

RESEARCH ARTICLE



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ELECTRICAL COORDINATED ENHANCED OPERATION OF MECHANICAL TRUCK

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ABSTRACT

Transportation engineering is having a huge improvement in its construction of vehicles after the use of electrical and electronic devices. Truck is the commonly used goods transportation vehicle utilized in different fields under various applications. Truck is facing some of the problems on unloading, air pressure checking and jack usage, measuring the load on the truck and also under accidents environment. By adapting suitable electrical devices, sensors and pneumatic control devices, the above said problems are mitigated and the performance of the truck being improved. Thus the electrical coordination based on microcontroller has enhanced the performance of the truck.

Key Words— Truck, Unloading Problem, Air Pressure, Performance.

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I. INTRODUCTION

Mechanization is broadly defined as the replacement of manual effort by mechanical power. Automation plays an important role in automobiles. Nowadays almost all the automobile are being atomised in order to provide comfort to the user. A truck is a vehicle designed for carrying bulk material often for construction sites. One of the main problem that is sited with the truck is the waste of time and energy for setting the huge truck in the proper direction to dump the material in the exact location. This will be a difficult process and which will also create uncomforted to the user(driver). In the reference paper [1] the author Ganesh Shined as found the solution for unloading truck in three ways possible as given the solution by having three base plates. In this method there are lot of complications and also it increases the weight of the truck drastically. On tacking this problem into account we have designed a truck that would dump the

materials in all the three possible directions without changing the position of the vehicle.

It is mandatory to monitor the tyre air pressure in order to provide automobile safety operation and also to ensure the efficiency. In the paper [2] the author Norbert Norman has designed the air pressure monitoring system when vehicle under rest position with the help of wired networks made up of rotatory connectors. The main drawback of the system is it gets damaged so always maintenance is required. Have in our system to monitoring the tyre air pressure, the air pressure sensor has been fixed on the tyre to monitor the pressure continuously on all conditions.

Load cell transducer is used to measure the weight of the consignments/goods on the truck. This arrangements avoids unnecessary burden to the driver. In the reference [3] the author S.K. yang has designed a setup for waiting the consignments/goods on the truck placing strain gauges on each limbs of the suspension plates. This

mechanism is more complicated on the output of all strain gauges has to be summed up to get actual value.

In the reference paper [4] the author Mohammed Abuzaid has designed an inbuilt hydraulic jack system which is attached to automobile vehicle on front and rear part of the chassis. An automobile hydraulic jack system can be easily attached to all currently manufacture automobile chassis and frames. There is a front suspension hydraulic jack that is mounted centrally to the front suspension of an automobile between its front wheels. There is also a rear suspension hydraulic jack that is mounted centrally to the rear suspension of the automobile between its rear wheels. The system operates from a compressed fluid reservoir tank that has connections for the front and rear car jack outlets. Additional outlets can be added to the compressed fluid reservoir tank for connecting a hydraulic lug wrench and another for a tyre inflating hose. Hence In order to provide the sophistication for the user the attached jockey system is designed.

Accident control system towards safety has been installed in the truck which will give indication and thus save truck from accident. The micro-controller plays a major role in monitoring and controlling the accidents and other controls.

II.THREE AXIS UNLOADING SYSTEM:

At present single axis unloading system has been used in the trucks which is having demerits on small areas and makes in convenience in the operation. The three axis system developed in this work makes the unloading process easy on all directions. It uses three hydraulic piston lever operated solenoid valve in a line horizontally this arrangement makes the unloading very simple and easy on all three directions expect the engine side. The middle piston is used to shift the container on the rear side and the piston on the right hand side shifts the container on the left hand side and the piston on the left hand side shifts the container on the right hand side.



Fig 1 Unloading on right side position



Fig 2 Unloading on Back side position



Fig 3 Unloading on Left side position

A.PNEUMATIC PISTON

There are two types of pneumatic pistons operated on the air pressure such on singly operated and doubly operated pistons. The figure shows the piston which makes the upward movement for the air pressure forced into the nozzle.

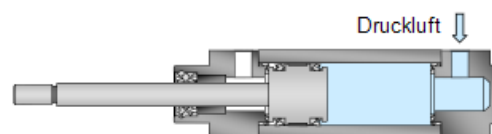


Fig 4...

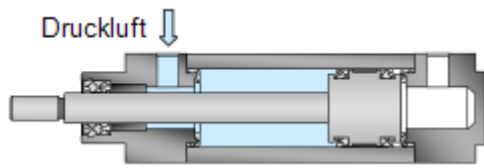


Fig 5...

III. ATTACHED JACK SYSTEM

Four jacks are placed on the axis near the wheels which are all pneumatic type and operated by a lever to solenoid valve from the driver's chamber

A. COMPRESSOR

An air compressor generates air of pressurized level with high potential energy. The air pressure has been increased further by storing lot of air in a truck. When the air pressure reaches its maximum level then the air compressor shuts off. The kinetic energy of the pressurized air drives the moving part of the solenoid valve and the chamber is fitted with air when it reaches its lower level.

B. CONTROL VALVE

The control valve shown in figure is used to limit the flow of in one direction and the other type are non-return valve, shuttle valve etc



Fig 6...



Fig 7...

IV. TYRE PRESSURE MONITORING SYSTEM

RF transmitter is used to measure the tyre air pressure and is placed on the nozzle (mouth) of the tyre. The pressure sensed is transmitted to the monitoring system through the receiver. The red LED indicates the low pressure and green LED indicates shown in normal level and blue LED indicates the high pressure. The RF transmitter module uses frequency ranges of 433.92MHZ, 915MHZ and 2400MHZ. Different types of RF transmitters used in pressure is shown in the figure.



Fig 8...

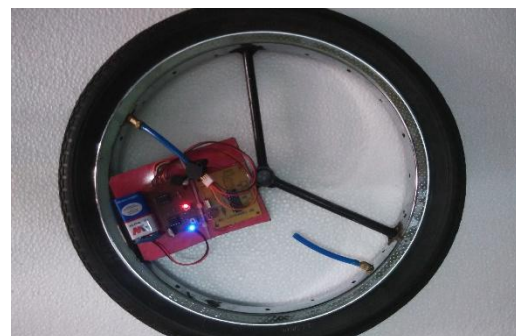


Fig 9...

V. ATTACHED WEIGHT MEASURING SYSTEM:

Automatic weight measuring system has been produced in the work. The load cell placed on the charrs gives the output according to the weight of the goods available and it is displayed on the 16x2 LCD monitor. The microcontroller controls the operation of the weight cell between its upper and lower limits. A/D converter has been used to convert the weight into digital forms.

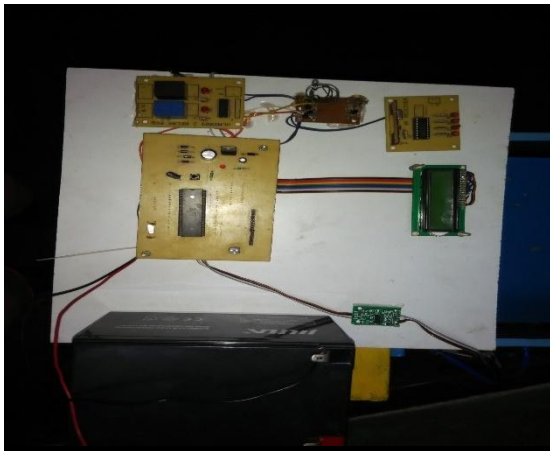


Fig 10...

The different types of load cells are shown in the figure, the resistive load cells are the commonly used cells is weight measurement in which the resistive property is converted into voltage level. The other types are pneumatic load cell and hydraulic load cell.

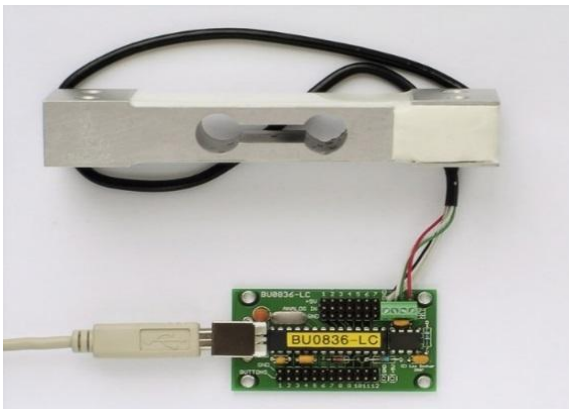


Fig 11...

VI. SAFETY SYSTEM:

Road accidents are frequently happening due to high speed, not following the road rules, etc. On safety purpose in our truck TSOP sensor has been used placed on the front and back of the truck. This will makes indication to the driver and the surrounding in view of avoiding accident.



Fig 12...

The TSOP sensor sense the distance between the vehicles. The microcontroller continuously monitor the signal received from the sensor compares it with the limit values. When the limit is crossed immediately the indicating system operates and this it alert the driver and the surrounding

CONCLUSION

The microcontroller operated mechanical truck is having many features over the other trucks on safety and other operation. The three axis operation of the unloading mechanism, automatic air pressure monitoring weight measurement and jack application are the enhancing the operation of the truck. The mechanical model developed exhibits the advantage of the truck.

REFERENCE

- [1]. "Ganesh Shinde, PrachiTaweale, LaukikRaut", "Design and Development of 3-Way Dropping Dumper", www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 4, Issue 9, September 2014).
- [2]. "Norbert Normann", "Tire Pressure Monitoring System for all Vehicle Categories", *ATZ Automobil technischeZeitschrift* 102 (2000) 11.
- [3]. "S.K. Yang, T.S. Liu, Y.C. Cheng" Automatic measurement of payload for heavy vehicles using strain gage" www.elsevier.com/locate/measurement
- [4]. "Mohammed Abuzaid, Mohammad Hasnain, ShabajAlam, Sohail khan, Prof.Surendra Agarwal", " Inbuilt Hydraulic Jack in Automobile Vehicles" international journal of innovations in engineering and technology
- [5]. "Albert PraveenKumar.JGowtham R R Gruraam V GPrabhakaran " " Design and Fabrication of Three AxisModern PneumaticTipper" *IJRME - International Journal of Research in MechanicalEngineering*ISSN:2349-3860

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- [6]. [6] "Ambarish G. Mohapatra""Design and Implementation of Diaphragm Type Pressure Sensor in a Direct Tire Pressure Monitoring System (TPMS) for automotive Safety Applications" International Journal of Engineering Science and Technology (IJEST)
- [7]. "Lu Cheng 1, Hongjian Zhang 1,* and Qing Li 2" "Design of a Capacitive Flexible Weighing Sensor for Vehicle WIM System"ISSN 1424-8220 © 2007 by MDPI
- [8]. Robert K. Whitford 'TRUCK WEIGHT MONITORING PLAN USING WEIGH-IN-MOTION DEVICES"PLAN FOR WIM FOR THE STATE OF ALASKA
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