Load Limit of Heavy Vehicles

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Abstract - *Nowadays many road accidents were done, there are many people losing their lives and their families. This project is done based on to reduce the road accidents. So, many heavy vehicle drivers were under gone overloading, if once the heavy vehicle there is out of control in lorry so accidents may occur. So we can install load limit to lorries that load limit will off the ignition once it crossed the load limit these can be done by Arduino UNO and some connecting wires then load cell with suitable coding to limit the load.*

Key Words: Arduino1, Load limits in Automobiles2, Heavy Vehicles3, Ignition off due to overloading4, Overloading in trucks6

1. INTRODUCTION

There are many Accidents due to over load vehicles of trucks. So we limit the load By using Arduino board. Arduino Board is an Electric device which get the information from the Sensor and also it Shows what sensor sense So we insert Arduino board and insert load limit control coding is Denotes the specific loads of Each trucks according to that's load capacity the Coding is programmed to Arduino.

Then load limit is work when the trucks crossed its load capacity then it will stop the ignition once it reached the load limit the truck ignition will cut off and also if truck ignition is off the truck is on while loading it will cut off.

The ignition of truck and load cell sensor is sense the load it send information to Arduino then Arduino carry the signal and it will transmit to the LCD and it will project the weight in it then the Arduino limit the load by coding and it will transmit to ignition then it cut of by Thus the load is limited by cut off ignition in trucks.

1.2 THE PRICE THEY PAY

All Truck drivers were overloaded due to high price they want to pay so they loaded the truck one times instead of two or more times So they over loaded the trucks and accidents.

2. NUMBER OF COMPONENTS

- ARDUINO BOARD

- ARDUINO BOARD CONNECTIONS

- WIRES LED LIGHTS

- LOAD CELL

- WIRES

- BATTERY USED

3. ARDUINO

Leaving the maximum weight which a vehicle is designed to carry on its tyres may lead to overheating and rapid tyres wear, making the vehicle less stable, more difficult to steer, and inconvenient to stop. Overloaded vehicles can have dangerous and expensive failures or blow-outs. The driver's control and operating space may be compromised, which increases the likelihood of an accident. Overloaded vehicles cannot accelerate as normally, making it more difficult to overtake. In the dark, an overloaded vehicle's headlights tilt upward, blinding oncoming drivers to any possible obstacles. Brakes work harder due to 'the riding of brakes' and because the vehicle is heavier because of overloading. Brakes overheat and fail. With overloading, seat belts are frequently not used since the goal is to pack as many people into the vehicle as possible. The whole suspension system comes under strain and, over time, the weakest point can give way. If your vehicle is overloaded, you will incur higher vehicle maintenance costs - tyres, brakes, shock absorbers, and more fuel consumption. Additionally, insurance coverage for overloaded vehicles may be void since overloading is illegal.

Fig - 3: Arduino UNO Board

A low-cost, easily-programmable, and versatile open-source microcontroller, Arduino UNO can be integrated into a variety of electronic projects. It can be interfaced with other Arduino boards, Arduino shields, Raspberry Pi boards, and can control relays, sensors, etc. LEDs, servos, and motors are possible outputs. Arduino UNO features AVR microcontroller Atmega328, 6 analog input pins, and 14 digital I/O pins, of which 6 are used for PWM outputs. Arduino IDE (Integrated Development Environment) software is used to program the board. The unit comes with 32KB flash memory to store instructions, while SRAM is 2KB and EEPROM is 1KB.The operating voltage is 3.3V.

4. LOAD CELL

Fig - 4: Load Cell Sensor

Basically, a load cell is a sensor that measures weight and force. When force is applied to it, it produces a weak electrical signal at the millivolt level. Basically, the sensor is a transducer for converting force into measurable electrical output

Load cells operate on the principle of piezo-resistivity. When a load/force/stress is applied to the sensor, it changes its resistance. This resistance change affects the output voltage when an input voltage is applied   The load cell is an electronic sensor that measures weight and force. When a force is applied to it, it produces a weak electrical signal at the millivolt level. In fact, the load cell is a transducer that converts force to measurable electrical output.

5. CONSTRUCTION

Since the output signal produced by the load cell is in the millivolt range, we need an amplifier to convert the signal into a level that can later be converted into a digital signal and processed. The HX711 amplifier sensor includes a HX711 chip with an analog-to-digital conversion capability in 24-bit precision. The HX711 module amplifies the load cell's low-voltage output and sends it to the Arduino, so the Arduino eventually calculates weight from the data. So the Arduino in connected with Load cell and it transmit the information to Arduino and its passes to LCD and its show the Weight and limit the load by coding this is the Construction of load limit sensor.

6. OVERLOADING VEHICLES WILL POSE THE FOLLOWING

In addition to being less stable, difficult to steer, and slower to stop, vehicles that are overloaded react differently. Overloaded vehicles have the potential to overheat their tyres. Tires overheat and wear rapidly, increasing the chance of premature, dangerous and expensive failures. The overloaded vehicle decreases the driver's control and operational space, increasing the likelihood of an accident.

The overloaded vehicle cannot accelerate normally, making overtaking difficult. At night, overloaded vehicles will tilt up their headlights, blinding oncoming drivers with possible debris. When a car overheats and loses its ability to stop, the brakes have to work harder due to wearing down of the brake pads and heavy loads. Brakes wear out and become ineffective because of 'riding of the brakes'. The whole suspension system comes under stress, and over time, the weakest point can give way due to overloading. Seat belts are rarely used because passengers are more often than not crammed into the vehicle without belts. If your vehicle is overloaded, you will incur higher vehicle maintenance costs - tyres, brakes, shock absorbers, and more fuel consumption. Additionally, insurance coverage for overloaded vehicles may be void since overloading is illegal.

6.1 OVERLOADING HAS DONE TO CAUSE GREAT HARM

There is a limit on the number of people and cargo that a vehicle can carry. In most cases, people overlook this and end up overloading their car. This may seem like a simple answer to your momentary problem, but it will not solve your long-term problem. As your vehicle wears out over time, your wheels may bulge and heat up increasing the risk of a blowout when you overload it.

Fig - 6.1: Overloaded Vehicle

The safety mechanisms on your vehicle may not function properly under the stress of overloading it. In other words, you are placing yourself and others on the road at risk of an accident. Under overloading conditions, the suspension system is under heavy stress and becomes less effective

over time. As well, it will not be able to handle high speeds. Overloading reduces the effectiveness of your brakes. Overloading is most noticeable when you are unable to steer the car correctly straight where as well as on curves. The sudden steering could cause your vehicle to lose control. Overloading seriously impairs the fuel economy of your vehicle, along with shortening the life of your engine. No one wants to drive a car that has poor mileage with rising petrol prices. As a result of the poor condition of Indian roads and the poorly designed speed breakers, an overloaded vehicle can hit the underbody easily when it's overloaded with cargo or passengers. For cars with "low ground clearance," overloading can be a nightmare. When tyres are overloaded, they are more likely to wear out and degrade early on.

7. WORKING

The over loading of trucks causes a lot of accidents. That is why the Arduino board is used to limit the load. We use Arduino Boards to read the information from the Sensor and to display what the sensor senses. So, we insert the Arduino Board in our sensor setup. Coding for the load limit control is a code that denotes the specific load capacity of each truck, and is sent to Arduino by the Coding system. Secondly, the load limit is used when the trucks have reached their load capacity, and when the truck is loaded, the ignition is shut down in the truck, and it will also shut down the truck when the ignition is off. Detection of load cell sensor, it sends information to Arduino then Arduino carries signal, and Arduino will transmit it to LCD, which will project weight. Arduino will limit the load by coding, and it will transmit information to ignition, then it will turn the system off. Due to this, there is a cut off of ignition in trucks that limits the load.

8. CONCLUSION

The load limit has been successfully designed; load limit is successfully established with limits. Use of Arduino, we limit the load weight. Due to the limit of weight load, ignition wouldn't start Hence the output has successfully attained. Finally, the load limit has fitted to heavy trucks.

So, in future the accident can be reduced by this load limit ignition.

REFERENCES

1. Jiang z - Heavy vehicles accident - 2001- survey, Moustafa El-Gindy loaded trucks problem - The objective of this literature survey is to review and report related information

2. Jean Salencon Institut de France, Académie des sciences 2020 load limits and load analysis,

3. K Raja sekaran - 2014- Engineering Automotive safety loading, Chassis is the most important structural member in the On-Road vehicles.

4. Lori mooren - 2013 jan Safety management, This paper reviews the literature concerning safety management interventions,

5. Mathews victor 2019 E&1, Load cell was used to sense weights of objects by, the load cells worked as sensors.

6. Universidade Federal, James D Miller, Load cells have long been used to sense and measure force and torque.

7. Victor air force institute of Technology 6 2020, Latin America with machine rentals. The company faces several challenges in distribution of these machines using trucks

8. Anindhya nayag - 2019 march Aurdino load cell This chapter elucidates on some of the work done by different researchers on sensors developed from Carbon Nanotubes (CNTs) and graphene.

9. Ayush sultania - 2015 - Engineer, One of the best microcontroller for prototyping is Arduino UNO.

10. Hari Kishan Kondavetti - 2021 prototyping with Arduino, VIT AP University India, Arduino UNO R3.