

Intelligent Overloading Prevention system in Trucks

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Abstract - This is a four wheel vehicle in truck shape with drive mechanism, the truck carrying load in its tray, to sense the load during loading which is preset for certain load and when getting overloaded will give the buzzer sound to alert the driver to control the loading and if gets overloaded and when started moving in overloaded condition, when coming near the check post or checking vehicle, sensing the checking vehicle, a siren in this overloaded vehicle will start to alert the checking authority that this vehicle is overloaded and when the authorities tries to stop the vehicle, the driver try to drive away the vehicle, the authorities from their control can stop the vehicle. If the driver when check post authorities signal to stop the vehicle, if does not stop, the authorities from their control can stop the vehicle automatically.

Key Words: Overload, truck, driver, authority

1. INTRODUCTION

This project is prepared purely for the purpose of prevention of damage of roads and prevents unauthorized, unlicensed driving. Roads now a day play a very important role in every part of world. We have many more advantages with these roads like it directs the way for communicating other places, time is consumed for reaching from one place to another place etc. Roads and streets are the most important transport communication medium in the country and are used by almost everyone on a daily basis. Besides the fact that roads are provided for the benefit of the road user, they also play a significant role in promoting economic growth and the living standards of the population. By means of roads, people have access to markets, places of work, clinics and hospitals, educational institutions, places for sport and leisure activities and vacations. It has been found that legally loaded heavy vehicles cause a relatively small amount of damage to road pavement structures, as opposed to overloaded heavy vehicles which are responsible for approximately 60% of the damage to the road network. The fines currently imposed by the courts on those convicted of heavy vehicle overloading are in most cases negligible in comparison with the damage caused to the roads and are quite clearly ineffective in discouraging overloading. Furthermore, overloaded vehicles become a traffic hazard, especially regarding the heavy vehicle's braking system and additional braking distance involved. This situation is aggravated by steep downhill slopes and sharp curves. On steep uphill gradients where no climbing lane is provided, the slow

moving heavy vehicle causes traffic disruption. Traffic accidents caused directly or indirectly by overloaded heavy vehicles are normally not included when the total cost to the country, caused by overloading, is calculated.

1.1 RISKS POSED BY OVERLOADING A VEHICLE

Overloading a vehicle will pose the following risks like -the vehicle will be less stable, difficult to steer and take longer to stop. Vehicles react differently when the maximum weights which they are designed to carry are exceeded. - Overloaded vehicles can cause the tires to overheat and wear rapidly which increases the chance of premature, dangerous and expensive failure or blow-outs. The driver's control and operating space in the overloaded vehicle is diminished, escalating the chances for an accident. The overloaded vehicle cannot accelerate as normal, making it difficult to overtake. At night, the headlights of an overloaded vehicle will tilt up, blinding oncoming drivers to possible debris or obstructions on the roadway. Brakes have to work harder due to 'the riding of brakes' and because the vehicle is heavier due to overloading. Brakes overheat and lose their effectiveness to stop the car. With overloading, seat belts are often not used as the aim is to pack in as many persons as possible into the vehicle. The whole suspension system comes under stress and, over time, the weakest point can give way. By overloading your vehicle you will incur higher maintenance costs to the vehicle, tyres, brakes, shock absorbers and higher fuel consumption. Insurance cover on overloaded vehicles may be void as overloading is illegal.

Overloading is an International problem and companies like Central Weighing provide an invaluable service to many countries introducing this new technology and offering extensive technical support to ensure its effective use whether for prosecution or defense. A significant goal of Artificial Intelligence research is to reduce human loss of life and injury. In principle, intelligent systems can warn humans and protect them from potentially dangerous situation. Evolutionary algorithms have the potential to identify danger where it might otherwise not be apparent by learning about dangerous situations through experience. In this paper, artificial neural networks are evolved to warn drivers in principle; learning may eventually help save lives.

1.2 OBJECTIVES

- The develop the system on the vehicle by which will stop the overloading on vehicles automatically, so that overloaded vehicle damaging the roads is reduced or avoided.
- To help make sure accidents avoided which in the process can reduce human loss of life and injury and will make the road much better for the public safety..

2 .LITERATURE REVIEW

Mohamed Rehan Karim, Ahmad Saifizul Abdullah, et al, in their studies have highlighted the magnitude of the problem of vehicle overloading. Apart from the impact on pavement damage and carbon emission, vehicle overloading would lead to more hazardous road environment because of the limitation in vehicle dynamics and braking performance of the vehicle to cope with the higher demands for the excess pay loads.

Wahid Wahyudi, Achmad Wicaksona, et al, have done study on impact of axle load overloading on freight vehicles toward the increasing of greenhouse gas emission by oxides and carbon. Overloading on vehicles would increase the effort of engine performance so that will cause the increase of fuel consumption. That increasing also would affect the concentration of gas emission from vehicle. This research will discuss about the impact of overloading towards concentration gas emission from heavy freight vehicle, especially oxides of carbon which cause green house effect, specifically CO and CO₂.

3. WORKING PRINCIPLE

In this we are making a four wheel vehicle being moved by the DC motor drive through chain sprocket with trolley and cabin, load carrying trolley which is having coil spring cushioning and the cushioning is set for the particular load and if overloaded, will activate the micro-switch to trigger the control circuit to indicate the small light on the dash board and sound a buzzer so that the driver come to know the overloading,so that the overloading is controlled.

If the driver tends to move the vehicle with overload, the buzzer soundscontinuously which is heard by the driver only. When the vehicle is moving on road and when it comes across the police station or outpost, it is sensed by the vehicle through radio remote frequency receiver circuit within the vehicle (radio remote frequency are continuously transmitted by the check post or police station or police vehicles of the same frequencies) which is received and the control circuit will trigger the siren on, drawing the attention of the police enforcer or authorities to stop the vehicle and penalize and force to unload the extra load. The vehicle is moved by DC motor to show the demonstration.



Fig 3.1 Prototype Truck for the project

4.Main Components required

4.1 Chassis frame:

This is made out of mild steel. All sides are hammered for flattening and then ground to remove the cutting burr and then joined by arc welding to make the chassis frame.

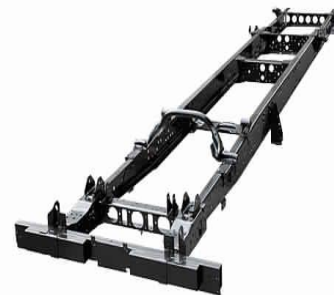


Fig 4.1 Chassis frame

4.2 Front axle:

This is made out of C30 steel round bar being cut from the lathe machine to make the diameter as per required to suit the ball bearing inner diameter for the entire length and then step turned at one end to make the length to suit the wheel holding plate hole diameter and faced from the other side to make the total length. Such two numbers of axles are made for this project.



Fig 4.2 Front axle

4.3 Rear axle:

This is made out of C30 steel round bar being cut from the diameter of 25mm of length 405mm and turned on lathe

machine to make the diameter as 20mm for the entire length and then step turned to make the diameters as 15mm to suit the ball bearing inner diameter for the length of 50mm from one side and another step turned of diameter 12mm for the length of 5mm and same way from other side 20mm diameter is maintained for 300mm and step turned to make 15mm to suit the ball bearing for 50mm and in that another step turning of 12mm to suit the wheel holding plate hole for the length of 5mm. such one axle is made for this project and used.

4.4 Battery Holder:

This is made out of mild steel flat being cut from the required size and then flattened by hammering and then is bent to make the rectangle of outside dimension and joined by arc welding and second flat is bent to U shape with legs and is joined to this rectangle frame to make the box to hold the battery as per the requirement.

4.5 Springs

These are the standard compression springs used of required lengths. Such four number of compression springs which are made out of spring steel are used in this project. Like this we have to manufacture different components required for us.

4.6 Tactile Sensors

These are the sensors which respond to contact forces with another object. Some of these sensors are capable of measuring the level of force involved.

4.7 DC Motor

In this model we have used DC motors. The main components of the motors are the rotors and stators. Usually the rotors include the armature & commutator assembly and stator includes permanent magnet and bush assembly. The current flows through the windings & sets up an magnetic field. It produces torque on the rotor and causes the rotor to rotate.



Fig 4.7 DC Motor

5. METHODOLOGY

5.1 Overloading Intimation Circuit

For Overloading intimation circuit we are providing the micro-switch below the material holding tray or trolley which is held on springs on the chassis. The trolley holds the material properly for the particular weight material and if in excess will close the micro-switch which gives the high state input voltage to IC, UM-606 pin number 7 to give the inverted output at pin number 6 which triggers the transistor BC547 to connect the relay to give the LED glowing and putting on the buzzer and also putting on the radio remote receiver circuit.

5.2 For the circuit for putting on the siren

There is a transmitter being provided at the enforcing authorities, whether at vehicle or police station, which will be transmitting radio frequency signals all around. When the overloaded vehicle is moving in the vicinity, the overloading circuit which has already put the receiver circuit on, will receive the signals and automatically put on the siren within the vehicle. If the driver tries to put off the siren switch, the drive will be blocked. The received signals being received by the receiver circuit which is brought from the market, which triggers the transistor S-1904 two numbers one is NPN and another transistor S-1904 is of PNP, to connect the relay to put on the siren and also if siren is put off, will put off the drive motor. We are using 40Mhz frequency in this project.

6. ADVANTAGES

1. Automation of the load inspection by the vehicle and on the vehicle itself.
2. Vehicle is not assessable to the unlicensed or drunken driver which avoids such instances which will reduce the accidents.
3. Easy for the enforcing authorities to control since the vehicle itself will indicate the overload.
4. Avoids all other measures which need physical monitoring of speed.
5. Damage of roads can be prevented.
6. System is easily built up on vehicles and easy to maintain.
7. Accident prevention means saving of lives and property.

7. CONCLUSION

Overloading prevention system is a useful tool to contribute towards more compliance with mass regulation. It could help to reduce the number of overloaded trucks and contribute to the more efficient and effective use of police officers' time. A reduction in overloaded trucks is also conducive to a reduction in crashes. There are still issues and challenges for this

technology and application which require more research and development work. So we will be developing new applications of these systems both for traffic and heavy vehicle regulation enforcement.

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