



## INTELLIGENT TRAIN ENGINE FOR AVOIDING ACCIDENTS USING IOT

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### ABSTRACT

In India, most of the commercial transport is being carried out by the railway network and therefore, any problems in the same has the capacity to induce major damage to the economy by impact of loss of life because of accidents. This paper proposes a cost effective yet robust solution to the problem of railway crack detection utilizing a method that is unique in the sense that while it is simple, the idea is completely novel. There is an increasing with the number of accidents at railroad railings. Now a days we use different types of transport facilities like Track, bus, flight and car etc., but above these facilities we chose to travel with rail because by travelling through the rail is cheap, takes less time to deliver our product, system and it is the cost efficient but the number of accidents on railway track due to fault on track and when any obstacle came in front of the train.

This paper deals about one of the efficient methods to avoid Train accidents. Here we are using Microcontroller for automatic control of Infra-Red sensor to detect the fault on railway track. After detecting the fault Microcontroller will give information about the fault to the loco pilot in the train indicating buzzer alert and Train automatically stops, it sends the information to control room through IOT. The main components used in this project are Microcontroller (Arduino), IR sensor, IOT, Buzzer, DC motor. We are using Infra-Red Sensors because it is the directional data transferring device it can show the output of fault and help us to take action according the fault on the track. With the help of this proposed project train can run on time during winter season on foggy condition and on night also where driver unable to see anything. It can be helpful for the Indian railway.

**Keywords:** Railway crack detection, Avoiding accidents, IoT.

### 1. INTRODUCTION

We belong to the edge of digitized and smart world. People are getting smarter day by day with the 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. However, if we consider the reliability and safety parameters, India has not reached the global standard yet. 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 proto type of testing train for detecting obstacles and cracks, which is similar to that of line following testing train.

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. In today's world, transport, which is one of people's biggest consumers, is of utmost importance for its sustainability and safety. Rail transport occupies a leading position in India in reducing a fast-growing economy's growing needs.



Nonetheless, if this type of model provides a cost-effective solution to the railroad crack detection problem by using a ultrasonic sensor and a IR sensor joint that responds to the exact situation of the faulty track, as well as forwarding the information to the control room via SMS, so that any incidents can be gridlocked. The main objective of the proposed system is to detect the tracks and avoid much accidents. The defect in crack can be found out easily and the preventive measures will be taken immediately.

Now, GPS will operate getting the coordinates of the location. So, now GSM Module comes into picture which operation is to transmit message to the control room of railway. So, GSM will send a message as "Obstacle Present" as shown in Figure 4 to the predetermined location. When both the messages are sent and the program will go again on the initial stage and the motor will start again, and it will scan the track.

It is one of the major mode of transport but still our facilities are not that accurate, safer as compared to international standards. A survey on the internet states that about 60% of all the railway accidents is due to derailments, recent measurements shows that about 90% are due to cracks on the rails. Hence, it is not safer for Human Life. This needs to be at the utmost attention. System having LED and LDR sensor assembly, but the main disadvantage is that the LED and LDR must be placed opposite to each other and also the environment needs to be perfect to detect the track. To overcome this disadvantage, here sensors are used, which will detect the crack accurately.

## 2. LITERATURE SURVEY

Indian railways is one of busiest network in the world covering track network of 1,27,000 sq.km. Almost 2/3rd of the population uses the railway network in India. Almost 60% of the accidents are occurring at railway track crossing and due to crack in railway tracks resulting in loss of precious life and loss of economy. So, in current scenario this problem has immense potential in having an ideal solution to this problem. Now I want to put some light on existing systems that railways in order to counter this problem. So, basically, we have the manual surveying and maintenance of tracks done by person and other is systems that they use like SPURT Car and USFD manual machine that are used in detecting and monitoring of cracks.

Basically, in the both the methods, surveying and detection of cracks is been done but the limitation is basically maintenance people are required for both methods to monitor the crack in the track. Also, this method is limited for certain routes and not all routes and divisions of railways can be covered. Also, sometimes accuracy is faulted. Also eddy current method ultrasonic crack detector is also used in.

We are committed in building such system which will give an optimal solution to the crack detection problem and also reach in achieving higher accuracy and precision than existing systems. Also, our project aims in giving safety assurance to railways, whereas the existing systems lag it completely. The cracks and other problems with the rails generally go unnoticed due to improper maintenance and irregular manual track line monitoring that is being carried out in the current situation.

Another disadvantage that can be attributed to the conventional commercially available testing equipment's is that they are heavy which poses a practical limitation. This important disadvantage has been rectified in robotics project as the design is simple and sensible enabling the device to be easily portable. While designing the mechanical parts of the robot, due consideration has been given to the variable nature of the tracks and the unique challenges possessed by the deviations in the Indian scenario.

For example, in areas near road crossings the outer part of the track is usually covered with cement. Also, there is always the problem of rocks obstructing the path on the inside parts of the rails. So, the specialized wheels that have been provided in robot that has taken into account and are specifically designed to overcome this aforementioned problem. The railway track crack detection is used to detect the crack while the train running on the track. The proposed system is used to detect the crack on railway track before 10km.

### 3. PROPOSED SYSTEM

The proposed system overcomes the limitations of the existing system that are used for the detection of faulty tracks. In this proposed system we are using Arduino UNO board. The Arduino is an open-source integrated development environment which simplified the coding greatly. The proposed system consists of Ultrasonic sensor for crack detection and IR sensors for obstacle detection. Motor driver L293D is used to drive the DC motors.

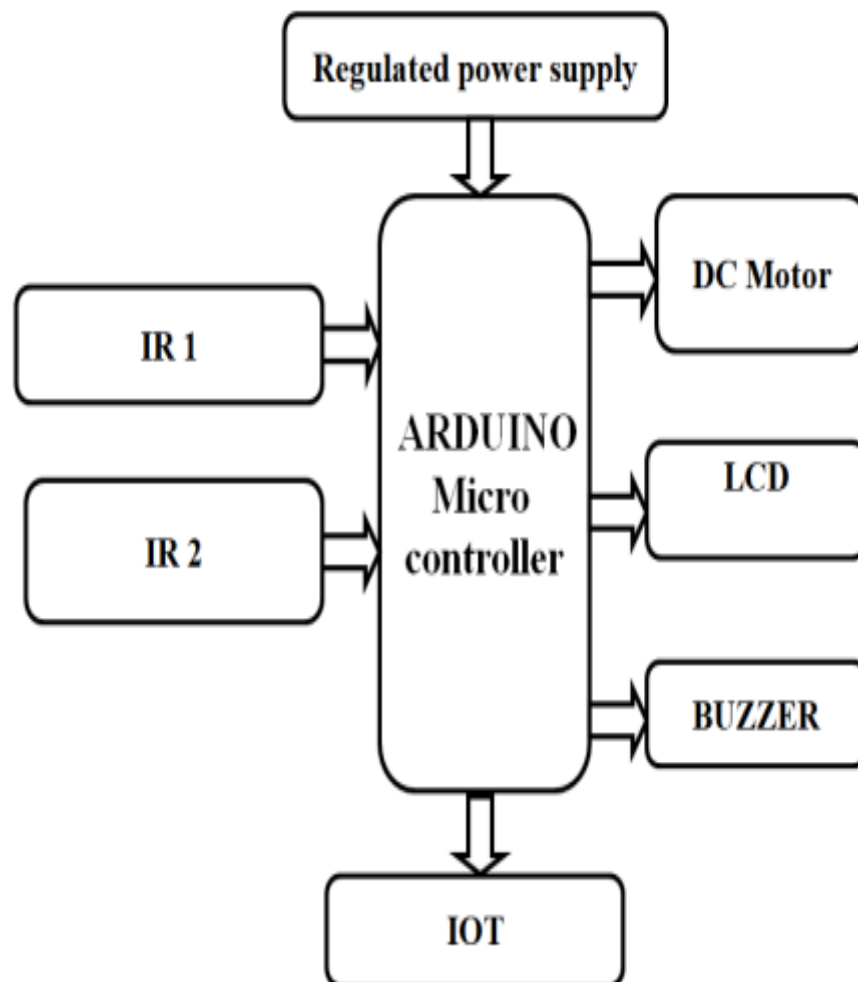


Fig. 1: Block diagram of proposed system.

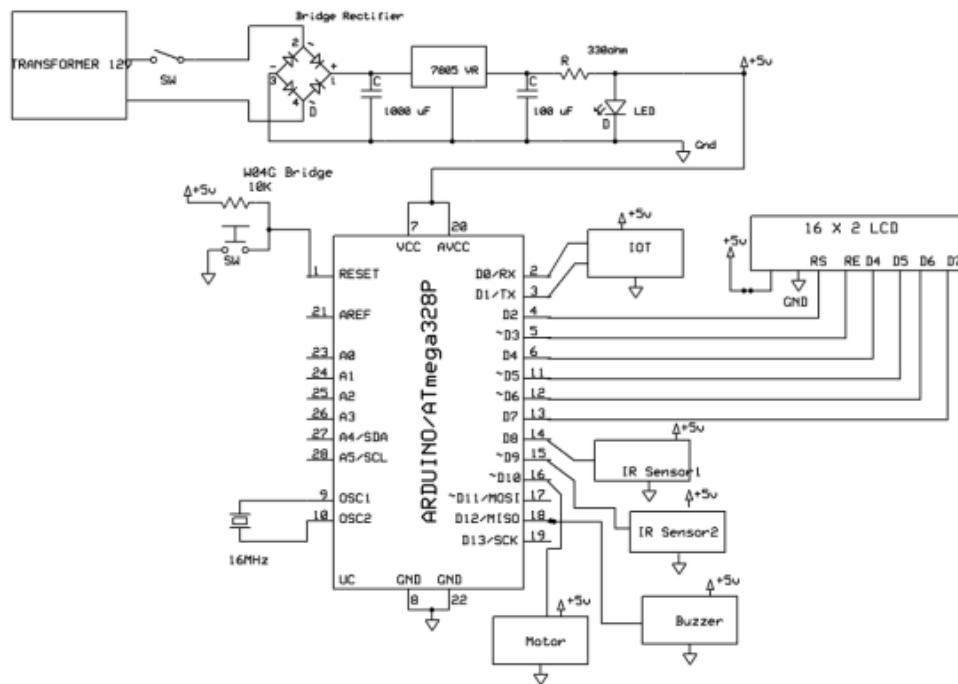
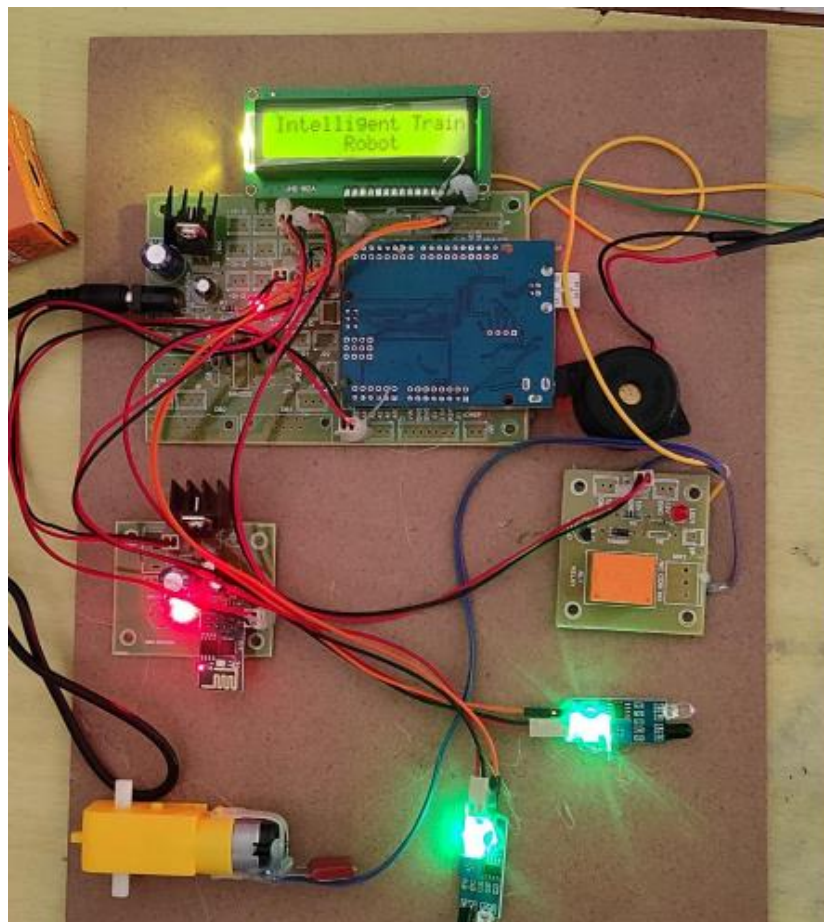


Fig. 2: Schematic diagram of proposed system.

## 4. RESULT





## 5. CONCLUSION AND FUTURE SCOPE

The railway is the most used mode of transportation by the people and for goods. The transport system must always be secure. Utilizing the benefit of embedded system, we can build a system which helps the cause of safe travel. 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 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. The process is done at a periodic rate to check for cracks so that casualties can be avoided entirely.

The entirety of the model is to ensure that defective rails can be found in time to stop derailment of trains, to save the loss of lives and property. The system has been designed and implemented after optimizing it on a number of factors. By introducing the concept of sensor technology in the field of railways we can make our railways safest. The operation of these sensors is much easier to loco pilot. The main aim of this project is to create a belief in people that the train journey is the safest journey among all.

### Future Scope

- This project has satisfactorily fulfilled the basic things such as prevention of accidents inside the level crossing and the wastage of a manpower.
- Since this arrangement can be used in remote areas where the power supply can't be expected for the motor operation, sensors, buzzer and signal lights, solar power can be the solution there.
- It can be used directly during the daytime and by charging the battery during night.
- Using the same principle, we can implement the concept of automatic track switching.
- Considering a situation where an express train and a local train are travelling in opposite direction on the same track, the express train is allowed to travel on the same track and the local train has to switch on to the other track, indicator lights have been provided to avoid collision.
- Here the operation is performed using a motor. Electromagnets can be used in practical purpose.

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