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Monitoring System for Freight Railway

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ABSTRACT:

The constant demand for heavier, longer, faster and more efficient rail freight vehicles, onboard fault detection system appear as a good approach for enhanced railway asset exploitation. Today accidents occur due to many reasons. One of the main reasons is brake failure which may lead to derailment. If the brake or shock absorber fails, then the LED display indicates engine driver with a buzzer sound. If derailment occurs, the message will be send by GSM and GPS to the nearby station.

Keywords:

Buzzer, Brake wire, Brake lever, Fault Detection, Wagon, Brake Failure, Shock Absorber.

INTRODUCTION:

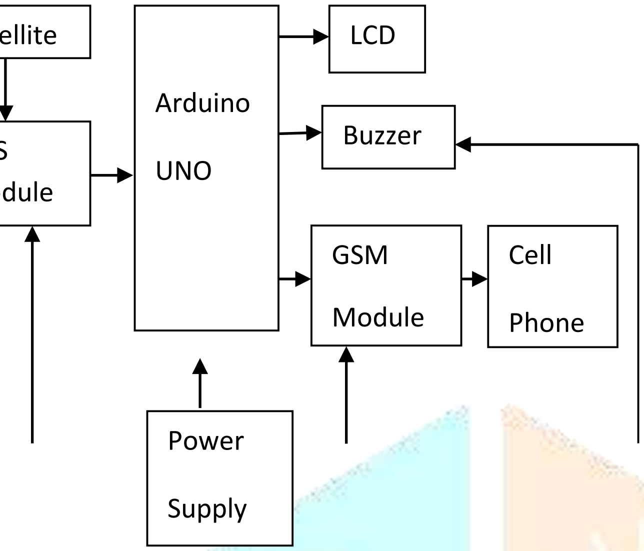
Railway freight transport's performance in Europe has constantly increased during the last few years and it will reach 3460 Bn tkm per year by 2030[1]. Railway freight in general, is the most efficient transport means for large tonnages of heavy cargo. In Australia for example, a single freight train can remove 110 trucks from the roads. Freight train derailments are more frequent than passengers train derailment[2]. Because, generally freight wagons are unpowered wagons. Onboard condition monitoring is not widely spread in unpowered railway vehicles, and its implementation would be expected to improve safety. Today accidents occur due to many reasons; one of them is brake failure. Sometimes brake failure may occur when the brake line is cut off which leads to derailment[3]. If brake failure occurs, then the buzzer warns the driver with a sound.

If the brake line is cut or any shock absorber failure will send a signal through the microcontroller. The micro controller analyzes the signal and operates the corresponding indicator[4] using the screen to display the failure. By using GPS, the current location will be sent to the driver and any nearby station through a message by using the GSM slot. The components used in the system are Buzzer, GPS, GSM, Microcontroller, GSM Antenna, Power supply, Brake wire, Shock Absorber, Transformer and Wheel Setup. And finally the Braking System installed in two wheelers and four wheelers also.

EXISTING SYSTEM:

By using sensors, the brake failure is indicated in LCD to driver.

SYSTEM DESCRIPTION:



1.ARDUINO

The main advantage of this arduino is fast processing and easy interface. It has 14 digital I/O pins in which 6 can be used as PWM output. It consists of a 16 MHz ceramic resonator, an ICSP header,USB connection,6 analog input, a power jack and a reset button.

2. GPS MODULE:

GPS stands for Global Positioning System and used to detect the latitude and longitude of any location on earth, with extract UTC time. GS module is used to track the location of wagon in our project. This device receives the coordinates from the satellite for each and every send with time and date. We have previously extracted $GPGGA string in vehicle tracking system to find the latitude and longitude.

3. GSM MOODULE:

The SIM900 is complete Quad band GSM/GPRS module which can be embedded easily used by customer or hobbyist. SIM900 GSM module provides an industry-standard interface and performance for voice, SMS, data with low power consumption.SIM900 designed by using single chip processor integrating AMR926EJ-s core.

4. BUZZER:

Buzzer or beeper is an audio signalling device, which maybe mechanical, electro-mechanical or piezoelectric. It is used for alarm, timer, keystroke, home appliance.

5. WHEEL:

A circular object connected at the centre to a bar used for making a vehicle or a part of a machine move.

6. BRAKE LEVER:

It connects the brake cable and thus operates the braking mechanism.

7. BRAKE CABLE:

It's a cable that connects a brake lever to a vehicles breaking mechanism.

8. POWER SUPPLY BOARD:

It is a basic essential interface for regulating & supplying power to the connected components.

9. LCD:

LCD is an electronic display module which uses liquid crystal to produce a visible image. A 16 X 2 LCD means, it can display 16characters per line and there are 2 such lines. In this LCD each character is displayed in 5 X 7 pixel matrix.

10. SHOCK ABSORBER:

A shock absorber or damper is a mechanical or hydraulic device designed to absorb and damp shock impulse. if any breakage occur in spring will be indicated.

11. CONNECTING WIRE:

It is used to extend the connections in a circuit.

WORKING:

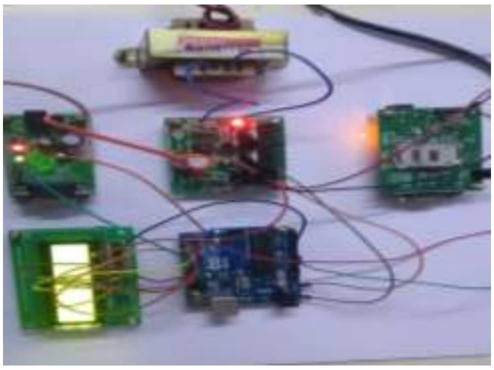
In this project, Arduino is used for controlling the whole process with a GPS receiver and GSM module. GSM module is used for sending alert SMS with the link to Google map. And an optional 16 X 2LCD is used for displaying status message. We have used GSM module SIM28ML and GSM module SIM900A.

If any brake failure or shock absorber failure occurs then, arduino reads coordinates by extracting $GPGGA string from GPS module data and send SMS to the nearby station with the location coordinates of place. The message also contains a Google map link to the wagon, so that location can be easily tracked. When we receive the message, then we only need to click the link and we will redirect to Google maps and we can extract the location of vehicle. If failure occurs the arduino sends signal to the buzzer and sends alert to the driver.

CONCLUSION:

Comprehensive real-time condition monitoring for freight wagons without onboard power is still a challenge for railway industry. The main component for onboard condition for monitoring device such as microprocessor, GSM, GPS, LCD, Power Supply. The failure occurrence in brake and shock absorber which may lead to derailment. If any failure occurs, the indication will send to the driver through LCD and Buzzer.

By using GSM module, the information will be sent as SMS to nearby station. The GSM system is added to the monitoring system to track the location of wagon and send it to nearby station by using GSM module. It can be also implemented in both two wheelers and four wheelers also.



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