

Overload Locking System

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Abstract— Indian has one of the largest markets for commercial vehicles globally. In India commercial vehicles can be used in remote and hilly areas where rail lines cannot be constructed. It enables quick, easy departure of goods and accepts smaller loads than railways. Construction, logistics, mining, and passenger transportation are few of the major industries that require commercial vehicles. Growth of Indian commercial vehicles market has increased due to daily transportation required by various industries for their growth of business, demand for commercial vehicles has increased in the country. As due to overloading, not only causes problem with operator of vehicle, but it also contributes to problem such as damage of road network, and tax payer to repair the road, it also gave rise to the problem of road traffic and accidents in local areas. Due to the installation of this sensor we can achieve the actual life cycle of vehicles committed by the companies producing commercial vehicles. Thus to fight with this problem and to reduce damages to the vehicles we are introducing the overload locking system in vehicles. The use of locking system can help us achieve this goal and help in controlling the overloading of commercial vehicles.

Key words: Locking System

I. INTRODUCTION

As the transportation is very important in India, most of the people has there source of income in transportation. During any delivery of material from one industry to another there are many problem can causes to the vehicle, if it is loaded more than the limit offered by company. For example, if any commercial vehicle manufacturer giving warranty of 5 years for their vehicle and, if manufacturer's loading limit is upto 150kgs and operator of that vehicle crossing the limit and putting 200 kgs. Due to this, it makes very difficult task for manufacturer, to keep their promise of 5yrs warranty for vehicle they have manufacturer. In India, in Maharashtra About 60% of road damage is caused due to overloaded vehicles which doesn't come into account at the time of annual tender pass to repair the roads. This not only increases the TOLL-COST, but also increases road tax which has to pay to the travellers/ passengers. This clearly indicates that common people that has no involvement in the overloading, also has to pay increased higher toll and road tax. Due to heavy loaded vehicles brake system also gets affected which causes brake failure and finally road accident takes place.

Overload locking system is a mechatronics system that uses a load cell to control the overload. The system we are developing for commercial vehicle. In our system, we are using strain-gauge load cells and micro-controller. Strain-gauge load cells are used in various applications for measuring strain, load, force, pressure, etc. The chassis we are using is diamond type above the chassis we are going to fit four load cells, and this four load cells will be sensed by one micro-controller. If the system goes overload the micro controller takes action and it will disconnect the fuel supply/ cut-off the engine, and alarm start buzzing. Strain gauge load cells are better than other load cells because it is easy to use

and regains its original position easily. In our system, if any of 3 load cells measures the load beyond the allowable limit, the micro controller detects and sense the movements of the load cells, the buzzer will give the signal and the system will get locked.

II. LITERATURE REVIEW

For any business, maximizing efficiency is the key to reducing operating cost and improving profit margins. When transporting goods, the temptation to overload a vehicle in a bid to maximize payload and reduce overall fuel costs can be a costly mistake. Overloading vehicles significantly increases fuel consumption. It is important for those responsible for the maintenance and operation of highway infrastructures to monitor and prevent commercial vehicle overloading. The additional weight carried by overloaded commercial vehicles accelerates the deterioration of the roadway, leading to rutting, fatigue cracking, etc. The main purpose of this study is to understand and establish the extent to which vehicle overloading is happening in a developing country. The phenomenon of vehicle overloading is not new and has been discussed in relation to the adverse effects on vehicle engine, road safety and environment problem. Although much has been said in the context of the more developed countries, in developing countries there has not been much discussion on vehicle overloading. In this study vehicle overloading in a developing country is established. Many types of problems are produced due to overloading. It is found that there is moderate increase in accidents due to overloading or higher weight. An overloaded vehicle is less stable and thus incurs additional risk for the other road users. In this project we are trying to resolve this problem of overloading vehicles and improving life span of vehicles by providing a system to totally control the overloading of vehicles.

III. OBJECTIVES

To lock the engine when the system is overloaded.
To enhance service life of vehicle.
Safety of user/vehicle driver.

IV. COMPONENT

A. Power Supply

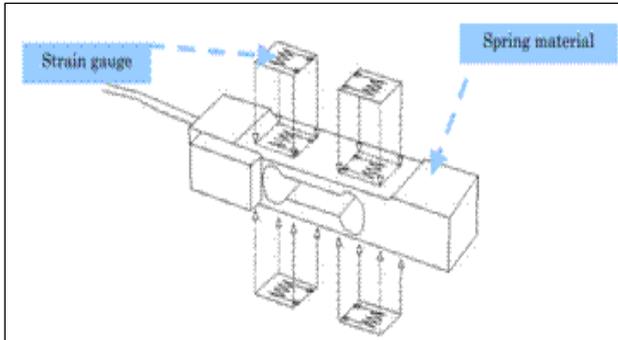
Power supply is a supply of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit. The term is most commonly applied to electrical energy supplies, less often to mechanical ones and rarely to others. A power supply may include a power distribution system as well as primary or secondary sources of energy such as:

- chemical fuel cells and other forms of energy storage system
- solar power and batteries
- generators or alternators
- transformers steps down high voltage ac mains to low voltage ac

- Rectifier - converts ac to dc but the dc output is varying.

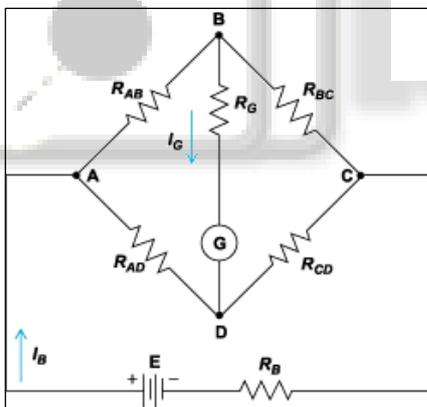
B. Load Cell

Load cell systems are essential to accurate weight readings. You cannot weigh with confidence, without precise and highly durable load cells. Load cell primarily consists of a spring material and strain gage. Spring material causes strain due to applied load and strain gauge changes its resistance in accordance with the change in strain.



C. Wheatstone Bridge Circuit

The four strain gauges are configured in a Wheatstone bridge configuration with four separate resistors connected as shown in what is called a Wheatstone Bridge Network. An excitation voltage – usually 10V is applied to one set of corners and the voltage difference is measured between the other two corners. At equilibrium with no applied load, the voltage output is zero or very close to zero when the four resistors are closely matched in value. That is why it is referred to as a balanced bridge circuit.



D. Microcontroller ATmega2560

- Operating Voltage 5V
- Input Voltage (recommended) 7-12V
- Input Voltage (limits) 6-20V
- Digital I/O Pins 54 (of which 14 provide PWM output)
- Analog Input Pins 16
- DC Current per I/O Pin 40 mA
- DC Current for 3.3V Pin 50 mA
- Flash Memory 256 KB of which 8 KB used by bootloader
- SRAM 8 KB
- EEPROM 4 KB
- Clock Speed 16 MHz

E. Arduino Programming

A program for Arduino may be written in any programming language for a compiler that produces binary machine code for the target processor. Atmel provides a development environment for their microcontrollers, AVR Studio and the newer Atmel Studio. The Arduino IDE supports the languages C and C++ using special rules of code structuring. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program. A minimal Arduino C/C++ sketch, as seen by the Arduino IDE programmer, consist of only two functions:

- Setup: This function is called once when a sketch starts after power-up or reset. It is used to initialize variables, input and output pin modes, and other libraries needed in the sketch
- Loop: After setup has been called, function loop is executed repeatedly in the main program. It controls the board until the board is powered off or is reset.

V. CONCLUSION

As we study the overloading locking system with load cell which has low maintenance and average accuracy. It is affordable by every manufacturer. From this review, we try to reduce the cost of the system as same system is not available in many countries. It also helps to increase the stability and decrease risk for operator of vehicle, wear and tear of vehicle and fuel consumption. Hence, we are going to use strain gauge load-cell which reduces the overloading of vehicle and this will help the handling of vehicle easily.

VI. RESULT

- Locking of system takes place when load goes beyond 40 kg.
- The overload locking system has been proven efficient in achieving its goal of signalling the overload in the vehicles thus providing us a better way of controlling the overloading in commercial vehicles.
- It is an efficient way of contributing to environment as is can help us in controlling damages and pollution.

VII. FUTURE SCOPE

Overload Locking System has mainly wide range of scope in automobile industry. This could be one of the best and most acceptable feature for commercial vehicle. Also system can be used in various bridges and in all that machines or system where load restrictions are prior part. Application of this system will lead to enhance the road safety which is prime moto of every human being. Also due to load shearing the job vacancies in transport field may increase. In the legal point of view system indirectly helps to restrict the overload transportation as well it will help to achieve the commitment to manufacturing company of vehicle for providing committed service life of their product. Under load vehicle will reduce the load on engine and hence complete combustion will takes place in engine that will lead to control of harmful exhaust gases. The economic aspects like controlled fuel consumption, low air pollution and noise

pollution can be achieved by this system. It will also help improve engine efficiency and thus increase its life.

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