JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

ACCIDENT PREVENTION SYSTEM IN RAILWAYS

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ABSTRACT

Transport is a key necessity for specialization that allows the production and consumption of products to occur at different locations. Economic prosperity depends on efficient and sustainable transportation that also prioritizes safety and environmental impact. The accident prevention system designed by us is one of the sub-systems for the railway lines of India and is essential equipment to ensure the transportation safety of the high-speed railway. This paper proposes a framework structure and accident prevention methods, particularly against cracks, obstacles, and fire catching which cost them their life.

Keywords: Railway Accident, crack, obstacle, Fire, Arduino.

I. INTRODUCTION

Presently in the real world, commuters are using different transport facilities such as flights, trains, buses, cars, etc. But the majority of the public in our country prefers to travel by train. The reason may be the comforts available for long journeys and relatively lesser traveling charges. Though the railways have implemented many safety standards for safe journeys, still one can witness some rail accidents leading to the loss of many precious lives and loss of property. Due to its huge size, poor maintenance will create accidents in the rails. Many lives are affected due to the lack of carelessness. To avoid this, we introduced a system that can avoid many accidents on rails. Some of the major reasons for rail accidents are faults on the rail, Obstacles, and fire attacks. At present our railways are using manual methods of detection through human inspectors. To avoid this, we are

introducing a system that automatically detects if any crack is present in the track, and makes the system stop. If any obstacle appears it notifies the loco-pilot to take necessary action. The live camera module is used to monitor obstacles. Also if fire catches in any bogie, the sprinkler gets activated. Here for the notification purpose, we use the Zigbee module. To prevent accidents at the station, we are implementing a fence system to ensure the safety of passengers.

II. LITERATURE SURVEY

[1]. **Train Accident Prevention System** designed by Yash Verma, Vineet Kesharwani, Tushar Kesharwani, and Vaibhav Agrawal, The aim of this project is to detect obstacles on railway tracks (e.g., animals and boulders) using piezoelectric and PIR sensors with a microcontroller, and alert nearby stations and upcoming trains to take preventive measures. GPS is used to determine the location, and the system can differentiate between landslides and animals. The system is 95% accurate, and improvements can be made by covering PIR sensors and using multiple piezoelectric sensors. Successful implementation of this project can save thousands of animal lives and prevent train accidents cost-effectively every year.

[2]. **Prevention of wild-life collision in railway tracks using image processing** designed by Kalaivani A , Hemalatha J. Train accidents involving wildlife are common in India, and a proposed computer vision system using YOLO object detection has been introduced to detect wild animals near railway tracks. With an accuracy of 98.8%, the system is cost-effective and customizable to specific areas. Although mitigation methods to reduce WTCs include providing wildlife crossing structures, reducing vegetation along the tracks, and using acoustic warning systems, more research and mitigation efforts are required given the growth of rail networks. Early detection and monitoring of animals can help reduce WTCs and their impact on wildlife and humans. Additional mitigation methods may still be necessary for optimal results.

[3]. **Railway track tracer system for creature detection using image processing** designed by M Deepa, C G Raji, VA Ajina, Ashla, Afsal Azra, and George Susanna. A Railway Track Tracer System is proposed to detect creatures on railway tracks and avoid accidents. Cameras are placed along tracks to monitor objects. Convolutional neural networks detect objects and alert the nearby control room and loco-pilot to stop train. The system includes two capturing processes and real-time monitoring of the train status. The system aims to reduce accidents caused by animals and vehicles crossing railway tracks and can be a crucial part of an intelligent monitoring system for Indian Railways.

[4]. **Railway Track Crack and Break Detection System using Arduino** designed by Chethan s, sebin Mathew, Vivek Purushotham, Raghu j. This paper proposes a system that uses sensors to detect cracks in railway tracks. The system is composed of an Arduino Uno microcontroller, IR sensor, ultrasonic sensor, GPS module, GSM module, and signaling system using LEDs. The system detects cracks using an IR sensor and stops the vehicle immediately while sending a text message to the maintenance department with the GPS location. The system is inexpensive, has low power consumption, and reduces analysis time

compared to manual inspection. By detecting cracks automatically, railway tracks can be repaired quickly, improving safety and saving lives.

[5]. **Automation of animal, fault detection in railway track using PLC** designed by M.Balamurugan, T. Prathinban, V. Kilivalavan, S. Manoj Kumar. This paper proposes an automated fault detection system for railway tracks, using PLCs, vibration and ultrasonic sensors. The system detects cracks and breakages, triggers an IR camera, and sends information via GSM to warn nearby trains and railway stations. The system aims to reduce accidents and loss of lives by providing a reliable and user-friendly automated fault detection system with minimal human intervention.

III. METHODOLOGY

Crack detection: The proposed model works on a simple principle i.e. IR sensor is connected to the bot which is fixed at the front end of the train in such a way that the transmitter of the IR sensor points to the train track. The length of the bot is about 30cm length from the train. When the train is in motion, the IR sensor continuously transmits the IR rays on track, and reflected rays are received by the receiver. Infrared (IR) sensors for crack detection typically work by emitting infrared light and analyzing the reflected signal. When the emitted IR light encounters a crack or discontinuity, it reflects differently, allowing the sensor to detect these variations. The change in reflected IR light helps identify cracks or irregularities in surfaces, enabling their detection. Whenever the IR sensor detects the crack on the track it intimates the Arduino and the emergency breaks are put in automatically and the train stops.

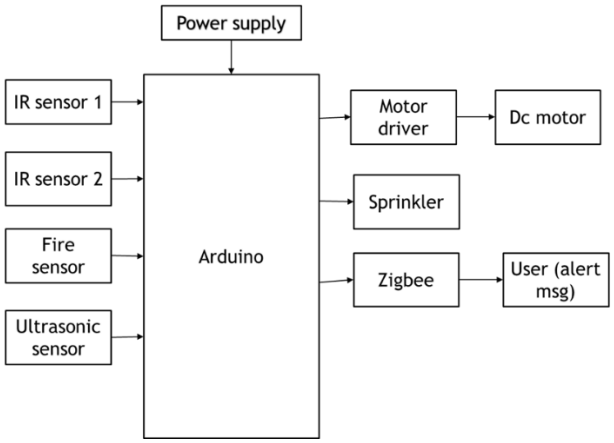
Obstacle detection: The train uses an ultrasonic sensor to detect obstacles. The sensor sends out sound waves, and when an obstacle is present, it reflects the waves. By measuring the time it takes for the waves to return, the sensor can determine the distance of the obstacle. If an obstacle is detected, the user is notified and the train's speed is automatically reduced. Additionally, the train has a camera module installed on the front to monitor obstacles and determine if they are movable or immovable. This information is used by the loco pilot to decide whether to stop or continue the train.

Fire detection: For the fire detection we use a fire sensor. Whenever the fire sensor detects a fire, the sprinkler is activated to stop the fire.

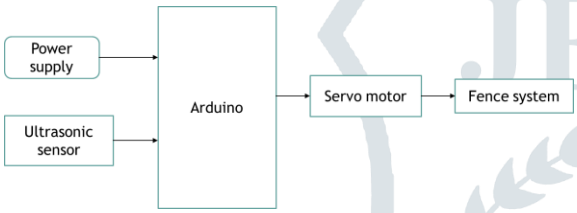
Automatic fencing system: At the station module we have attached an automatic fence between the platform and the train. The fence in default is always in the upright position to prevent passengers from getting into the tracks in the station. Whenever the IR sensors in the station detect the arrival of the train the fence automatically goes to a horizontal position allowing the passengers to get into the train. And when the train leaves the station again the fence goes back to an upright position. Here we use a servo motor for the movement of the fence.

Zigbee communication: It is a wireless communication technology that has a range of about 100m works in 2.4GHz frequency and consists of a transmitter and receiver via which message can be sent and received. In our project, we use this technology for sending alert messages that consist of the distance of the obstacle from the train and the GPS location of the obstacle. And we also use it for sending alert messages during crack detection and fire detection.

IV. BLOCK DIAGRAM



Block diagram for accident prevention system



Block diagram for fence system at station

V. APPLICATION

- This can be implemented not only in trains but in other vehicles also to reduce accidents.
- It can also be used commercially in amusement parks to check the tracks for a few rides.
- In the long run, safety standards will be improved.

VI. CONCLUSION

The paper proposes an accident prevention system for railways to detect cracks in railway tracks, obstacles on tracks, and fires in train bogies. In conclusion, the proposed accident prevention system has the potential to improve railway safety by automatically detecting issues and notifying authorities to take timely action. It can also be implemented for other vehicles to reduce accidents.

VII. REFERENCE

[1]. "Railway Track Crack and Break Detection System with Onboard Signalling "Chethan S, Vivek Purushotham, Raghu J, and Vineeth, 2019 JETIR May 2019, Volume 6, Issue 5

[2]. Prevention of wild-life collision in railway tracks, Kalaivani A, Hemalatha J, Sathyabama Institute of Science and Technology

[3]. Railway track tracer system for creature detection, Chunyan Rong, Jiahui Zhu, Fabio Giardina et al. To cite this article: M Deepa et al 2021 IOP Conf. Ser.: Mater. Sci. ETrain

[4]. Accident Prevention System (T.A.P.S), Yash Verma, Vineet Kesharwani, Tushar Kesharwani, Vaibhav Agrawal, JETIR, May 2022, Volume 9, Issue 5.

[5]. Automation of animal, fault detection in railway tracks using plc. M. Balamurugan, T. Parthinban, & S. Manoj Kumar International Journal of Current Research and Modern Education (IJCRME*)* 2455 – 5428

[6]. M.D. Anil, Sangeetha.S, Divya.B, Niranjana.B and Shruthi.K.S,," Advanced Railway Accident Prevention System Using Sensor Networks", International Journal of Advanced Research in Computer and Communication Engineering Vol. 3, Issue 5, May 2014

[7]. Hongyu Zhang, zhiming Liu, Chunxiao Fan, "Monitoring System for Disaster and Accident Prevention in Railway Passenger-Dedicated Lines" IEEE Industrial

Electronics Society (IECON), Nov. 5-8, 2007, Taipei, Taiwan.

[8]. C. W. Li, C. C. Chu, W. L. Fong, and H. C. Wang, "Intelligent level crossing safety control system," Proc. - 2014 10th Int. Conf. Intell. Inf. Hiding Multimed. IIH-MSP 2014, pp. 799–802, 2014.
.

[9]. R. Iqbal and D. Saeed, "Safe railway crossing system based on Zigbee communication," Proc. Comput. Conf. 2017, vol. 2018January, no. July, pp. 1243–1246, 2018.