



ALERTING SYSTEM FOR RAILWAY RIFTS AND RAILWAY CROSSING

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Abstract: In India, Railway transportation is the most common, convenient and cheapest transportation. This helps people in shipping of goods and travelling. The most common causes of railway accidents are railway track crossings, unseen cracks in the tracks and objects, animals and human on the tracks.

In this product Arduino, GMS, GPS tracking system and Sensors is used to give alert message for railway maintenance team, geographical point identification for immediate action, railway crossing gate and buzzer to alert the pedestrians as well as vehicles.

There are many advantages in this product compared with the traditional detection techniques. By this system the exact location of the faulty rail track can easily be located and also can easily avoid the accidents occur by the faulty track, which will help us for saving many lives.

Keywords: Arduino, GMS, GPS, Sensors.

I. INTRODUCTION

In today's world, transport, being one of the biggest drainers of energy, its sustainability and safety are issues of paramount importance. In India, rail transport occupies a prominent position in quenching the ever urge owing needs of a rapidly growing economy. The major problem is that there is no efficient and cost-effective technology to detect problems in the rail tracks and the lack of proper maintenance. However, the proper operation and maintenance of transport infrastructure has a large impact on the economy. This model says about a proposed prototype of testing train for detecting cracks, obstacles and automatic gate controlling when these problems occurred, then train can be automatically controlled without driver control. This work introduces a project that aims in designing robust railway crack detection using ultrasonic sensor assembly system which avoids the train accidents by detecting the cracks on railway tracks and IR sensors for detecting obstacles on track. And also capable of alerting the authorities in the form of SMS messages along with location by using GPS and GSM modules. The system also includes distance measuring sensor which displays the track deviation distance between the railway tracks. In case of rail gate control the presently existing system is that once the train leaves the station the stationmaster informs the gatekeeper about the arrival of the train through the telephone. Once the gatekeeper receives the information, he closes the gate depending on the time at which the train arrives. Hence if the train is late due to certain reason, then gate remain closer for a long-time causing traffic near the gates. By employing the automatic railway gate control at the level crossing the arrival of the train is less compared to the manually operated gates and also reduces the human labor. This type of gates can be employed in an unmanned level crossing where the chances of accident are higher and reliable operation is required. Since the operation is automatic, error due to manual operation is prevented. The proposed testing train is cost effective and analysis time is less. With this proposed system the exact location of the faulty rail track can be easily located, so that many lives can be saved.

II LITERATURE SURVEY

- [1] In 2017, Ishan Jain, Shubham Malik and Soumya Agrawa from India with the title “Automatic Railway Barrier System, Railway Tracking and Collision Avoidance, International Journal of Computer Applications” proposed a system helps to detect track, and to find the train collision. Also, the system warns the train driver through SMS if the collision is about to occur.
- [2] In 2014, Prof Navaraj from India with the title “Crack Detection System for Railway Track using Ultrasonic Sensor” This proposed system aims for the detection of cracks in Railway tracks, distance.
- [3] In 2016, Naresh PS and Bharatha from with the title “Identification of type and degree of railway ballast fouling using ground coupled GPR antennas”. GPR studies were carried out on model and actual railway tracks using three ground coupled antennas and considering three fouling materials.
- [4] In 2016, Ramesh S from India with the title “Detection of Cracks and Railway Collision Avoidance System” This proposed system has the ability to avoid the Railway collision.
- [5] In 2018, Vasupalli Manoj, Goteti Bharadwaj, V Lokesh. With the title “Programmed Railway Track Fault Tracer” HVDC Transmission and Protection, Applications of Power Electronics to Power Systems, Power System Operation & Control, and Power System Stability & Analysis.
- [6] In 2017, Er.Kunduru Umamaheswari, Er. Polepogu Rajesh With the title “An Arduino Based Method For Detecting Cracks and Obstacles in Railway Tracks”. This proposed system has the ability to detect the cracks and obstacles if any on the track.
- [7] In 2016, A Prashanth, G. K Rao with the title “A Modern Method For Detecting Cracks In Railway Tracks By The Efficient Utilization Of LDR And LED System” In this paper, the proposed broken rail detection system automatically detects the faulty rail track without any human intervention.
- [8] In 2016, S. Sam Jai Kumar, T Joby Titus, V Ganesh, V.S. Sanjana Devi with the title “Automotive Crack Detection for Railway Track Using Ultrasonic Sensor” he Cracks and Short Gaps are Detected. The Msg and the phone calls are also made with proper timing.
- [9] In 2017, P Nikhar, R Pise, Avinash S with the title “IR Sensor Based Crack Detection of Railway Track Using GSM & GPS System” the IR sensors are used to detect the crack in the rail track, ultrasound sensors measure the distance between the two track and the PIR sensors are used to detect the presence of humans the track.

2.1 Outcome of Literature Survey

By the literature survey we came to know that the main objective of this work is to design and construct an Arduino based system: to detect the railway cracks, obstacle and gate controlling. The paper discusses three major approaches to detection and controlling robotic system. The first involves the detection of track crack and its location using ultrasonic sensor, GPS and GMS. The second approach is to detection of obstacle on track and its location using IR sensor, GPS and GMS. The third approach is to controlling of gate. Moreover, it is also possible to detect the distances of cracks. This system will play an important role for the detection of faulty part easily compared to manual detection technics and it is flexible way.

III PROBLEM STATEMENT

By using this Railway crossing and Railway rifts alerting system to avoid accidents we can prevent the accidents that occurs on railway track and helps in the maintenance of railway tracks.

The regions where manual inspection is not possible in mountain and hills regions can easily be done by using this railway crossing and Rift alerting system to avoid accidents.

Number of deaths have been increased due to the absence of gate control at level crossing especially in rural areas. To overcome this problem, we have implemented a buzzer system along with the model to alert the pedestrians and drivers around.

IV OBJECTIVES

Main objective of the work is to resolve the crisis of train accidents and solution in terms of alert system and time factor to avoid such accidents.

To detect the Rift on track and send information to railway surveillance team.

By this model the regions where manual inspection is not possible, the rifts can be easily detected.

To detect the obstacles on the track.

To alert the pedestrians near railway crossing.

V METHODOLOGY

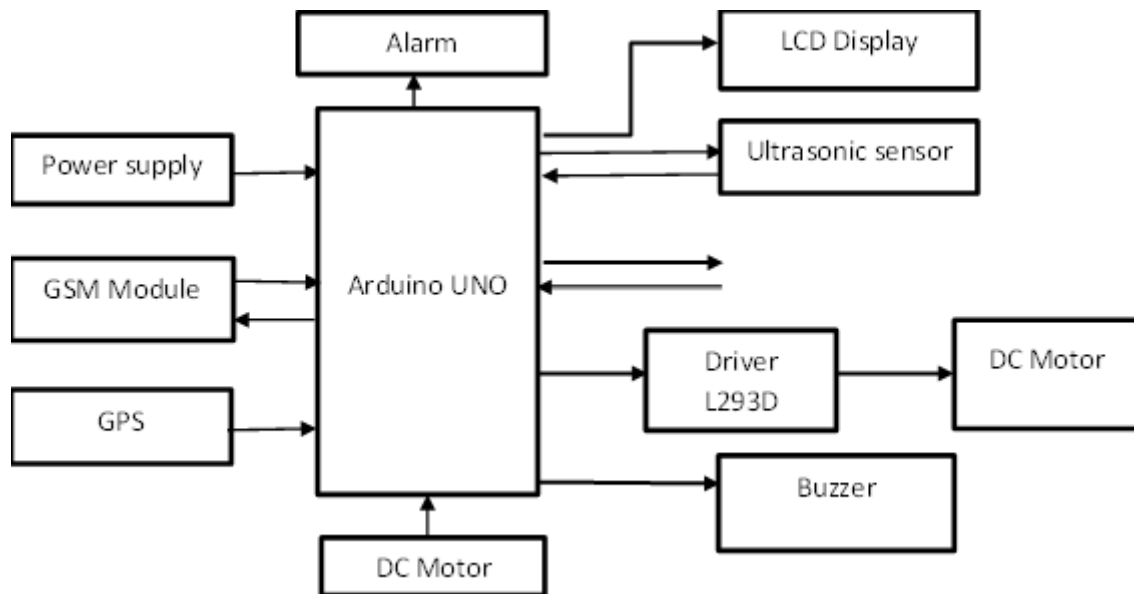


Fig.5: Block Diagram

The main aim of project is to design the railway Crack detection using Ultrasonic sensors, obstacle detection and level crossing system. The project block diagram is shown in Figure 2.1, which contains microcontroller (Arduino), ultrasonic sensor, motor driver, motor, GPS module. when the crack is detected, relevant geographical location coordinates will send to the nearest station. This recording and sending of coordinates are done by GPS module. GPS network used by cell phones provides a low cost, long range wireless communication channel for applications that require connectivity rather than higher data rates. Infrared transmitter is one type of the LED which emits infrared rays generally called IR transmitter. Ultra-sonic sensor is used to detect the crack in the rail track with measuring the distance from track to sensor. Ultrasonic technique is the most effective method which detects cracks on a railway track. An android application will be developed to intimate about the rail cracks. As and when a rail crack is detected by the crack detection system, the corresponding loco pilot will be intimated through a pop-up message. This pop-up notification service will be implementing with the help of GPS module. Ultrasonic sensors emit short, high frequency sound pulses at regular interval. If they strike an object, then they are reflected back as echo signal to the sensor which itself computes the distance to the target based on the time span between emitting the signal and receiving the echo.

ADVANTAGES/DISADVANTAGES/APPLICATIONS

Advantages:

- Very accurate detection.
- Continuous monitor checks for surface and near surface of the rail cracks.
- Alerting signals transfer immediately for safety measures.
- Buzzer at crossings saves lives.
- Reduces accidents.
- Cost is very low compared to existing system.

Disadvantages:

- To establish the entire network, it is quite a costly task since these are the issues of the government cost doesn't matter a lot.
- The Arduino board is a delicate device so it has to be handled carefully.

Applications:

- Wireless application
- Railway track crack detection application
- Detection of obstacles on the track
- To alert the pedestrians/vehicles at railway crossings.

VI CONCLUSION

By using this automated visual inspection robot for purpose of railway track inspection and crack detection, it will have a great impact in the maintenance of the tracks which will help in preventing train accidents to be a very large extent. The regions where manual inspection is not possible, like in deep coal mines, mountain regions and dense thick forest regions can be easily done using this robot. By using this robot for the purpose of Railway track inspection and crack detection and automated SMS will be sent to pre-defined phone number whenever the vehicle sensors detected any crack, obstacles and deformation. This will help in maintenance and monitoring the condition of railway tracks without any errors and thereby maintaining the tracks in good condition, preventing train accidents to very large extent. Railway track crack detection automated visual inspection robot is designed in such a way that it detects the cracks, obstacles or deformities on the track which when rectified in time will reduce train accidents. The addition of automatic gate control is an added advantage, which also helps and reducing the delay time. The idea of automating the process of railway gate operation in level crossings has been undertaken. The response of which is the reduction of accidents within the gate. This mechanism, gate keeper presence is not required. Microcontroller performs all the operations like sensing, software coding and closing etc. The mechanism works on a simple principle and there is not much of complexity needed in the circuit. The existing system which presents with our proposed system is the main advantage.

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