

Railway Track Crack Detection

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ABSTRACT

The Indian Railway is the seventh biggest Railway framework on the planet. The support of the human based vehicle framework can be dangerous and human and blunder can cause crises. Till date there are instances of rail crash because of track crack. The pro-posed system is an answer for consequently recognise a crack in the Railway track. Internet of Things is the most inquired about field and its applications are boundless. Internet of Things (IOT) is executed to sur-render a to date update on the Railway framework. In this model IR sensor is utilized to identify the co-ordinates of the crack on the Railway track and ultraso-nic is utilized to calculate the depth in crack.

Keywords - Power Supply, Ultrasonic Sensor, GPS, Bluetooth Module, Motor Driver IC, DC Motor.

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I. INTRODUCTION

The framework is an answer for naturally identify a crack in the Railway track. Internet of Things is the most usable field and its applications are boundless. Internet of Things (IoT) is executed to surrender a to date update on the Railway framework. In this model IR sensor is utilized to recognize calculate the co-ordinates on the Railway track ultrasonic is utilized to identify depth of cracks. The system is a solution to automatically detect a crack in the railway track. Internet of Things is the most usable field and its applications are limitless. Internet of Things (IoT) is implemented to give an up to date update on the railway system. In this model IR sensor is used to detect crack on the railway track ultrasonic is used for to detect distance between to cracks and GPS receiver is used to track the location of the crack. A GPS is used to send messages to notify the authorities about the crack.

The framework is an answer for naturally identify a crack in the Railway track. Internet of Things is the most usable field and its applications are boundless. In this model IR sensor is utilized to recognize split on the Railway track ultrasonic is utilized for to identify separation between to cracks.

II. LITERATURE SURVEY

[1]DeepCrack: Learning Hierarchical Convolutional Features for Crack Detection, an end-to-end trainable deep convolutional neural network for automatic crack detection.

Research has been carried out by :Zou , Zhang Z, Li Q, Qi X, Wang Q, Wang S .Development of by learning high-level features for crack representation. In this method, multi-scale deep convolutional features learned at hierarchical convolutional stages are fused together to capture the line structures. More detailed representations are made in larger-scale feature maps and more holistic representations are made in smaller-scale feature maps. DeepCrack net has been build on the encoder-decoder architecture of SegNet, and pairwise fuse the convolutional features generated in the encoder network and in the decoder network at the same scale. We train DeepCrack net on one crack dataset and evaluate it on three others.

[2]Crack Detection System for Railway Track by Using Ultrasonic and PIR Sensor.

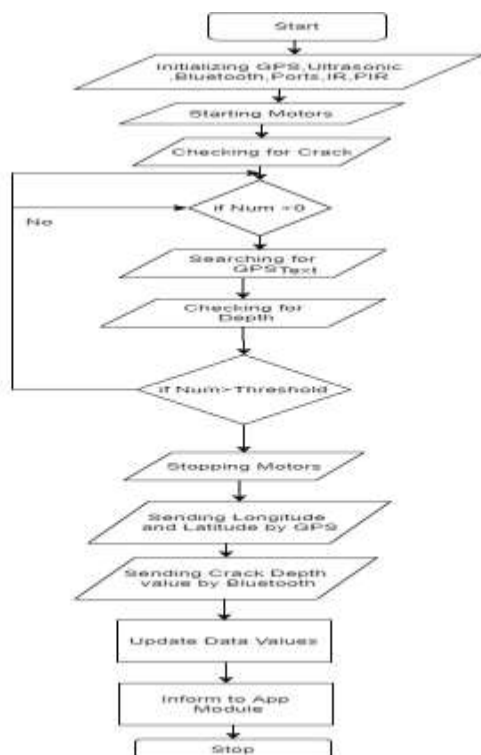
Research has been carried out by Prof. P.Navaraja, introduced the integration of ultrasonic and total station for railway track geometry surveying system. This project consists of GPS module, GSM modem, IR sensor, PIR sensor for application of communication purpose, crack detection and finding of human being present in the railway track. The GPS module and GSM modem help us to find and sending railway geometric parameter of crack detection to nearest railway station and have implemented PIR sensor in this project to avoid manual checking of detection of presences of human being in recent trends of application.

[3]Railway Crack Detection System.

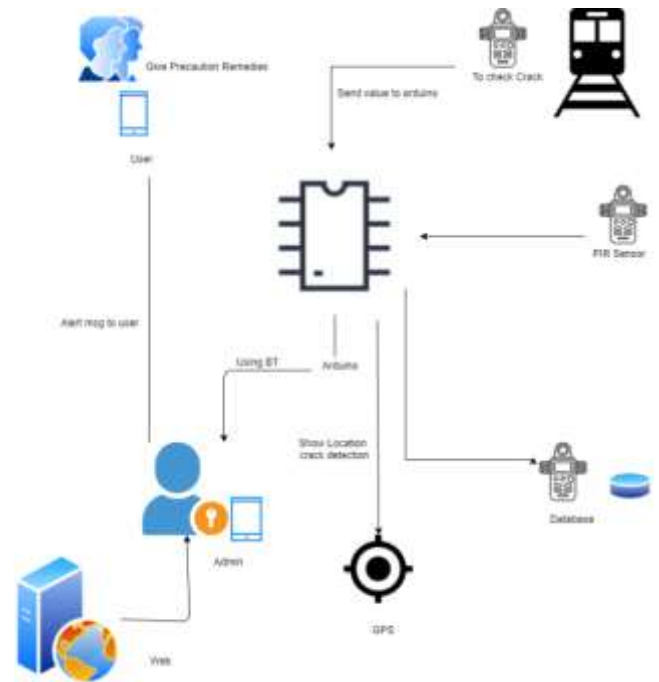
This paper is presented by AKHIL, DINU MOHAN and proposed an implementation of an efficient and cost effective solution suitable for railway application. This paper consists of GPS module, GSM module (for application of communication purpose) and Ultra Sonic sensor (for crack detection). A motor driver is used to control the motor. The GPS module and GSM module helps us to send railway geometric parameter of crack detection to nearest railway station. In the present days we use the measurement of crack by using high cost LVDT having less accuracy. But here we use less cost ultrasonic sensor for above process. The importance of this paper is that, it is applicable in the detection during both day and night.

III. IMPLEMENTATION

The crack detection has been tested by placing the robot on an actual rail track. The latitude, longitude and the closest railway station will be sent as a message. At the point when the crack is identified on the track.



IV. SYSTEM ARCHITECTURE



In this proposed system, we used Arduino microcontroller. First, we initialize the Ultrasonic, PIR, IR, Bluetooth module connected to Arduino and start the robot. The principle involved in detecting the crack is the light reaching the IR receiver is proportional to the crack. I.e. when maximum light transmitted by transmitter reaches the receiver, the crack is found. During normal operation, there are no cracks; light from the transmitter does not fall on the receiver. If the crack is found, the co-ordinates of the crack are stored. Further, with the help of an ultrasonic sensor, depth is calculated using the formula mentioned below:

$$\text{Depth (1st Leg)} = \cos \beta \times \text{Sound path Length}$$

If the threshold value of depth in crack is greater than the normal threshold value, then the longitude and latitude are fetched through GPS. The Bluetooth module is used for sending crack depth information to the database. The data in the database gets updated accordingly. The information related to the crack is displayed on the app module. For taking preventive measures, later a web application module will receive the updated data and display it in tabular format. Also, whether preventive measures are taken upon the crack by the lower authority, which will help higher authority for taking corrective measures.

V. ROBOT IMPLEMENTATION

We have used Arduino Uno R3 as the robot base with two DC motors of 30rpm by using L293D Motor Driver IC. LCD and LCD-PCB are connected to Arduino Uno R3. IR sensor, PIR sensor, and ultrasonic sensor HC-SR04 are connected to Arduino Uno microcontroller. 10K POT, DDR register, and LED are also placed on the controller.

Bluetooth HC05 is attached to controller for connectivity. One 9V Battery is used for movement of robot and power supply. PCB is used to allow signal and power to be routed between the physical devices.

FEASIBILITY ANALYSIS

In our system, we have used Arduino UNO, IR sensor, PIR sensor, ultrasonic hc-sr04 sensor and Bluetooth module. Arduino consists of processor core, memory and several input and output peripherals. mobile GPS is used to send the location and mobile network service is used to send alert message to authority.

Components which need to build system are less expensive and the cost of element are low. System make quick and efficient solution against any unwanted incident occurred in rail.

VI. ADVANTAGES

The rationale of this model is to guarantee that blemished rails can be found so as to stop wrecking of trains, to spare the lives and property of the individuals.

The procedure of this venture is done at an occasional rate to check for calculate the co-ordinates with the goal that casualties can be kept away from totally.

VII. FUTURE SCOPE

1. In future, we will also using the Camera system for monitoring visuals videos capture from tracks.
2. It will also increase security for both rails and passengers.
3. In future, It can give alert message to running train which are already running on this particular tracks.

VIII. CONCLUSION

The railway is the most utilized method of transportation by the individuals and for goods. The proposed framework is an amalgamation of the traditional strategy for crack location and the creative technique for creating awareness for the authority through the application and IOT. The whole framework is set on a four-wheeler bot which goes along the rails. The proposed framework is a creative method which brings down the weight of the specialists and expands the precision of the crack identification.

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