically a radar 1, a camera 2 a light alarm, specifically LED 6. Also in connection with the rim a suction cup to facilitate attachment of the warning triangle to said first vehicle's rear portion.

[71] Reference is now made to **Figure 4** disclosing an anti-collision warning system for use onboard a car. Here, an input of time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear is continuously transmitted from sensor 11 to processor 12. Based on that input, processor 12 determining a TTC (time to collision). If Ct ≥ TTC, namely TTC equals or lower than critical time (Ct) required to avoid a collision, than processor 12 will signal and activate the system's alarms 14 (light alarm, audio alarm) and video camera 13 and will simultaneously signal the onboard horn 21, onboard audio-video system 22 and onboard rear camera 23. Hence, alerting said first vehicle's driver via system's alarms 14, onboard horn 21 and onboard audio-video system 22. Further alerting said at least one second vehicle's driver via system's alarms 14 and onboard horn 21. Correspondingly, processor 12 will signal the system's video camera 13 and the onboard video camera 23 to record. If TTC ≥ Ct+Dt, namely TTC equals or higher than critical time (Ct) required to avoid a collision plus additional possibly dangerous

time period (Dt) than processor 12 will signal and activate the system's video camera 13 and the onboard video camera 23 to record.

[72] Reference is now made to **Figure 5** disclosing a vehicle comprising an intrinsic anti-collision warning system. As such, a vehicle, comprises vehicle body 100. It further comprises an intrinsic anti-collision warning system 10 as described in example 3. Optionally, said processor interconnected with said sensors 11 and alarms 14, system's video camera 13 and on board horn 20, onboard audio-video system 30, onboard rear camera 40 by means selected from a group consisting of wires, wireless communication, including BT, Blu-Ray, Radio, UV, IR and any combination thereof.

[73] Reference is now made to **Figure 2**, disclosing an anti-collision warning system. Here, an anti-collision system for use onboards a rear portion of a vehicle as described is defined, wherein the processor further connected to said first vehicle's onboard HUD (Heads-Up Display), the first vehicle's onboard GPS navigation software application (fig 6). Therefore, If $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than processor 12 will signal and activate the system's alarms 14 (light alarm, audio alarm) and video camera 13 and will simultaneously signal the onboard horn 21, onboard audio-video system 22, onboard rear camera 23, onboard HUD 24 and onboard GPS navigation software application 25. Hence, alerting said first vehicle's driver via system's alarms 14, onboard horn 21 and onboard audio-video system 22, onboard HUD 24 and onboard GPS navigation software application 25. Further alerting said at least one second vehicle's driver via system's alarms 14 and onboard horn 21. Optionally in correspondence, processor 12 will signal GPS navigation software application 25 to identify said at least second vehicle driving plate and license and alerting either or both said second driver or a third party. As per the HUD, the display is selected from a group consisting of helmet mounted display (HMD), add-on HUD, HUD navigation system and any surface display system thereof.

[74] Reference is now made to **Figure 3**, disclosing an anti-collision vehicular beacon. Here, an anti-collision vehicular warning beacon is used onboard a top portion of a vehicle, wherein the beacon comprises: beacon's body 20; interconnected with the beacon's body is a collision warning system 10 as described in example 3. The vehicular beacon's body is a vehicle mounted beacon, vehicle mounted lamp, vehicle mounted light, vehicle mounted light bar vehicle mounted illuminated sing or any combination thereof.

[75] Reference is now made to **Figure 4**, disclosing an anti-collision taillight. Here, an anti-collision taillight, comprises lamp's body 20, in connection with a collision warning system 10 as described in example 3. Said taillight's lamp is one or more members of a group consisting of rear flashlight, license plate light, center high mount stop lamp (CHMSL); emergency stop signal (ESS), side blinkers and any combination thereof.

[76] Reference is now made to **Figure 5**, disclosing a vehicle comprising an intrinsic-anti-collision taillight. A vehicle comprises vehicle's body 100; further comprising a taillight 20 wherein at least one the taillight comprising an intrinsic anti-collision system 10 as described in example 3. Said taillight's lamp is one or more members of a group consisting of rear flashlight, license plate light, center high mount stop lamp (CHMSL); emergency stop signal (ESS), side blinkers and any combination thereof.

[77] Reference is now made to **Figure 11**, discloses a method of warning before collision. The method comprises steps of providing a housing comprises sensors and alarms and a video camera 10, as described in example 1. providing a processor 20, interconnected with the sensors and alarms and onboard a vehicle's systems as described in example 5. continuously calculating movement parameters of the first vehicle and the at least one second vehicle's 30. Obtaining a value indicative of a time-to-collision (TTC), based on the time resolved measurements, that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle 40. If $C_t \geq TTC$, namely TTC equals or lower than critical time (C_t) required to avoid a collision 52, than alarming and recording 70 If $TTC \geq C_{t+}D_t$, namely TTC equals or higher than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t) 51 recording without alarming 60.

[78] Reference is now made to **Figure 12**, discloses a vehicle with with collision warning system method of warning before collision. The method comprises steps of providing vehicle 10 comprising a housing further comprises sensors and alarms and a video camera, as described in example 1. providing a processor 20, interconnected with the sensors and alarms and onboard a vehicle's systems as described in example 5. configuring the processor 30 for continuously calculating movement parameters of the first vehicle and the at least one second vehicle's 40. Obtaining a value indicative of a time-to-collision (TTC), based on the time resolved measurements, that is responsive to a relative acceleration between the first vehicle and the at least one second vehicle 50. If $C_t \geq TTC$, namely TTC equals or lower than critical time (C_t) required

to avoid a collision 62, than alarming and recording 80 If TTC $\geq C_{t+}D_t$, namely TTC equals or higher than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t) 61 recording without alarming 70.

[79] Reference is finally made to **Figure 13** and **14**, each of which discloses further embodiments of the present invention.

[80] Wearable IOT incudes, *inter alia*, smart watches namely watches, typically wristwatches, which furnish functionality that is enhanced beyond timekeeping. For example, some smart watches comprise wearable electronic devices that can execute applications or apps, play back digital media, and furnish Internet connectivity. Some smart watches are further equipped with a Global Positioning System receiver to furnish location-based functionality. Smart watches typically employ a display device for displaying information to a user. Many smart watches further utilize touchscreens to facilitate interaction by the user with information displayed by the display device. Since the smart watch is put on the wrist of the user, it is possible to detect a variety of arm motions of the user. At this time, a variety of commands may correspond to the detected motions such that the user can more easily control the smart watch. In particular, a variety of commands may correspond to a snap motion of the user such that the user can more easily control the smart watch through a simple snap motion. The smart watch is a watch with a built-in intelligent system (or with a smartphone system) which is connected to the Internet to realize multiple functions, and in some cases, it can synchronize the phone calls, messages, emails, photos, music, etc., in the mobile phone. The smart watches on the market currently can be roughly divided into two kinds: one is not with the phone call function, it depends on connecting to the smart phones to realize the multiple functions, and can synchronize and operate the phone calls, messages, emails, photos, music, etc., in the mobile phone; the other is with the phone call function, and it supports inserting an SIM card, and which is essentially a smart phone in the form of a watch.

[81] The present invention hence also discloses a wearable IOT system as defined in any of the above, wherein the wearable item is smart-watch or parts, modules and attachments thereof, such as smart-watch band, face or back portions.

[82] As used herein, and in a non-limiting manner, the term '**smartphone**,' or parts, modules and attachments thereof, such as its case, ear-plug etc., means a mobile apparatus that is capable of running a programmed application suitable for executing the embodied functionality. While suitable traditional smartphones may include products such as, e.g., the iPhone, iPad (Apple, Inc.),

Android-based devices, and other well-known devices and associated operating systems, the term smartphone as discussed and embodied herein is intended to include any digital mobile device such as smartphones, tablets, phablets, smart watches, and other current or future 'smartphone' platforms having similar minimal functionality. In this regard and for the sake of clarity, a 'laptop' computer would not necessarily be covered under the definitional use of the term 'smartphone;' nor would a computing device that could be made 'portable' or 'mobile' by an accompanying apparatus that might give it portability or mobility. Thus, the term 'smartphone' will be used herein (including the claims) to mean devices as discussed within the paragraph above.

[83] The present invention further discloses a wearable IOT system as defined in any of the above, wherein the wearable item is smartphone.

[84] Wherever applicable, the phrase "selected from the group consisting of A, B, and C" can replace the phrase "A, B, C, or any combination of the aforesaid".

[85] The terms "engine", "module", "applications" and/or "**system**" as used herein in the context of computerized functionalities may comprise one or more computer modules. Exemplarily, a module may be a self-contained hardware and/or software component that interfaces with a larger system. A module may comprise a machine or machines (also: computer-) executable program instructions. A module may be embodied by a circuit or a controller programmed to cause the system to implement the method, process and/or operation as disclosed herein. For example, a module may be implemented as a hardware circuit comprising, e.g., custom Very Large Scale Integrated (VLSI) circuits or gate arrays, an Application-specific integrated circuit (ASIC), off-the-shelf semiconductors such as logic chips, transistors, and/or other discrete components. A module may also be implemented in programmable hardware devices such as field programmable gate arrays, programmable array logic, programmable logic devices and/or the like.

[86] Any digital computer system, module and/or engine exemplified herein can be adapted or configured or otherwise programmed to implement a method disclosed herein, and to the extent that the system, module and/or engine is operable to implement such a method, it is within the scope and spirit of the disclosure. Once the system, module and/or engine are programmed to perform particular functions pursuant to computer readable and executable program instructions from program software that implements a method disclosed herein, it in effect becomes a special purpose computer particular to embodiments of the method disclosed herein. The methods and/or

processes disclosed herein may be implemented as a computer program product that may be tangibly embodied in an information carrier including, for example, in a non-transitory tangible computer-readable and/or non-transitory tangible machine-readable storage device. The computer program product may be directly loadable into an internal memory of a digital computer, comprising software code portions for performing the methods and/or processes as disclosed herein.

[87] Additionally, or alternatively, the methods and/or processes disclosed herein may be implemented as a computer program that may be intangibly embodied by a computer readable signal medium. A computer readable signal medium may include a propagated data signal with computer readable program code embodied therein, for example, in baseband or as part of a carrier wave. Such a propagated signal may take any of a variety of forms, including, but not limited to, electro-magnetic, optical, or any suitable combination thereof. A computer readable signal medium may be any computer readable medium that is not a non-transitory computer or machine-readable storage device and that can communicate, propagate, or transport a program for use by or in connection with apparatuses, systems, platforms, methods, operations and/or processes discussed herein.

[88] The terms "non-**transitory computer-readable storage device**" and "non-transitory machine-readable storage device" encompasses distribution media, intermediate storage media, execution memory of a computer, and any other medium or device capable of storing for later reading by a computer program implementing embodiments of a method disclosed herein. A computer program product can be deployed to be executed on one computer or on multiple computers at one site or distributed across multiple sites and interconnected by one or more communication networks.

[89] These computer readable and executable program instructions may be provided to a processor of a general-purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks. These computer readable and executable program instructions may also be stored in a computer readable storage medium that can direct a computer, a programmable data processing apparatus, and/or other devices to function in a particular manner, such that the computer readable storage medium having

instructions stored therein comprises an article of manufacture including instructions which implement aspects of the function/act specified in the flowchart and/or block diagram block or blocks.

[90] The computer readable and executable program instructions may also be loaded onto a computer, other programmable data processing apparatus, or other device to cause a series of operational steps to be performed on the computer, other programmable apparatus or other device to produce a computer implemented process, such that the program instructions which execute on the computer, other programmable apparatus, or other device implement the functions/acts specified in the flowchart and/or block diagram block or blocks.

[91] In the discussion, unless otherwise stated, adjectives such as "**substantially**" and "**about**" that modify a condition or relationship characteristic of a feature or features of an embodiment of the invention, are to be understood to mean that the condition or characteristic is defined to within tolerances that are acceptable for operation of the embodiment for an application for which it is intended.

[92] It is important to note that the method may include is not limited to those diagrams or to the corresponding descriptions. For example, the method may include additional or even fewer processes or operations in comparison to what is described in the figures. In addition, embodiments of the method are not necessarily limited to the chronological order as illustrated and described herein.

[93] Discussions herein utilizing terms such as, for example, "**processing**", "computing", "calculating", "determining", "establishing", "analyzing", "checking", "estimating", "deriving", "selecting", "inferring" or the like, may refer to operation(s) and/or process(es) of a computer, a computing platform, a computing system, or other electronic computing device, that manipulate and/or transform data represented as physical (e.g., electronic) quantities within the computer's registers and/or memories into other data similarly represented as physical quantities within the computer's registers and/or memories or other information storage medium that may store computer-executable program instructions to perform operations and/or processes. The term determining may, where applicable, also refer to "heuristically determining".

[94] It should be noted that where an embodiment refers to a condition of "**critical**" "above a threshold", this should not be construed as excluding an embodiment referring to a condition of

"equal or above a threshold". Analogously, where an embodiment refers to a condition “below a threshold”, this should not to be construed as excluding an embodiment referring to a condition “equal or below a threshold”. It is clear that should a condition be interpreted as being fulfilled if the value of a given parameter is above a threshold, then the same condition is considered as not being fulfilled if the value of the given parameter is equal or below the given threshold. Conversely, should a condition be interpreted as being fulfilled if the value of a given parameter is equal or above a threshold, then the same condition is considered as not being fulfilled if the value of the given parameter is below (and only below) the given threshold.

[95] It should be understood that where the claims or specification refer to "a" or "an" element and/or feature, such reference is not to be construed as there being only one of that elements. Hence, reference to “an element” or “at least one element” for instance may also encompass “one or more elements”.

[96] Terms used in the singular shall also include the plural, except where expressly otherwise stated or where the context otherwise requires.

[97] In the description and claims of the present application, each of the verbs, "**comprise**" "include" and "have", and conjugates thereof, are used to indicate that the object or objects of the verb are not necessarily a complete listing of components, elements or parts of the subject or subjects of the verb.

[98] As used herein, if a machine (e.g., a controller, or a processor in conjunction with a memory) is described as “operable to” perform a task, then, at least in some embodiments, the machine may include components, parts, or aspects (e.g., software) that enable the machine to perform a particular task. In some embodiments, the machine may perform this task during operation. Similarly, when a task is described as being done “in order to” establish a target result, then, at least in some embodiments, carrying out the task may accomplish the target result.

[99] It is noted that the terms “**operable to**” can encompass the meaning of the term “adapted or configured to”. In other words, a machine “operable to” perform a task can in some embodiments, embrace a mere capability (e.g., “adapted”) to perform the function and, in some other embodiments, a machine that is actually made to (e.g., “**configured**”) to perform the function.

[100] Unless otherwise stated, the use of the expression "and/or" between the last two members of a list of options for selection indicates that a selection of one or more of the listed options is appropriate and may be made, and may be used interchangeably with the expressions "at least one of the following", "**any one of the following**" or "one or more of the following", followed by the listing of the options.

[101] It is appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments or example, may also be provided in combination in a single embodiment. Conversely, various features of the invention, which are, for brevity, described in the context of a single embodiment, example and/or option, may also be provided separately or in any suitable sub-combination or as suitable in any other described embodiment, example or option of the invention. Certain features described in the context of various embodiments, examples and/or optional implementation are not to be considered essential features of those embodiments, unless the embodiment, example and/or optional implementation is inoperative without those elements.

[102] The number of elements shown in the Figures should by no means be construed as limiting and is for illustrative purposes only.

[103] Throughout this application, various embodiments may be presented in and/or relate to a range format. It should be understood that the description in range format is merely for convenience and brevity and should not be construed as an inflexible limitation on the scope of the embodiments. Accordingly, the description of a range should be considered to have specifically disclosed all the possible subranges as well as individual numerical values within that range. For example, description of a range such as from 1 to 6 should be considered to have specifically disclosed subranges such as from 1 to 3, from 1 to 4, from 1 to 5, from 2 to 4, from 2 to 6, from 3 to 6 etc., as well as individual numbers within that range, for example, 1, 2, 3, 4, 5, and 6. This applies regardless of the breadth of the range.

[104] Where applicable, whenever a numerical range is indicated herein, it is meant to include any cited numeral (fractional or integral) within the indicated range.

[105] The phrases "**ranging/ranges between**" a first indicate number and a second indicate number and "ranging/ranges from" a first indicate number "to" a second indicate number are used herein

interchangeably and are meant to include the first and second indicated numbers and all the fractional and integral numerals there between.

[106] It should be appreciated that embodiments formed from combinations of features set forth in separate embodiments are also within the scope of the present invention.

[107] While certain features of the invention have been illustrated and described herein, modifications, substitutions, and equivalents are included within the scope of the invention.

[108] Several publications, patents, and patent applications have been cited hereinabove. Each of the cited publications, patents, and patent applications are hereby incorporated by reference in their entireties.

[109] All of the compositions and/or methods disclosed and claimed herein can be made and executed without undue experimentation in light of the present disclosure. While the compositions and methods of this invention have been described in terms of preferred embodiments, it will be apparent to those of skill in the art that variations may be applied to the compositions and/or methods and in the steps or in the sequence of steps of the method described herein without departing from the concept, spirit and scope of the invention. All such similar substitutes and modifications apparent to those skilled in the art are deemed to be within the spirit, scope and concept of the invention as defined by the appended claims.

CLAIMS

I claim

1. A collision warning system for use onboard a rear portion of a vehicle, wherein said system comprising:
    a. a housing, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and,
    b. a processor, interconnected with said sensors and alarms, with possibly one or more members of a group consisting of said first vehicle audio-video system, said first vehicle onboard horn, and said first vehicle onboard cameras; said processor configured for;
        i. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations of said first and at least a portion of said second vehicles and any combination thereof;
        ii. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;
        iii. if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and
        iv. possibly, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), recording without alarming.
2. A collision warning system for use onboards a rear portion of a vehicle, said system comprising:
    a. a housing, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved

distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and,

b. a processor, interconnected with said sensors and alarms, with possibly one or more members of a group consisting of said first vehicle audio-video system, said first vehicle onboard horn, and said first vehicle onboard cameras; wherein said processor configured for;

i. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations of said first and at least a portion of said second vehicles and any combination thereof;

ii. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

iii. if $C_t \geq TTC$, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording;

iv. possibly, if $TTC \geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), recording without alarming.

3. A collision warning system for use onboards a rear portion of a vehicle, said system comprising:

a. a housing, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and,

b. a processor, interconnected with said sensors and alarms, with possibly one or more members of a group consisting of said first vehicle audio-video system, said first vehicle onboard horn, and said first vehicle onboard cameras; said processor configured for;

i. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations of said first and at least a portion of said second vehicles and any combination thereof;

ii. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

iii. wherein said processor is provided, if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, for alarming and recording; and

iv. possibly, if TTC $\geq C_t+D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), recording without alarming.

4. An collision warning for use onboards a rear portion of a vehicle, said system comprising:

a. a housing, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and,

b. a processor, interconnected with said sensors and alarms, with possibly one or more members of a group consisting of said first vehicle audio-video system, said first vehicle onboard horn, and said first vehicle onboard cameras; said processor configured for;

i. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations

of said first and at least a portion of said second vehicles and any combination thereof;

ii. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

iii. if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording;

iv. wherein said processor is provided, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), for recording without alarming.

5. An anti-collision system for use onboards a rear portion of a vehicle, said system comprising:

a. a housing, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and,

b. a processor, interconnected with said sensors and alarms, with possibly one or more members of a group consisting of said first vehicle audio-video system, said first vehicle onboard horn, and said first vehicle onboard cameras; said first vehicle onboard HUD (Heads-Up Display), said first vehicle onboard GPS navigation software application, said processor configured for;

i. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations of said first and at least a portion of said second vehicles and any combination thereof;

ii. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

iii. if $C_t \geq TTC$, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording;

iv. possibly, if $TTC \geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), than recording without alarming.

6. The system of claim 61, wherein said processor is configured for alarming driver of said first vehicle and/or autonomous driving system thereof by means of said onboard HUD, said onboard GPS navigation software application and any combination thereof.

7. The system of claim 61, wherein said processor is configured identifying a second vehicle driving license by means vehicle's rear camera and/or GPS navigation software application.

8. The system of claim v, wherein said display is selected from a group consisting of helmet mounted display (HMD), add-on HUD, HUD navigation system and any surface display system thereof.

9. An anti-collision warning triangle for use onboard a rear portion of a vehicle, comprising:

a. a housing, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and,

b. a processor, interconnected with said sensors and alarms, configured for

i. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations of said first and at least a portion of said second vehicles and any combination thereof;

ii. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

iii. if $C_t \geq TTC$, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and

iv. if $TTC \geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), than recording without alarming.

10. A vehicle, comprising vehicle body; a housing; characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with said sensors and alarms, configured for

a. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations of said first and at least a portion of said second vehicles and any combination thereof;

b. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

c. if $C_t \geq TTC$, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and

d. possibly, if $TTC \geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), than recording without alarming.

11. An anti-collision safety protective gear, wherein said protective gear comprising an outer shell; in connection with said shell, an collision warning system, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with said sensors and alarms, with possibly one or more members of a group consisting of said first vehicle audio-video

system, said first vehicle onboard horn, and said first vehicle onboard cameras; said processor configured for

a. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations of said first and at least a portion of said second vehicles and any combination thereof;

b. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

c. if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and

d. possibly, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), recording without alarming.

12. The protective gear of claim 109, selected from a group consisting of hamlet, riding jacket, wearable items, gloves, shoos, watch, eyes protectors and any combination thereof.

13. An anti-collision taillight, wherein said taillight comprising:

a. lamp's body,

b. in connection with said body, a collision warning system comprising a housing, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and,

c. a processor, interconnected with said sensors and alarms, configured for

i. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations

of said first and at least a portion of said second vehicles and any combination thereof;

ii. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

iii. if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording;

iv. if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (Dt), than recording without alarming.

14. A vehicle, comprising: vehicle body; a taillight wherein at least one said taillight comprising a lamp a housing an anti-collision system; comprising a housing, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and,

a. a processor, interconnected with said sensors and alarms, configured for

i. continuously calculating movement parameters of said first vehicle and said at least one second vehicle’s; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations of said first and at least a portion of said second vehicles and any combination thereof;

ii. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

iii. if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and

iv. if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (Dt), than recording without alarming.

15. An anti-collision vehicular warning beacon for use onboard a top portion of a vehicle, wherein said beacon comprising: beacon's body; interconnected with said beacon's body is a collision warning system comprising a housing, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with said sensors and alarms, configured for

a. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations of said first and at least a portion of said second vehicles and any combination thereof;

b. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

c. if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and

d. if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (Dt), than recording without alarming.

16. The anti-collision warning system according to any one of claims 1-5, 6-11, and 13-15, wherein said lamp is one or more members of a group consisting of rear flashlight, license plate light, center high mount stop lamp (CHMSL); emergency stop signal (ESS), side blinkers and any combination thereof.

17. The anti-collision warning system according to any one of claims 1-5, 6-11, and 13-15, wherein shape of said rim is selected from a group consisting of triangular, warning

triangle, pyramid, triangular pyramid, polygonal shape having *n* facets, *n* is ranging 3 to 18, a curved figure, a palm of hand-like figure, baby-like figure, text, figures, including seconds or meters to collusion, clock, stopper, animated figure(s) and any combination thereof.

18. The anti-collision warning system according to any one of claims 1-5, 6-11, and 13-15, wherein sensors and alarms are located within said rim portion, the core portion, both or therebetween.

19. The anti-collision warning system according to any one of claims 1-5, 6-11, and 13-15, wherein said alarm is selected from a group consisting audio alarm (e.g., emitting voice or sound); light alarm (e.g., emitting light); vibrating alarm and any combination thereof.

20. The anti-collision warning system according to any one of claims 1-5, 6-11, and 13-15, wherein said rim and said core interconnected with said rear portion of said first vehicle by means selected from a group consisting of a clamp, fastener, Velcro™, suction cup, sticker, magnet, clippers and any combination thereof.

21. The anti-collision warning system according to any one of claims 1-5, 6-11, and 13-15, wherein said sensor is selected from one or more members of a group consisting of radar, radar distance sensor, laser, phase radar, lidar device, laser distance meter, accelerometer(s) including MEMS accelerometer and any combination, array, arrangement, and spatial configuration thereof.

22. The anti-collision warning system according to any one of claims 1-5, 6-11, and 13-15, wherein said sensors and alarms are integratable into, onto, adjacent or in connection with said first vehicle's one or more members of a group consisting of rear flashlight, license plate, center high mount stop lamp (CHMSL); emergency stop signal (ESS) rear window, and any combination thereof.

23. The anti-collision warning system according to any one of claims 1-5, 6-11, and 13-15, wherein said processor and alarm are configured for alarming said first vehicle driver and/or autonomous driving system by means selected from a group consisting of said audio alarm; said onboard audio-video system; said onboard HUD; said onboard said first vehicle GPS navigation software application and any combination thereof.

24. The anti-collision warning system according to any one of claims 1-5, 6-11, and 13-15, wherein said processor and sensor(s) are configured for identifying said second vehicle

driving license by means selected from a group consisting of first vehicles' a rear camera, said system's camera, GPS navigation software application and any combination thereof.

25. The anti-collision warning system according to any one of claims 1-5, 6-11, and 13-15, wherein said processor and sensor(s) are configured for alarming driver and/or autonomous driving system of said at least one second vehicle by means selected from a group consisting of said light alarms, first vehicle onboard horn, the GPS navigation software application and any combination thereof.

26. The anti-collision warning system according to any one of claims 1-5, 6-11, and 13-15, wherein said processor is configured for recording said at least one second vehicle approaching the rear portion of said first vehicle and storing said data by means selected from a group consisting of said system's camera, said first vehicle onboard rear and side cameras and any combination thereof.

27. The anti-collision warning system according to any one of claims 1-5, 6-11, and 13-15, wherein by means of a rear or side cameras, identifying second vehicle driving license, hence, by cellular communication, alerting said at least one second vehicle's driver and/or autonomous driving system and/or a third party, including said at least one second vehicle's owner thereof, supervisor thereof, police, road managers, car fleet manager, emergency forces and any combination thereof.

28. The anti-collision warning system according to any one of claims 1-5, 6-11, and 13-15, wherein at a time period being a member of a group consisting of real time, beforehand and after a suspected collision, and by means of said processor provided in communication with at least one communication module, e.g., a mobile phone, sending said hereto recorded video-audio data to a remote third party.

29. The anti-collision warning system according to claim 28, herein said third party is selected from a group consisting of said first vehicle, and/or said at least one second vehicle's owners, supervisors thereof, insurance companies, police, emergency forces, road managers, car fleet manager, and any combination thereof.

30. The anti-collision warning system according to any one of claims 1-5, 6-11, and 13-15, wherein said processor interconnected with said sensors and alarms by means selected from a group consisting of wires, wireless communication, including BT, Blu-Ray, Radio, UV, IR and any combination thereof.

31. The anti-collision warning system according to any one of claims 1-5, 6-11, and 13-15, wherein said vehicular beacon's body is a vehicle mounted beacon, vehicle mounted lamp, vehicle mounted light, vehicle mounted light bar vehicle mounted illuminated sing or any combination thereof.

32. A method for warning before collision, said methods comprising steps of:

a. providing a housing, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm;

b. providing a processor, interconnected with said sensors and alarms, with possibly one or more members of a group consisting of said first vehicle audio-video system, said first vehicle onboard horn, and said first vehicle onboard cameras; and

c. configuring said processor for;

i. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations of said first and at least a portion of said second vehicles and any combination thereof;

ii. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

iii. if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and

iv. possibly, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), recording without alarming.

33. A method for warning before collision, said methods comprising steps of

a. providing a housing, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm;

b. providing a processor, interconnected with said sensors and alarms, with possibly one or more members of a group consisting of said first vehicle audio-video system, said first vehicle onboard horn, and said first vehicle onboard cameras; said first vehicle onboard HUD (Heads-Up Display), said first vehicle onboard GPS navigation software application, and,

c. providing said processor configured for;

i. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations of said first and at least a portion of said second vehicles and any combination thereof;

ii. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

iii. if $C_t \geq TTC$, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and

iv. possibly, if $TTC \geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), than recording without alarming.

34. The method of claim 33, further comprising step of configuring said processor for alarming driver of said first vehicle and/or autonomous driving system thereof by means of said onboard HUD, said onboard GPS navigation software application and any combination thereof.

35. The method of claim 33, further comprising step of configuring said processor for identifying a second vehicle driving license by means vehicle's rear camera and/or GPS navigation software application.

36. The method of claim 33, wherein said display is selected from a group consisting of helmet mounted display (HMD), add-on HUD, HUD navigation system and any surface display system thereof.

37. A method for providing a vehicle with collision warning system, said methods comprising steps of providing a vehicle with a vehicle body; a housing; characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with said sensors and alarms, configuring said processor for

    a. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations of said first and at least a portion of said second vehicles and any combination thereof;

    b. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

    c. if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and

    d. possibly, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), than recording without alarming.

38. A method for providing protective gear with an anti-collision system; said method comprises steps of providing a protective gear comprising an outer shell; in connection with said shell, providing an collision warning system, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a

radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and, a processor, interconnected with said sensors and alarms, with possibly one or more members of a group consisting of said first vehicle audio-video system, said first vehicle onboard horn, and said first vehicle onboard cameras; configuring said processor for

a. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations of said first and at least a portion of said second vehicles and any combination thereof;

b. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

c. if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and

d. possibly, if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (D_t), recording without alarming.

39. The method of claim 38, wherein said gear is selected from a group consisting of hamlet, riding jacket, wearable items, gloves, shoos, watch, eyes protectors and any combination thereof.

40. A method of providing a taillight with anti-collision system; said method comprises steps of

a. providing lamp's body,

b. providing in connection with said body, a collision warning system comprising a housing, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm;

c. providing a processor, interconnected with said sensors and alarms, and

d. configuring said professor for

i. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations of said first and at least a portion of said second vehicles and any combination thereof;

ii. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

iii. if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and

iv. if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (Dt), than recording without alarming.

41. A method for warning before collision, said methods comprising steps of providing a vehicle with vehicle body; a taillight wherein at least one said taillight comprising a lamp a housing an anti-collision system; comprising a housing, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm; and,

a. providing a processor, interconnected with said sensors and alarms, configured for

i. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations

of said first and at least a portion of said second vehicles and any combination thereof;

ii. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

iii. if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and

iv. if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (Dt), than recording without alarming.

42. A method for warning before collision, said methods comprising steps of providing an anti-collision vehicular warning beacon for use onboard a top portion of a vehicle, wherein said method comprising steps of providing a beacon with beacon's body; interconnecting the same with said beacon's body is a collision warning system comprising a housing, characterized by pre-shaped rim portion, and a core portion; said housing further comprises sensors and alarms, including a radar for measuring time resolved distance between said first vehicle and at least one second vehicle approaching said first vehicle's rear; a video recording camera; an audio alarm; and light alarm; providing a processor, interconnected with said sensors and alarms, and configuring the same for

a. continuously calculating movement parameters of said first vehicle and said at least one second vehicle's; said movement parameters are selected from a group consisting of first vehicle velocity the velocity of at least a portion of said second vehicles, relative velocities of said first and at least a portion of said second vehicles, accelerating of said vehicle, relative accelerations of said first and at least a portion of said second vehicles and any combination thereof;

b. determining, based on said time resolved measurements, a value indicative of a time-to-collision (TTC) that is responsive to a relative acceleration between said first vehicle and said at least one second vehicle;

c. if $C_t \geq$ TTC, namely TTC equals or lower than critical time (C_t) required to avoid a collision, than alarming and recording; and

d. if TTC $\geq C_{t+}D_t$, namely TTC equals or lower than critical time (C_t) required to avoid a collision plus additional possibly dangerous time period (Dt), than recording without alarming.

43. The method according to any one of claims 32-33, 37-38, 40-42, wherein said method further comprising steps of providing said rim with a shape selected from a group consisting of triangular, warning triangle, pyramid, triangular pyramid, polygonal shape having *n* facets, *n* is ranging 3 to 18, a curved figure, a palm of hand-like figure, baby-like figure, text, figures, including seconds or meters to collusion, clock, stopper, animated figure(s) and any combination thereof.

44. The method according to any one of claims 32-33, 37-38, 40-42, wherein said method further comprising steps of locating said sensors and alarms within said rim portion, the core portion, both or therebetween.

45. The method according to any one of claims 32-33, 37-38, 40-42, wherein said method further comprising steps of selecting said alarm from a group consisting audio alarm (e.g., emitting voice or sound); light alarm (e.g., emitting light); vibrating alarm and any combination thereof.

46. The method according to any one of claims 32-33, 37-38, 40-42, wherein said method further comprising steps of interconnecting said rim and said core interconnected with said rear portion of said first vehicle by means selected from a group consisting of a clamp, fastener, Velcro™, suction cup, sticker, magnet, clippers and any combination thereof.

47. The method according to any one of claims 32-33, 37-38, 40-42, wherein said method further comprising steps of selecting said sensor from one or more members of a group consisting of radar, radar distance sensor, laser, phase radar, lidar device, laser distance meter, accelerometer(s) including MEMS accelerometer and any combination, array, arrangement, and spatial configuration thereof.

48. The method according to any one of claims 32-33, 37-38, 40-42, wherein said method further comprising steps of integrating said sensors and alarms into, onto, adjacent or in connection with said first vehicle's one or more members of a group consisting of rear flashlight, license plate, center high mount stop lamp (CHMSL); emergency stop signal (ESS) rear window, and any combination thereof.

49. The method according to any one of claims 32-33, 37-38, 40-42, wherein said method further comprising steps of configuring said processor and alarm are for alarming said first vehicle driver and/or first vehicle autonomous driving system by means selected from a group consisting of said audio alarm; said onboard audio-video system; said onboard HUD; said onboard said first vehicle GPS navigation software application and any combination thereof.

50. The method according to any one of claims 32-33, 37-38, 40-42, wherein said method further comprising steps of configuring processor and sensor(s) for identifying said second vehicle driving license by means selected from a group consisting of first vehicles' a rear camera, said system's camera, GPS navigation software application and any combination thereof.

51. The method according to any one of claims 32-33, 37-38, 40-42, wherein said method further comprising steps of configuring said processor and sensor(s) for alarming first vehicle driver and/or first vehicle autonomous driving system of said at least one second vehicle by means selected from a group consisting of said light alarms, first vehicle onboard horn, the GPS navigation software application and any combination thereof.

52. The method according to any one of claims 32-33, 37-38, 40-42, wherein said method further comprising steps of configuring said processor for recording said at least one second vehicle approaching the rear portion of said first vehicle and storing said data by means selected from a group consisting of said system's camera, said first vehicle onboard rear and side cameras and any combination thereof.

53. The method according to any one of claims 32-33, 37-38, 40-42, wherein said method further comprising steps of identifying second vehicle driving license by means of a rear or side cameras, hence, by cellular communication, alerting said at least one second vehicle's driver and/or first vehicle autonomous driving system and/or a third party, including said at least one second vehicle's owner thereof, supervisor thereof, police, road managers, car fleet manager, emergency forces and any combination thereof.

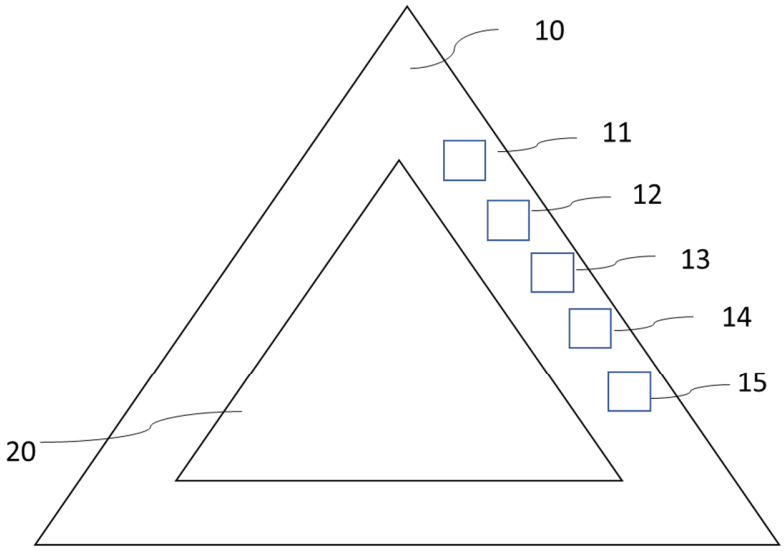
54. The method according to any one of claims 32-33, 37-38, 40-42, wherein at a time period being a member of a group consisting of real time, beforehand and after a suspected collision, and by means of said processor provided in communication with at least one

communication module, e.g., a mobile phone, sending said hereto recorded video-audio data to a remote third party.

55. The method according to any one of claims 32-33, 37-38, 40-42, wherein said third party is selected from a group consisting of said first vehicle, and/or said at least one second vehicle's owners, supervisors thereof, insurance companies, police, emergency forces, road managers, car fleet manager, and any combination thereof.

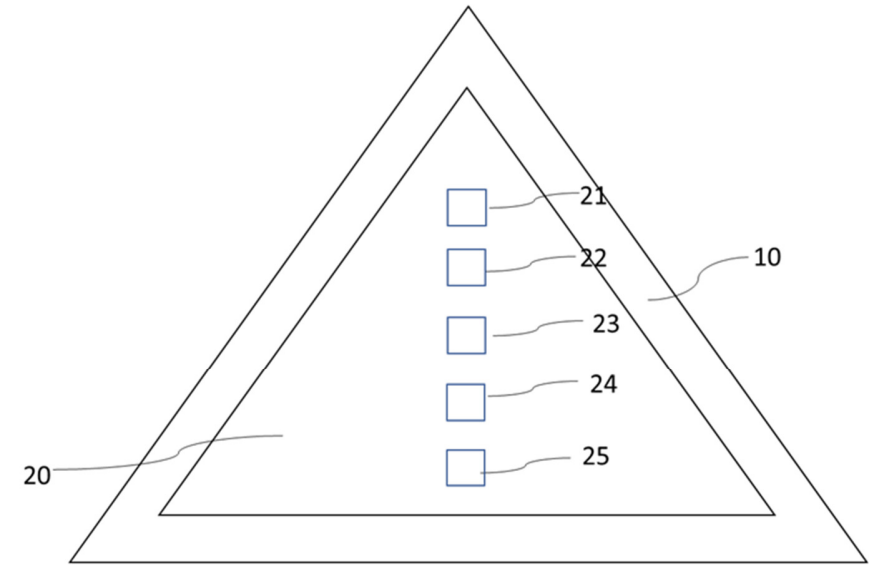
56. The method according to any one of claims 32-33, 37-38, 40-42, wherein said method further comprising steps of interconnecting said processor with said sensors and alarms by means selected from a group consisting of wires, wireless communication, including BT, Blu-Ray, Radio, UV, IR and any combination thereof.

57. The method according to any one of claims 32-33, 37-38, 40-42, wherein vehicular beacon's body is a vehicle mounted beacon, vehicle mounted lamp, vehicle mounted light, vehicle mounted light bar vehicle mounted illuminated sing or any combination thereof.



10 RIM
11 SENSOR
12 PROCESSOR
13 ALARMS
14 VIDEO CAMERA
15 ATTAHMENT APPARAUS
20 CORE

Figure 6: Anti-collision warning system embodiment 1



10 RIM
20 CORE
21 SENSOR
22 PROCESSOR
23 ALARMS
24 VIDEO CAMERA
25 ATTAHMENT APPARAUS

Figure 7: Anti-collision warning system embodiment 2

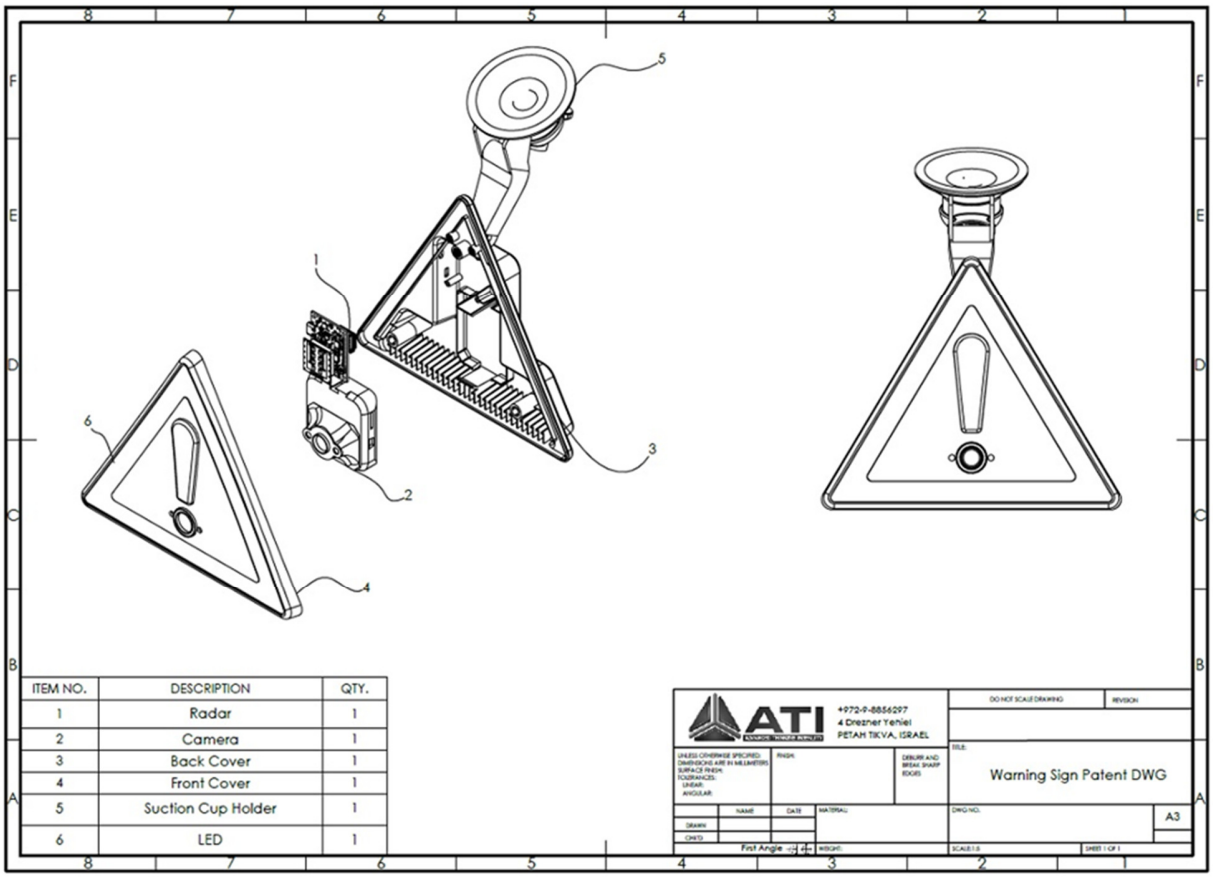
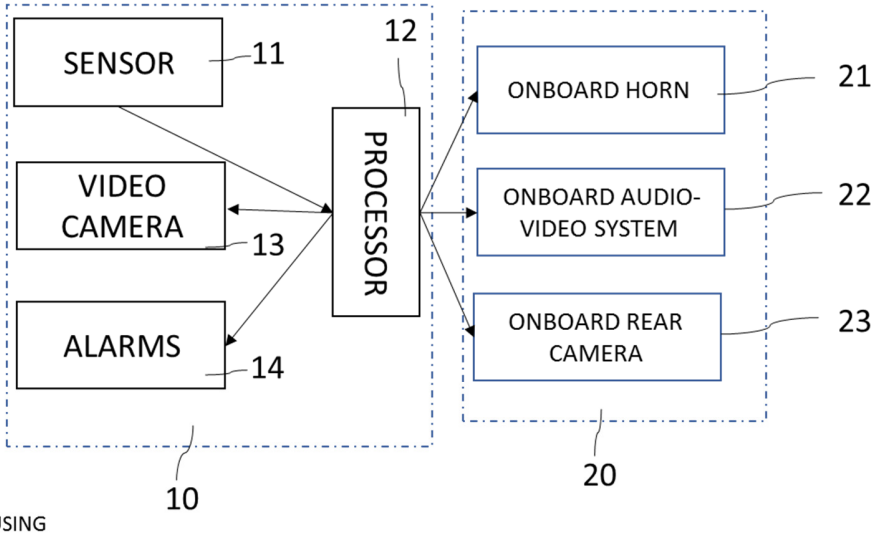


Figure 8: An anti-collision warning triangle system



10 HOUSING
11 SENSOR
12 PROCESSOR
13 VIDEO CAMERA
14 ALARMS
20 VEHICLE
21 ONBOARD HORN
22 ONBOARD AUDIO-VIDEO SYSTEM
23 ONBOARD REAR CAMERA

Figure 9: An anti-collision warning system for use onboard a car

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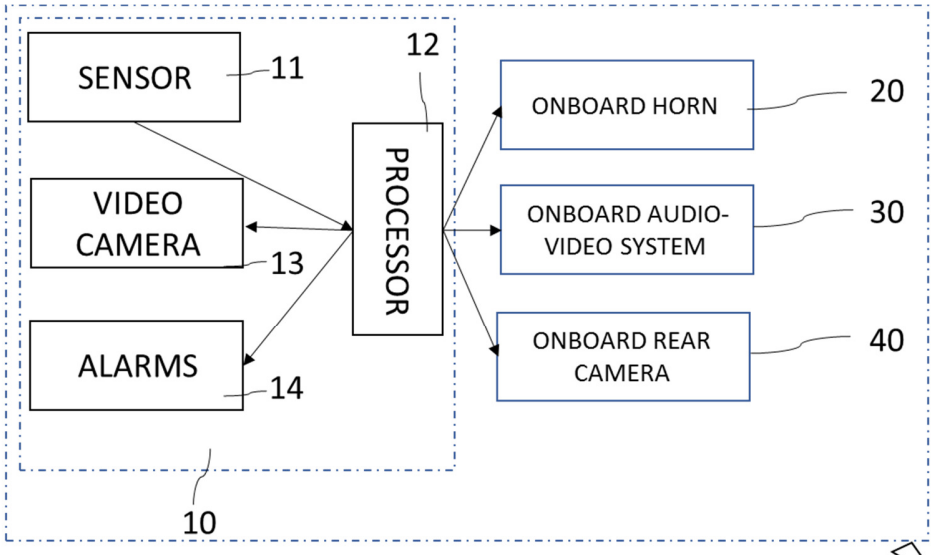
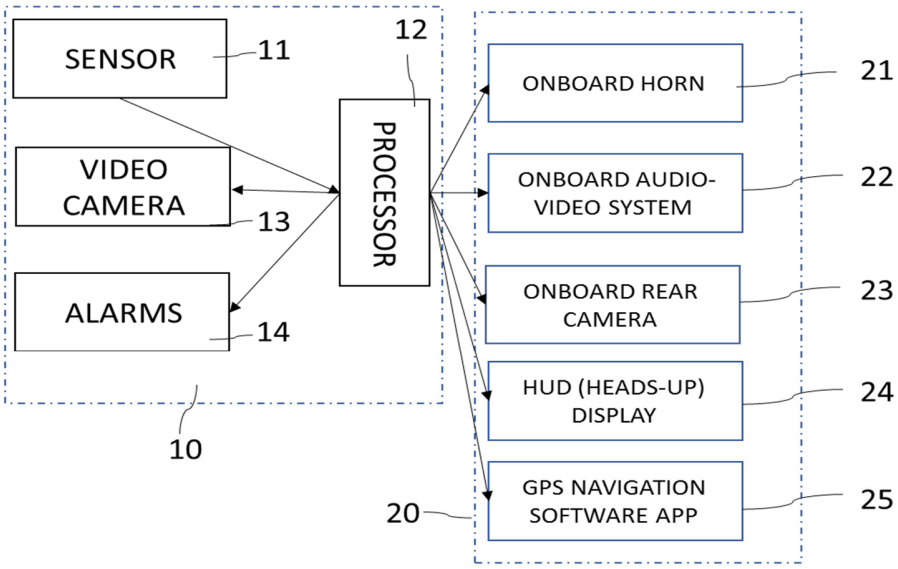


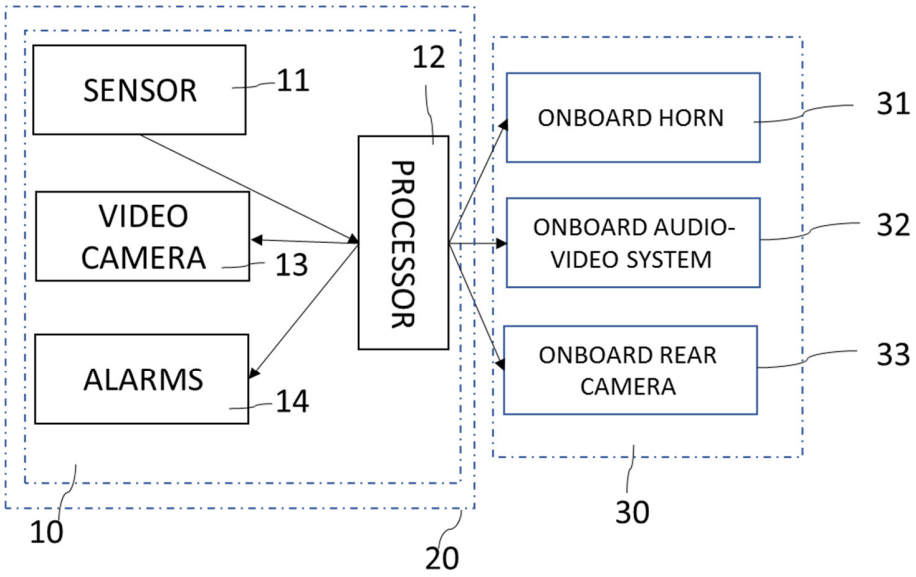
10 HOUSING 11 SENSOR 12 PROCESSOR 13 VIDEO CAMERA 14 ALARMS
20 ONBOARD HORN 30 ONBOARD AUDIO-VIDEO SYSTEM 40 ONBOARD REAR CAMERA
100 VEHICLE

Figure 10: A vehicle comprising an intrinsic anti-collision warning system



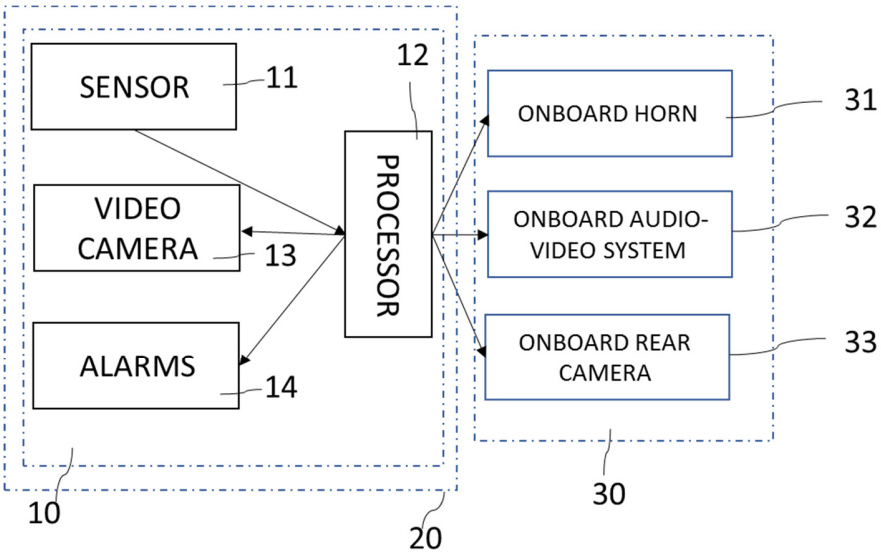
10 HOUSING 11 SENSOR 12 PROCESSOR 13 VIDEO CAMERA 14 ALARMS
20 VEHICLE 21 ONBOARD HORN 22 ONBOARD AUDIO-VIDEO SYSTEM
23 ONBOARD REAR CAMERA 24 HUD (HEADS-UP) DISPLAY
25 GPS NAVIGATION SOFTWARE APP

Figure 11: An anti-collision warning system



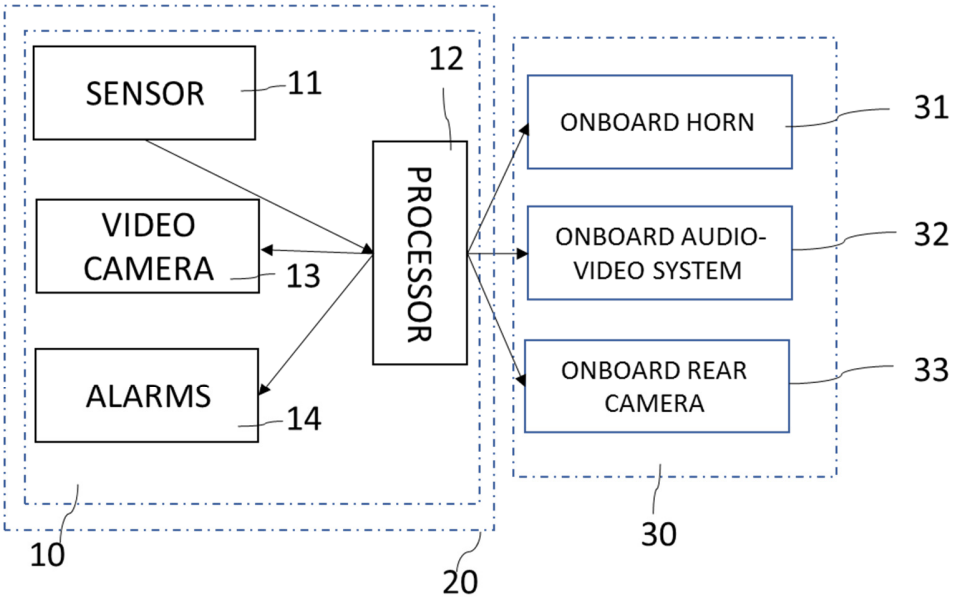
10 ANTI-COLLISION SYSTEM 11 SENSOR 12 PROCESSOR 13 VIDEO CAMERA 14 ALARMS
20 SHELL
30 VEHICLE 31 ONBOARD HORN 32 ONBOARD AUDIO-VIDEO SYSTEM
33 ONBOARD REAR CAMERA

Figure 12: an anti-collision safety protective gear



10 ANTI-COLLISION SYSTEM 11 SENSOR 12 PROCESSOR 13 VIDEO CAMERA 14 ALARMS
20 BEACON'S BODY
30 VEHICLE 31 ONBOARD HORN 32 ONBOARD AUDIO-VIDEO SYSTEM
33 ONBOARD REAR CAMERA

Figure 13: An anti-collision vehicular beacon



10 ANTI-COLLISION SYSTEM 11 SENSOR 12 PROCESSOR 13 VIDEO CAMERA 14 ALARMS
20 LAMP'S BODY
30 VEHICLE 31 ONBOARD HORN 32 ONBOARD AUDIO-VIDEO SYSTEM
33 ONBOARD REAR CAMERA

Figure 14:An anti-collision taillight

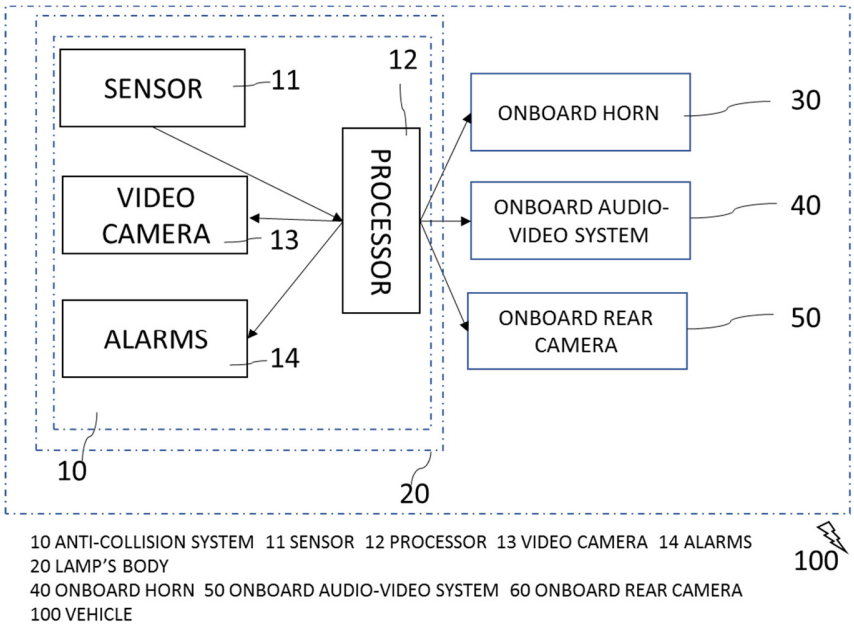


Figure 15: A vehicle comprising an intrinsic-anti-collision taillight

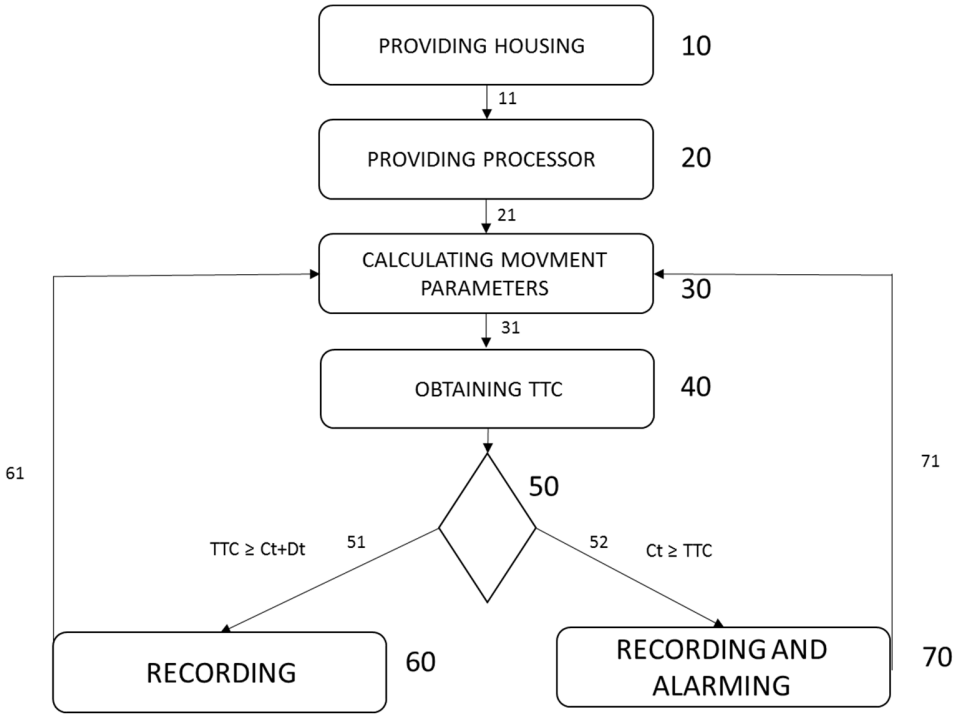


Figure 16: A method of warning before collision

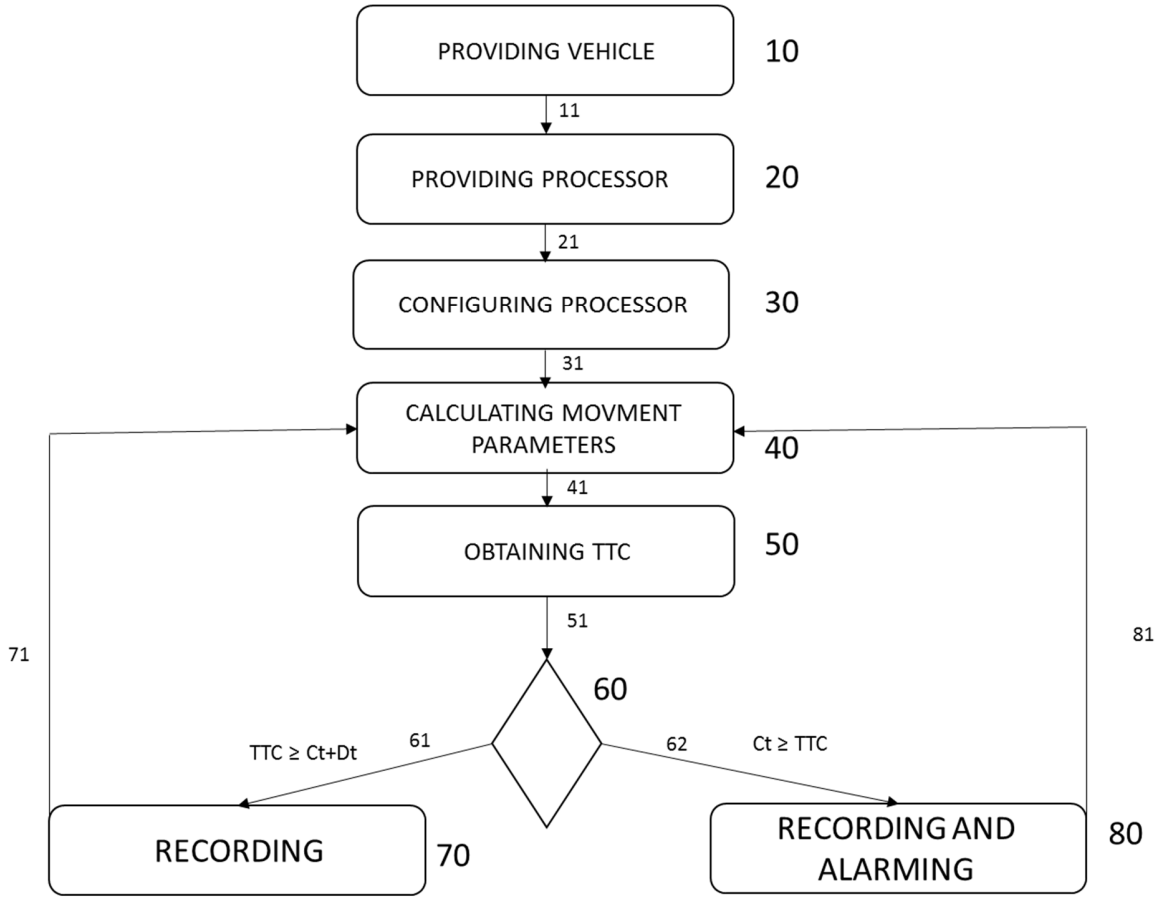


Figure 17: A method of vehicle with collision warning system

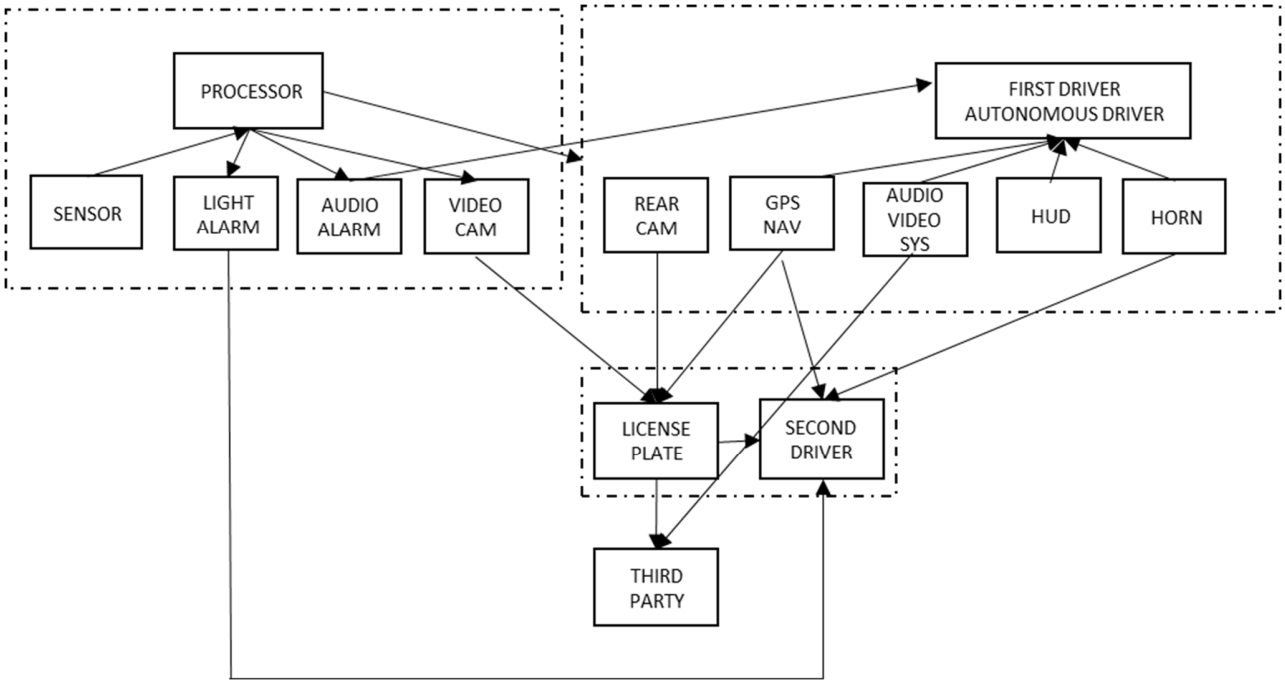


Figure 18: An anti-collision warning system depicting the range of operating modules

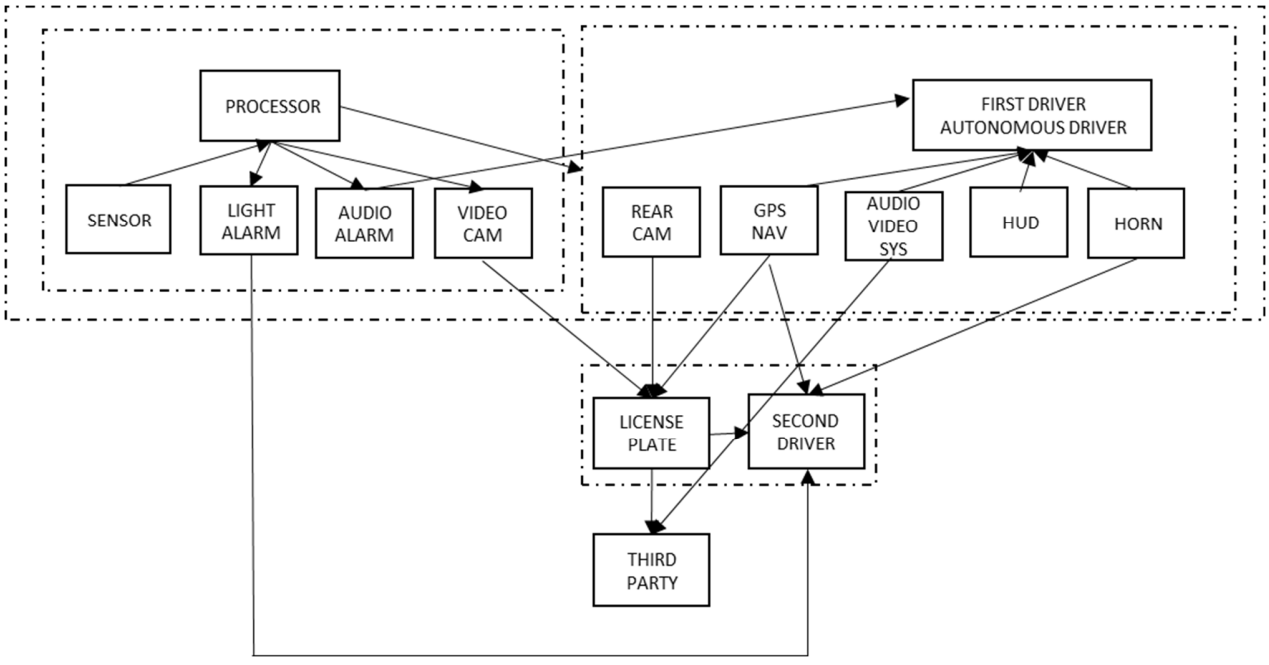


Figure 19: A vehicle with an anti-collision warning system depicting the range of operating modules