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ijircce@gmail.com



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Accident Prevention in Agricultural Goods Transportation System

Saurabh Tapse, Adesh Rasal, Vyankatesh Khune, Dr.D.B.Salunke

Department of Electronics and Telecommunication Engineering, JSPM'S Jayawantrao Sawant College Engineering,
Hadapsar, Pune, India

Department of Electronics and Telecommunication Engineering, JSPM'S Jayawantrao Sawant College Engineering,
Hadapsar, Pune, India

Department of Electronics and Telecommunication Engineering, JSPM'S Jayawantrao Sawant College Engineering,
Hadapsar, Pune, India

Project Guide, Department of Electronics and Telecommunication Engineering, JSPM'S Jayawantrao Sawant College
Engineering, Hadapsar, Pune, India

ABSTRACT: A cane transport vehicle overload detection and accident alerting system is proposed based on a microcontroller system that includes an information acquisition module, signal conditioning module, and wireless transmission module. The system uses a floored load cell to analyze the real-time load of the vehicle, and the weight of the cane trolley is calculated from the load cell output. The microcontroller processes the data and drives the system. The collected data is wirelessly transmitted through the GSM network to the respective owner. The system also includes an ADXL345 accelerometer sensor to detect tilting of the cane trolley. If the tilt angle exceeds a certain threshold, the system promptly alerts the owner about the potential danger. The proposed system has been tested and can accurately detect overloading and tilting. The system's ability to alert the owner promptly in case of an overload or tilt ensures that corrective action can be taken in time, thus improving the safety of cane transportation. Overall, this system can be an essential tool for cane transporters, helping to reduce accidents and increase efficiency in cane transportation.

***KEYWORDS:** Overload detection , Accident alerting system , Real-time load analysis , Agricultural goods transportation

I. INTRODUCTION

The agricultural industry is known to be one of the most important economic sectors worldwide, as it not only provides food but also employing a number of workers in the industrial sector. However, agriculture is considered as one of the most hazardous sectors in both developing and developed countries. Agricultural goods transportation plays a vital role in the global economy. However, the transportation of agricultural goods often associated with several challenges and risks, including accidents, damage to goods, and loss of productivity. Accidents during transportation can cause serious injuries and even fatalities, resulting in significant financial and social costs. To mitigate these risks and ensure the safe transportation of agricultural goods, an accident prevention system is proposed. This project report presents an overview of the development and implementation of an accident prevention system for the transportation of agricultural goods. The proposed system uses advanced technologies such as microcontroller systems, sensors, and wireless communication to detect and prevent accidents in real time.

This project, proposes an agriculture transport vehicle overload detection and accident alerting system for agricultural transportation vehicles is proposed. The system includes a floored load cell to analyze the real-time load of the vehicle, and the weight of the trolley is calculated from the output of the load cell output. The microcontroller processes the data and drives the system, which includes an information acquisition module, a signal conditioning module, and a wireless transmission module. The collected data is transmitted wirelessly via the GSM network to the respective owner. In addition, the system includes an ADXL345 accelerometer sensor to detect tilting of the cane trolley. If the tilt angle exceeds a certain threshold, the system immediately alerts the owner about the potential danger. The experiments conducted demonstrate that the system can accurately detect overload and tilt, making it a valuable tool for cane

transporters. The system's ability to alert the owner promptly in case of an overload or tilt ensures that corrective action can be taken in time, improving the safety of cane transport .

II. LITERATURE SURVEY

Intelligent Overloading Prevention system in Trucks [1]. This is a four wheel vehicle in truck shape with drive mechanism, the truck carrying load in its tray, to sense the load during loading which is preset for certain load and when getting overloaded will give the buzzer sound to alert the driver to control the loading and if gets overloaded and when started moving in overloaded condition, when coming near the check post or checking vehicle, sensing the checking vehicle, a siren in this overloaded vehicle will start to alert the checking authority that this vehicle is overloaded and when the authorities tries to stop the vehicle, the driver try to drive away the vehicle, the authorities from their control can stop the vehicle. If the driver when check post authorities signal to stop the vehicle, if does not stop, the authorities from their control can stop the vehicle automatically.

Effect of overloading Freight vehicles to increased carbon dioxide emissions case study [2]. In their studies have highlighted the magnitude of the problem of vehicle overloading. Apart from the impact on pavement damage and carbon emission, vehicle overloading would lead to more hazardous road environment because of the limitation in vehicle dynamics and braking performance of the vehicle to cope with the higher demands for the excess pay loads.

Degree of vehicle overloading and it's implications on road safety in developing Countries [3]. a patient-centered, totally decentralised approach that offers patients access control, can stop data change, and can identify data theft. The most efficient method for resolving all problems and satisfying all expectations is blockchain technology. Blockchain, a decentralised and distributed ledger, has the potential to influence financial data crimes, record sharing, billing, and medical research in the future. Further simplification may be possible with smart contracts in the health care industry. Invoking, creating records, and validating will all happen on the blockchain.

Systematic Literature Survey on Accident Alert & Detection System [4]. The leading cause of deaths in road accidents is due to delay in medical help. This can be prevented by messaging the authorities and emergency contacts too on time. The system consists of GPS, GSM, accelerometer and Arduino. It alerts nearest hospital, police headquarters, family and friends during the time of mishap mainly by detecting changes in accelerometer. The system sends a google map link using GPS module and Arduino. The vehicle sets the flag bit of the Arduino UNO as an accident is identified until it detects abrupt deviation from the threshold values with the help of the measuring system detector. Throughout the accident, the device sets the effective sensitive value for measuring instrument detectors, unless a crash is observed. Once the accident or set bit is detected by the measuring instrument detector, Arduino activates the GSM module, which has a manually saved signal of the accident victim's emergency contact, and sends a pre-stored SMS to that contact.

Emergency Alert and Service for Automotives for [5]GPS Receivers Play a very important role to provide timely aid in case of emergency like accidents, theft or Fence –violation to detect the exact location of the vehicle. This self contained system is able to send alert SMSs, it also communicate with the server through GPRS to track the vehicle. Its operational cost is also minimal, making it suitable for developing countries like India. Thus, the proposed system can help the People by providing essential safety and security features economically

III. PROBLEM STATEMENT

The transportation of agricultural goods, such as cane, can be dangerous due to overloading and tilting of the trolley. Current systems for detecting and preventing these accidents are limited and often rely on manual inspections. Therefore, there is a need for an automated and accurate system that can detect overloading and tilting in real-time and alert the owner promptly to prevent accidents.

IV. MOTIVATION OF THE PROJECT

The project aims to develop an automated agricultural transport vehicle overload detection and accident alerting system that can detect overloading and tilting in real-time and alert the owner promptly to prevent accidents. This system is essential to prevent economic losses, injuries, and fatalities caused by accidents during agricultural goods transportation. The current systems for detecting and preventing such accidents are limited and unreliable, which makes an automated system necessary to accurately detect overloading and tilting and ensure that goods reach their destination on time. The implementation of this system can benefit both farmers and transporters and contribute to the growth of the agricultural sector.

V. GOAL AND OBJECTIVE

1. To develop a system that can detect potential accidents before they happen, such as unstable loads or unsafe driving conditions.
2. To create a system that is scalable and can be adapted to various types of agricultural goods transportation vehicles.
3. To develop a system that is easy to install and use, requiring minimal training for operators.
4. To build system which is reliable and accurate, with minimal false alarms or missed detections.
5. To create a cost-effective solution that can be widely adopted by farmers and agricultural businesses.

VI. METHODOLOGY AND ARCHITECTURE

A. Methodology of problem solving

In most cases, trucks and trollies are used to transport agricultural goods. These do not have system alert and other safety measures to prevent accidents.

The system involves the installation of sensors in the vehicles that can detect overloading and tilting in real time. The sensor data will be transmitted to a central system that will analyze the data and generate alerts for the driver in case of potential danger. The system will also provide real-time monitoring and analysis of vehicle condition, which will help prevent accidents caused by vehicle malfunction and overloading. The system will be integrated with a user-friendly dashboard that will allow the driver to monitor the vehicle's condition and receive alerts on their Mobilephone . The use of this system will help improve safety in the safety of agricultural goods transportation and reduce the risk of accidents and injuries to the driver and other road users, as well as reduce the loss of materials and good being transported.

SYSTEM ARCHITECTURE

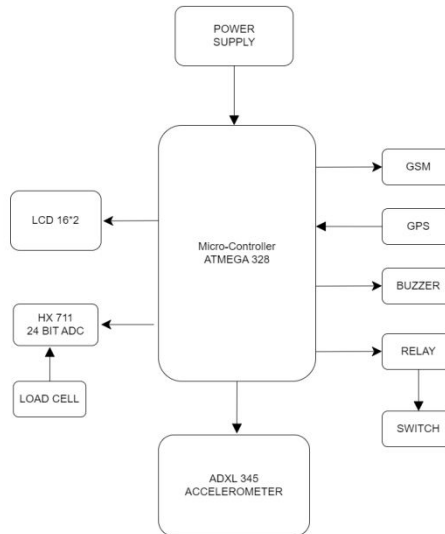


Fig 1. System Block Diagram

The system includes the modules listed below:

Micro-Controller ATMEGA 328: It is main module which controls all the connected sensors, execute programs and control input/output operations.

Accelerometer : Used to determine if the vehicle is tilting or experiencing a collision, which can trigger an alert or warning to the driver or automatically activate safety measures.

LOAD-CELL : Used to measure weight by converting the load into an electrical signal.

LCD Display : Shows the real-time weight.

RELAY : Controls Engine Switch On/Off.

ADC: It converts analog signal to digital .

GSM: Used to send data via SMS as a part of communication.

GPS: Provides accurate information on latitude, longitude, and altitude.

BUZZER : To get Indication of the tilting and overloading .

B. Results:

1. The driver can get exact weight of loaded material in trolley on LCD display.
2. When there will be excess weight of material , system will not allow to start vehicle.
3. When there will be unwanted or extra tilting of vehicle system indicates driver via Buzzer .
4. SMS alerts will be given to user if vehicle becomes overloaded or tilts excessively.

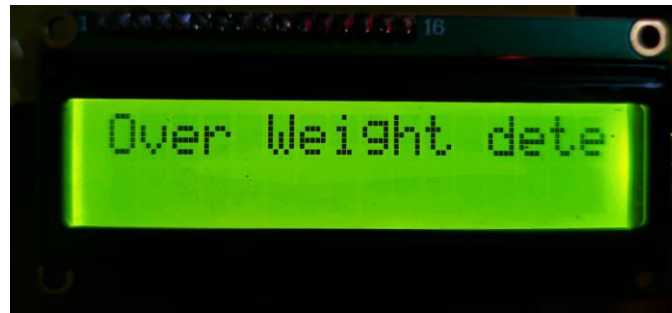


Fig B (1). Overload Alert



Fig B (2). Tilt Alert

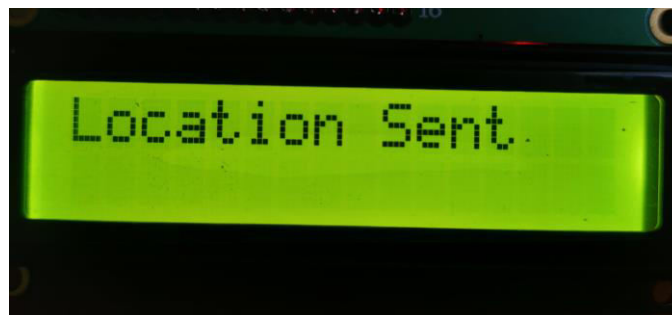


Fig B (3). Location Sent Alert

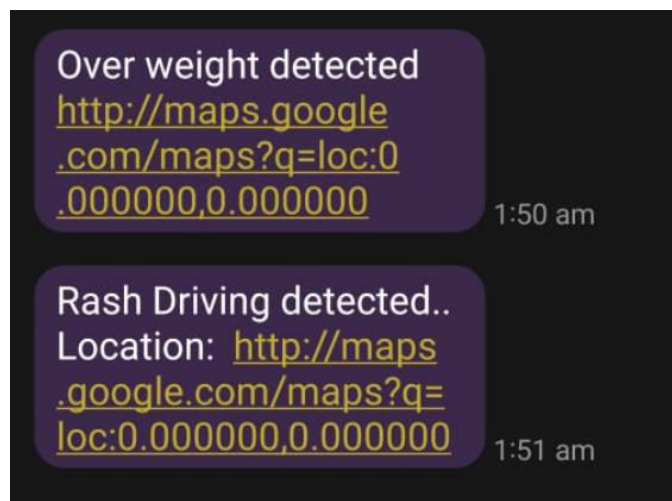


FIG B (4). SMS Recieved

VIII. FUTURE SCOPE

Future Scope:

The majority of accident alertation systems limited to certain categories of vehicles, although some of the standard safety measures are common. Numerous other issues related to hazards and accidents that depend on vehicle type, such as mining vehicles, heavy-load vehicles, and construction vehicles, remain unresearched.

Statement of Scope:

Accident prevention system in agricultural goods transportation includes integrating advanced technologies like AI and IoT for real-time monitoring and analysis, developing predictive maintenance systems to prevent breakdowns and accidents, implementing driver training programs, and exploring new materials and designs for vehicle construction to improve stability and prevent tilting. Additionally, the system can be expanded to cover other types of vehicles and transportation industries, and can be integrated with existing transportation management systems for better efficiency and coordination.

Application:

1. Expansion of the system to cover other types of vehicles and transportation industries
2. Integration with existing transportation management systems for better efficiency and coordination.

IX. CONCLUSION

Solutions can be explored to improve road infrastructure and transportation policies to better accommodate the needs of agricultural goods transportation and reduce the risk of accidents. The accident prevention system for agricultural goods transportation can significantly reduce the number of accidents and injuries caused by overloading and tilting of vehicles. The implementation of this system can provide real-time monitoring and alerts to the driver through SMS notifications, leading to safer transportation of goods. The integration of advanced technologies like AI and IoT, predictive maintenance systems, driver training programs, and new materials and designs for vehicle construction can further enhance the system's effectiveness in preventing accidents.

Moreover, this system can serve as a model for implementing similar systems in other industries that involve heavy vehicle transportation, ultimately leading to safer and more secure transportation of goods across various sectors. The system's future scope also includes the expansion of coverage to other types of vehicles and transportation industries, as well as integration with existing transportation management systems for better efficiency and coordination.

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