IOT Railway Track Crack Detection Robot Using GSM-GPS

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ABSTRACT

The Indian railway department is the seventh largest railway system in the world. Although work can be done in order to provide a better speed to done to get better accuracy about the location of the place where the fault had occurred. Till date there are cases of rail derailment due to track fracture. The proposed system is a solution to automatically detect a crack in the railway track . Internet of Things is the most usable 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 ultrasonic sensor is used for surveillance and GPS receiver is used to track the location of the crack. A GSM module is used to send messages to notify the authorities about the crack. A camera is fixed to provide the live video data to analyse the rupture from the base stations.

Keywords : Internet of Things, Surveillance, GPS, GSM

I. INTRODUCTION

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 .A GSM module is used. Railway is one of the most conventional methods of travelling and is the most commonly used means of transport. India has the world's seventh largest railway system. The detection of fractures around 115,000 km of track around the country increases the probability of error. Many derailment cases due to track fracture have been occur even to this date .The previously mentioned misfortunate incidents happened just within the past seven month duration at four different places. The railways extend all around the country and accidents have been recorded since 1890. The rupture may happen due to a crack is detected at an early stage, the derailment and loss of lives can be prevented. The GSM (Global System for Mobile Communications), GPS (Global Positioning System) and microcontroller based broken railway track detection when implemented is an efficient method of a detection on cracks is present in the tracks and thus avoiding derailment of the trains. The implementation of Internet of Things (IoT), which is a fast growing technology in the present times, is used for smart surveillance system. This system is used in-between two stations are detect the cracks presents on the track using ultrasonic sensors which transmit sine waves for an ideal track. If a crack is detected the ultrasonic

sensor will send a signal to the Arduino Uno board which will activate the GPS receiver. The GPS receiver will pin point the exact location which will then be messaged to the authorities. Once the ultrasonic sensor sends a signal to the controller, the controller will initiate the webcam. This smart technology will be a part of the brave new digitalized world which will able to prevent the loss life or property as the above mentioned cases.

II. LITERATURE SURVEY

1)PAPER NAME: Efficient Monitoring System for Railways for Crack Detection
year-IEEE 2018

AUTHOR : Manisha Vohra S.K. Gabhane.
DESCRIPTION: Railways serve people with numerous benefits like helping in reaching places very quickly, providing low priced fare travelling. The railways provide one of the most largely used mode of public transportation. Now days in Indian railways, frequent number of accidents have taken place due to fault like presence of cracks on rail tracks. To overcome this problem we are using IOT based railway track crack detection .

2) PAPER : Design and Implementation of Wireless Security System for Railway Tracks year-2017 IEEE International Conference on Power, Control, Signals and Instrumentation Engineering (ICPCSI-2017)
AUTHOR : Mehaboob.Mujawar , Sangam.Borkar. This paper describes a system, basically an electronic system that can help to detect the exact location of the crack. In India railway transportation occupies a very important role for connecting the entire country via different routes in the hilly regions, deserts, plateaus and all other extreme climatic conditions found all across the country. we are implementing a system that can locate the exact location of the crack on the track which will help to reduce the rail accidents which often leads to heavy loss of life and property.

3)PAPER : Autonomous Railway Crack Detector Robot for Bangladesh: SCANOBOT year-2017 IEEE Region 10 Humanitarian Technology Conference
AUTHOR   :Nagib Mahfuz, Omor Ahmed Dhali, Safayet Ahmed, Mehen Nigar In this paper explaination is based on an automatic railway track crack detector system by using robot This robot includes two ultrasonic sensors, GPS, GSM modules, and Arduino Mega based crack detection which is cost effective and to facilitate better safety standards in railways. By using GPS and GSM module an alert SMS consist of the geographic coordinate of that damaged track is sent to the nearby railway authority who can easily take necessary steps to resolve the problem before any major accident occurs.

4)PAPER : A Survey on Crack Detection Technique in Railway Track year- IEEE Conference on Emerging Devices and Smart Systems (ICEDSS 2018) 2-3 March 2018,
Author : Maneesh Kumar M,Muthu S Murali , Saranya M, Arun S, Jayakrishnan R P In this paper explanation is based on an automatic railway track crack detector system by using robot This robot includes two ultrasonic sensors, GPS, GSM modules, and Arduino Mega based crack detection which is cost effective and to facilitate better safety standards in railways. By using GPS and GSM module an alert SMS consist of the geographic coordinate of that damaged track is sent to the nearby railway authority who can easily take necessary steps to resolve the problem before any major accident occurs.

5)NAME: IoT : Automatic Broken Railway Track Detection with Live Video Streaming
year- 2017

AUTHORS: Dr. S. Malathy, Aravindha Kumar, Dharmaraj, Hari Priya & Janani.

The Indian railway is the seventh largest railway system in the world. The proposed system is a solution

to automatically detect a crack in the railway track. The most researched field and its applications are limitless of IOT. Internet of Things (IOT) is implemented to give 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 GSM module is used to send messages to notify the authorities about the fracture. Then authorities will take the action on problems in railway track by using our proposed system.

III. EXISTING SYSTEM

Resulted in the formation of cracks in the rails and other similar problems caused by antisocial elements which is the security of operation of rail transport. In the past, this problem has lead to a number of crack resulting in a heavy loss of life and property. Cracks in rails have been identified to be the main, yet there have been no cheap automated solutions available for testing purposes.

IV. PROPOSED SYSTEM

In this system we developed for reduce railway accident and reduce the human power in this system 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 to detect distance between cracks and GPS receiver is used to track the location of the crack. A GSM module is used for sending a messages to notify the authorities about the fracture. A camera is fixed to provide the image data to analyze the rupture from base stations

V. ALGORITHM

AES Algorithm Steps:

The encryption process is a set of derived keys. These are applied, along with other operation so on one block of data. The data to be encrypted. This array we call the state array.

You take the following AES steps of encryption for a 128-bit block:

1. Derive set of round keys from the cipher key.
2. Initialize state array with the block data (plaintext).
3. Add initial round key to the starting state array.
4. Perform nine rounds of state manipulation.
5. Perform tenth and final round of state manipulation.
6. Copy final state array out as the encrypted data (cipher text).

The reason have been listed as "nine followed by a final tenth round over" is because the tenth round.

Note: AES is a non cipher that encrypts and decrypts a data block of 128 bits. It use 10, 12, or 16 rounds. The key size has been 128, 192, or 256 bits, depends on the number of rounds.
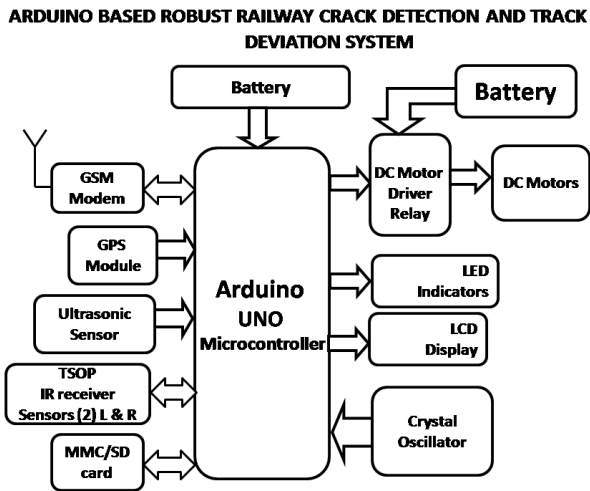
VI. SYSTEM REQUIREMENT

- **Hardware Requirements:**

  1. System Processors: Core2Duo
  2. Speed: 2.4 GHz
  3. Hard Disk :150 GB

- **Software Requirements:**

  1. Operating system :Windows 7 and above.
  2. Coding Language : Java 1.8
  3. Tool Kit : Android 2.3 and above
  4. IDE : Android Studio

VII.   BLOCK DEIAGRAM OF SYSTEM

ARDUINO BASED ROBUST RAILWAY CRACK DETECTION AND TRACK DEVIATION SYSTEM

VIII.   CONCLUSION AND FUTURE SCOPE

The railway is the most commonly used mode of transportation by the people and for goods. The proposed system is an amalgamation of the conventional method of crack detection and the innovative method of live video streaming and IoT. The entire system is placed on a four wheeler bot which travels along the rails. When compared to existing system which uses IR sensor transmitter and receiver, the proposed system is an innovative technique which lowers the burden of the authorities and increases the accuracy of the crack detection

IX. ACKNOWLEDGEMENT

X.   REFERENCES

[1].   Kim, N. Stubbs " Crack Detection in beam type structures using frequency data" Elsevier volume 259 2,January 2003.

[2].   Reenu George, Divya Jose, Gokul T G, Varun A G "Automatic broken track detection using IR transmitter and receiver" ISSN 2320-3765 International Journal of Advanced Research in Electrical Electronics and Instrumentation Engineering volume 4, Issue 4, April-2015.

[3].   R. Girshick, "Fast r-cnn," in 2015, pp. 1440–1448.

[4].   J. Long, E.Shelhamer, and T. Darrell, "Fully convolution networks for semantic segmentation," in 2015, pp. 3431–3440.

[5].   O. Ronneberger, P. Fischer, and T. Brox, "U-net: Convolution networks for biomedical image segmentation," in International Conference on Medical Image Computing and Computer-Assisted Intervention, 2015, pp. 234–241.

[6].   Indore-Patna train derailment Nov 2016 www.thehindu.com/news/resources/Indore-Patna-railderailment.

[7].   Selah-Ajmer train derailment Dec 2016 www.hindustantimes.com/india-news/live-sealdahajmer-express-derails-near-kanpur

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