



# DETECTION OF HAZARDS OCCURRING IN RAILWAY SYSTEM

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**Abstract:** In this paper we detect various hazards like cracks in railway tracks, findings of suspicious objects like bombs or any unauthorized entry in the railway platform, noises in gathering of people on platforms. In this system we used image processing sensor-based technology wherein sensor detects the parameters, compares the parameters online as well as offline in the microcontroller-based module. There is in-built Database which recognizes the exact deficiency and provides the output with 100% accuracy to the railway management system. Our process is best as compared to other available systems and it can be modified for future with including advance parameters. The system we design is never designed earlier and this system is integrated one and best for railway management.

**KEYWORDS:** Arduino, Cracks, Noise, Automatic

## I. INTRODUCTION

### 1.1 Ancient railway hazards Systems:

In the starting age of Railway track cracking system, the cracks are detected manually and not automatically using machine. This creates problem and there is no 100% guarantee that the cracks will be removed similarly in the suspicious object detection and noise detection, the detection is done manually, partial-manually and there were more chances of accidents and odd things happening like bomb blasts in railway because there were no sensitive hazard detection system.

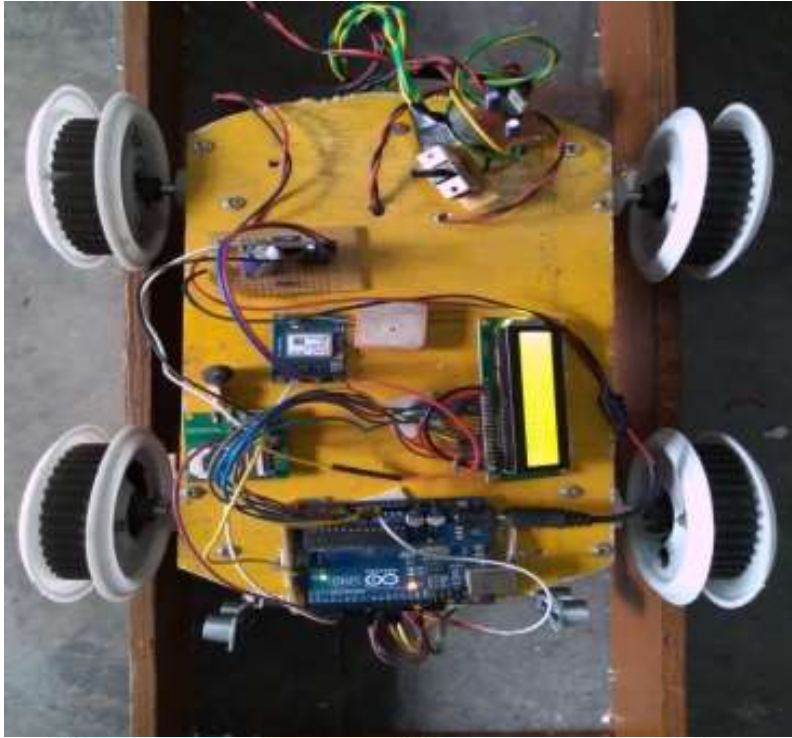
Our system is a complete solution using automatic, not manually computerized image processing based simple which can be handled by any railway operator, controlled by top Railway management and flexible hazard detection system.

### 1.2 System design consideration with railway feedback:

There are day to day advancements in railway systems with automatic electronics-based improvement technology. There is automatic movement on the same track with large number of railway traffic because of more crowd attraction towards metro cities like Mumbai. The railway in metro cities like Mumbai should be time bound and must be keenly observed and controlled so that every time it will collect the feedback from passengers and provide flexibility to passengers.

### 1.3 Our system:

This project will have a micro-controller based kit. It will detect parameters like the cracks in the railway tracks, noise level at the platforms and any suspicious object on the railway platform, after detection of the parameters, they will be sent to the railway control room.



## II. METHODOLOGY

### 2.1 EXISTED METHODOLOGY:

**2.1.1** As per the previous design schemes to find railway hazards there were so many deficiencies like momentarily happening were not sent directly to the railway control room and this scheme were not smart hence 100% protection will not be given to odd happenings in the railway systems.

**2.1.2** An Arduino based Method for Detecting Cracks and Obstacles in railway track by Er.kundurumamamaheswari, Er.PolepoguRajesh, used a testing train which uses ultrasonic sensor. The LED and photodiode setup is placed to testing train to detect cracks. They used an Arduino microcontroller. After crack detection the testing train stops, and the longitudinal and latitudinal positions are sent via SMS to GSM and GPS.

**2.1.3** In the paper Arduino Based Programmed Railway Track Crack Monitoring Vehicle by Vasupalli Manoj, Goteti Bharadwaj, Nagumalla Ram Pavan Akhil Eswar, they proposed another monitoring train that uses an ultrasonic sensor which is used to detect the crack in the railway track and used to send SMS and call via GSM and GPRS module with the help of Arduino Uno.

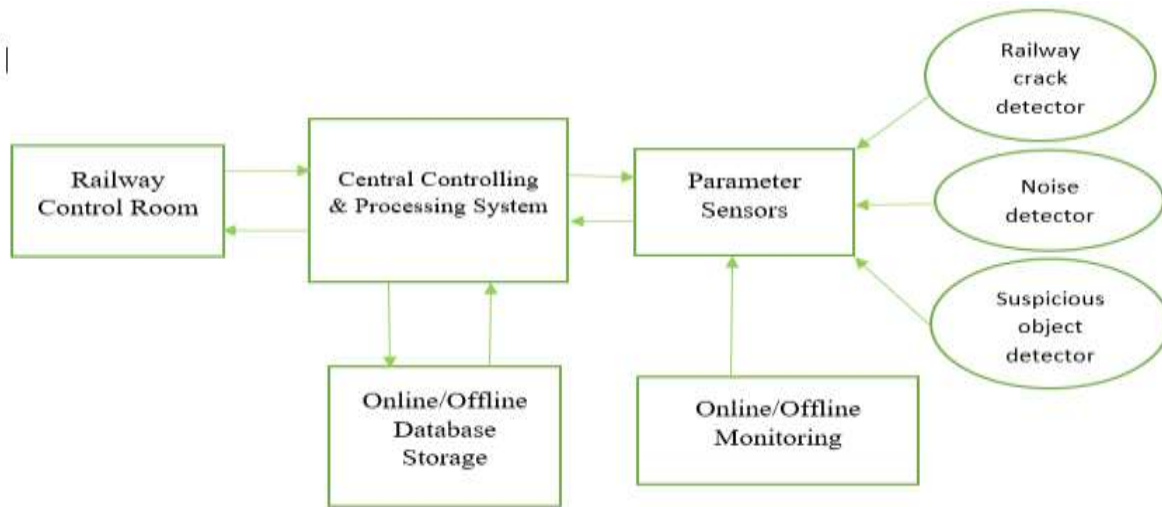
**2.1.4** In the paper Design of Noise Level Monitoring Based On Arduino Uno by Laura Anastasi Seseragi Lapono and Redi Kristian Pingak, aims to know the noise level monitoring. The data acquisition system consists of an analogue sound sensor V2, Arduino Uno, display LED, and display seven segments. Sound sensor serves to convert sound into electrical quantities. The microphone converts the sound pressure (Pa) to audio voltage (Volt). Noise detection using the sensor is an electrets condenser microphone with sensitivity of -56 dB relative to 1 V/ $\mu$ bar. The output from the sound sensor is then connected to Arduino Uno. The measurement results are displayed in seven segments.

In these papers they have not used online/offline smart technology, not using these parameters (crack detection, suspicious objects, noise detection). Hence, we are suggesting complete, simple, automatic, usable hardware cum software railway hazard detection system.

2.2 Design methodology:

2.2.1 **Hardware and Software:** We have used micro controller based hardware and MATLAB, python as a software for programming.

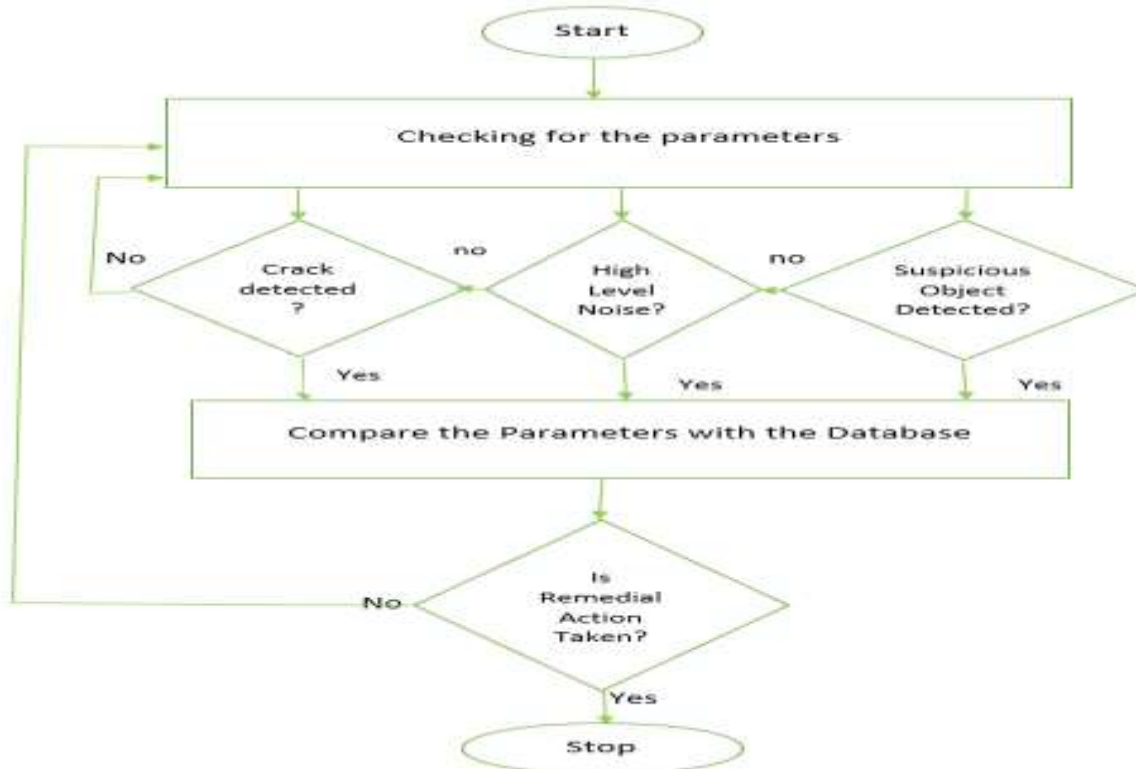
2.2.2 Sensing of parameters and processing: -



2.2.3 During Railway in running position if there is any crack on the track then that is detected by sensors (online and offline) in accidental conditions and related information is processed in the central controlling and processing system.

Central processing and controlling system is microcontroller based system wherein parameter (crack) sensor is compared with inbuilt database for normal track and related information is passed to the railway control room in response the railway control room will take necessary action to remove the crack on track. In the same order other parameters like suspicious object or noise in people's gathering will be detected by our decision system and processed by central controlling and processing system with remedial action taken by railway controlling authority.

The detail flow diagram for the working is as given below:-





### III. OUTPUTS AND RESULTS



As per figure no 1 it has been observed that when online camera detected the image of railway track there was no crack but in continuous successive scanning minor cracks has been detected and related feedback has been given to the central room.



In figure no.2 (a) there is normal object detection by online camera, hence no feedback or complaint or alert message has been transferred to railway control room but in figure no.2 (b) due to observation of unidentified suspicious object the alert is generated and related information is given to the railway control room.



In the figure no. 3 many people are gathering on the railway platform and due to this the noise level crossed the limit and hence the system maintains proper level of noise.

Similarly, in figure no.4 noise level on all surroundings are maintained by the control room. Hence, system generated the related positive output.

#### IV. COMPARISON

In Response to following parameters, Our Designed system is better than other ones.

System	Crack	Suspicious Object	Noise level	Quality in %
Previous Railway Hazards (1947-1957)	Manually Done	Separate Detection System It is not inbuilt	No	50%
Railways Hazards Detection (1958-1987)	Manually Done	Separate Task Force	Manually measured	65%
Railway Hazards Detection (1988-1919)	Semi-Automate Computerized	Sensor Based Technology	Manually and Sensor Based	75%
Railway Hazards Detection (1920-future)	Automation Through Software	Inbuilt Automatic Parallel with <u>other</u> parameter detection	Inbuilt Automatic parallelly with <u>other</u> parameter Detection	100%

#### V. FUTURE SCOPE

- 1] It is flexible means other extra parameters like animal, people detection, accidental chancier. Can be implemented in the same design.
- 2] Hardware and software can be changed as per the advancement in technology.
- 3] It can be attached to other train such as toy train, metro train, electronic trains etc.

#### VI. CONCLUSION

From the comparative study from tables it has been concluded that the railway hazards system designed by us is unique, automatic, and smart over all the previous system designed. It is flexible means more parameter can be considered. It has fast momentarily instant response to the controlling authority hence 100 percent correct system must be adopted in all the part of railway in all worlds.

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