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REVIEW ON RAILWAY CRACK DETECTION BY LED-LDR ASSEMBLY

Mohammad Zakir[1], Diksha Nagdevte[2], Avinash H. Shelar[3]

[1]*Student, Electrical Department, DES's COET*
[2] *Student, Electrical Department, DES's COET*
[3]*Professor, Dept. of Electrical Engineering, DES's College of Engineering and technology, Maharastra, India*

Abstract - *Most of the commercial transport in India is being carried by the railway network and that's why any problem in the same has the capacity to induced major damage to the economical not with standing to the affect on social atmosphere and it occurs loss of life or limb on this major problem we have a solution which is the railway crack detection by LED and LDR this is the cost effective and robust solution which can used to crack detection This is the cost effective and robust solution which can be used to crack detection it is the unique method also utilization of these method is simple and easy as compared to any other so it is also inexpensive which can occur less cost We can discuss the technical and design in detail and also provides the proposed robust crack detection algorithm It also represents and implements and research of the RRCDS utilization simple components include GPS module GSM modem and crack detection assembly LED and LDR*

Key Words: *Arduin, Railway Cracks, LED-LDR assembly, GSM, GPS, Robot, GPS module*

1.INTRODUCTION

Channelization means in other language transportation is very important to deport and carry the passengers and good from one place to another The better transport is responsible for more business deals. The refer economical level is mainly depends on increasing the capacity and ability of the level of transport .This concept represents an implementation of an efficient and less cost solution desirable for railway application. In this concept we are going to use IR sensor to detect the crack in rail road. If there is any crack detected its longitude and latitude values are send a message and inform the nearby station by using GPS and GSM system. Then ultrasonic is used for the surveying process. The PIR sensor is very important component which consumed to detect the presence of humans in the track throughout its history Transportation has been a very huge requirement fot eh expansion of trade. For the economic success we have to increase rationality and capacity of transport system. The proper operation and maintenance of the transport, basic structure of features of a system or organization has a great encouragement on the economy.

2. PROPOSED RRCD SCREEN

In the process of designing the prototype, Chennai's Suburban Railway System, South Line, which runs between Tambar am to Chennai Beach spanning a total of 22Km was considered as the testing and usage area. This railway line does not operate between time 12:30 am to 5: am. This gives us a five hour window during which the robot has to travel the railway line looking for cracks. Figure 1 shows the overall design of the proposed assembly. To ensure robustness, repeatability and simple implementation, the idea has been kept simple. 479 ICRTIT-2012 . The core of the proposed crack detection assembly consists of a Light Emitting Diode (LED)-Light Dependent Resistor (LDR) assembly that functions as the rail track crack detector. The idea involved in crack detection is the concept of LED and LDR. In the design, the LED will be attached to one side of the rails and the LDR to the opposite side of the track. During normal operating condition when there are no cracks, the LED light does not collide on the LDR and hence the LDR resistance is high. Subsequently, when the LED light collide on the LDR, the resistance of the LDR gets decreases and the amount of reduction will be approximately proportional to the intensity of the fallen light. As a consequence, when light from the LED changes from its path due to the presence of a crack in track, a sudden change in the resistance value of the LDR ensues. This change in resistance indicates the presence of a crack in track or some other similar structural fault in the rails. In order to detect the current area of the device in case of detection of a crack, a GPS receiver whose work is to receive the current latitude and longitude data is used. Necessary because the LDR has a natural tendency to show a drifting effect because of which, its resistance under the same lighting condition may vary with time. After calibration, the robot waits for a predetermined period of time so that the on board GPS module starts reading the correct geographic coordinate. This is necessary because any GPS module will take some time to synchronize with the satellites

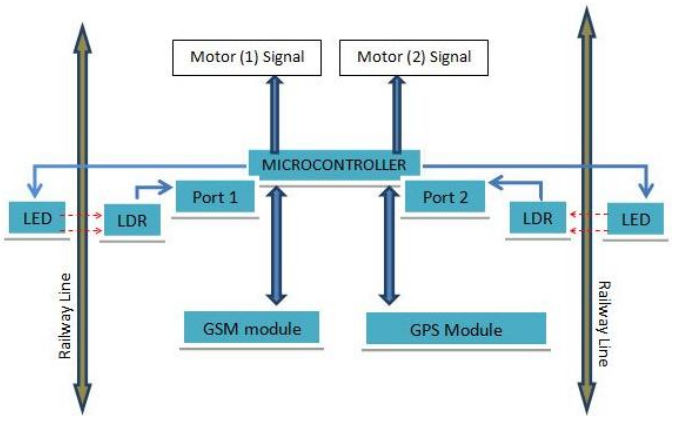

Fig. 1 – Block Diagram

3. ELECTRICAL DESIGN

3.1. Microcontroller

An Arduino Uno board which has ATMega328 microcontroller forms the brain of the scheme. This board has been chosen for two important reasons other than the fact that it is cost effective. First, the Arduino integrated development environment (IDE) is an open-source project which highly simplifies the coding and debugging process. Secondly it has all the required pins to interface the required peripherals. It has 6 analog input pins, 14 digital I/O pins (of which 6 provides PWM output) and one UART. The detailed description about how various components have been interfaced with Arduino is also discussed hereafter.

3.2. GPS module

EM-406 GPS receiver has been used as the GPS module. It follows NMEA convention. With a baudrate of 9600 bps, 1Hz update rate and 1 sec hot start time, the properties of the said module was found to ideally match the requirements. It isinterfaced with Arduino using the UART.

3.3. GSM module

The SIM 300 GSM module has been chosen to achieve the SMS functionality. Since the Arduino Uno board has only on UART, it was necessary to program 2 of the digital pins (pins2 and 3 in our case) of Arduino to act like a virtual UART so as to interface the GSM with the Arduino. The overall electrical design of the RRCDS has been shown in Fig. 1

3.4. DC Motors

To traverse a distance of 22 Km in 4 hrs, an average speed of 1.5 meters/sec is needed. The proposed design uses 4 DC motors (Torque Rating: 10Kg and Speed Rating: 500 rpm)480 ICRTIT-2012 interfaced with the Arduino using H-Bridges. With a wheel diameter of 5.2 cm and the total mass of around 5 Kg the approximate speed of the robot is around 0.5 metres/sec. Hence it has been calculated that three such robots would be required to scan the whole Southern Chennai Suburban Railway System

3.5. LED-LDR Assembly

The common 5V LED and cadmium sulphide LDR was found to be sufficient. The LED is powered using one of the digital pin of the Arduino. The LDR and a 45kΩ resistor form a potential divider arrangement. The output of the potential divider is given to one of the analog input channel of the Arduino. The LDR is calibrated every time the robot is used. To compensate for the ambient light we use the concept of dead band. Fig. 1 clearly illustrates it.

3.6. Mechanical Design

Above fig. shows the mechanical design of the robot it is The robot runs on both the railway track then its stability is increases and preventing it from falling when it is move over a railway which will be splitting into more branches in addition. The robot has been design to be proportionate symmetrical. It consists of two wooden frameworks that's each supports the two motors one LED LDR Assembly and one battery. The battery's weight is little near about 300 grams. If giving additional weight on the robot when it moved over railway bifurcations. The cylindrical aluminums rod which is connected to these two wooden frameworks and is ¾ inch and thickness is 0.25mm. The railway track length of the aluminums closed that the four wheels of the robot on a typical board gauge of the track. The distance between two board gauge track is 1.676 meter this criteria is useful in India. In the circuitry box containing the board which is Arduino uno board. On the aluminums rod the GPS and GSM module is exactly placed in center. The 10 wires are divided into two bunch wire for motor and remaining two wire for battery Each wire enters in the circuit box from two sides which is left a right side. The proper packing of these many wires is a crucial in design of the robot.

CONCLUSION

These system providing useful solution while making the railway track crack free railway detection by using GSM based scheme by using operational amplifier. The cost of the system is less and it gives the reliable output as compared to another system which already used in the track security purpose. To have safe track with sound infrastructural facilities. It is mainly implemented on a long scale for the better results and problem free solutions in the future.

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