ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 11, November 2018

Vehicle Overloading Detection and Protection using Raspberry Pi and IOT Application

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ABSTRACT: 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: Overloading, Road safety, Vehicle protection.

I. INTRODUCTION

The present works focus on prevention of damage of roads and prevent vehicle damage. Roads now a day play a very important role in every part of world. The value lies in providing safe and convenient travel for the users. As the device is working in the loading process, it can ensure to prevent vehicle overloading; in the process of driving, the drivers don't have to worry about being fined due to overload syndrome; ensure the personal safety of driving. At the same time the system is designed to save the national highway maintenance fees and to ensure the safety of people's lives and property; it can solve the problem of the damage of highway bridges, can also travel to provide a more humanized service life for the people and for the country's economic construction contribute a strength. To sense the overloading effect well in advance there has to be a technology which focus on the calculation of the pay load and compares with the legal limits.

1.1 Overload and Road Safety:

The safety issues and the cost issues are to be identified based on overloading and hence the National department of transport has incorporated a campaign against overloading in its Road Safety strategy. Overloading of commercial vehicles has a major impact on the life expectancy of road networks. The cost of premature road failure and repairs is a major burden on many governments particularly in developing countries where this problem diverts vital funding that could otherwise be spent on health and education. The overloading problems should be controlled or else the extra expenses will be barred by the people who will result in extra wages to be paid in terms of overloading penalty, extra fuel consumption charges and also the trucks carrying goods beyond the permitted load will end up paying 10 times higher the toll charges. This imposes a serious problem on both economical aspects and also upon maintenance of roads. Overloading is a safety hazard that leads to unnecessary loss of life and also the rapid deterioration of our roads, resulting in increased maintenance and transportation costs. In India the midst of building national highways under the NHDP(NATIONAL HIGHWAY DEVELOPMENT PROGRAMME) entails huge investment ,which will last for at least 10-12 years. However even a 10% overloading of goods carriage in excess of prescribe weight can reduce the life of roads and highways by 35%.

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1.2 Overloading a Vehicle will pose the following risks:
Different vehicles have different maximum weights for which they are designed .Hence if this maximum weight exceeds than it is difficult to stop the vehicle and thus the vehicle becomes less stable .Effectiveness to stop the vehicle decreases due to overheating of breaks which will result in harder breaking mechanism as the vehicle is heavier. The parts of the vehicle are of great concern and overloading will incur major loss or reduction in their effective usage and will decrease the efficiency of the vehicles. As the overloading is illegal the insurance covered by it becomes invalid. Overloaded vehicles produce higher kinetic energy, resulting in greater impact forces and damages to other vehicles or to the infrastructure. The other common problems on National highways is overloading of trucks beyond the specified height and length limits. In 2014 these two causes have resulted in 36,543 deaths. In a significant judgment on November 9, 2005 ,the supreme court said the issuance of gold cards/tokens under notifications issued by 9 state government ,allowing overloading of trucks in excess of prescribed weight limits, after payment of fixed charges ,was a violation of motor vehicle act 1988,and central motor vehicle rule 1989 and should not only be stopped immediately but also the over loaded cargo should be offloaded at the point of penalty the cost of which has to be borne by the transporter. This all causes a major uncertainty, does need a solution to prevent the risks.

1.3. Objective of the Project:
The aim of this project is to identify the effectiveness of using overload system in enhancing the operations in enforcing vehicle weight limit regulations. Specifically, this project attempts to quantify the effect of overloaded vehicle and protect the system and infrastructure of the roads.

II. LITERATURE REVIEW

This section represents the various different implementation section associated with this topic or some relevant to this topic with their implementation method and mode of operation.
Soumya, Malini, Shuchi & Niharika [1] describes the Home automation system on their paper based on IOT. They used LDR for light intensity & ultrasonic sensor for distance range condition. ON or OFF of light depends on above sensors. Also, human remotely controlled the light of their houses.

Kumar Mandula, Ramu Parupalli [2] presented the two ideas on home automation, one by using Bluetooth or another using Ethernet. They also created an application based on android.

Jun Li1, Yanzhao Su1, Jinli Xie1,Yangjiao Xu1& Lei Ji1,2 Research of the Vehicle Load Control System Integration Device . Studies in Engineering and Technology Vol. 1, No. 2; August 2014.[3] Overloading a Vehicle will pose the following risks: Different vehicles have different maximum weights for which they are designed .Hence if this maximum weight exceeds than it is difficult to stop the vehicle and thus the vehicle becomes less stable .

Mohamed Rehan Karim1, Ahmad Saifizul Abdullah1, Hideo Yamanaka2, Airul Sharizli Abdullah1, Rahizar Ramli1 Degree of Vehicle Overloading and its Implication on Road Safetyin Developing Countries[4] The aim of this project is to identify the effectiveness of using overload system in enhancing the operations in enforcing vehicle weight limit regulations. Specifically, this project .

Sadaqat Ullah Khana , Tehmina Ayubb, Adnan Qadira,Effect of overloaded vehicles on the performance of highway bridge girder: A case study How Payload worksbY john fulle R auto | vehicle towing capacity[5] The load cell that is placed on the chassis collects, the vehicle load information accurately and reliably and transit the real-time information to the computer processor efficiently and safely using the Raspberry Pi and the information can be received in the form of variety of amplified signals by load cell in harsh environment.

Rupal Shah1, Yogesh Sharma2, Binil Mathew3, Vijay Kateshiya4 and Jatin Parmar51Review Paper on Overloading Effect.[6] It could help to reduce the number of overload trucks and contribute to the more efficient and effective use of roadways. A reduction in overload trucks is also conducive to a reduction in crashes and serious damage to people's lives and property.

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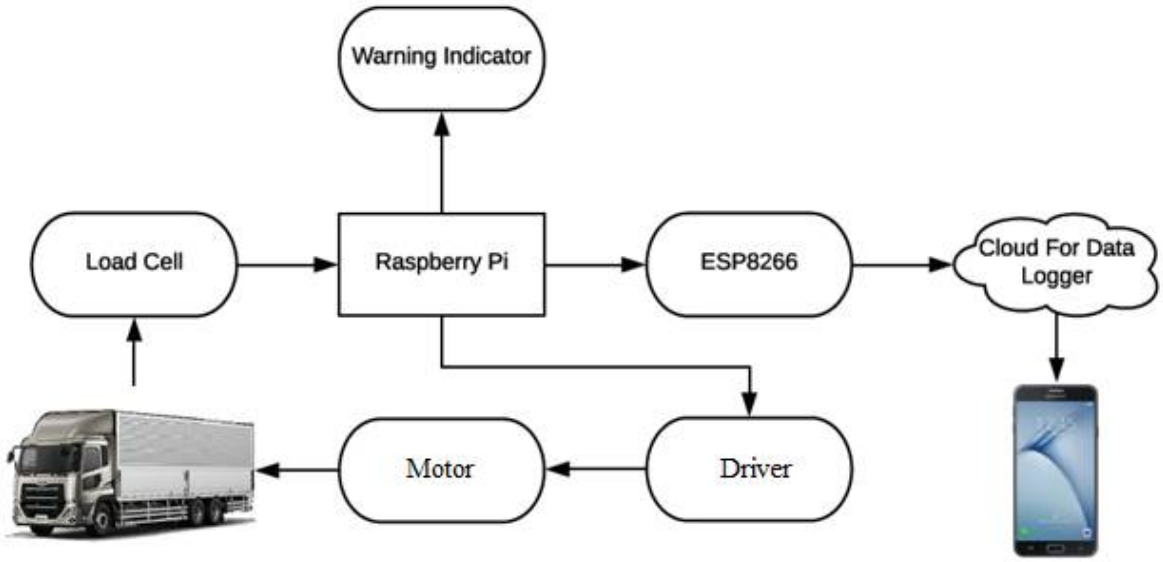
III. PROCEDURE

In this project, the feasibility of vehicle load control system through the strain gauge load cell installed in the vehicle, the Raspberry Pi receives the information transmitted by the weight sensors and calculates the total weight of the vehicle load; if overweight, the single-chip microcontroller will send commands to the vehicle system to prevent the start of the system.

IV. WORKING

The load cell that is placed on the chassis collects, the vehicle load information accurately and reliably and transit the real-time information to the computer processor efficiently and safely using the Raspberry Pi and the information can be received in the form of variety of amplified signals by load cell in harsh environment, calculates the total load and then transmit the data to the ESP8266 and Motor Driver. According to different vehicle load, the Raspberry Pi will choose whether to send instruction to the ignition system.



V. CONCLUSION

Overloading prevention system is a useful tool to contribute towards more compliance with mass regulation. It could help to reduce the number of overload trucks and contribute to the more efficient and effective use of roadways. A reduction in overload trucks is also conducive to a reduction in crashes and serious damage to people's lives and property. New applications of these systems are expected both for traffic and heavy vehicle regulation enforcement. Therefore this system is simple and convenient to know the vehicle load and solve the problem of vehicle overloading effectively.

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