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# Designing and Creating of Automatic Crack Detector System for Railway Track

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**ABSTRACT-** In India rail route is quite possibly the most widely recognized methods for transport, which is the fourth biggest rail route local area on the planet. Despite the fact that Indian rail routes has an extraordinary blast, it remains tormented in view of a portion of the significant issues like issue in door crossing, fire mishaps and issue in the track which remains unmonitored causing crash and derailment. India is one of the fastest developing countries with significant advancement in the field of the railway network. Numerous cases of train derailments driven on by track cracks have resulted in accidents on the railway. Due to inconsistent maintenance and manual track monitoring, these cracks typically go unreported.

**KEYWORDS**–Railway track inspection , Crack detector , Train safety , Real – time monitoring

## I. INTRODUCTION

The fourth Largest railway system in the world is found in India. The Indian rail system is still expanding in an effort to meet the demands of the country's economy. Despite India's fast growth in rail travel , the associated safety infrastructure facilities are still lacking . As a result , there have been numerous derailments , which have severally cost valued human lives as well as property.

When the elements that causes these train accident are further examined , contemporary figures shows that about 60% of them are caused by derailments , of which 90% are due to gaps in the tracks that are either the results of natural causes ( such as excessive expansion due to heat ) or human causes. Because of the bad components. One of the most effective ways to prevent train accident is the subject of this study the goal of project to solve the problem by creating a system that automatically detect railway track crack.

This articles proposes a project whose goal is design a reliable rain accident – avoidance , IR sensor assembly system that can identify cracks in railway rails. Additionally capable of calling the appropriate authorities and using GSM module. The automatic crack detection system for railway track is a crucial system that can aid in preventing accident brought on by track cracks . This system is made to uses an IR sensor to find crack , and a GSM module receives information about crack position .Additionally ,system has two 12 v motors that assist in moving the car along the railway track. The car halts when the IR sensor spot a crack ,and the GSM module places a call to the are where track is by detecting cracks before the cause and accident , this device can significantly increase the safety of railway tracks.

## II. OBJECTIVES

- Avoid railway accidents and safeguard people.
- Reduce labour cost and human efforts.
- Easy surveying and with less delay the information can be Required.
- Also serves as a transport vehicle in remote locations.

### III. LITERATURE REVIEW

One of the most popular modes of transportation's is the railway. Continues track monitoring and inspections are necessary for the railway system to function. Currently railway tracks are inspected manually , which is expensive and inaccurate due to possibility of human error . We suggested this technology which is successful approach for a railway track monitoring system , to prevent accident. Our current design preliminary attempt to see have the previously mentioned ideas might be put into practices . The sensor will alert the Arduion Uno , which will activate the GSM when the crack is discovered . The relevant location will be given by the GSM.

This position coordinate are sent over the Wi-Fi module short call service. It is possible to used this technology continuously in tunnels . this is very straight forward plan and highly cost effective techniques with enough potency to the real world situation to the geometry of the track serve by using sensor , which prove to be advantageous in comparisons to exiting techniques .

This advantages of most existing system that use light dependent resistor ( LDR) light emitting diode (LED) is that the sensor must be positioned upon opposite one another in a order to detect that . In our study , we have utilise IR sensor with a single module a transmitter and receiver to address alignment concerns.

### IV. BLOCK DIAGRAM

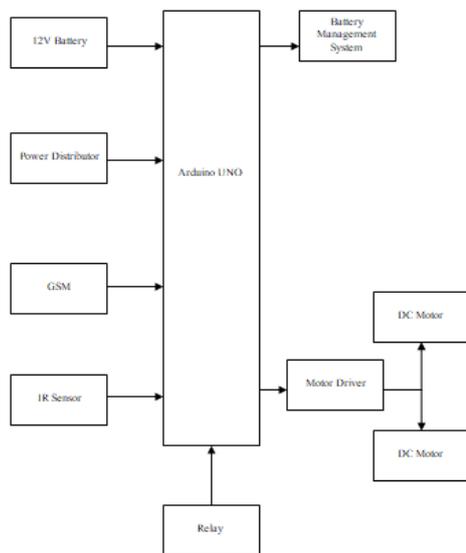


Fig. a Block Diagram

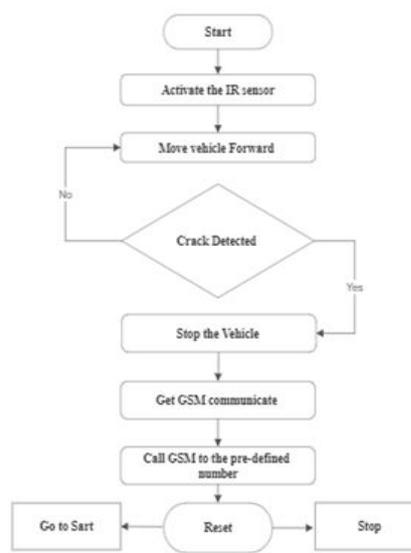


Fig. b Program Algorithm

The program algorithm shown in is explained as follow:

- a) Initially the motor starts.
- b) It will initiate the IR sensor.
- c) The motor will move the vehicle ahead.
- d) The IR sensor will scan the tracks persistently.
- e) When the crack is recognized.
- f) It will stop the vehicle.
- h) Further the GSM will communicate something specific as "Obstacle Present' to the registered number.
- i) Then call pre defined number
- j) The program will go again on the underlying stage also. The motor will turn over once more.
- k) It will again scan the track.

### V. COMPONENTS

#### I. Arduino Uno

Arduino UNO is based on an ATmega328P microcontroller. It is easy to use compared to other boards, such as the Arduino Mega board, etc. The board consists of digital and analogInput/Output pins (I/O), shields, and other circuits.



The Arduino UNO includes 6 analog pin inputs, 14 digital pins, a USB connector, a power jack, and an ICSP (In-Circuit Serial Programming) header. It is programmed based on IDE, which stands for Integrated Development Environment. It can run on both online and offline platforms.

The Arduino board is shown below:



Fig. a Arduino Uno

## II. IR Sensor

IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infrared sensor can detect these radiations.



Fig. b IR sensor

## III. DC Motor

The 60 RPM Single Shaft BO Motor - Straight motor gives good torque and rpm at lower operating voltages, which is the biggest advantage of these motors. Small shaft with matching wheels gives an optimized design for your application or robot. Mounting holes on the body & light weight makes it suitable for in-circuit placement. This motor can be used with 69mm Diameter Wheel for Plastic Gear Motors. It is an alternative to our metal gear DC motors. It comes with an operating voltage of 3-12V and is perfect for building small and medium robots.



Fig.c DC motor

## IV. Motor Driver Module – L293

L293D is a normal Motor driver or Motor Driver IC which permits DC engine to drive on one or the other course. L293D is a 16-pin IC which can handle a bunch of two DC engines all the while toward any path. It implies that you can handle two DC engine with a solitary L293D IC. L293D Motor Driver Module is a medium power motor driver perfect for driving DC Motors and Stepper Motors. It uses the popular L293 motor driver IC. It can drive 4 DC motors on and off or drive 2 DC motors with directional and speed control.

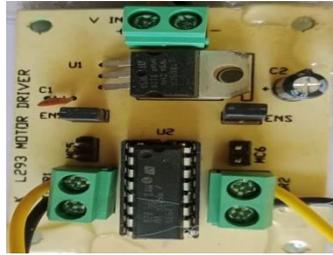


Fig.d Motor Driver Module – L293

## V. GSM Module

GSM/GPRS module is used to establish communication between a computer and a GSM-GPRS system. Global System for Mobile communication (GSM) is an architecture used for mobile communication in most of the countries. Global Packet Radio Service (GPRS) is an extension of GSM that enables higher data transmission rate. GSM/GPRS module consists of a GSM/GPRS modem assembled together with power supply circuit and communication interfaces (like RS-232, USB, etc.) for computer. GSM/GPRS MODEM is a class of wireless MODEM devices that are designed for communication of a computer with the GSM and GPRS network. It requires a SIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. Also they have IMEI (International Mobile Equipment Identity) number similar to mobile phones for their identification. A GSM/GPRS MODEM can perform the following operations:

1. Receive, send or delete SMS messages in a SIM.
2. Read, add, search phonebook entries of the SIM.
3. Make, Receive, or reject a voice call.



Fig.e GSM Module

## VI. CONCLUSION

As we came to know that existing systems are time-consuming as well as uneconomical. The proposed system overcomes these issues as well as improves accuracy and crack identification in rails. It is the most efficient solution provided in order to achieve good results of rail routes of our country to limit the details of mishaps caused. In this way to save precious lives of passengers and loss of economy. It additionally saves time and money for the identification of crack.

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