Automatic Weight Monitoring Using Rfid and Load Cell

M.Lakshmi,* K.Hariprasad

Department of Mechanical Engineering, Jeppiaar Engineering College, Chennai-600119

***Corresponding author: E-Mail: lakshmiece2k14@gmail.com**

ABSTRACT

The world is flourishing with new innovation in the field of science and technologies. Heavy vehicle transportation plays a major role in our country. Heavy vehicle owners and drivers in or country face deaths, injuries and loss of goods. The main reasons for road accident, stealing of goods, adding Drugs in the goods in midway. In our project implementation of tollgate based RFID technology to gather sensor is installed on two corner on the field in order to position vehicle for getting the information of load weight through load cell, after positioning the vehicle with camera is invoked through which front image of vehicle is captured and information such as vehicle detail, load weight, image of vehicles are saved in computer and send as mail to client, with the data client can cross verify the details regarding the transportation. By means of providing proper monitoring & tracking system of the vehicle and for assurance of safe transport and to protect from theft of goods certain precaution are taken to avoid client receiver loss. In Tollgate we have attached card swiping system for paying the toll amount. Based on the vehicle amount will be charged.

KEY WORDS: Microcontroller, Load Cell, Camera, RFID.

1. INTRODUCTION

Now a large majority of freight transportation is made by road in most countries, and the volume of ground transportation is keep increasing as the result of the fast growing industry and commerce. The vehicles are fully loaded trucks and their gross weights. Recently, there have been a significant number of vehicles illegally overloaded and damage vehicles. With developing the highway, transportation and business trade, vehicle weightin-motion technology has become a key technology and trend of measuring weight of the loads. Moreover, because of the strong competition between transport modes and companies, transportation management was improved, which has led to an increase in the numbers of fully loaded trucks and their gross weights.

Literature Review

Toll-gate monitoring: Farhad Ismail has explained the   designed toll-collection system reduces   the collection time   and   corruption   and   thus   increases   the government revenue. The toll- collection system also ensures safety and better traffic management (Farhad Ismail, 2015).

Weight measurement: Wenbin Zhang, has suggested a WIM system, the gross weight or the axle weight of the passing vehicle can be measured dynamically by the sensors installed in or on the pavement. Traditional measure men method just uses the interactions between the sensor and the vehicle's tires that make the measurement inaccurate because the sensor cannot cover the whole tire patch along the driving direction. A novel WIM method based on pavement strain response is proposed in this paper. Since the pavement strain is caused by an entire moving vehicular wheel load; it covers a longer force duration time than current WIM methods, so higher measurement accuracy is expected by considering the pavement strain. The proposed method has more durability. A major contribution of this paper was to design, build, and test of a novel experimental WIM system prototype based on a radically different approach than current WIM systems. The field tests and calibration experiments were presented. The results verified that using the embedded strain sensors was feasible and multiple sensors fusion could get higher accuracy and confidence level than individual sensor (Wenbin Zhang, 2010).

 Measurement of load cell: Nemoto, has explained Therefore measurement of horizontal load and measurement in a narrow space are possible with this system. The impact absorption characteristic of cell sponge is nearly the same as that of the characteristic of organism soft tissue. Therefore, it was confirmed that cell sponge can be used instead of organism soft tissue (Nemoto, 2009).

RFID technology: Toll Collection (ETC) systems around the world are implemented by DSRC (Dedicated Short Range Communication) technology. It is an innovative technology for expressway network automatic toll collection solution. In this paper, the frame composing and working flow of the system is described and data information is also easily exchanged between the motorists and toll authorities, thereby enabling a more efficient toll collection by reducing traffic and eliminating possible human errors (Li, 2012).

Pic microcontroller: Nikita Mahajan et.al has, analyzed the microcontroller based Electronic Weighing Machin, used load cell for measurement of weight. The transducer used is a foil strain gauge based load cell mounted to operate by the bending principle. This system is more accurate than analog scale weighing machine (Nikita Mahajan, 2012).

Weight to speed system: Andrew Jason Tickle, presented a functional speed to weight sensor system that could in the future be equipped to HGVs order to help solve a problem of bottlenecks on motorways. Whilst a great deal of work has still to be done, there is potential in this technology to help the general road user. Additionally, the logistics of installing and using the technology by professionals in the field has been accepted by some of the haulage

companies, and they are keen to embrace the idea to increase their profitability

Vechile weight : Mehran Safdar has explained Many equipment have been designed for automatic vehicle load monitoring system and navigation monitoring system, but the system which we designed has these qualities: a weight sensing device attached to a base of a vehicle, and wherein the weight sensing device is a load cell; a compression spring attached to the weight sensing device and to a suspension spring of the vehicle; a voltage conversion unit attached to the weight sensing device to convert an output resistance of the load cell into a voltage; an automatic vehicle location data and a voltage conversion unit; and a central server connected to the AVL to receive a vehicle location data and a voltage data for computing a vehicle load at an instant; wherein the vehicle location data and the vehicle load at any instant is communicated simultaneously to a driver of the vehicle (Mehran Safdar, 2000).

2. PROPOSED METHODOLOGY

Existing System: The goods transportation import and export process is carried out by means of manual paper work regarding the overall shipment and vehicle details, are gathered through manual paper work in the overall goods transportation.

Proposed System: In this proposed system managing and monitor the vehicle details to avoid unethical activities such as overloading and goods theft. Due to overloading they gain extra money but the safety of the driver cannot be assured so to avoid accident and to reduce the unethical activities, In this project RFID tags are used for gathering the information of the vehicle which is installed in vehicle through RFID reader, information such as vehicle number, driver information, receiver address are obtained through RFID reader, IR sensor installed in field around the Two corner of vehicle which helps in positioning the vehicle after positioning the gate is closed, for weighting load to gather information regarding the imported load. After positioning the vehicle, camera is invoked by IR sensor and the front image of the vehicle is captured and the details such as weight, receiver address, and the vehicle details with image is stored in PC and sent to the receiver through mail with the received information the cross verification in receiver side is made possible.

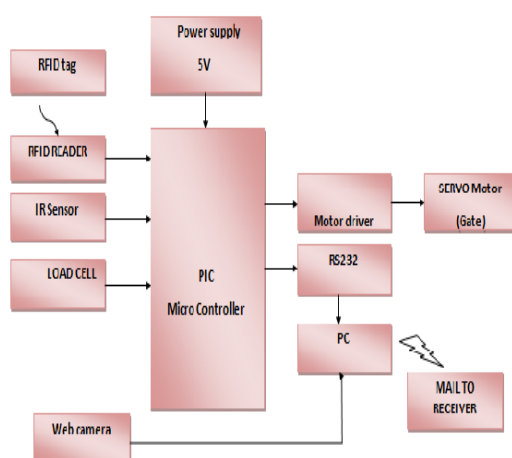**Selection of Components**

Block Diagram

Figure.1. Block Diagram

3. RESULT AND DISCUSSION

Software Program Testing: The software program is written in EMBEDDED 'C' language and compiled by HI-TECH C compiler using MPLAB IDE software. The compiler is used to convert middle level language into machine level language. After compiler operation the hex code is generated and stored in the computer. The hex is nothing but machine level language understands by the micro controller. The hex code of the program is burnt into the ROM (Flash memory) of PIC16F877A by using PICKIT2 Programmer.

Simulation: When the vehicle enters the toll gate, RFID tag at receiver end in the toll gate scans the vehicle and allows it inside when all the details are one and the same. The virtual terminal shows the details of vehicle. In this case LDR acts as gate where it scans the incoming vehicle which has RFID Transmitter. LCD displays "DOOR OPEN" when all the details matches and "DOOR CLOSED" when the details are different. Thus restricting the vehicle out.
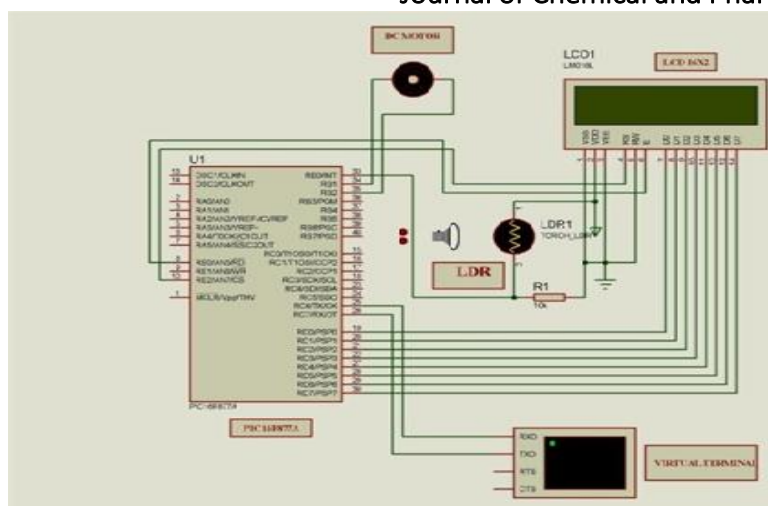
Figure.2. Simulation

4. CONCLUSION

The microcontroller based Electronic Weighing Machine. IR sensor installed in field around the two corner of vehicle which helps in positioning the vehicle after positioning the gate is closed, for weighting load to gather information regarding the imported load. Monitor the vehicle details to avoid unethical activities such as overloading and goods theft. Due to overloading they gain extra money but the safety of the driver cannot be assured so to avoid accident and to reduce the unethical activities.

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