FORM 2

THE PATENTS ACT, 1970

(39 of 1970)

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The Patent Rules, 2003

COMPLETE SPECIFICATION

(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

TRUCK OVERLOADING DETECTION SYSTEM

2. APPLICANT (S)

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3. PREAMBLE TO THE DESCRIPTION

COMPLETE SPECIFICATION

The following specification particularly describes the invention and the manner in which it is to be performed.

TECHNICAL FIELD

[0001] The present disclosure relates generally to the field of truck systems and more specifically relates to a truck overloading detection system with real-time monitoring and response action.

BACKGROUND

[0002] Background description includes information that may be useful in understanding the present disclosure. It is not an admission that any of the information provided herein is prior art or relevant to the presently claimed disclosure, or that any publication specifically or implicitly referenced is prior art.

[0003] The efficient and safe transportation of goods by trucks is a critical component of modern logistics and supply chain management. Ensuring that trucks are not overloaded is not only essential for road safety but also for maintaining the integrity of vehicles, complying with regulatory weight limits, and optimizing transportation operations.

[0004] Several methods and technologies have been employed to monitor truck weights and detect overloading, such as weigh stations equipped with scales have long been a common method for monitoring truck weights. Trucks are required to stop at these stations for weight checks at designated points along their routes. While effective in identifying overloading, this method has significant limitations. It is not a continuous process and can cause delays in transit as trucks must stop for inspections. Furthermore, it relies on truck drivers adhering to weigh station rules and does not provide real-time monitoring during transit, limiting its ability to prevent overloading before it occurs.

[0005] To address the limitations of weigh stations, some trucks are equipped with on-board weighing systems. These systems measure axle loads and total weight and provide immediate feedback to the driver. However, the accuracy of these systems can vary based on their quality and calibration, and many only provide feedback to the driver without enabling remote communication or real-time data transmission.

[0006] Load cells and sensors placed in truck beds or on suspension components offer a direct method of measuring the weight of the cargo. While accurate, traditional load cells may require manual checking and interpretation of data, and their direct measurement does not automatically trigger actions like ignition cutoff to prevent overloading.

[0007] Telematics systems, often paired with GPS technology, provide real-time data on vehicle location, speed, and sometimes load. While they offer valuable insights into truck operations, the accuracy of load measurement may not be as high as that achieved with direct load cells. Additionally, many telematics solutions primarily focus on providing location and vehicle data rather than detailed load information.

[0008] These existing technologies serve the purpose of weight monitoring and overloading detection to varying degrees, however, they have their limitations. Delays in detection, limited real-time monitoring capabilities, accuracy concerns, and the need for user reliance for interpretation and corrective actions have prompted the exploration of more advanced and comprehensive solutions to address these challenges.

[0009] There is, therefore, a need to overcome the above drawbacks, limitations, and shortcomings associated with the existing techniques, and provide a solution for effectively addressing the challenges of overloading in trucks by real-time monitoring and response action.

OBJECTS OF THE PRESENT DISCLOSURE

[0010] Some of the objects of the present disclosure, which at least one embodiment herein satisfies are as listed herein below.

[0011] An object of the present disclosure is to provide a truck overloading detection system that utilizes one or more transducers to efficiently measure the weight of the load in real time within the truck.

[0012] An object of the present disclosure is to provide a truck overloading detection system that compares measured load weight with a predefined threshold

and activates the cut-off of truck ignition in case of overloading, ensuring swift preventive actions.

[0013] An object of the present disclosure is to provide a truck overloading detection system that enables users to adjust and customize the predefined threshold of load weight through a server to ensure adaptability to varying load requirements.

[0014] An object of the present disclosure is to provide a truck overloading detection system that enables users to remotely activate and deactivate the ignition through the server, offering flexibility and control in managing the truck's operations.

[0015] An object of the present disclosure is to provide a truck overloading detection system that enables users to take immediate corrective actions upon receiving indication messages to comply with load regulations.

[0016] An object of the present disclosure is to provide a truck overloading detection system that allows movement of the truck to the nearest parking spaces when the ignition of the engine is switched off due to overloading.

SUMMARY

[0017] Various aspects of the present disclosure relate to the field of truck systems and more specifically relates to a truck overloading detection system with real-time monitoring and response action.

[0018] According to an aspect of the present disclosure, a truck overloading detection system is disclosed that includes one or more transducers, a first control unit, and a second control unit. One or more transducers may be placed in a truck and configured to measure the weight of the load in the truck. The first control unit may be configured to receive the measured weight of the load from the one or more transducers, compare the measured weight of the load with a predefined threshold of weight of the load, and activate cut off of ignition on detection of an overload with the weight exceeding the predefined threshold to prevent the movement of the truck. The second control unit may be connected to the first control unit and may be configured to transmit updates in real-time through a server to the one or more users.

[0019] In an aspect, the one or more transducers may include one or more load cells placed within the cargo area of the truck.

[0020] In an aspect, the server may be configured to function as a juncture between the system and the one or more users.

[0021] Various objects, features, aspects, and advantages of the inventive subject matter will become more apparent from the following detailed description of preferred embodiments, along with the accompanying drawing figures in which like numerals represent like components.

BRIEF DESCRIPTION OF DRAWINGS

[0022] The accompanying drawings are included to provide a further understanding of the present disclosure and are incorporated in, and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure, and together with the description, serve to explain the principles of the present disclosure.

[0023] In the figures, similar components, and/or features may have the same reference label. Further, various components of the same type may be distinguished by following the reference label with a second label that distinguishes among the similar components. If only the first reference label is used in the specification, the description is applicable to any one of the similar components having the same first reference label irrespective of the second reference label.

[0024] FIG. 1 illustrates an exemplary block diagram of the proposed truck overloading detection system, in accordance with an embodiment of the present disclosure.

[0025] FIG. 2 illustrates exemplary functional components of a control unit, in accordance with an embodiment of the present disclosure.

DETAILED DESCRIPTION

[0026] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to communicate the disclosure. However, the amount of detail offered is

not intended to limit the anticipated variations of embodiments. On the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit, and scope of the present disclosure as defined by the appended claims.

[0027] In the following description, numerous specific details are set forth in order to provide a thorough understanding of the embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details. Embodiments of this disclosure relate generally to the field of truck systems and more specifically relate to a truck overloading detection system with real-time monitoring and response action.

[0028] If the specification states a component or feature “may”, “can”, “could”, or “might” be included or have a characteristic, that particular component or feature is not required to be included or have the characteristic.

[0029] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context dictates otherwise.

[0030] According to an embodiment of the present disclosure, a truck overloading detection system is disclosed that includes one or more transducers, a first control unit, and a second control unit. The one or more transducers may be placed in a truck and configured to measure the weight of the load in the truck. The first control unit may be configured to receive the measured weight of the load from the one or more transducers, compare the measured weight of the load with a predefined threshold of weight of the load, and activate cut off of ignition on detection of an overload with the weight exceeding the predefined threshold to prevent the movement of the truck. The second control unit may be connected to the first control unit and may be configured to transmit updates in real-time through a server to the one or more users.

[0031] FIG. 1 illustrates an exemplary block diagram of the proposed truck overloading detection system, in accordance with an embodiment of the present disclosure.

[0032] Referring to FIG. 1, a truck overloading detection system 100 (hereinafter referred to as system 100) is disclosed. The system 100 may include one or more transducers 102, a first control unit 104, and a second control unit 106. The one or more transducers 102 may be placed in a truck and configured to measure the weight of the load in the truck. The first control unit 104 may be configured to receive the measured weight of the load from the one or more transducers 102, compare the measured weight of the load with a predefined threshold of the weight of the load, and activate cut off of ignition on detection of an overload with the weight exceeding the predefined threshold to prevent the movement of the truck. The second control unit 106 may be connected to the first control unit 104 and may be configured to transmit updates in real-time through a server 108 to the one or more users 110.

[0033] In an embodiment, the first control unit 104 and the second control unit 106 may be a microcontroller. In an exemplary embodiment, a microcontroller may be an Arduino Nano, or a Node microcontroller, but are not limited, to any or a combination of one or more processor technologies known in the art.

[0034] In an embodiment, the one or more transducers 102 may include one or more load cells placed within the cargo area of the truck and may be configured to convert the weight of the load into readable electrical units. In an exemplary embodiment, the one or more load cells may be a hydraulic load cell, or pneumatic load cell but are not limited to, any or a combination of the one or more load cells known in the art.

[0035] In an embodiment, the control unit 104 may be programmed with a predefined threshold of the weight of the load, which may be the maximum weight the truck can carry without overloading.

[0036] In an embodiment, the predefined threshold of the weight of the load may be adjustable by the one or more users 110 through the server 108. In an exemplary embodiment, a server may be an application server, database server, or

media server, that may include, but is not limited, to any or a combination of the servers known in the art.

[0037] In an embodiment, the server 108 may be configured to function as a juncture between the system 100 and the one or more users 110.

[0038] In an embodiment, the second control unit 106 may be further configured to transmit updates to the one or more users 110 through one or more computing devices 112 by at least one communication mode selected from the group consisting of SMS, email, and a mobile application. The computing devices 112 may be a smartphone, tablet computer, personal digital assistant, laptop, portable media device, or the like. Moreover, the computing devices 112 may include any web client or application that facilitates communication and interaction. One or more computing devices 106 may be connected to the control unit 102 and the processing unit 104 through a network 114.

[0039] Examples of the network 114 may include, but are not limited to, a Wireless Fidelity (Wi-Fi) network, a Wide Area Network (WAN), a Local Area Network (LAN), or a Metropolitan Area Network (MAN). Various devices in the system 100 can connect to the network in accordance with the various wired and wireless communication protocols such as Transmission Control Protocol and Internet Protocol (TCP/IP), User Datagram Protocol (UDP), and 2G, 3G, and 4G communication protocols.

[0040] In an embodiment, the updates transmitted in real-time by the second control unit 106 may include the load status of the truck, ignition events, and notifications.

[0041] In an embodiment, the one or more users 110 may be authorized to remotely activate and deactivate the ignition of the truck through the server 108.

[0042] In an embodiment, the one or more users 110 may be authorized to take prompt corrective actions upon receiving the indication message comprising redistributing the load, arranging for additional transportation, and addressing the excess weight to ensure compliance with load regulations.

[0043] In an exemplary scenario, a truck carrying cargo reaches its load threshold while en route, the load cells detect the excessive weight and transmit this

data to the first control unit and the control unit may trigger an ignition cutoff to prevent the truck from moving further while overloaded. The load status and ignition event are transmitted to the server the truck-owning company's fleet manager receives an instant alert on the application to indicate the overloading event and the fleet manager remotely disables the truck's ignition through the application, preventing any further movement until the load is reduced. The application provides a comprehensive overview of all trucks, their load statuses, and ignition events and the company may use this data for regulatory compliance reporting and operational optimization.

[0044] FIG. 2 illustrates exemplary functional components of a control unit, in accordance with an embodiment of the present disclosure.

[0045] Referring to FIG. 2, exemplary functional components of the control unit are disclosed. The first control unit 102 and the second control unit 104 comprise one or more processors 202, a memory 204, and an interface(s) 206. The interface(s) 206 may comprise a variety of interfaces, for example, interfaces for data input and output devices referred to as I/O devices, storage devices, and the like. The interface(s) 206 facilitates communication with various devices coupled to the user device. The interface(s) 206 also provides a communication pathway for one or more components of the first control unit 102 and the second control unit 104. Examples of such components comprise, but are not limited to, processing engine(s) and database. Interface 206 comprises a platform for communication with the devices/servers to read real-time data /write data in the system 100. Interfaces 206 allows users to feed inputs, type/write/ upload the data, and other software and hardware interfaces, for example, interfaces for peripheral device(s), such as a keyboard, a mouse, an external memory, and a printer.

[0046] In an embodiment, the processing engine(s) 208 are implemented as a combination of hardware and programming (for example, programmable instructions) to implement one or more functionalities of the processing engine(s) 208. In the examples described herein, such combinations of hardware and programming may be implemented in several different ways. For example, the programming for the processing engine(s) 208 are processor-executable

instructions stored on a non-transitory machine-readable storage medium, and the hardware for the processing engine(s) comprises a processing resource (for example, one or more processors), to execute such instructions. In the present examples, the machine-readable storage medium stores instructions that, when executed by the processing resource, implement the processing engine(s). In other examples, the processing engine(s) 208 is implemented by electronic circuitry. The processing engine 208 includes database 210 data that is either stored or generated as a result of functionalities implemented by any of the components of the processing engine(s).

[0047] In an embodiment, the processing engine(s) 208 may include a data monitoring unit 212, an ignition control unit 214, and other units (s) 216, but not limited to the like. The other unit(s) 216 implements functionalities that supplement applications or functions performed by the control unit 102 and control unit 104 or the processing engine(s) 208. The database 210 serves, amongst other things, as a repository for storing data processed, received, and generated by one or more of the engines.

[0048] In an embodiment, the data monitoring unit 212 may receive the measured weight of the load from the one or more transducers and compare the measured weight of the load with a predefined threshold of the weight of the load through the first control unit 102.

[0049] In an embodiment, the ignition control unit 216 may activate cut off of ignition on detection of an overload with the weight exceeding the predefined threshold to prevent movement of the truck through the first control unit 102.

[0050] Above embodiments disclose a truck overloading detection system is disclosed that includes one or more transducers, a first control unit, and a second control unit. The one or more transducers may be placed in a truck and configured to measure the weight of the load in the truck. The first control unit may be configured to receive the measured weight of the load from the one or more transducers, compare the measured weight of the load with a predefined threshold of weight of the load, and activate cut off of ignition on detection of an overload with the weight exceeding the predefined threshold to prevent the movement of the

truck. The second control unit may be connected to the first control unit and may be configured to transmit updates in real-time through a server to the one or more users.

[0051] Moreover, in interpreting the specification, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms “comprises” and “comprising” should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, utilized, or combined with other elements, components, or steps that are not expressly referenced. Where the specification claims refer to at least one of something selected from the group consisting of A, B, C….and N, the text should be interpreted as requiring only one element from the group, not A plus N, or B plus N, etc.

[0052] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions, or examples, which are comprised to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to those having ordinary skill in the art.

ADVANTAGES OF THE INVENTION

[0053] The present disclosure provides a truck overloading system that continuously monitors the weight of the load in the truck in real time. This enables immediate detection of overloading and the activation of an ignition cutoff mechanism, preventing the truck from operating with an excessive load.

[0054] The present disclosure provides a truck overloading system that executes instructions to compare measured load weight with a predefined threshold. This automation allows for immediate activation of the ignition cutoff mechanism in the event of an overload,

[0055] The present disclosure provides a truck overloading system with predefined threshold for load weight that is adjustable by the users. This flexibility allows truck operators and managers to adapt the system to varying load requirements and regulations.

We Claim:

1. A truck overloading detection system (100), said system (100) comprising:

one or more transducers (102) placed in a truck and configured to measure the weight of the load in the truck;

a first control unit (104) to execute a set of instructions, wherein said set of instructions comprising:

receive the measured weight of the load from the one or more transducers (102);

compare the measured weight of the load with a predefined threshold of weight of the load; and

activate cut off of ignition on detection of an overload with the weight exceeding the predefined threshold to prevent movement of the truck; and

a second control unit (106) connected to the first control unit (104) and configured to transmit updates in real-time through a server (108) to the one or more users (110).

2. The system (100) as claimed in claim 1, wherein the first control unit (104) and the second control unit (106) is a microcontroller.

3. The system (100) as claimed in claim 1, wherein the one or more transducers (102) comprise one or more load cells placed within the cargo area of the truck.

4. The system (100) as claimed in claim 1, wherein the predefined threshold of the weight of the load is adjustable by the one or more users (110) through the server (108).

5. The system (100) as claimed in claim 1, wherein the server (108) is configured to function as a juncture between the system (100) and the one or more users (110).

6. The system (100) as claimed in claim 1, wherein the second control unit (106) is further configured to transmit updates to the one or more users (110) through one or more computing devices (112) by at least one communication mode selected from the group consisting of SMS, email, and a mobile application.

7. The system (100) as claimed in claim 1, wherein the updates transmitted in real-time by the second control unit (106) comprises load status of the truck, ignition events, and notifications.

8. The system (100) as claimed in claim 1, wherein the one or more users (110) remotely activate and deactivate the ignition of the truck through the server (108).

9. The system (100) as claimed in claim 1, wherein the one or more users (110) take prompt corrective actions upon receiving the indication message comprising redistributing the load, arranging for additional transportation, and addressing the excess weight to ensure compliance with load regulations.

For Panipat Institute of Engineering and Technology

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ABSTRACT

TRUCK OVERLOADING DETECTION SYSTEM

A truck overloading detection system is disclosed. The system comprises one or more transducers (102) placed in a truck to measure the weight of the load in the truck, a first control unit (104) to receive the measured weight of the load from the one or more transducers (102), compare the measured weight of the load with a predefined threshold of weight of the load and activate cut off of ignition on detection of an overload with the weight exceeding the predefined threshold to prevent movement of the truck and a second control unit (104) connected to the first control unit (104) and configured to transmit updates in real-time through a server (108) to the one or more users (110).

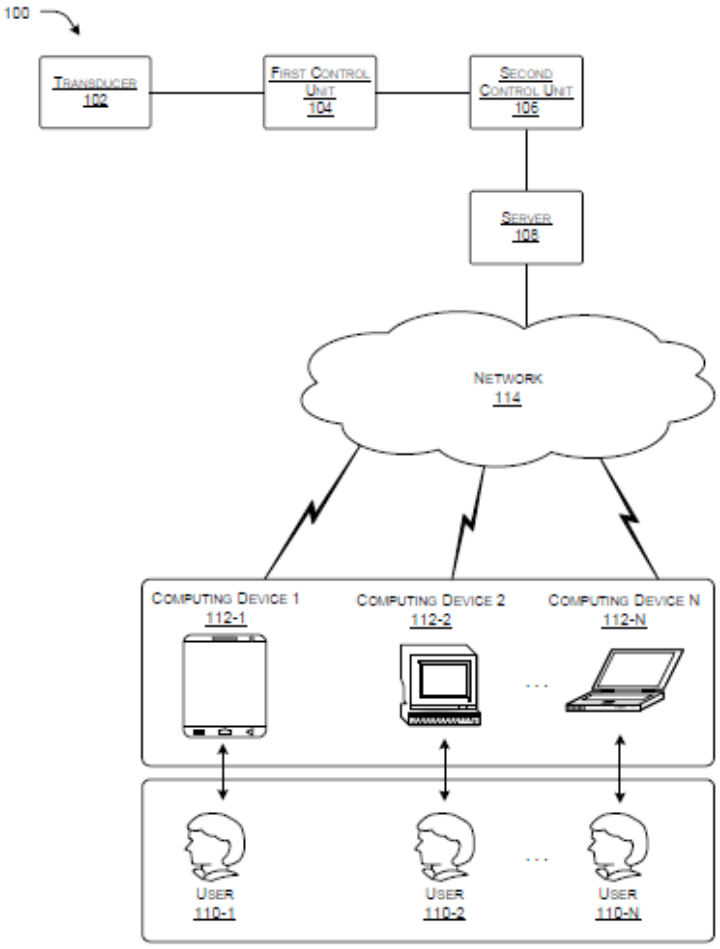

FIG. 1