

IOT Based Track Crack Detection And Intimation System

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ABSTRACT:

Global people use various sorts of transportation to travel from one location to a different location. Most of them give preference to public transportation for safer and economically cheaper journey. One such public transportation is Railway department. Every day billions of people travel all over the world, so it needs to monitor the safety of people, train and track. So, railway department monitor at regular interval of time about the security measures implemented on them especially railway track. Because number of train track crack related accident is happened in the past years. The proposed system is focused and suitable for railways transportation to spot the cracks within the train path (i.e) tracks, that too identify well in advanced and avoid the situation of accident. This paper is concentrated to spot the crack detection using sensor, which is placed within the train engine. Using this system crack is detected on the track and the train starts to slow down the speed and stop at respective point automatically. Another important advantage of this is to avoid the direct collusion of two trains by using the sensor and each train receives the signal and stop at certain distance automatically. The derailment because of crack is also avoided. Finally big loses of railway department and public are stopped. The proposed system also introduces Bluetooth based technology, to stop the derailment. The system automatically send signal to breaking system to stop train. Finally it avoids the train accidents without manual process.

Keywords:

Track, ultrasonic sensor, sensor unit, control unit.

INTRODUCTION:

The Indian Railways has one among the world's biggest railroad organizes inside the world, containing over 1,10,000Km (70,000 mi) of track length over a route of 67,311 Km (40,826 mi) spreading to most the areas of the country[reference]. However, with reference to reliability and passenger safety. There are areas where improvements are often made and new techniques are often employed to scale back possibility of accidents. Among other factors, cracks developed on the rail is that the explanation for accidents in a number of the cases. thanks to absence of timely detection and therefore the related support suggest genuine conversation starters on the security of activity of rail transport. An ongoing report uncovered that over 24% [reference] of the track length needs substitution on account of the occasion of splits consequently . Manual identification of tracks is bulky and not completely powerful because of much time utilization and necessity of talented specialists. This work is pointed towards tending to the trouble by building up a programmed railroad track split recognition framework integrating an Ultrasonic Sensor crack sensing module and a communication module supported GSM technology by which information about the situation of the crack are often conveyed to a central location enabling the immediate attention and intervention of maintenance personals. The paper organized in the following manner. 1.Introduction, 2.literature review, 3.working principles 4.related work 5.Methodology and 6.Conclusion

LITERATURE SURVEY:

This section briefly discusses main purpose and observations made by various researchers in various Railway Track crack detection system.

1. Dr.Shafeeq Ahmad , the author comment about, a PC vision based strategy is introduced. A framework has been proposed which can intermittently take pictures of the railroad tracks and

contrasted and the current database of non-broken track pictures consistently. On the off chance that a deficiency emerges in the track area, the framework will naturally distinguish the flaw and fundamental actions can be taken, to maintain a strategic distance from any mishappening. “Crack Detection in Railway Track Using Image Processing”,2017 [1]

2. S.Sam Jai Kumar the author address in this paper the checking process is going on, the train may approach, it is identified by the vibration sensor and gives alert to the microcontroller, thereby shrinks the size of the robot between the two tracks. After the train has crossed it returns to its normal position and continue its checking process “Automotive Crack Detection for Railway Track Using Ultrasonic Sensorz”,2016 [2]
3. N.Karthick, author says about this paper The Bluetooth device is installed at each front end of the locomotive. If the train starts to derail, automatically signal is broken and an alert is given to engine driver and on the other emergency brake is applied automatically. The main aim of the work is to avoid the train accidents without manual power. “Implementation of Railway Track Crack Detection and Protection”,2017 [3]
4. Saad Ahmed Khan ,the author comment about The assumed range covers possible friction values from those for non-lubricated rail to those for rail with a minimum measured friction control on the top of the rail using a friction modifier. A fatigue index model based on the shakedown theory was used to predict the generation of surface-initiated rolling contact fatigue. Simulations were performed using multi-body simulation.

“Prediction of the effects of friction control on top-of-rail cracks”,2016 [4]

5. Flavita Janice Pinto the author address in this paper A camera will be mounted on the device which will run on the railway track. Camera will capture the image of track of specified length this image will be compared with the initially loaded image then accordingly it detects the crack in the track if any. If any fault seen then computer will warn otherwise if there are no fault, then it proceed. “Railway Track Inspection Using Arduino and Image Processing”,2018 [5]

EXISTING SYSTEM

Cracks in rails are perceived to be the most factor of crashes inside the past, yet there are no modest self-acting arrangements accessible for testing purposes. Subsequently, because of the critical repercussions of this issue, structure on actualizing a much better presentation and cost viable arrangement reasonable for monster scope application. Since the railway was created, rail maintenance had always been a drag crack or damage rail could lead on the train derail from track. the matter has been the deficiency of modest and effective innovation to recognize absconds inside the rail tracks and in certainty , the inadequacy of support of rails which have come about inside the arrangement of splits inside the rails and other comparative issues brought about by hostile to social components which compromise the wellbeing of activity five of rail transport. within the past, this problem has influence to variety of derailments leading to an important loss of life and property. High safety standards need within the management of railroad lines demand the inspection of railway wheels directly after production so as to detect the presence of surface cracks and bolt loosening that would seriously affect the condition of the railway, and thus passenger’s safety.

PROPOSED SYSTEM

This framework includes the arranging of split discovering robot for finding breaks in railroad tracks. this procedure utilizes controller for interfacing the automated vehicle and split discovery sensor. The detecting gadget detects the voltage varieties from the split sensor then it gives the sign to the microcontroller. The microcontroller checks the voltage varieties between estimated worth and edge worth and controls the robot reliable with it. The mechanical model is interfaced with the microcontroller with the help of motor driver circuit. If any crack occurs within the rail, the robot are going to be stopped then a SMS are going to be send

WORKING:

Ultrasonic sensor is utilized to distinguish the break on the railroad track by not receiving the echo from the track; if the echo sound is received then no crack is detected on the track. The output of the ultrasonic sensor is given to the microcontroller, which is connected to the GPS, GSM and motor driver IC. A mobile no. is registered in the memory the microcontroller in which the message is send by the GSM module. In the received message a link is given by the GPS which is open in the Google map to show the route where the crack is detected. If crack will found then microcontroller will take the location from GPS and send it to a control station. At the same time a message will be display on LCD screen, and a buzzer will turn ON.

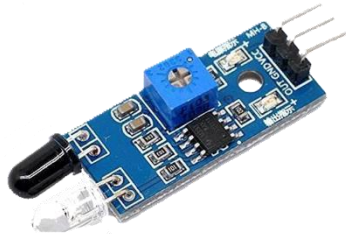
COMPONENTS

IR SENSOR:

This sensor is a short range obstacle detector with nodead zone. It has a reasonably narrow detection areawhich can be increased using the dual version. Rangepan also be increased by increasing the power to the IRLEDs or adding more IR LEDs. An infrared sensor isan digital device, that emits if you want to feel some

components of the surroundings. An IR sensor can measure the heat of an object in addition to detects the motion. These forms of sensors measures simplest infrared radiation, in preference to emitting it that is called as a passive IR sensor.

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IR sensor

ULTRASONIC SENSOR:

Ultrasonic sensors emit short, high-frequency sound pulses at ordinary intervals. These propagate inside the air at the velocity of sound. If they strike an object, then they may be meditated lower back as echo alerts to the sensor, which itself computes the gap to the target primarily based on the time-span between emitting the sign and receiving the echo.

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Ultrasonic sensor

SIM900 GSM MODULE:

GSM is an international wellknown for cellular telephones. It is an acronym that stands for Global System for Mobile Communications. It is likewise sometimes called 2G, as it's miles a second-generation cellular community. To use

GPRS for net access, and for the Arduino to request or serve webpages, you need to achieve the Access Point Name (APN) and a username/password from the community operator. See the data in Connecting to the Internet for more records about the usage of the data competencies of the shield.

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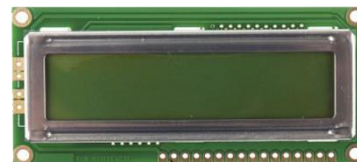


SIM900 GSM module

LCD DISPLAY 16X2 :

The Liquid Crystal Library allows you to manipulate LCD displays which are like minded with the Hitachi HD44780 driver. There are lots of them out there, and you could usually tell them by means of the 16-pin interface.

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LCD display 16x2

GPS RECEIVER:

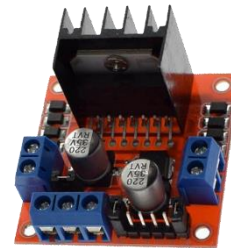
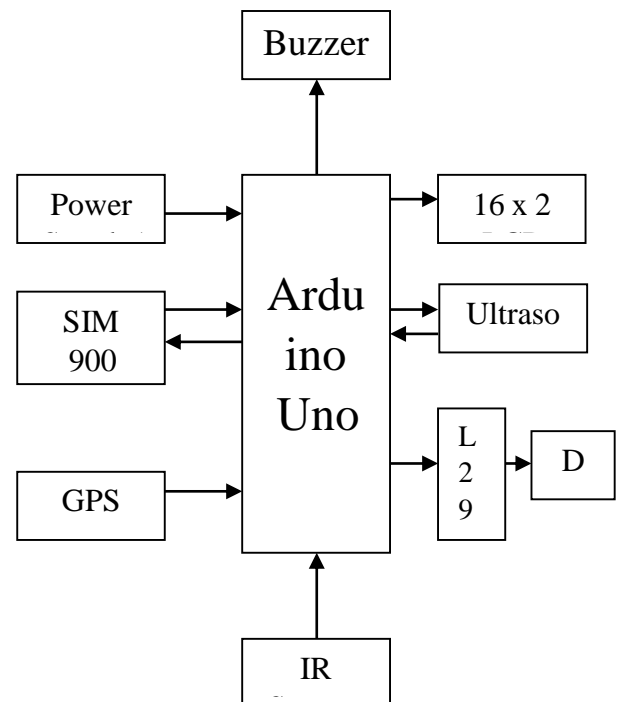
The module surely assessments its vicinity on this planet and presents output information which is longitude and latitude of its position. It is from a family of stand-alone GPS receivers featuring the excessive performance u-blox 6 positioning engine.

train track crack monitoring system**GPS receiver****Arduino Uno :**

The Arduino Uno is an open-supply microcontroller board primarily based at the Microchip ATmega328P microcontroller and developed via Arduino.Cc. The board is geared up with sets of digital and analog input/output (I/O) pins that may be interfaced to various growth boards (shields) and other circuits.

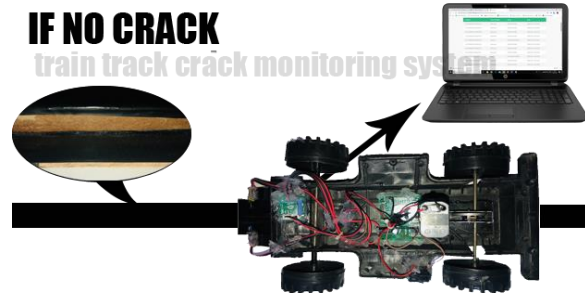
train track crack monitoring system**Arduino Uno****L298N MOTOR DRIVER:**

The L298N is a dual H-Bridge motor driving force which permits pace and direction control of two DC vehicles at the equal time. The module can force DC cars which have voltages between 5 and 35V, This depends on the voltage used at the automobiles VCC.

train track crack monitoring system**L298N motor driver****DATA FLOW DIAGRAM**

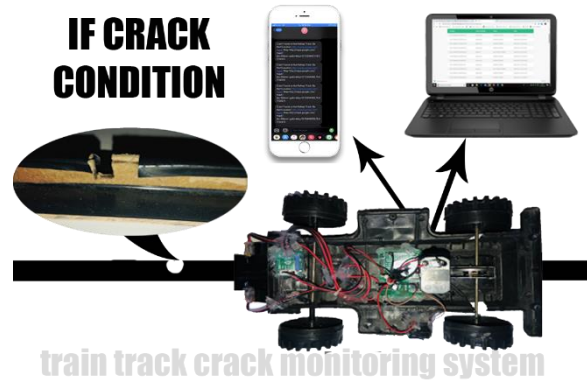
At Normal Condition:

The IR transmitter sensor is transmitting the infrared rays. These infrared rays are received by the IR receiver sensor. The Transistors are used as an amplifier section. At normal condition Transistor is OFF condition. At that point relay is OFF, in order that the vehicle running continuously.

**At Crack Condition:**

At crack detection conditions the IR transmitter and IR receiver, the resistance across the Transmitter and receiver is high thanks to the non-conductivity of the IR waves. When the track is in continuous with none cracks then output of IR LED and Photodiode are going to be high. As soon because the crack detected by the system the IR sensor reflection are going to be adequate to zero and therefore the robot are going to be stopped automatically. Another IR sensor is employed to watch Hell on the way of the railway track. When this output is high then it's concluded that there's no pit within the track. But if any pit is detected by the IR sensor the output of the IR sensor given to the microcontroller are going to be zero and again the microcontroller will stop the robot. When a crack is detected by the IR sensor the vehicle stops directly , and therefore the GPS receiver triangulates the position of the vehicle to receive the Latitude and Longitude coordinates of the vehicle position, from satellites. The Latitude and Longitude coordinates received by GPS are converted into a text message which is completed by

microcontroller. The GSM module sends the text message to the predefined number with the assistance of SIM card that's inserted into the module to send the SMS.

**CONCLUSION:**

In this paper we've structured a financially savvy, low-vitality inserted framework, which encourage better security necessities for Train tracks for forestalling railroad mishaps because of splits and obstructions on railroad tracks. The Prototype of testing vehicle can practically hit upon splits and boundaries on railroad tracks. The final product demonstrates this new creative age will blast the dependability of security structures in railroad transport.

The locales where manual examination is beyond the realm of imagination, as in profound coal mineshafts, mountain locales and thick timberland locales can be effortlessly done utilizing this vehicle. By utilizing this vehicle with the end goal of Railway track review and break location and mechanized SMS will be sent to predefined telephone number at whatever point the vehicle sensors identify any break or twisting.

Reference :

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