Iot Based Vehicle Monitoring Load Status

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Abstract- *Measurements and standards of Measurements is one of the most important stages for measuring an object's size, length, weight etc. measuring the weights of small objects does not need much time and efforts but on the other hand weighing large objects needs lots of time and efforts. This work gives significance to replace the present weighing system i.e. Weigh bridge which is used to measure heavy goods and containers and to install load cells in the vehicle itself which will reduce the time and energy. The load cell system incurs only the installation, maintenance costs and reduces the other related cost for weighing the goods and containers to a great extent. The Node MCU is used to get the Token ID and this ID is unique and specified to the user, the weigh is measured and the information can be seen by the user and the owner at anytime they needed.*

Keywords*- IOT, Load cell, Brakes hoe Temperature sensor, Node MCU, ECU*

I. INTRODUCTION

In the early ages people used different techniques to measure a particular object. First, they used to guess the weights of an object, then people started using their hands to weigh and then the use of balances came to existence to weigh objects on the basis of predetermined standards. The balance system was then converted into a digital balance. Even though many different types of balances came into existence still the exact standard of measurement is in debate it differs from one part of the world to another part of the world. As measurement is the process of measuring a particular object relative to the predetermined measurement standards and these standards should be accurate and reliable. Nowadays weigh bridge is used to weigh heavy objects or goods but one of the main considerations to use this weigh bridge is the consumption of time and energy. Usually the weigh bridge is located at a distance from the loading place and to measure the goods one has to travel to the place where the weigh bridge is located which takes time and energy. This study tries to alter the existing system of measuring the weights of heavy objects or goods.

Fig 1.1. Cloud access

II. LITERATURESURVEY

Simulation-Of-Piezo-electric-sensor-in-weigh-In-motion-sensor

This Paper explains about measuring weigh-in- motion system. The measurement of changing load status in a moving vehicle is done by using piezo- electric sensor. This piezo electric sensor is embedded on the roads.When vehicles run over the roads, Piezo electric sensors detect and send the output voltage. The output is obtained at different speed and load. The response of the sensor is a obtained at high pressure and road roughness. This one comes with main drawback that the measurement cannot be viewed at various places and the sensors are embedded in the roads not in vehicles.

Weight-in-motion measurement based on vibration sensors

Vibration based method deals with measuring and monitoring of various parameters. In this, it measures vibrations with the help of accelerometers. Periodic impulse method is used for lower signal-to-noise ratio and as a result it increases the accuracy in measurement. It predicts the axle and gross weight of a vehicle under different load conditions. It calculates weight dynamically when the vehicle enters the load evaluation region by PIM strategy. It does not cover the area of automatic speed control and finding of any

malfunctioning parts in a vehicle. It also fails in storing of measurement information and viewing from anywhere.

System-of- real-time- monitoring- dynamic vehicle-load-status

In this, it calculates the load in the truck at different speed, differing load and at different roads by calculating axle load .Italso aims at overload protection of vehicles. This does not cover the regions of automatic speed control and load measurement is not accurate. Measurement of load is viewed on at that particular place.

Load Cells in Force Sensing Analysis

In this, they covers load cells and it's types which are used in various applications. Usually, load cells are used to measure torque and force applied on it. They convert the force and pressure to the Electrical voltage. Various types of load cells are used for many applications. Ring type load cell are Used for calculating pressures of fruits during transportation and pallet lifting. In this, they cover only Theory of load cells and applications and where the ring type load cell are used. They did not explain about measuring of heavy goods by load cells.

Monitoring the Static Vehicle Load on a Heavy Goods Vehicle

Uniform vehicle load is calculated precisely from axle strain. It provides results by comparing vehicle load and axle strain. This method is cost efficient and more accurate comparison with weigh bridge Method. It fails to explain the dynamic load measurement in vehicles. Automatic vehicle parts Monitoring also absent in this.

III. HARDWARE*COMPONENTS*

A. ARDUINOUNO

The Arduino Uno is able to adapt many functions of microcontroller boarded to support the Microchip ATmega328P microcontroller and create and perform simultaneously by Arduino.cc. The board is deposit of with specified place of digital and analog input/output (I/O) pins which might be interacted to numerous larger growth on boards (shields) and other circuits. The board is fitted to14 I/O pins of digital specifications (six for PWM output), 6 analog I/O pins, and is abled with automatic performance by the implementation of the Arduino IDE (Integrated Development Environment), through form B USB cable. it's visiting be powered by the USB cable or by an external 9-volt battery, thoughit accepts voltages between 7

and 20 volts. it's also rather similar to the Arduino Nano and Leonardo.

B. VECHICLEECU

An engine control unit (ECU), and engine control module (ECM), that specifically controls a series of actuators (a device that causes a machine or other device to operate) on an inside the process of burning engine to provide evidence to support most favourable engine performance. This is done by reading values from an exponentially large number of sensors placed within the engine bay, finding the info using multidimensional performance maps (otherwise known as lookup tables), and adjusting and managing the engine actuators. Before the existence of ECUs, air-fuel mixture, time of the current piston position and a shaft driven by a crank angle, the idle speed were mechanically built and dynamically controlled.

C. BUZZER

A buzzer be an audio signaling device that specifically indicates the specific function is done or not , that are mechanical, electro- mechanical, or piezoelectric. Use of these buzzers and beepers that include warning devices, chronometer, and taking in of user input.

D. NODEMCU

Node MCU is an open source firmware developed for ESP8266 Wi-Fi chip. Node MCU firmware comes with ESP8266 Development board. In Node MCU their hardware design is open for edit, modify and build. Node MCU Dev Kit/board accommodates ESP8266 Wi-Fi enabled chip. The ESP8266 is also a low-cost Wi-Fi chip developed by Express if Systems with TCP or IP protocol. It works in an Iot platform. It consists of 10 digital pins and one analog pin. It consumes more power than Arduino.

E. SPEEDCONTROLLER

An electronic speed controller is a circuit that monitors, controls and regulates the speed of an electrical motor. It also provide reversing of the motor and dynamic braking. Electronic speed controls are utilized in electrically powered radio controlledmodels. Full-size electric vehicles even have systems to manage the speed of their drive motors. An electronic speed control Circuit follows a reference signal and varies proportional to the switching rate of field effect transistors.

F. BRAKE OIL DENSITY CHECK

Brake fluid may be a style of hydraulic fluid utilized in hydraulic brakes and clutches. It finds it's applications in automobiles, motorcycles, light trucks, and a few quite bicycles. It's wont to transfer force into pressure, and to amplify braking force. It works because liquids don't seem to be compressible. Brake fluids even have certain requirements as defined by various standards set by international, national, or local organizations or government agencies. This is often especially important in systems with an anti-lock braking system and stability control as these systems often use valves which aremicro.

G.BRAKE SHOE TEMPERATURE SENSOR

The brake shoe could be a rigid plate usually made from steel, within the shape of an arc of a cylinder, coated on the skin of its curved surface by a friction-producing material and tightened against the within of a cylinder which is critical to supply a braking action. The lining gradually wears away because the restraint assembly is employed to brake a vehicle. The brake pad is typically connected to the surface mount of the restraint.

H.LCD DISPLAY

A liquid-crystal display uses light synchronizing effects of liquid crystals which is combined with polarizer to give an output which could be of smooth display. Emission of light is not taken directly from liquid crystals. Images are processed colored or mono-colored by using rear light or reflector. Images are formed by using matrix of tiny pixels. When it is larger display it uses larger elements. The device can be switch on or off by using arrangement of polarizer.

I. POWERSUPPLY

Electrical loads are powered by using power supply. Continuously changing current is converted into to the proper uniform voltage from main source using power supply. As a result, power supplies are sometimes spoken as wattage converters. Some power supplies are individual and unique pieces of apparatus that can be usedas per application purpose while others are inbuilt in many appliances.

IV. PROPOSEDWORK

One of the main requirements of installing the load cells behind the vehicle carrying the goods is to reduce the time and energy. Load cells works mainly on the basis of Piezo electric work. When the goods are loaded in the container the load cells measure the weight of the goods inside the container. This weight is sent to the Arduino UNO in

terms of Millivoltage and the calculated weight is then displayed on the LCD Display. In case the weight of the goods exceeds the permitted weight the overweight signal is sent to Buzzer which alarms the overweight caution on LCD display. Load cell system not only alarms about the over weight of the goods inside the container but also checks the temperature of the tier because if the temperature of the tier increases it can lead to tier rupture. The tier temperature is detected by the Brake shoe Temperature Sensor, the signal is sent to the buzzer and the caution is displayed on the LCD Display.The other options available in the load cell system is Brake oil density check which checks the level of oil density, vehicle ECU that measure the speed of the vehicle to ensure that the speed of the vehicle containing the goods does not crosses the permitted speed limit. Node MCU is used to get the Token ID and this ID is unique and specified to the user, the weigh is measured and the information can be seen by the user and the owner at anytime they needed. The user can check the vehicle load status by specifying the ID and track the changes in the vehicle.
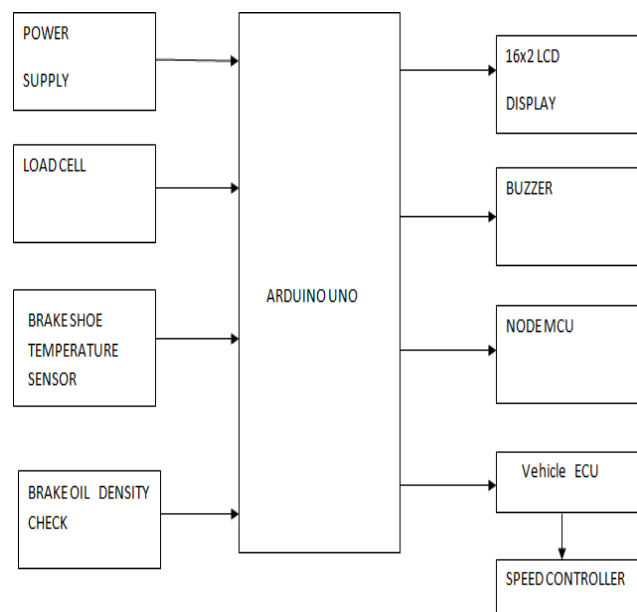

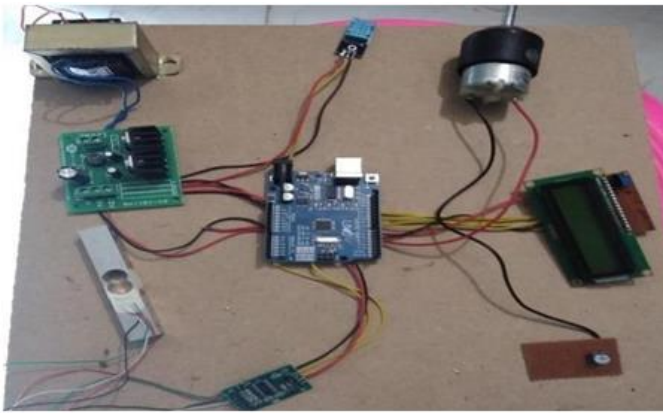Fig 4.1. Block Diagram of IOT based Vehicle Monitoring System

Fig 4.2. Hardware Implementation
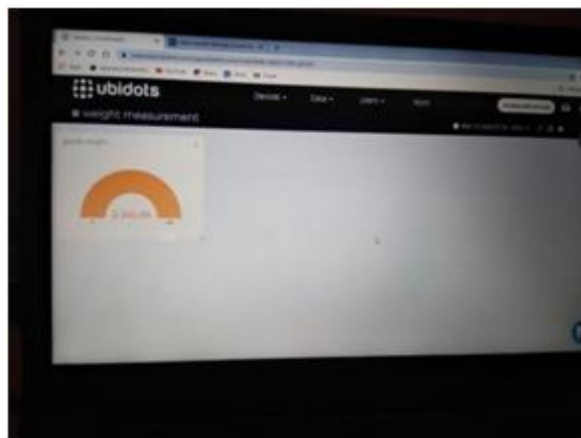
V. RESULT*S*

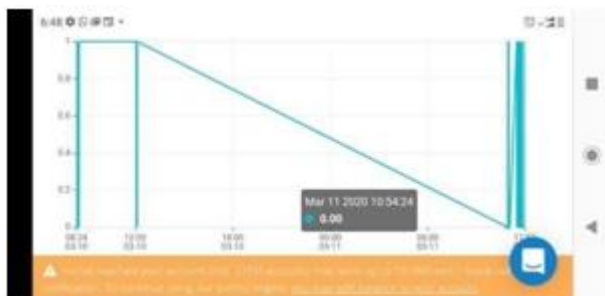Fig5.1 .Login page

Fig 5.2.Output view through Cloud access

Fig 5.3.Load Measurement Graph

VI. CONCLUSION

The load and exclusion characteristics were examined under divergent working conditions. Sensing device for calculating goods weight with maximum protection structures was developed in the vehicles and the readings are maintained. Vehicle load was measured by using load cells which was fixed in vehicle itself and continuously examining the varying load status. The examined measurements are accessed by both customers and owner of the vehicle. The measures are shown immediately to the drivers using LCD display.It reduces more time consumption for measuring goods weight.The values are sent to owners and customers by using cloud access using IOT. It also covers the area of automatic monitoring of brake, engines and tires. If any fault is predicted, it indicates the driver immediately. By doing so, we can reduce the break failures and malfunctioning of vehicle parts.

VII. FUTUREWORKS

We are in the process of establishing our project in a better way by adding some additional features. This includes enhancing the security system of the truck while transporting important documents, university exam papers which will be much useful for educational institutions and higher authority personnel's. There are certain load restrictions while transporting in highways which will be analyzed and will be intimated to the person transporting regarding it through atele metric server. Protection IP67, (i.e.) vibration- resistant design (5G/40Hz) will be considered in further working process.

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