



AVOID OVERLOADING IN TRUCK USING IOT WITH FUEL CUTOFF

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Abstract : The Objective of this project is to detect the load of the vehicle and indicate. This project is very useful to the vehicle owner in order to measure the load of the vehicle. The growth of every country's economy is measured by the growth of its transport infrastructure. With the gradual development of economy, the scale of transportation industry continues to expand. The problem of overload in the vehicle transport has emerged. Therefore, how simple and conveniently to know the vehicle load and how to effectively limit overload has become a key issue. Vehicle load control system integration device can detect conveniently vehicle load to prevent overloading of vehicle and improve vehicle safety and it can effectively reduce heavy work of the vehicle load testing station and improve work efficiency in transport sector.

Keywords : Iot, Trucks, Load cell, Fuel Tank

1. INTRODUCTION

Overloading is a major problem in transportation. There is a relatively major number of problems is related to over weighing of heavy goods vehicles. In today's life on an average one in three trucks checked is overloaded. These Trucks exceed the maximum authorized weight by 10% to 15%. Overloaded vehicles lead to all kinds of negative problems like road damage, driver safety and road safety. The weight and overload indicator is designed for easy weighing for avoiding the over loading in trucks and other loaded vehicles. In order to reduce and to control the weight and to improve the mileage over load indicator is used. When the vehicle is overloaded above the licensed limit the spring compresses to its maximum limit so, the two screws which are electrical conducting material comes into contact with each other and the circuit closes so it is indicated by a buzzer. This will help the drivers to reduce the overload and also to provide good mileage. The failure or fracture of a product or component in a single event is known as mechanical overload. It is a common failure mode, and may be contrasted with fatigue, creep, rupture, or stress relaxation. The terms are used in forensic engineering and structural engineering when analysing product failure. Failure may occur because either the product is weaker than expected owing to a stress concentration, or the applied load is greater than expected and exceeds the normal tensile strength, shear strength or compressive strength of the product. An overload indicator for a cargo handling vehicle, such as a truck, trailer, or the like, having a chassis mounting a cargo receiver and supported on wheel axles by springs which yield under the cargo weight with resultant lowering of the chassis toward the axles. The indicator has two separate parts to be attached to one axle and the chassis, respectively, in such a way that the chassis part lowers into contact with the axle part to actuate an overload signal upon loading of the vehicle to a predetermined cargo weight. The indicator is adjustable to vary the cargo weight at which the overload signal is actuated and is designated to avoid damage to the indicator in the event of deflection of the vehicle springs beyond the point at which the chassis part initially engages the axle part due to continued loading of the vehicle or bouncing of the vehicle chassis and axle in travel.

1.1 PROBLEMS DUE TO OVERLOADING

There were several adverse consequences that may occur when the vehicles exceed the maximum permitted limit i.e.

- 1) Vehicles that are overloaded cause excessive wear and damage to roads, bridges, and pavements etc.
- 2) Serious overloading can affect your safety by making the vehicle less stable, difficult to steer and take longer to stop when braking.
- 3) Overloaded & over seat vehicles are in unfair competition with other haulers. In the long term, keeping within weight limits.
- 4) Overloaded & over seat vehicles are illegal - this may affect the insurance cover for the vehicle.
- 5) Overloading & over seat vehicles lead to decrease in mileage and performance.

2. PROPOSED SYSTEM

The planning was the first step in outlining the project, before the designing of the project. In accordance with the literature and the problems we have come across we have planned to design a system to avoid Overloading in Trucks. Our project is designed with Load cell, Amplifier, ADC, microcontroller, LCD display, ESP8266 wi-fi device. In this project we are using load cell as a detector. A load cell can detect objects without physical contact. The detected value in the load cell and given to the amplifier. Amplifier converts the small amount of energy into the ADC Analog to digital converter. It is an electronic integrated circuit device. Load cell value increases automatic cut off the fuel and also send data on android application. This generally affects the manufacturing process and ultimately the material. For example, it would never be desirable to go casting of a less number of components which can be fabricated much more economically by welding or hand forging the steel. Sometimes high strength materials have to be selected because the forces involved are high and space limitations are there. Hence, we have placed Load-cell below the trailer.

3. COMPONENTS

3.1 List of Components

- 1) Load Cell
- 2) Amplifier
- 3) ADC
- 4) Control Unit
- 5) Microcontroller
- 6) ESP8266 Wi-Fi Module
- 7) LCD
- 8) Solenoid Valve
- 9) Fuel Tank

3.1.1 Load Cell

A load cell is an electronic device (transducer) that is used to convert a force into an electrical signal. This conversion is indirect and happens in two stages. Through a mechanical arrangement, the force being sensed deforms a strain gauge. The strain gauge converts the deformation (strain) to electrical signals. A load cell usually consists of four strain gauges in a Wheatstone bridge configuration. Load cells of one or two strain gauges are also available. The electrical signal output is typically in the order of a few millivolts and requires amplification by an instrumentation amplifier before it can be used. The output of the transducer is plugged into an algorithm to calculate the force applied to the transducer.



Figure 3.1 Load cell

3.1.2 Amplifier

Amplifier is any device that will convert one signal often with a small Amount of energy into another signal often with a larger amount of energy. In popular use, the term today usually refers to an electronic amplifier, often as in audio applications. The relationship of the input to the output of an amplifier usually expressed as a function of the input frequency is called the transfer function of the amplifier, and the magnitude of the transfer function is termed the gain. A closely related device that emphasizes conversion of signals of one type to another is a sensor. Amplifier is any device that changes. Increases, the amplitude of a signal. The "signal" is usually voltage or current. The relationship of the input to the output of an amplifier usually expressed as a function of the input frequency is called the transfer function of the amplifier, and the magnitude of the transfer function is termed the gain. A related device that emphasizes conversion of signals of one type to another.

3.1.3 ADC

Analog to digital converter is an electronic integrated circuit. Which converts continues signals to discrete digital numbers. The reverse operation is performed by a digital to analog converter. ADC is an electronic device that converts an input analog voltage (or current) to a digital number. Most converters sample with 6 to 24 bits of resolution, and

produce less than 1 mega sample per second. It is rare to get more than 24 bits of resolution because of thermal noise generated by passive components such as resistors.

3.1.4 Control Unit

Microcontrollers are destined to play an increasingly important role in revolutionizing various industries and influencing our day to day life more strongly than one can imagine. Since its emergence in the early 1980's the microcontroller has been recognized as a general purpose building block for intelligent digital systems. It is finding using diverse area, starting from simple children's toys to highly complex spacecraft. Because of its versatility and many advantages, the application domain has spread in all conceivable directions, making it ubiquitous. As a consequence, it has generate a great deal of interest and enthusiasm among students, teachers and practicing engineers, creating an acute education need for imparting the knowledge of microcontroller based system design and development. It identifies the vital features responsible for their tremendous impact; the acute educational need created by them and provides a glimpse of the major application area.

3.1.5 Microcontroller

A microcontroller is a complete microprocessor system built on a single IC. Microcontrollers were developed to meet a need for microprocessors to be put into low cost products. Building a complete microprocessor system on a single chip substantially reduces the cost of building simple products, which use the microprocessor's power to implement their function, because the microprocessor is a natural way to implement many products. This means the idea of using a microprocessor for low cost products comes up often. But the typical 8-bit microprocessor based system, such as one using a Z80 and 8085 is expensive. Both 8085 and Z80 system need some additional circuits to make a microprocessor system. Each part carries costs of money. Even though a product design may requires only very simple system, the parts needed to make this system as a low cost product.

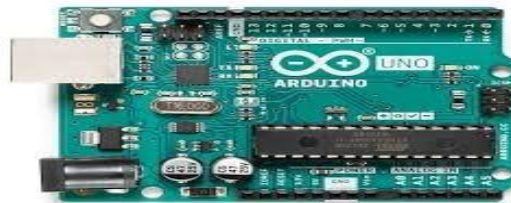


Figure 3.2 Microcontroller

To solve this problem microprocessor system is implemented with a single chip microcontroller. This could be called microcomputer, as all the major parts are in the IC. Most frequently they are called microcontroller because they are used they are used to perform control functions. The microcontroller contains full implementation of a standard MICROPROCESSOR, ROM, RAM, I/O, CLOCK, TIMERS, and also SERIAL PORTS. Microcontroller also called "system on a chip" or "single chip microprocessor system" or "computer on a chip". Microcontroller is a General purpose device, which integrates a number of the components of a microprocessor system on to single chip. It has inbuilt CPU, memory and peripherals to make it as a mini computer. A microcontroller combines on to the same microchip:

- The CPU core
- Memory (both ROM and RAM)
- Some parallel digital i/o

Microcontrollers will combine other devices such as:

- A timer module to allow the microcontroller to perform tasks for certain time periods.
- A serial i/o port to allow data to flow between the controller and other devices such as a PIC or another microcontroller.
- An ADC to allow the microcontroller to accept analogue input data for processing.

Microcontrollers are:

- Smaller in size
- Consumes less power
- Inexpensive

3.1.6 ESP8266 Wi-Fi Module

The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much Wi-Fi ability as a Wi-Fi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost-effective board

with a huge, and ever growing, community. This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.



Figure 3.3 ESP 8266WiFi module

3.1.7 LCD

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome.



Figure 3.4 LCD

3.1.8 Solenoid valve

These valves are basically used pneumatic actuators as circuitry valves. Pneumatic actuators and cylinders cannot be operated without these valves. These valves works perfectly with compressed lubricated air and non-lubricated air and gases and temperature required is 90 degree maximum. Pressurevacuumisrequiredbetween0-10bar

Features:

Size ¼” NB to 2” NB

End connection: screwed BSP/NPT

Body: Aluminum surface treated with Brass, ANSI 304.

Working Parts ANSI 304

Sealing Nitrile

Coil Supply AC & DC supply.

Coil Insulation F class and H class

Coil Enclosure general purpose IP 20 Weather Proof IP 65 Flange proof up to IP 67 GP IIA, IIB.

A solenoid valve is an electromechanically operated valve. The valve is controlled by an electric current through a solenoid: in the case of a two-port valve the flow is switched on or off; in the case of a three-port valve, the outflow is switched between the two outlet ports. Multiple solenoid valves can be placed together on a manifold. Solenoid valves are the most frequently used control elements in fluidics. Their tasks are to shut off, release, dose, distribute or mix fluids. They are found in many application areas. Solenoids offer fast and safe switching, high reliability, long service life, good medium compatibility of the materials used, low control power and compact design.

3.1.9 Fuel Tank

A fuel tank (also called a petrol tank or gas tank) is a safe container for flammable fluids. Though any storage tank for fuel may be so called, the term is typically applied to part of an engine system in which the fuel is stored and propelled (fuel pump) or released (pressurized gas) into an engine. Fuel tanks range in size and complexity from the small plastic tank of a butane lighter to the multi-chambered cryogenic Space Shuttle external tank.



4.WORKING PRINCIPLE

This project is designed with Load cell, Amplifier, ADC, microcontroller, LCD display, ESP8266 wi-fi device. In this project we are using load cell as a detector. A load cell can detect objects without physical contact. The detected value in the load cell and given to the amplifier. Amplifier converts the small amount of energy into the ADC Analog to digital converter. It is an electronic integrated circuit device. Load cell value increases automatic cut off the fuel and also send data on android application. There is keypad used to input the value of required load value. Use of IoT message is send to the owners mobile to alert.

CONCLUSIONS

Here we rectified the overloading problems in truck. So most of the accidents occur due to over loading can be reduce. Then the problem faced by owner can be rectified and it prevent the road from damage so, it's use full to highway Authorities.

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