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# A Review Paper on "Automatic railway gate opening and unmanned level crossing"

Prajakta.M. Boin, Gayatri.T. Mete, Sushil.S.Vedpathak, Sukanya.P.Patil, Mrs. Varsha Kshirsagar

RMDSSOE (BE E&TC)
RMDSSOE (BE E&TC)
RMDSSOE (BE E&TC)
RMDSSOE (BE E&TC)
Asst.Prof RMDSSOE

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**ABSTRACT: -**
Railway crashes are a major issue in India, a sizable nation with the longest railway network in the world with approximately lakhs of kilometers. Numerous news items have been published, ranging from the numerous fatalities in Uttar Pradesh. Our remarkable technology might potentially save lives, and we also intend to identify the busiest railroad crossings and install an above camera there to watch the crossing as well as a sensor system to detect the presence of trains at specific points that we can choose. Once a train is found in the field using an object detection algorithm, a Raspberry Pi alert is sent to trigger the alert alarm, whose volume increases automatically. We also employ an automatic railway gate control system, which assists in automatically opening and closing gates in response to the arrival or departure of trains, in addition to the suggested system. In any circumstance, we can employ image processing as a substitute for these sensors if they are not functioning properly.

**Keyword:-** Raspberry pi, Object Detection, image processing, CCTV camera, Train Detection Subsystem (TDS) and Level Crossing Subsystem (LCS), inductive proximity sensors.

## I. INTRODUCTION

In India, the railway system is the most widely used form of transportation. It is also one of those transportation modes that encounters numerous difficulties as a result of human mistake, such as level cross accidents. Accidents occur when there is insufficient human coordination at a level cross, where a road meets a railway line. If this issue is not resolved quickly, it could result in a lot of derailments and a significant loss of life and property. In the conventional system, the gatekeeper is responsible for controlling level crossings. The gatekeeper receives instructions from the control room via telephone at the majority of the level crossings. However, because these level crossovers are dangerous to operate without proper knowledge of the procedures, the risk of manual error that could occur there is considerable.

Train schedule Accidents on the railroad could result from delayed gate opening and shutting. The suggested study offers the idea of a railway gate automation system that was updated by employing IR, Ultrasonic sensors technology to perform automatic gate operation in order to prevent human errors that may happen during the operation of gates. An innovative circuit known as the Automatic Railway Gate Control with Alerting System automates the operation of railway gates by monitoring the arrival and departure of trains at the gate. We can see the train's arrival and departure thanks to detectors on the railway track that are located far away. The Raspberry Pi is provided these detectors, and when it does, the motors that open and close the railway gate proportionately are activated. The raspberry pi automatically activates the alarm installed at the gate if the speed is discovered to be greater than the expected speed. This informs the commuters of this near the road's railway crossing [2]. The absence of infrastructure to stop people and animals from wandering across the tracks is another significant problem in India. These have harmed the train engines and resulted in fatalities. Object detection is an area that is increasingly being recognized for its potential to increase public safety. It operates under the fundamental tenet that everything possesses distinctive key characteristics that may be recognized and used to categories the object. This

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can be done in a variety of ways, including through picture processing. CCTV cameras collect image data. The camera records photographs of the railroad crossing continuously, and the images are sent to the Raspberry Pi. Due to its popularity as India's primary means of transportation, we largely focused on the Indian railway system. The majority of people use trains for transportation on a daily basis. Because they lack direct access to the trains when it comes to tracking, people are still dissatisfied with the train system. The level crossing system irritates users of the road transportation system since it takes a lot of time and causes traffic. In the event of an emergency, there is no path for the ambulance to take.

## II. LITERATURE

S. Mercy Infant Joice, R. Shankar he entitled" Railway crossing automatic on using infrared sensor" This paper contains the standard evaluation of safety effectiveness. Accidents are prevented, everyone is safe, and a higher standard is provided. We were forced to create new traffic and railroad regulations. The railway department can use this equipment of process model to stop 75% of accidents. There isn't much to pay. This technique produces equipment that aids in the growth of Indian railways.

G. Hemanth Kumar, the research paper is about" Intelligent gateway for real time train tracking and railway crossing including emergency path using d2d communication" He offers several suggestions for locating the train. The arrangement created for the user and the train to receive accurate information. The user's precise location tracking of the train to ensure correct timekeeping. We have the authority to take severe action against anyone who violate traffic laws.

M.I.M. Amjath, T. Karth Eswaran, he discussed about "An Automat ed Railway Level crossing system" At the study, cameras with machine learning algorithms were used to detect the barrier caught in the level crossing as the train was approaching using inductive sensors to detect the train. Two subsystems, the Train Detection Subsystem (TDS) and the Level Crossing Subsystem, are proposed for a full embedded system (LCS). The TDS is carried out with the aid of a vibration sensor and inductive proximity sensors, and a camera module completed the vehicle detection process of the LCS with image processing and a machine learning algorithm for manned crossing, which could lessen the number of accidents that occur close to the crossings.

Bharti S. Dhande, Utkarsha S. Pacharaney they studied on" Unmanned Level Crossing Controller and Rail Track Broken Detection System Using IR Sensors and Internet of Things Technology" This suggested system has shown to be quite trustworthy. Using internet of things technology and an IR sensor- based system, we can stop severe loss of life. The proposed unmanned railway gate crossing system operates automatically to open and close gates without assistance from humans. It also has a technology that automatically detects defective railroad tracks without human involvement. When compared to the conventional approach, the proposed system has a lot of advantages. The benefits in crack detection include lower costs, lower power requirements, higher accuracy, reduced power consumption, and shorter analysis times. However, the biggest benefits are the ability to centrally manage this system using internet of things technology and the ability to pinpoint the precise location of the faulty track using hosted websites (IOT). This allows for the potential saving of numerous lives.

Athira S P G Scholar the research is about" Image Processing based Real Time Obstacle Detection and Alert System for Trains" This study examines the remarkable rise in rail accidents caused by obstructions in the tracks. Ongoing efforts are made to ensure train track safety and lower accidents. In terms of rail safety, accurately and quickly detecting obstacles becomes essential. The current Obstacle and Derailment Detector (ODD) only detects obstacles after they have been damaged. To detect obstacles from a distance and inform the TCMS system to stop the train, a camera-based technology is used. The system is integrated into the body of the car to provide real-time monitoring and obstacle recognition. To prevent accidents, the technology offers more precise and prompt obstacle detection.

Zdeněk Silar ( ) and Martin Dobrovolny he discussed about "Objects Detection and Tracking on the Level Crossing "In this article, a technique for item identification near a railroad crossing is described. The project SGS FEI 2014002, "The System for Image Analysis of Space Occupancy and Unknown Space Exploration," examined the methodologies that were given. 2015 saw the system's implementation of objects tracking for increased dependability (SGSFEI 2015002). In order to decrease accidents at level crossings, it is crucial to discover new solutions to the security issue. One such approach is the use of vision-based technology. The only technologies used for proposed occupancy status detection are image processing techniques. To achieve this, a new method for accurate

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background and object separation was created. This technique makes use of a modified Lucas-Kanade method-based optical flow estimation. The clustering algorithm handles velocity vectors that are produced by the optical flow estimation. The suggested approach for efficient clustering of the optical flow vectors using the K means method is described in the second section of the study. Finally, using appropriate input data, the tests conducted on actual traffic data are detailed.

## III. SYSTEM DESCRIPTION

**A. Ultrasonic sensor: -** The color or transparency of an object has no bearing on the ultrasonic sensor's reading because ultrasonic sensors reflect sound off of objects. Even while our sensors perform well in these settings, substantial accumulations of dirt or water—especially in harsh weather—can still cause them to generate false readings. Ultrasonic sensors work by using sound; since there is no air for the sound to pass through in a vacuum, they are utterly inoperable. Not intended for use underwater The usage of our sensors underwater will void our warranty because they have not been adequately tested in this setting. Having said that, we do offer documentation to clients who wish to continue testing our sensors under water. Despite the fact that this is true, we offer a range of temperature compensated sensors that, depending on the sensor type, calibrate either before each range reading or at sensor startup. The sensor will calibrate with any change in temperature or voltage during this period.


**B. Raspberry pi: -** The 26 GPIO Pins of the Raspberry Pi are incredibly helpful for embedded projects and connecting electronics. These pins are quite helpful for understanding component interaction. Due to the huge amount of GPIO pins provided, numerous digital sensors can be combined together. It works with practically all of the Arduino's available peripherals. It's one of the nicest features of this board because, as you may know, Arduino only supports C and C++. While acting as a single board computer, this board. You receive a Linux desktop environment where you can be programmed in practically any language, including C, C++, C#, Ruby, Java, and Python. The Raspberry Pi's best feature is this. Imagine adding a monitor to it, turning it into a portable computer. You can perform any work that a computer can. You can perform computational work, check websites, and connect to Wi-Fi. The Raspberry Pi's best feature is this. Imagine adding a monitor to it, turning it into a portable computer. You can perform any work that a computer can. You can perform computational work, check websites, and connect to Wi-Fi.


**C. DC Motors: -** DC motors come in a wide variety of shapes and sizes to fit a variety of requirements. Larger ones are used in the elevator, hoists, propulsion of electric vehicles, and industrial appliances while smaller ones are used in toys, tools, and home and office equipment. Although the simple generation and transmission with lower losses over long distances, the need for less maintenance, and the ability to operate in explosive environments made AC motors more popular, DC motors are still utilized in situations when ACs cannot meet the needs. The distinctive qualities and significance of DC motors in certain industries more than offset the many benefits AC motors have over them. Where strong starting torque is required and speed variation is possible, DC series motors are employed. Traction systems, cranes, air compressors, vacuum compressors, sewing machines, etc. all employ series motors.

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## IV. RESULT & DISCUSSION

We proposed a reliable System which can reduce the number of accidents occurring at railway level crossings and reduce the time which the vehicles have to wait at crossing stations. In our system we use 4 ultrasonic sensors and a pair of ultrasonic sensors are used to detect the train arrival in both the directions and the other pair of sensors are used to detect train departure in both the directions.

## V. CONCLUSION

This essay covers a regular evaluation of safety performance, helps everyone stay safe, and prevents accidents. By putting this concept into action in real time, we can manage the traffic problem at the railroad crossing. The management of the railroad and the users of the roads both gain greatly from this scheme. This technique substantially decreases the amount of time that vehicles must wait at railroad crossings while also reducing accidents that occur there. Since this technology doesn't require any human resources, it can be used in any rural or distant place without a railway gatekeeper. The servo motors, which are very dependable and exact and can elevate or lower the gate by the set angle rotation, are used in the suggested system to raise the gates. Finally, we will draw the conclusion that, in comparison to the already in use system, the suggested system will be highly reliable, highly performant, and inexpensive.

## REFERENCES

[1]. Kumar, G. H., & Ramesh, G. P. (2017). Intelligent gateway for real time train tracking and railway crossing including emergency path using D2D communication. 2017 International Conference on Information Communication and Embedded Systems (ICICES). doi:10.1109/icices.2017.8070779

[2]. S, A. (2019). Image Processing based Real Time Obstacle Detection and Alert System for Trains. 2019 3rd International Conference on Electronics, Communication and Aerospace Technology (ICECA). doi:10.1109/iceca.2019.8821816

[3]. Singh, G., Kumar, P., Mishra, R. K., Sharma, S., & Singh, K. (2020). Security System for Railway Crossings using Machine Learning. 2020 2nd International Conference on Advances in Computing, Communication Control and Networking (ICACCCN). doi:10.1109/icacccn51052.2020.936

[4]. G. H. Kumar and G. P. Ramesh, "Intelligent gateway for real time train tracking and railway crossing including emergency path using D2D communication," 2017 International Conference on Information Communication and Embedded Systems (ICICES), 2017, pp. 1-4, Doi: 10.1109/ICICES.2017.8070779.

[5]. Dhande, B. S., & Pacharaney, U. S. (2017). Unmanned level crossing controller and rail track broken detection system using IR sensors and Internet of Things technology. 2017 International Conference on Inventive Communication and Computational Technologies (ICICCT). doi:10.1109/icicct.2017.7975189

[6]. M. I. M. Amjath and T. Kartheeswaran, "An Automated Railway Level Crossing System," 2020

[7]. International Conference on Image Processing and Robotics (ICIP), 2020, pp. 1-7, Doi:10.1109/ICIP48927.2020.9367346

[8]. A. S., "Image Processing based Real Time Obstacle Detection and Alert System for Trains," 2019 3rd International conference on Electronics, Communication and Aerospace Technology (ICECA), 2019, pp. 740-745, Doi: 10.1109/ICECA.2019.8821816.